



2024 Joint Meeting of the Association of Field Ornithologists,
Society of Canadian Ornithologists and Wilson Ornithological
Society

July 29 - August 2, 2024

Peoria, Illinois

Meeting Code of Conduct

This Code of Conduct is intended to set clear expectations of behavior at the AFO/SCO-SOC/WOS 2024 Joint Meeting to ensure that all participants feel safe and welcome and that AFO/SCO-SOC/WOS 2024 is a positive experience for all.

The partner societies welcome everyone to AFO/SCO-SOC/WOS 2024 and celebrate diversity in all its forms. The AFO, WOS, and SCO-SOC are dedicated to providing an inclusive environment that is collaborative, supportive, and engaging for everyone involved and that is free of discrimination, harassment, and retaliation. We expect all participants to help in this mission by being respectful and considerate of each other, providing supportive critique, and embracing the multitude of opinions that are on offer.

Meeting Scope

AFO/SCO-SOC/WOS 2024 is intended to foster the open and honest communication of ornithological science and to promote equality of opportunity and treatment for all participants. Effective communication requires courteous interactions and respect for the intellectual property of our colleagues. We represent the field of ornithology, and it is imperative that we behave as professionals toward all conference participants, including, but not limited to, conference delegates, society employees, conference volunteers, sponsors, and exhibitors.

All forms of communication among AFO/SCO-SOC/WOS 2024 participants during the meeting are considered within the scope of the AFO/SCO-SOC/WOS 2024 meeting and thus fall under the jurisdiction of the Code of Conduct. These include public and private communications, social media posts and direct messages, phone calls, and other forms of written, verbal, and non-verbal (including visual) communication. Additionally, communication as described above that occurs before or after the AFO/SCO-SOC/WOS 2024 meeting but that pertains to content associated with the meeting and/or relies on contact information of a meeting participant was procured before or during the meeting may also fall under the purview of this Code of Conduct.

Expectations of Participants

Harassment between participants of AFO/SCO-SOC/WOS 2024 will not be tolerated in any form. Harassment includes any communication with or behavior towards another participant that involves offensive gestures, verbal and written comments, posts on the internet and social media, deliberate intimidation, stalking, harassing photography or recording, sustained disruption of talks or other events, inappropriate physical or electronic contact, microaggressions, and unwelcome attention. It is possible to engage in harassment without the intention of doing so. Participants asked to stop any

harassing behavior by anyone are expected to comply immediately, regardless of their intent.

Use of Media Associated With the Meeting

By registering for and attending this Meeting, Participants agree to allow AFO/SCO-SOC/WOS 2024 to use photos, videos, or audio recordings taken of them during the Meeting in publications, promotions, and on the websites and social media pages of the participating societies. Only participating Societies may (a) take/make or distribute audio or video recordings of the Meeting or Participants or (b) distribute them (via social media or other means).

Participants wishing to share information from the Event and/or post photos via social media, whether of their own material or that of others, must adhere to individual social media platforms' stated rules and policies. We ask that presenters and hosts of Events that **do not** want content or information shared via social media clearly communicate this to members of the audience and that members of the audience adhere to such requests.

Reporting an Incident

Any individual covered by the Code of Conduct who believes that they have been subjected to harassment, notices that someone else is being harassed, or has any other concerns about an individual's behavior should report the incident immediately. Similarly, any breaches of the Code associated with media use should be reported immediately. Potential violations of the Meeting Code of Conduct should be reported promptly to the AFO/SCO-SOC/WOS 2024 Safe Meeting Committee via **SAFE_AFOSCOWOS24@googlegroups.com** for review. All complaints will be treated seriously and reviewed promptly, and may be investigated. To contact the Safe Meeting Committee, please use the group email, which will go to the entire committee.

Bad faith reporting under the Code of Conduct will be considered a violation of the Code of Conduct, where bad faith reporting is defined as intentionally false and/or malicious reporting of code of conduct violations against another attendee.

Disciplinary Action

Individuals found to have engaged in behavior prohibited by this policy, as well as those making allegations of a breach of the Code in bad faith, will be subject to disciplinary action. The AFO/SCO-SOC/WOS 2024 Safe Meeting Committee may take any action they deem appropriate, ranging from a verbal warning or ejection/prohibition from the specific activity in question (e.g., workshop, symposium, or even the entire conference),

banning them from future conferences run or jointly run[by the partner societies, revoking membership in one or more of the partner societies, and/or the reporting of their behavior to their employer and research funders.

Retaliation Is Prohibited

AFO/SCO-SOC/WOS 2024 will not tolerate any form of retaliation—including seeking to violate the confidentiality of a reporting individual—against individuals who file a complaint or assist in an investigation or against any individuals suspected of doing so. Retaliation is a serious violation of this policy and, like any breach of the Code itself, will be subject to disciplinary action.

Questions & Appeal

Any questions regarding this policy should be directed to the AFO/SCO-SOC/WOS 2024 Safe Meeting Committee. In the event that an individual involved in any reported incident is dissatisfied with the disciplinary action, they may appeal to a committee made of the collective members of the executive committees from partnering societies.

Social Media Policy

The 2024 joint meeting of the AFO, SCO-SOC, and WOS is a pro-social media event; we actively encourage the sharing of conference content. Sharing ornithological science with the public via social media is one way to educate the public, which can only help the support of the science and its application.

Presenters are encouraged to include personal and/or project social media handles and project hashtags on slides (at least the opening/title slide, but recommended to use on all slides) and posters. For those without personal/project handles or hashtags, consider including the conference hashtag (#AFOSCOWOS24) or a social media icon on slides to let people know you are supportive of them posting about your work on social media.

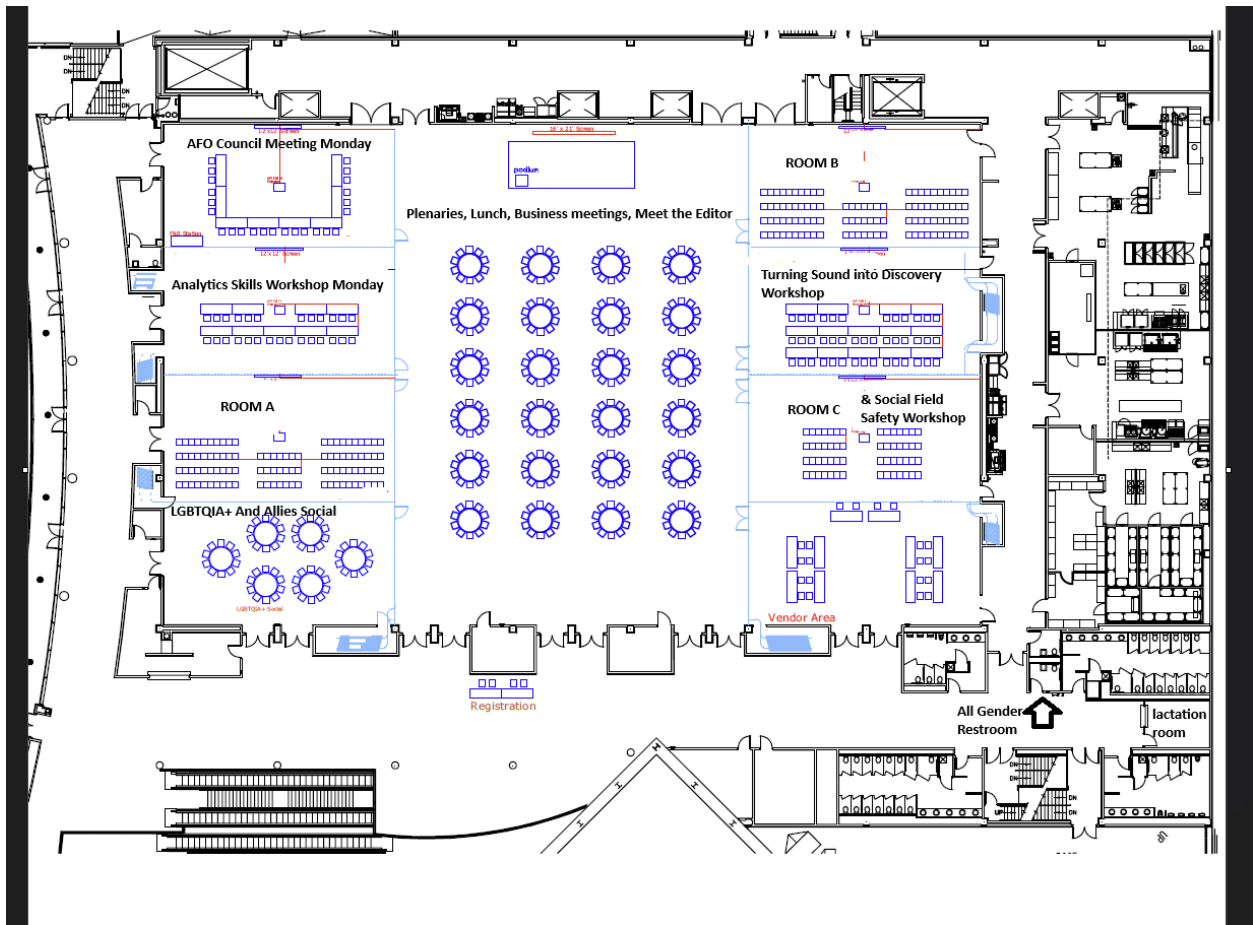
Presenters must opt out if they do not want their presentation or research to be featured in social media posts: this is best achieved by placing a “no social media” symbol on slides or materials. If presenters do not opt out in this manner, conference organizers and/or attendees can share published research presented at the conference without consent.

Anyone may participate in conversations on the host societies’ respective social media channels, but:

- Please give credit to presenters/researchers whose presentation and/or research are featured in your post.
- Host societies have the right to delete posts or comments containing spam, irrelevant remarks, or items that do not align with their mission/integrity.
- Personal attacks, promotion of violence or illegal activities, offensive material, or profanity will be deleted.
- Host societies reserve the right to ban users who violate this policy.
- Conference attendees are expected to abide by the meeting code of conduct (*note: will be posted soon*), and all those engaging on social media are asked to maintain respect, courtesy, inclusivity, and support in their conduct to ensure a safe, hospitable, and productive environment for all. Discrimination, harassment, and/or retaliation will not be tolerated.

Additionally, it is recommended that presenters and those sharing on social media be mindful of how photos of birds (and other animals), especially birds in the hand, may appear to the public: Are safe and taxonomically appropriate grips being used? Does the bird appear in any way to be stressed, disheveled, or in an unnatural position? Is it a “trophy shot” (prolonging handling time), or was it taken during banding and provides educational material such as molt? For further suggestions on sharing photos of birds in the hand, see the guidelines written by the North American Banding Council at <http://www.nabanding.net/photographic-guidelines/>.

Peoria Civic Center Map



Wifi at Peoria Civic Center

Network: AFOSCOSOCWOS2024

Password: Ornithology2024

Monday July 29th

All events at Peoria Civic Center (PCC) unless otherwise specified

11	Registration Opens - Peoria Civic Center			
12				
1	Association of Field Ornithologists Council Meeting - Peoria Civic Center			
2				
3				
4		Turning Sound Into Discovery - Peoria Civic Center	Social Field Safety - Peoria Civic Center	Analytical skills: Journey into the tidyverse - Peoria Civic Center
5				
6				
7	Welcome Reception (7-9) - Peoria Civic Center			

Our Monday night social will have light hors d'oeuvres and beverages will be available for purchase.

Tuesday July 30

All events at Peoria Civic Center (PCC) unless otherwise specified

9	AFO Plenary: Dr Jen Owen "Migratory birds and global health: Facing risks, posing risks, and offering solutions" - Peoria Civic Center					
1030	BREAK					
	Peoria Civic Center Room A		Peoria Civic Center Room B		Peoria Civic Center Room C	
11	Wendy Dorman	Extralimitals as Scouts at the Leading Edge	Rachel Budge	Do Rocket Launches Influence the Nesting Success of Western Snowy Plovers and California Least Terns?	Sara Moore	Impacts of Urbanization on Nestling Growth and Begging Behavior
1120	Madison Sutton	Avian annual survival rates heavily influenced by climate cycles on a continental scale	Elexis Anderson	Comparing Reconstructed, Natural, and Alternatively Used Wetlands Within The Red River Basin Using An Avian IBI	Mark Vrtiska	Wetland use and movements of post-breeding trumpeter swans in the Nebraska Sandhills
1140	Alysha Riquier	The role of environmentally-induced synchronization between arthropod prey and breeding phenology on success in the Snow Bunting	Kayleigh Kueffner	Using passive acoustic monitoring to investigate occupancy patterns of Timaliidae and Pellorneidae Babblers in Sarawak, Malaysia	Emily Charlotte MacDonald	Sitting Ducks: Physiological and behavioural responses of incubating common eiders facing thermal stress in the Canadian Arctic.
12	Lunch (Provided 12-130) & AFO Business Meeting (1230-130)					

Lunch will be provided for all attendees. During lunch will be the Association of Field Ornithologists business meeting, which all AFO members, and those interested in learning more about AFO are invited to attend.

	Peoria Civic Center Room A		Peoria Civic Center Room B		Peoria Civic Center Room C	
130	Samuelle Simard-Provencal	Using radio tracking technology to examine environmental influences on movement decisions in Snow Buntings	Jessica Schmit	Migration and Breeding Ecology of King Rails in Arkansas	Rebecca Jardine	Examining the relationship between environmental temperatures, body temperature and behaviour in breeding Snow Buntings
150	Rebecca Ralston	Range-wide evidence of carry-over effects of nonbreeding habitat in the Prothonotary Warbler	Jordan Winter	Variation in Brown Creeper, <i>Certhia americana</i> , song at the individual, population, and subspecies level	Elsa Forsberg	Nest survival of interior least terns and piping plovers at off-river sites and sandbars in the lower Platte River system, Nebraska
210	Moshood Kolapo Ayinde	Assessing Migratory Influence: West Nile Virus Dynamics in American Robins of West-Central Illinois	Lauren Monopoli	Fire Effects on Breeding Marsh Bird Success with Implications for Eastern Black Rail	Avery Dart	Effects of extra-pair paternity on provisioning effort in male house wrens
230	Dylan Titmuss	Implications of natal philopatry for Great Black-backed Gull breeding success	Hunter Mentges	Egg Morphometrics and Egg Hatchability in Box-Nesting Wood Ducks	Joseph Niederhauer	Effects of anthropogenic and natural noise on songbird vocalizations in North-Central West Virginia
250	Cara Herrington	Turkey Vulture Movements on Vancouver Island: Home Range, Activity Patterns, and Habitat Use	Samuel Bressler	Phenotypic plasticity in the anthropause: does reduced human activity impact novel nesting behavior in an urban bird?	Jennifer Foote	Variable response of territorial Ovenbirds to simulated intrusions that sound similar to or different from a neighbor
310-350	BREAK					

	Peoria Civic Center Room A		Peoria Civic Center Room B		Peoria Civic Center Room C	
350	Trevor MacLaurin	Impacts of vegetation and elevation on nest-site selection and reproductive success in American Oystercatchers	Emily Miller	Advances in Weather-Related Indices of Waterfowl Abundance in the Central Flyway during Autumn-Winter	Mac Chamberlain	Fledgling Familiarity: Investigating the relatedness of juvenile Brown-headed cowbirds and the adults that they're caught with
410	Haley Haradon	Deciphering survival and habitat use during the breeding and post-breeding periods for Kirtland's Warblers	Andrea Parisi	Insights into corncrake movements in a fragmented agricultural landscape using bioacoustics with implication for nature conservation strategies	Lyn Brown	Diet specialization in American Oystercatchers breeding in Virginia
430	Paul Preston	Relationships between city characteristics and avian diversity and occurrence in Ontario's cities	Mary Benjamin	Increasing Detectability of Secretive Marsh Birds Using Autonomous Recording Units	Hayley Spina	Multigenerational fitness outcomes of double-brooding in Savannah sparrows
450	Nicholas Russo	Three-dimensional vegetation structure drives patterns of seed dispersal by African hornbills	Tharindu Kalukapuge	Response of boreal songbird communities to energy sector linear features in Alberta, Canada	Connor Johnson	Discovery and Documentation of Breeding Presence and Preferences of the Boreal Owl in Utah
530	Remembering Reed (530-7) - Special Event Honoring Reed Bowman at Obed & Isaac's Microbrewery and Eatery. Join us for a toast and to share memories of Reed with friends and colleagues. (21 NE Madison Ave, Peoria, IL 61603)					
7	Poster Session - Peoria Civic Center					

Our Tuesday night poster session will be from 7-9pm, and will include light hors d'oeuvres and non-alcoholic drinks.

Poster ID	Title	Authors
Poster 1	All your eggs in one basket - the Bird Eggs of Canada website	Ryan J Fisher
Poster 2	Postbreeding Ecology of Wood Ducks in the Illinois River Valley	Andrew D Gilbert; Auriel MV Fournier; Aaron P Yetter; Christopher S Hine; Joshua M Osborn; Chelsea S Kross; Joseph D Lancaster
Poster 3	Influence of hunting pressure on dabbling duck behavior and departure from an autumn stopover	Abigail G Blake-Bradshaw; Therin M Bradshaw; Andrew D Gilbert; Joshua M Osborn; Elizabeth A Beilke; Chelsea S Kross; Auriel MV Fournier
Poster 4	Testing the limits of Autonomous Recording Units (ARUs): A case study detecting waterfowl hunter shotgun shots in the Illinois River Valley	Therin M Bradshaw; Abigail G Blake-Bradshaw; Elizabeth A Beilke; Andrew D Gilbert; Chelsea S Kross; Joshua M Osborn; Auriel MV Fournier
Poster 5	Are predator proof nest boxes really predator proof?	Julie Jedlicka; Teri Larison; Stacy Barnes; Dakota Ballard; Jacobo Barriga; Marissa Gruetze; Jessica Poush; Alyka Zahnd
Poster 6	Effects of climate on plumage coloration within and across species of Toxostoma Thrashers	Joel Ralston; Charlotte Probst; Satin Garman; Campbell Washer; Ian Bentley
Poster 7	The impacts of differential migration on energetic condition in parulid warblers during spring migration	Madison O Sutton; Michelle L Gianvecchio; Mark E Deutschlander
Poster 8	Breeding Site Fidelity of Trumpeter Swans in the Nebraska Sandhills	Mark P Vrtiska; Anna Crist; Dessalegn Ejigu; Larkin A Powell
Poster 9	Habitat Associations and Responses to Prescribed Fire of Wintering Henslow's Sparrows in south Arkansas	Kevin J Krajcir; Ben E Benton; William C Holimon
Poster 10	The Relationship Between Temperature, Rainfall, and Tree Swallow Fledging Times	Caleb Gruber; David Aborn

Poster 11	Characteristics of irruption in three montane passerine species	Sydney Sjoblom; John Cavitt
Poster 12	Nest Site Selection in Eastern Wild Turkeys: Do Hens Prospect Prior to Egg-Laying?	Gracie Moreno; Luke Garver; Jeff Hoover
Poster 13	Is Timing Everything? Examining the importance of the timing of parasitism to cowbird chick success	Julia Boldrick; Wendy Schelsky; Mark E Hauber; Jeffrey Hoover
Poster 14	Estimating apparent adult survivorship to understand population dynamics of long-distance migratory birds: A frontier in the forest canopy	Carl Engstrom; Stephen Matthews; Christopher M Tonra; Amanda D Rodewald; Felicity L Newell
Poster 15	Impacts of oil and gas activities on annual occupancy rate and breeding success of Mississippi Kite in Western Oklahoma	Atabo O Lucky; Timothy O'Connell; Fidel Atuo
Poster 16	Vocal amplitude of songbirds: Amplifying our understanding of an overlooked trait	Connor S Acorn; Jennifer R Foote; Daniel J Mennill
Poster 17	Band recovery data illustrate spatial and taxonomic patterns of seabird collisions with buildings and other structures	Riley R Lawson; Holly M Todaro; Lucas R Bobay; Matthew S Broadway; Dylan A Cooper; Madeline M Eori; Alexander J Harman; Landon K Neumann; Scott R Loss; Timothy J O'Connell
Poster 18	Survival of adult and hatch-year piping plovers at off-river sites in the lower Platte River system, Nebraska	Elsa M Forsberg, Rose J Swift, Joel G Jorgensen, Mark P Vrtiska, Larkin A Powell
Poster 19	House Sparrows' Global Conquest: Unpacking the Enemy Release Hypothesis and Immune Dynamics	Indira Goldman; Diego Santiago-Alarcon; Lynn B Martin

Poster 20	Evaluation of eBird data validity using wetland point-counts in the Red River Basin	Zoe Williams; Jessica L Coleman; Matthew J Greenwold
Poster 21	Investigating Spring Migration Timing and Stopover Duration of Sora and Virginia Rail in Central Illinois using the Motus Tracking Network	Chad A Cremer; Auriel MV Fournier; Michael Ward; Michael Avara
Poster 22	Investigating the Role of Drought and Air Pollution on Oxidative Stress in Different Diet Guilds of Migratory Birds in Southern Colorado	Megan Miller; Claire Varian-Ramos
Poster 23	Why are eastern whip-poor-wills disappearing across the Midwest?	Dave Edlund; Michael Ward; TJ Benson; Chris Tonra; Steve Matthews; Michael Avara; Holly Coates; Ian Souza-Cole; Grant Witynski
Poster 24	Nesting Success of Grenadas Native Landbirds: Examining Depredation Rates of Invasive vs. Native Predators.	Zahra Nanji
Poster 25	Activity patterns of Eastern Whip-poor-wills across different Midwestern forest management regimes	Holly Coates; Michael Ward; Thomas J Benson
Poster 26	What Birds Tell Us: Monitoring Birds in Cacao Agroforests of Western Ecuador Using Bioacoustics	Rebecca Davis; Shawn McCracken
Poster 27	Urban Seasonal Waterlogged Areas As An Alternative Habitat for Wide-Array of Avian Species in Hyderabad Sindh	Anees Ur Rahman; Arshad Ali; Jawad Danish

Poster 28	Wide open spaces?: Habitat preferences of grassland birds in areas of varying amounts of woody encroachment	Cody McGregor; Jacob Cooper; Letitia Reichart
Poster 29	Characterization of song repertoire variation in the Vervain Hummingbird	Katja H Kochvar; Joshua B LaPergola
Poster 30	Nest tree selection, nesting material, and phenology of Hooded Oriole at two natural areas in southeastern Arizona	Dylan A Cooper
Poster 31	Nest defenses increase five times the reproductive output of Pampas Meadowlark	Candelaria Neyra; Pablo Grilli; Igor Berkunsky.
Poster 32	The Influence of Climate Change on the Reproductive Success of Tree Swallows	Margaret C Friedman; Todd J Underwood
Poster 33	Factors affecting detectability of RFID feeder systems	Sagan Smith; Daizaburo Shizuka;; Faiza Hafeez
Poster 34	Analysis of foraging strategies in winter resident birds	Aidan Hand; Daizaburo Shizuka
Poster 35	Nest dwelling ants and their relationship with house wrens breeding in Northern Missouri	Trace Ackley; Kylie Helmig; Joanna K Hubbard
Poster 36	The Effects of Tree Density in Relation to Building Fronts and Foraging Strategies on Window Collision Probability	Holly E Erickson; Emma R Robinson; Matthew B Shumar
Poster 37	Characterizing Window Strikes at Truman State University to Inform Conservation Efforts	Matthew Gilley; Colin Barry; Vayujeet Gokhale; Joanna K Hubbard

Poster 38	The Effects of Age and Habitat Quality on Fall Migration Decisions in Lazuli Buntings	Kenton James Bustin; John F Cavitt
Poster 39	Variation of flight muscle mass in a breeding population of Lazuli Buntings	Kate Thompson; Julie Draper; Niku Mojabi; John F Cavitt
Poster 40	Weight deposition of passerines during migration in the Wasatch Front	Parker Zabriskie; Connor Johnson; Sydney Sjoblom
Poster 41	Comparison of vegetation and water-holding capacity of a waterfowl production area, pre- and post-sediment removal, in south-central Nebraska	Hailey Fuqua; Letitia Reichart; Jeffrey Drahota
Poster 42	Eastern Screech-Owls in Kearney, NE: Descriptions of an Urban and Semi-Urban Population in the Great Plains	Ran Hirosawa; Jacob Cooper; Letitia Reichart
Poster 43	Tail plumage signaling in Grey Fantails: Exploring age and sex-based variation	Lorena Munoz; Matthew Reudink; Peter A Biro; Christa Beckmann
Poster 44	Birds and Window Collisions	Annie Beckstrand
Poster 45	Hummingbird Migration: Are Ruby-Throated Hummingbirds better prepared for their fall migration in years with a wetter or drier summer?	Coralie Rossbach

Wednesday July 31

All events at Peoria Civic Center (PCC) unless otherwise specified

7	LGBTQIA+ and allies social (pre-registration required) 7-830					
9	SCO-SOC Plenary: Dr Matthew Furist "Dispersal and lifetime fitness in a food-caching resident of the boreal forest"					
1030	BREAK					
	Peoria Civic Center Room A		Peoria Civic Center Room B		Peoria Civic Center Room C	
11	Leah Crenshaw	The impact of landscape characteristics on Western Meadowlark song and body condition	Daniel Redwine	Agonistic behavior of wintering White-throated Sparrows	Evan Jackson	A collaborative effort to understand golden eagle presence, distribution, and movement in Maine, USA
1120	Heather Brooks	Single species and multi-species playbacks elicit asymmetrical responses within mixed-species chickadee, titmouse, and nuthatch flocks	Baily Crable	Do morph, sex, and age influence interspecific agonistic behaviors of White-throated Sparrows?	Kristen Covino	Object recognition in Herring Gulls
1140	Avery Marsh	Does LeConte's Sparrow song type use vary with time of day?	Neha Mariya Shafi Ibrahim	Detection and Projection of Environmental Impacts on Different Bird Species at Scale	Selina Alcantar	Summit metabolism in Carolina Wrens on the northern edge of their range
12	Lunch (12-130) & SCO-SOC Business Meeting (1230-130)					

Lunch will be provided for all attendees. During lunch will be the Society of Canadian Ornithologists business meeting, which all SCO-SOCmembers, and those interested in learning more about SCO-SOC are invited to attend.

	Peoria Civic Center Room A	Peoria Civic Center Room B		Peoria Civic Center Room C	
130	<p>Battling Burnout in Ornithology</p> <p>This workshop is an attempt at bringing together ornithologists to understand the triggers that lead to burnout and how to identify it in yourself and others. Allyson Jackson will lead and detail her research and personal experience with burnout. Workshop participants will get time to rate their burnout and share their experiences. As a group, we will also work on strategies to help combat burnout in ornithology. Interaction among participants is crucial because an important part of helping burnout is building a community.</p>	Shae Turner	The role of prealternate moult in carry-over effects for Nearctic-Neotropical migratory warblers	Diya Balagopal	Data Harvesting from Social Media for Real-Time Monitoring of Bird Collisions
150		Amy West	Body mass, colony size, and survival in Cliff Swallows	Sunny Tseng	Species-specific evaluation of BirdNET: varied performance on species and impact of confidence threshold setting
210		Kathleen Hunter	Landscape effects on Chimney Swift roost sizes		
230		Daniel Shustack	Using Motus to determine Dark-eyed Junco migration strategies		
250		Grant Witynski	Conservation implications of breeding Eastern Whip-poor-will prey preferences assessed via comparison of fecal DNA metabarcoding and UV light insect trap samples	Nate Willson	3D Analysis of Morphological Diversity in Hawaiian Hawks Across Time and Space, from Pleistocene to the Present
310	BREAK				

	Peoria Civic Center Room A		Peoria Civic Center Room B		Peoria Civic Center Room C	
350	Jacob Wyco	Quantifying Color Variation in Basic and Formative Plumage of White-throated Sparrows	Jacqueline Schoen	Short -Term Effects of the Site C Dam and Reservoir on Bank Swallow Riparia riparia Populations Along the Peace River	Skadi Kylander	Investigating arthropod community diversity using environmental DNA (eDNA) and a potential role of bryophytes in the nests of the Prothonotary Warbler
410	Eyitope Michael Abundi	Beyond Beauty: Investigating Carotenoids in Kingbird Feathers	Michael Ward	The ecology of Eastern Whip-poor-wills on their wintering grounds and why are they so difficult to locate on their Latin American wintering grounds.	Facundo Fernandez - Duque	The Role of Parental Phenotype on Nest Predation in a Facultatively Biparental Species
430	Ivy Ciaburri	Feather quality as an indicator of breeding to nonbreeding carry-over effects in the American Redstart	Zac Zetterberg	The Art of the Decoy	Nayeli Cruz	Long term changes in Clock allele lengths in Tree Swallows in response to climate change
450	Heather Kenny-Duddela	Female space use and plumage color are correlated with extra-pair mating in barn swallows	Kenn Kaufman	Wilson, Audubon, and the struggle to classify American warblers.		
				Kaufman Book Signing 5-530		
7	<p>Social at Peoria Riverfront Museum (222 SW Washington St, Peoria, IL 61602) - light hors d'oeuvres and beverages available via drink tickets. During the social the museum galleries will be open for folks to enjoy, including an exhibit of duck decoys and the SHARKS exhibit. The Dawn chorus: tales from the many voices of ornithology Event will be occurring during the social at the museum.</p>					

The museum is 2 blocks south of the Peoria Civic Center. If you need transportation to the museum from the civic center/back again, please sign up at the registration desk by the end of the afternoon break on the 31st.

Thursday August 1

All events at Peoria Civic Center (PCC) unless otherwise specified

8	Meet the Editors - Come meet the Editors of the Wilson Journal of Ornithology, Journal of Field Ornithology and Illinois Audubon magazine and learn more about how the publication process works! There will be lots of time for questions with editors.					
9	WOS Plenary: Dr Ron Mumme "A tale of the tail in Hooded Warblers: Foraging performance, uniparental desertion, and stabilizing selection"					
1030	BREAK					
	Peoria Civic Center Room A		Peoria Civic Center Room B		Peoria Civic Center Room C	
11	Lindsey Walters	Measuring Eastern Bluebird embryo heart rate in the field using a digital egg monitor: successes and challenges	Claire Varian Ramos	The changing climate may create more challenges for songbirds during migration.	T.J. Benson	Pesticide exposure and plant damage in natural areas in agricultural landscapes: implications for birds
1120	Benjamin Van Doren	Nighthawk: A new tool for acoustic monitoring of nocturnal bird migration in the Americas	Chris Hill	Movements dominate population dynamics in a nonmigratory population of Loggerhead Shrikes	Meg Hatch	Long-term change in climate and body size of songbird species captured during migration in northeastern Pennsylvania, USA.
1140	Dustin Brewer	Using Bayesian network analysis to identify habitat distribution for a secretive marsh bird of conservation concern	Terri Maness	Predictors of short- and long-term survival in a long-lived seabird	Matt Hayes	Relatedness among Sandhill Cranes in south-central Wisconsin
12	Lunch (12-130) & WOS Business Meeting (1230-130)					

Lunch will be provided for all attendees. During lunch will be the Wilson Ornithological Society business meeting, which all WOS members, and those interested in learning more about WOS are invited to attend.

	Peoria Civic Center Room A	Peoria Civic Center Room B			Peoria Civic Center Room C	
130	Illinois River Symposium	Auriel Fournier - "130 Years of Forbes Biological Station"	Joanna Hubbard	Does mercury exposure influence sexually selected plumage color variation in barn swallows?	V.Ravinder Reddy	Management of Depredatory Birds in Sorghum Crop at College Research Farm, Pjtsau, Hyderabad, Telangana, India
150		Randy Smith - "TNC's Illinois River Program and Emiquon Preserve Restoration"	Kim Abplanalp	Build an Island, Terns Will Come!	Jeffrey Hoover	Conservation partners defragment bottomland forests and increase songbird nesting success
210		Stephanie Bishir - "Wetlands in the Sand"	Dai Shizuka	Breeder-helper conflict along environmental gradients	Ann McKellar	Structured Decision Making to support recovery of one of the world's rarest birds
230		Jim Lamer - "Large river research and monitoring at the Illinois River Biological Station"	Brian Davis	Optimal Brood Sizes in Wood Ducks	Alicia Korpach	A no-win situation: Mismatch between whip-poor-will home ranges and harvest setbacks are bad for both the birds and the forestry industry
250		Joshua Osborn - "Trends in Waterfowl and Habitat Restoration in the Illinois River Valley"	Brian Davis	Wetland Bird Use and Management of Louisiana and Texas Gulf-Coast Ricelands.	Anant Deshwal	Effect of Urban characteristics and Land Use pattern on the Abundance of Declining Aerial Insectivore.
310		Doug McClain - "Restoration, Management, and Recreational Use of Illinois River Valley Wetlands Managed by the Illinois Department of Natural Resources"				

330							
BREAK							
	Peoria Civic Center Room A		Peoria Civic Center Room B				
400			Careers in Ornithology Workshop - Peoria Civic Center (4-6p)		Student Judges Meeting 310-430 Room C		
630							
7							
8							
Banquet & Award Ceremony (630-830) - Peoria Civic Center							

Everyone who is registered for the meeting is welcome to attend the banquet. The banquet will be a full dinner, and there will be a program during dinner where awards are presented. Alcohol will be available for purchase.

Places to Eat

Nightjar Artful Ales and Inspired Cocktails

112 State St, Peoria, IL, United States, Illinois

Brand new brewery (grand opening July 31), cocktail bar and eatery here in Peoria!

Pizza and drinks (including some delicious non-boozy options)

Bollywood Bites

316 SW Washington St, Peoria, IL 61602

Great Indian food with lots of vegetarian options!

Ardor Bread and Provisions

301 Southwest Water Street, Peoria, IL 61602

Great baked goods and coffee.

Blueduck Barbeque Tavern

212 Southwest Water Street Suite B, Peoria, IL 61602

Barbeque and Beer

Obed and Issacs

321 NE Madison Ave, Peoria, IL 61603

Great pizzas and sandwiches, and craft beer.

Thyme Kitchen

736 SW Washington St, Peoria, IL 61602

Great vegetarian options!

Sugar Wood-Fired Bistro

826 SW Adams St, Peoria, IL 61602

Great Pizza!

Things to Do in Peoria

[Caterpillar Visitor Center](#)

[Peoria Zoo](#)

[Peoria Riverfront Museum](#)

(conference social is here on Wednesday night)

[Luthy Botanical Gardens \(Free!\)](#)

Things to do in the greater Peoria Area

[Wildlife Prairie Park](#)

[The Emiquon Preserve](#)

[Chautauqua National Wildlife Refuge](#)

[Dixon Waterfowl Refuge](#)

Abstract Book

(These are arranged alphabetically by last name of the presenting author)

The Relationship Between Temperature, Rainfall, and Tree Swallow Fledging Times

Caleb Gruber; David Aborn

Weather variables, such as temperature and precipitation, are known to affect reproductive success of many avian species, and can directly or indirectly influence the fledging success of nestlings. As the climate changes, understanding these effects will become important for conservation and management. We investigated the effect of minimum temperature, maximum temperature, average temperature, maximum rainfall experienced in one day during a fledging period, and average daily rainfall on how long it takes Tree Swallow nestlings in Tennessee to fledge using multi-linear regression and linear mixed-effects modeling. We found that minimum temperatures, maximum temperatures, maximum rain experienced in a one-day period, and total rain all had a significant relationship on the time it takes for Tree Swallow chicks to fledge ($p < 0.05$); average temperature had no effect. The best model includes these weather variables and can account for about 20-21% of the variation seen in the time it takes Tree Swallow chicks to fledge.

Build an Island, Terns Will Come!

Kim Abplanalp; David F Brinker; David Curson; Roman Jesien

In 1991, 1,268 pairs of Common Tern (*Sterna hirundo*) bred in Maryland's coastal bays; by 2020 this population segment had declined to ~35 pairs. The decline is the result of habitat deterioration from sea level rise related accelerated island erosion and loss. In 2021, a 1,024 sq. ft. floating raft was constructed and deployed to provide critically needed breeding habitat. The raft was enlarged in 2022 to 2,304 sq. ft. In 2021, 23 pairs of Common Tern fledged 19 chicks from the raft (0.83 fledglings per nest). Nearly 80% of 19 nesting adult terns marked with field readable bands in 2021 returned to breed on the raft in 2022. During 2022 the breeding colony produced 155 nests and fledged 147 chicks (0.94 fledglings per nest). In 2023, 82% of 110 adult terns marked during the previous two breeding seasons returned to breed on the raft, including 89% of the 2021 adult birds. The raft produced 322 nests in 2023, but reproductive success was lower because of a four day storm that killed ~90 small chicks (<10 days old) through exposure and starvation. 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 2022. While not an inexpensive solution, (approximately \$110,000) artificial islands are an important conservation technique to provide critical breeding habitat while permanent natural habitat solutions are implemented.

Beyond Beauty: Investigating Carotenoids in Kingbird Feathers

Eyitope M Adunbi; Maggie Macpherson

Yellow, orange, and red pigments are associated with dietary carotenoids in bird coloration. In migratory birds, there may be trade-offs between prioritizing nutrition for energetically expensive migrations and selecting foods that can produce colorful pigments for signaling. My research explores the relationship between migratory status, diet and crown feather color in the *Tyrannus* genus of birds. There is variation both within and across *Tyrannus* (kingbirds) in their brightly colored crown feathers that they display during agonistic interactions, and migratory status with migratory, partially migratory and sedentary taxa. To better understand the evolutionary drivers of variation in crown feather color, I am analyzing carotenoid profiles from crown feathers in 28 kingbird operational taxonomic units (OTUs). I will present the results of a test for evolutionary associations between crown feather color and migratory status using color data from spectrophotometry and carotenoid data from high-performance liquid chromatography analyses. Many kingbird OTUs display yellow crown feathers, but deviations of deep orange to scarlet crown feathers appear in both migratory and island populations. I expect to find xanthophyll carotenoids in yellow crown feathers as yellow in bird feathers often arises from dietary sources of this carotenoid. Canthaxanthin, adonirubin, and α -doradoxanthin are common ketocarotenoids in bird feathers that are bioconverted from yellow carotenoids to produce orange to red pigments. I expect variation in carotenoid content across OTUs with orange to red color that may be attributed to differences in diet due to trade-offs between energetic priorities during molt. As carotenoids come from diets, more study is needed on the evolutionary drivers behind observed variation in the important crown feather signaling region. Additionally, the dynamic changes in color over time in kingbirds warrants further investigation to reveal generalizable patterns across taxa. These unresolved aspects beckon researchers to delve deeper into the captivating world of avian plumage.

Nest dwelling ants and their relationship with house wrens breeding in Northern Missouri

Trace Ackley; Kylie Helmig; Joanna K Hubbard

Bird nests often act as their own ecosystems. These ecosystems are short lived and variable with which species inhabit them. Oftentimes, the most frequent inhabitants of these nests, besides the birds themselves, are arthropods. Several different species of arthropods aggregate in these nests such as ectoparasites, beetles, spiders, and ants. Like many ecosystems, there are many complex relationships between the different species. Many studies have focused on parasitic interactions, but rarely on other types of interactions (e.g., mutualisms). This study aims to understand the relationship between house wrens (*Troglodytes aedon*) breeding in Northeast Missouri, and ants that have been observed inhabiting the nests. To better understand this interaction, we collected and dissected house wren nests after nestlings fledge to determine the arthropod community composition and abundance within each nest. We assessed the health of the chicks via morphological (e.g., body condition) and physiological (e.g., hematocrit) measures. We will compare the abundance of ants, as well as the arthropod diversity and richness, within a nest to the metrics mentioned above. Ants have been found to create different types of relationships with different bird species. Whether the relationship between ants and house wrens is mutually beneficial, parasitic, or commensal remains unclear as the presence of ants does not have a strong effect on nest success. We do, however, see higher variation in nestling body condition within nests where ants are present. It is important to understand the relationship between cavity-nesting birds like house wrens and their nest dwelling arthropod inhabitants as populations of these birds are decreasing. Investigations like this could aid in the conservation of all species involved. Ongoing studies aim to understand these relationships by identifying the ant species and exploring additional metrics of nestling health.

Vocal amplitude of songbirds: Amplifying our understanding of an overlooked trait

Connor S Acorn; Jennifer R Foote; Daniel J Mennill

Song amplitude is an important aspect of songbird communication, influencing how far a song propagates through the environment and how loud it will be perceived by listeners. Previous research suggests that song amplitude is a flexible trait that songbirds modulate with social context. Yet song amplitude has received less attention compared to the spectral and temporal features of songs, especially in wild free-living songbirds. Recent technical innovations make it possible to collect detailed field measurements of song amplitude. Our research objective was to collect field-based recordings of song amplitude in male Ovenbirds (*Seiurus aurocapilla*), exploring whether amplitude varies with social context. Ovenbirds are a member of the Parulidae wood warblers, and are renowned for their loud songs, although no previous studies have measured their song amplitude. Studying the song amplitude of breeding male Ovenbirds in northern Ontario, we used a Larson Davis sound level meter to measure the amplitude of songs from 45 territorial male Ovenbirds. We collected measurements in three contexts: males engaged in distant counter-singing, close counter-singing, and broadcast singing (singing without directly interacting with other males). We explore the Context-dependent Amplitude Hypothesis, which states that if amplitude serves a social function, then songbirds will regulate their song amplitude depending on social context. We predicted that male Ovenbirds would sing their highest-amplitude songs when broadcast singing and sing their lowest-amplitude songs when close counter-singing. This study is among the first to examine song amplitude in a field setting and provide a better understanding of amplitude variation in wild birds.

Summit metabolism in Carolina Wrens (*Thryothorus ludovicianus*) on the northern edge of their range

Selina Alcantar; David Swanson; Joel Ralston

A species' thermogenic capacity is likely highly important for determining range boundaries. Summit metabolism (M_{sum}) is the maximum cold-induced metabolic rate an organism is able to achieve, and is important in determining maximum thermogenic capacity or the maximum heat an organism can produce. The Carolina Wren (*Thryothorus ludovicianus*) is a year round resident that has been spanning their range northward throughout eastern North America. The objective of this research is to measure the summit metabolic rates of the population of Carolina Wrens in South Bend, Indiana, at the northern border of its range. I attracted individuals into nets using playback and a Carolina Wren study skin specimen placed near the mist net as a decoy. I performed cold exposure tests in a helox atmosphere. A metabolic chamber was placed in a water-ethylene glycol bath to control temperature. I captured a total of four Carolina Wrens. The mean M_{sum} for our three birds was 5.875 (SD =4.07). I found higher M_{sum} values than other birds previously studied in the literature, suggesting that Carolina Wrens have high thermogenic capacity. Further investigation in other parts of the Carolina Wren range would inform if there is any adaptation on the leading edge of the range.

Comparing Reconstructed, Natural, and Alternatively Used Wetlands Within The Red River Basin Using An Avian IBI

Elaxis Anderson; Jessica Coleman; Matthew Greenwold

Wetlands are a valuable resource and important to study because of the many economic and ecological benefits that they provide, such as habitat for wildlife, harvestable goods, and water filtration. This study compares constructed ACEP-WRE easements to natural and alternatively used wetlands located in the Red River Basin of Northeastern Texas and Northwestern Louisiana by creating an avian index of biological integrity (IBI) to assess the health of the reconstructed wetlands. Wetlands will be assessed by conducting bird surveys using a point count sampling method, analysis of soil and water chemistry, and hydrological sampling. Point counts will be conducted at random sites no closer than 200 meters and will consist of a 10-minute unsupplemented survey. Avian surveys will be conducted three times in a twelve-month period to index wintering, breeding/nesting, and the presence/absence of distinct species. Soil chemistry will be measured twice annually by collecting soil core and topsoil samples and water chemistry will be measured quarterly. Hydrology measurements will be collected from inflow and outflow points at each of the wetlands monthly using a hydrology probe and placement of water gauges. To date we have sampled 10 constructed, 3 natural, and 1 alternatively used wetland and found 72, 35, and 20 species per location, respectively. It was found that reconstructed wetlands have a Shannon's diversity index of 2.84, which is greater than the diversity index of the natural ($H = 2.24$) and alternatively used ($H = 2.46$) wetlands.

Impacts of oil and gas activities on annual occupancy rate and breeding success of Mississippi Kite in Western Oklahoma

Atabo O Lucky; Timothy O'Connell; Fidel Atuo

In mixed-grass ecosystems of the central Great Plains, the proliferation of oil infrastructure and oil-related human activities in wildlife reserves present a broad-scale threat to several species and wildlife management goals. In this study, we analyzed a decade-long dataset to understand spatiotemporal patterns of occupancy and breeding success of Mississippi Kite in a landscape of energy development. Our goal was to quantify the resilience of kite's territories in the face of shifting oil and gas activities. We conducted daily searches for Kite nests from May to July through systematic inspection of preferred habitats, observation of kite's breeding behavior, and information from other researchers working in the area. At the broad-scale, Mississippi kite demonstrated strong resilience to the presence of oil-related activities in this system, attaining a breeding success rate of 75%. Nonetheless, kite occupancy rate was inconsistent with breeding territories shifting frequently to avoid or reduce the impacts of oil-related activities. Kites that nested in proximity to oil infrastructure were twice less likely to fledge a chick compared to individuals that bred >100-m away. Albeit the Mississippi Kite has been shown to tolerate a suite of human activity in urban environments, our study suggests a decline in the fitness value of kite territories with increasing proximity to novel disturbances in this landscape. This could explain the poor recruitment and population growth currently experienced in many kite populations.

Data Harvesting from Social Media for Real-Time Monitoring of Bird Collisions

Diya Balagopal

Bird collisions with buildings and windows pose a significant threat to avian populations worldwide. Many people often post on social media about bird collisions, but the lack of monitoring systems results in valuable data going unnoticed. To augment present data collection methods, we present a novel approach leveraging social media data, such as Twitter, to monitor bird collision incidents. Our project involves the development of a data harvesting program designed to collect and analyze tweets related to bird collisions, alongside a Twitter bot that automatically retweets relevant tweets, directing users to resources for assistance. Both utilize specific keywords and hashtags associated with bird collisions to filter relevant tweets. The program extracts information such as the content, date, time, and any available images related to the incident. The collected data are then processed and compiled into a CSV file available for research organizations and avian conservationists to use. Our project aims to achieve several primary findings, including insights into spatial and temporal patterns of bird collisions, increased community engagement and participation in bird conservation efforts, and the development of enhanced conservation strategies through the analysis of collected data. The Twitter bot's page has amassed a multitude of tweets about bird collisions and is currently being updated to improve functionality and accessibility. Efforts are being taken to develop an Artificial Intelligence reply bot to respond to these tweets and expand our data sources to include platforms such as Instagram, Facebook, and NextDoor. This project that leverages social media as a data source has the potential to complement existing data collection methods and empower communities to actively participate in bird conservation initiatives through a previously untapped data repository.

Birds and Window Collisions

Annie Beckstrand

Collisions with windows and other building structures are one of the major factors of avian mortality. It is estimated that up to 1 billion birds die each year from these window strikes. In order to reduce and remedy these losses, it is imperative to understand the factors responsible and the species most affected. I examined building collisions by birds on two university campuses to determine the extent of mortality, timing, species affected, as well as the factors that affect these collisions such as building and window types. Data was collected during the Fall 2022 Semester at Utah Tech University in St. George, Utah, and during Fall 2023 at Weber State University. Collision victims were recorded by photographing birds as they were found. I conducted surveys on campus buildings between 11:00 am - 2:00 pm or after 5:00 pm. A correlation between window types was seen, with most strikes being at buildings with walls made up of windows, and susceptible families included the Passerellidae and Parulidae families.

Increasing Detectability of Secretive Marsh Birds Using Autonomous Recording Units

Mary Benjamin; Thomas Gehring

Maximizing detection probability for rare and elusive marsh-dependent bird species is essential for estimating population trends. Previous research has provided conflicting evidence on peak detection periods for marsh-dependent birds and the impact of time of day on detection probability. Autonomous recording units (ARUs) expand the temporal and spatial scale of surveys, potentially allowing for more effective detection of elusive species compared to traditional survey methods. I deployed 18 ARUs at eight coastal wetland sites in Michigan from May 10th to July 13th, 2023. I identified vocalizations of Virginia rail (*Rallus limicola*) and Sora (*Porzana carolina*) using BirdNet, an artificial neural network specialized in the automated detection of avian sounds. I plan to use generalized linear mixed models (GLMM) to determine the effect of Julian date, season, and time of day on detection probability. Also, preliminary results suggest that ARUs significantly increase the detectability of both Sora and Virginia rail when compared to the traditional in-person point counts employed by the Great Lakes Coastal Wetland Monitoring Program. This study aims to provide valuable insights into optimizing survey techniques for marsh-dependent bird species, ultimately contributing to more accurate population assessments and informed conservation efforts.

Pesticide exposure and plant damage in natural areas in agricultural landscapes: implications for birds

Thomas J Benson; Tara A Beveroth; Claire A Johnson; Edward P Price; Timothy A Rye; Emily J Lain;
Brian M Charles; David N Zaya

Starting in the second half of the 20th century, agricultural intensification increasingly involved the use of chemicals for pest control. The development of numerous synthetic pesticides, including herbicides, insecticides, and fungicides, led to widespread use and, in some cases, recognition of widespread non-target effects on organisms. Unfortunately, our understanding of the potential effects of these pesticides on non-target organisms generally lags behind their widespread adoption, as does our understanding of the extent to which these chemicals travel beyond the agricultural fields in which they're applied and end up in natural areas. In 2023, we set out to examine the extent of plant damage consistent with non-target herbicide exposure as well as to quantify concentrations of pesticides from plant tissue and soil from natural areas throughout Illinois. We sampled >180 sites in Illinois 2 times during the growing season of 2023 and found at least moderate damage to plants at almost all sites, with >50% of sites having severe damage and oak species most frequently affected. We found pesticides in nearly all natural areas, with 40 different chemicals detected, primarily from plant tissues. Herbicides were found in the greatest concentrations, with Atrazine and 2,4-D most common, and Dicamba relatively rare. Later in the season, fungicides and insecticides were more commonly detected. The amount of row-crop agriculture in the surrounding kilometer predicted leaf-tissue concentrations of pesticides and severity of plant injury. The longer-term effects of this exposure and plant injury are unknown, as are the effects on insects and insectivorous birds. Given that oaks were the most frequently observed with plant damage, and the disproportionate importance of this group for caterpillars and the migrating and breeding birds that consume them, more work is needed to explore these implications.

Nest defenses increase five times the reproductive output of Pampas Meadowlark (*Sturnella defilippii*)

Candelaria Neyra; Pablo Grilli; Igor Berkunsky

Pampa's Meadowlark (*Leistes defilippii*) is an endemic passerine of the Southern Cone of South America grasslands, currently categorized as "Vulnerable" globally. It has lost 90% of its range in the last 100 years, mainly due to changes in land use causing the loss of natural grasslands. Nowadays, cattle grazing is one of the main causes of habitat degradation, and in grazed systems nests, predation is the main cause of breeding failure. The last populations of this species in Argentina are found in the southwest of the province of Buenos Aires. In 2021, we started a research project with the aim of contributing to its conservation. In this work, we present preliminary information about the species' reproductive biology and natural history, and we analyze the efficacy of antipredator defenses in nests. During the 2021, 2022 and 2023 breeding seasons, we found 93 nests in pastures used by livestock. We installed and adapted nest defenses in 73 clutches. Clutch size was 3.9 ± 0.1 eggs, and hatching success was 96%. In successful nests, egg survival to incubation period was 98%, and nestling survival to nestling period was 92%, respectively. The reproductive success of nests without defenses was, on average, 11%, and with defenses was 49%. Considering the proportion of successful nests and the number of nestlings per successful nest, the number of fledglings per nest attempt in protected nests was 1.65, five times what it would have been without defenses. Nest defenses could increase nest success in Pampas Meadowlark and other threatened grassland birds.

Wetlands in the Sand

Stephanie Bishir

Illinois ranks second highest in the country for the percentage of land converted from original vegetation. The Illinois chorus frog (*Pseudacris illinoensis*) is one species that has been heavily impacted by these habitat changes. This rare, unique species depends on sandy soil for foraging and overwintering, but also requires wetlands for breeding. As habitat managers, providing wetlands in a sandy soil landscape poses a challenge. In 2023, restoration experts and local partners came together to build wetlands, and share knowledge for providing this niche habitat. A year later, initial outcomes of this restoration work are proving useful to more than just the frogs.

Influence of hunting pressure on dabbling duck behavior and departure from an autumn stopover

Abigail G Blake-Bradshaw; Therin M Bradshaw; Andrew D Gilbert; Joshua M Osborn; Elizabeth A Beilke;
Chelsea S Kross; Auriel MV Fournier

Hunting pressure and associated anthropogenic disturbance influences many aspects of wildlife behavior. Disturbance by hunters has been shown to factor into the timing of relocation movements of waterfowl and could drive departures from stopover locations during autumn. Wildlife professionals are interested in understanding what drives autumn-winter movements and migration events of waterfowl; therefore, we evaluated the extent to which hunting pressure influenced daily flights and departure from an autumn stopover location. Our study took place in of the La Grange Reach of the Illinois River Valley, IL, USA. To evaluate the influence of “hunting pressure” on waterfowl behavior and departure from a stopover location, we placed 20 Autonomous Recording Units (ARUs) across our study area to quantify daily shotgun volleys. We then captured 38 mallards (*Anas platyrhynchos*) and 26 American green-winged teal (*Anas carolinensis*; hereafter teal) at Chautauqua National Wildlife Refuge, IL, USA. We deployed GPS-GSM transmitters on both age (i.e., juveniles and adults) and sex classes (i.e., males and females) and tracked both species during autumn and winter 2022–2024. We quantified the number of daily local-scale flights and related it to local hunting pressure as indexed by ARUs. The median number of local-scale flights was 3 (range: 0–18). Additionally, we identified the day individuals departed the Illinois River Valley stopover area by quantifying when they passed 40°N southwards, which marked the southern extent of our study area. In total, 24 teal and 8 mallards departed the study area. Here, we will present preliminary findings for this ongoing project regarding the number of local-scale flights and departure of mallards and teal from an autumn stopover location. We will deploy 30 additional transmitters for each species during autumn 2024. Future directions include incorporating additional hypotheses such as weather and conspecific abundance into the local-scale flights and departure date analyses.

Is Timing Everything? Examining the importance of the timing of parasitism to cowbird chick success

Julia Boldrick; Wendy Schelsky; Mark E Hauber; Jeffrey Hoover

Brood parasitism is a reproductive strategy whereby parasitic offspring are raised by an unrelated host. Brown-headed Cowbirds are North America’s most widespread avian brood parasite and successfully parasitize 140+ host species. Cowbird females typically parasitize during the narrow window of the host’s laying period before the start of incubation, resulting in their chicks hatching before the host’s. Despite extensive cowbird research, female cowbirds are cryptic and difficult to monitor during egg laying, and it’s unknown if female cowbirds incur reproductive costs by laying eggs in host nests outside the host laying period. Single cowbird eggs were added experimentally to the nests of Prothonotary Warblers (*Protonotaria citrea*), a common cowbird host, at different stages of host nest progression to simulate different cowbird parasitism timing decisions. This manipulation resulted in cowbird eggs hatching early, synchronously, or late relative to warbler eggs. We compared hatching synchrony and success between cowbird and host eggs, as well as growth, health, and survival of the chicks across the 3 treatment groups. We predicted that cowbird eggs experimentally added “late” to host nests would have lower hatching success, slower growth, and lower fledging success compared to cowbird eggs added to nests prior to onset of host incubation (the natural condition). Data from the first field season documented little difference in cowbird hatching success across treatments (overall hatching success = 93%, $n = 28$). Survival varied between treatments: of 26 cowbirds, only 7 (27%) fledged: 5 (50%) early hatch, 2 (29%) synchronous hatch, and 0 (0%) late hatch. Growth and health analyses are pending. Another field season will bolster sample sizes, allowing us to determine the strength of selection on female cowbirds to time parasitism correctly. Advantages from accurate timing, like early hatching, are likely an important factor shaping how brood parasites select hosts and decide when to parasitize them.

Testing the limits of Autonomous Recording Units (ARUs): A case study detecting waterfowl hunter shotgun shots in the Illinois River Valley

Therin M Bradshaw; Abigail G Blake-Bradshaw; Elizabeth A Beilke; Andrew D Gilbert; Chelsea S Kross; Joshua M Osborn; Auriel MV Fournier

Autonomous Recording Units (ARUs) have proven to be a useful tool in field ecology offering a passive method of obtaining audio recordings from the landscape. These recordings have been used in many wildlife studies, particularly with wildlife that generate unique acoustic signals or calls. In addition, ARUs can also be used to detect anthrophony, or the sounds generated by humans. Given the great influence of hunting pressure on wildlife behavior and ecology, the Forbes Biological Station is currently using ARUs to detect shotgun shots during waterfowl hunting season. Since the start of the project in fall of 2022, we have learned the detection probability of shotgun shots varies by distance, we have learned how ARU shotgun shot detection compares to human detection of shotgun shots and the extent to which environmental conditions (e.g., wind) influence detection probability. To thoroughly test the performance of ARUs and their ability to detect shotgun shots, we conducted a case study on The Nature Conservancy's Emiquon Preserve, where we placed 12 ARUs across the site. We then shot from 40 known locations along 4 north-south transects. At each known location, we fired shotgun shots in all 4 cardinal directions resulting in a total of 160 shots. Detection probability of shotgun shots decreased as distance to ARUs increased and as wind speeds increased. Additionally, directionality of shots influenced whether ARUs successfully detected a shot. Results of this case study have informed our larger shotgun shot detection study throughout the Illinois River Valley (LeGrange Reach) enabling us to determine preferred ARU spacing to maximize coverage across the landscape while minimizing overlap between ARUs.

Phenotypic plasticity in the anthropause: does reduced human activity impact novel nesting behavior in an urban bird?

Samuel A Bressler; Eleanor S Diamant; Christina Cen; Pamela J Yeh

The COVID-19 pandemic temporarily transformed urban ecosystems by restricting public human activity to only the most essential societal functions, even as other landscape level factors such as the built environment remained unchanged. In so doing, it provided a unique opportunity to experimentally answer questions about the role of human disturbance in driving behavioural adaptation in urban wildlife. We compared nesting data collected on an urban dark-eyed junco, *Junco hyemalis*, population nesting on the University of California, Los Angeles (UCLA), U.S.A. campus during the 2021 nesting season, when the campus restrictions were in effect, to a similar data set collected in 2019, before the pandemic, in order to examine (1) whether urban dark-eyed juncos on the UCLA campus altered their use of novel off-ground and artificial nesting sites in response to reduced human activity and (2) whether reduced human activity impacted nesting success. We found that after a >80% reduction in human activity, junco nesting success during the COVID-19 pandemic modestly increased compared to prepandemic levels. However, nest site selection remained unchanged. Our findings suggest that the landscape of the built environment or urban predators, rather than disturbance by human activity, drives novel nest site selection in urban birds.

Using Bayesian network analysis to identify habitat distribution for a secretive marsh bird of conservation concern

Dustin E Brewer; Elisabeth B Webb; Anne E Mini; S Keith McKnight

Many bird species are both imperiled and data deficient, thus complicating management and conservation efforts. One such species, the King Rail (*Rallus elegans*), has experienced population declines throughout much of its range. These population declines are due largely to habitat loss and degradation and are particularly pronounced in regions where individuals tend to be migratory, such as the Lower Mississippi Valley. Given the historical reduction in wetland area in this region due to human activity, accurate prediction of where King Rail habitat exists—and where occupancy is most probable—could help to conserve King Rails and other wetland dependent species that utilize similar conditions. Therefore, we used Bayesian network analysis to identify potential King Rail habitat in the Lower Mississippi Valley throughout the full annual cycle. This approach is ideal for data deficient situations because experts, in conjunction with available data, can be used to generate initial models that can be seamlessly updated when new knowledge or data become available. We describe our modeling framework, in which we quantified conditional probability of the interactions among multiple habitat variables and conditions in a Bayesian framework, with an aim to help ornithologists utilize this powerful, yet relatively intuitive, methodology. Specifically, we explain how we elicited expert knowledge via a formalized peer review process and how we used citizen science data to develop and evaluate our Bayesian networks. We also present preliminary results regarding King Rail habitat distribution, based on separate models for the breeding and non-breeding periods, and associated occupancy probability throughout the Lower Mississippi Valley.

Single species and multi-species playbacks elicit asymmetrical responses within mixed-species chickadee, titmouse, and nuthatch flocks

Heather JB Brooks; Todd M Freeberg

Individuals join mixed-species groups to gain benefits such as improved foraging and predator detection. Birds in the family Paridae often drive mixed-species flocking in North America, and these species can act as community informants for forest-wide eavesdropping networks. Although we know a great deal about how this communication functions in anti-predator contexts, less is known about how the vocalizations of members of these flocks may affect the foraging behavior of potential flockmates. In this study we presented naturally occurring mixed-species flocks of chickadees, titmice, and nuthatches with one of four playback conditions: chickadee-only calls, nuthatch-only calls, calls of both species, and a silent control. We hypothesized that the flocks would be most responsive to playbacks that contained calls from more than one species. We also tested an alternative hypothesis that predicted that birds would be most responsive to the nuclear species within the flock (chickadees). We found that birds were more likely to arrive, and arrived more quickly, for the playbacks with calls from both species compared to playbacks of nuthatches alone or the silent control. Playbacks of chickadee calls alone attracted an intermediate number of birds, which did not differ significantly from the mixed-species flock condition, or the nuthatch call alone condition. Our hypotheses were not supported due to the lack of significant difference between the mixed-species playbacks and the chickadee playbacks. However, our findings do indicate that different species in these flocks can react differently to the calls of members of these flocks and that future studies may continue to find asymmetries in attraction to these different social signals.

Diet specialization in American Oystercatchers breeding in Virginia

Lyn Brown

Individual specialization in diet occurs when some individuals eat prey species in different proportions than others. We provide the first evidence of diet specialization in American Oystercatchers. We investigated the existence of diet specialization in a population of American Oystercatchers (*Haematopus palliatus*) breeding on two barrier islands in Virginia in 2022 and 2023. We described foraging area use across space and time based on diet. We explored the potential adaptive value of diet specialization, and mechanisms explaining diet specialization including mole crab abundance, intra-specific competition avoidance, ecological opportunity, and kleptoparasitism avoidance. We determined diet from observations on foraging adults and chick provisioning, and GPS tracking. Specialists fed almost exclusively on mole crabs (*Emerita talpoida*) at oceanside shorelines. Mole crabs composed > 90% of the specialist diet. Generalists fed at oceanside shorelines and bayside mudflats, and ate seven prey species, mole crabs plus six species of bivalves. Specialists and generalists appear to be equally effective foraging strategies, since there was no significant difference in food profitability, adult body condition, or chick energy intake rate. Mole crab specialization was best explained by ecological opportunity, where individuals specialize on mole crabs, the second most profitable prey species, when they lack nearby access to the most profitable prey species, the Atlantic ribbed mussel (*Modiolus demissus*). The existence of individuals who specialize on eating mole crabs supports conserving American Oystercatchers by managing beaches to maintain healthy mole crab populations.

Do Rocket Launches Influence the Nesting Success of Western Snowy Plovers (*Charadrius nivosus nivosus*) and California Least Terns (*Sterna antillarum browni*)?

Rachel H Budge; Megan R McCullah-Boozer; Lucas K Hall; Kent L Gee; Levi T Moats; Grant W Hart; Dan Robinette; John P LaBonte; Lawrence Wolski; Emily Rice

Anthropogenic noise, such as road traffic, telephone wire buzz, and machinery, is a type of disturbance that has been shown to affect shorebird reproductive success. Research has shown that noise in shorebird nesting areas has been increasing over time. Rocket launches are an example of an extreme form of anthropogenic noise, but there is a scarcity of research analyzing rocket launch noise and its effects on shorebirds. Vandenberg Space Force Base is located on California's Central Coast and is home to breeding colonies of threatened western snowy plovers (*Charadrius nivosus nivosus*) and endangered California least terns (*Sterna antillarum browni*). The base has also been a launch site for space vehicles since 1959. Since 2000 however, launch numbers per year have historically been low, but those numbers have been increasing over the last couple of years. Our objective was to determine if low launch cadence influenced the nest success of Vandenberg shorebird populations compared to other shorebird populations at other locations along the Pacific Coast that are not affected by rocket launches. We analyzed 23 years of historic shorebird nest data from Vandenberg to determine nest success of plovers and terns at a very low cadence of rocket launches. We then analyzed nest success at other similar sites along the Central Coast. We will provide details about these nest success comparisons in this presentation. Rockets are often launched from coastlines, which are important breeding and migration areas for many species of birds. A deeper understanding of how this might be affecting these birds will help instruct management decisions going forward.

Object recognition in Herring Gulls (*Larus argentatus smithsonianus*)

Kristen M Covino; F Dylan Titmuss; Joseph E Brosseau; Dora C Donacik; Maddie E Ellms;
Allison E Fisante; Olivia K Maday; Alyssa R Nowicki; Daphne Okuyama; Jessica M Robinson;
Katherine A Schickfus; Eliza L Stanley; Mary Elizabeth Everett

The ability to recognize and associate objects with prior experiences has been demonstrated in several avian taxa. However, the extent to which similar memory-based behaviors exist in seabirds is poorly understood. Our study investigated object recognition by Herring Gulls (*Larus argentatus smithsonianus*) on their breeding grounds, the site of a long-term monitoring project. When handling gulls and conducting field research, researchers wear standard bicycle helmets as a protective measure against physical aggression by nesting gulls. We tested whether previously banded gulls vary their behavioral responses based on the headgear worn by human researchers. Herring Gulls were significantly more aggressive when approached by helmeted observers compared to those wearing neutral headwear or even holding a helmet, thus indicating a potential association between wearing bike helmets and the negative experience with researchers. Our study demonstrates that Herring Gulls are capable of object memory and object recognition within context, and display different behaviors toward different objects according to their levels of perceived threat. This information is key when designing studies with nesting gulls to ensure that behavioral biases are not unintentionally created due to gull prior experiences or researcher safety gear.

Variation of flight muscle mass in a breeding population of Lazuli Buntings

Kate Thompson; Julie Draper; Niku Mojabi; John F Cavitt

Migratory birds must undergo cycles of fuel storage and depletion during their annual cycle. These changes can result in more than a two-fold change in body mass. In addition to changes in fat stores, migratory birds also have been shown to undergo considerable changes of muscle tissue and abdominal organs. Changes in flight muscle mass are likely to come at a cost, as regression of the pectoralis has been shown to reduce escape speed. We examined the variation in Lazuli Bunting (*Passerina amoena*) mean flight muscle mass as birds arrived to the breeding grounds, throughout the breeding season and as they prepared for migration to the non-breeding sites. Birds were captured with mist-nets, aged, sexed, banded with a numbered USGS aluminum leg band, weighed, and measured. Body condition was by scoring each bird for fat deposition and mean flight muscle mass was determined with the use of a breast muscle meter. Reductions in flight muscle mass are likely to come at a cost of increased predation risk. These costs may be ameliorated by behavioral strategies to minimize predation risk.

Fledgling Familiarity: Investigating the relatedness of juvenile Brown-headed cowbirds and the adults that they're caught with

Mac Chamberlain

The Brown-headed cowbird (*Molothrus ater*; "cowbird" hereafter) is an obligate brood parasite, meaning it lays its eggs in the nests of heterospecific hosts. Adult cowbirds often associate with post-fledgling juveniles during the later portion of the breeding season to help facilitate the juvenile's social development. It has been suggested that adult cowbirds may be able to seek out, recognize, and preferentially associate with closely related juveniles. If this is true, the adult cowbird's facilitation of juvenile social development would be a prime example of kin-directed preferential behavior (or kin selection). To assess genetic relatedness between co-captured female adult and juvenile cowbirds, Hahn and Fleischer (1995) performed a DNA fingerprinting analysis between juveniles and adult females with which they were caught. These researchers found a significantly higher likelihood of sharing bands with adult-juvenile pairs caught together compared to randomly assigned pairings. However, since adult males were excluded from their analysis, we cannot ascertain if there was an association that depended on adult sex. Here, I present a study to test the hypothesis that adult-assisted social development in cowbirds ultimately evolved as a result of kin selection by investigating the relatedness of juvenile cowbirds and the adults they are captured with, regardless of sex. Using two summers of capture data from east-central Illinois and a 9-loci microsatellite analysis, I ran a linear regression and found that pairwise-relatedness did not significantly influence whether a juvenile was captured with a particular adult ($p=0.085$). However, my current sample size of only seven total juveniles across both years may be inadequate, and a p -value of 0.085 may be considered a trend toward significance. Additional juveniles will be added after the 2024 field season. Adult sex, however, shows a significant effect, with juveniles being more likely to be caught with adult females than adult males ($p=0.016$).

**Feather quality as an indicator of breeding to nonbreeding carry-over effects
in the American Redstart**

Ivy A Ciaburri; Bryant C Dossman; Matthew W Reudink; Peter P Marra; Christopher M Tonra

American Redstarts (*Setophaga ruticilla*) have provided invaluable insights into the importance of studying the full-annual cycle biology of migratory birds. That said, almost all this research has examined the influence of nonbreeding on breeding season events and we know little about how breeding-ground environmental conditions affect subsequent phases of the annual cycle despite expected climatic change on temperate breeding habitats. Here, we explore relationships between environmental conditions on the breeding grounds and feather quality, an indicator of an individual's health at the time of molt. We then evaluate breeding to nonbreeding carry-over effects by relating individual feather quality to that individual's winter performance as determined by nonbreeding territory quality and departure date from the nonbreeding grounds. Using the 27-year collection of tail feathers (3rd rectrix) sampled from a population of redstarts wintering in southwest Jamaica, I measured each feather's carotenoid content via spectrometry, feather density, and growth rate to evaluate feather color and structural quality. We leveraged the fact that our study population breeds in the Upper Midwest to derive annual estimates of environmental conditions (EVI, temperature, and precipitation) on the breeding grounds via remote sensing. We then investigated the relationships between environmental conditions on the breeding grounds to individual feather quality and relate that to winter performance of individuals during the 2022 and 2023 field seasons in southwest Jamaica. This expands upon previous research by incorporating more direct indicators of food availability, structural feather quality, a dataset that includes a greater variation in climatic conditions, and the known breeding area of Jamaican redstart, thereby providing a more comprehensive understanding of the relationship between breeding-ground environmental conditions and the annual cycle of the American Redstart.

Activity patterns of Eastern Whip-poor-wills across different Midwestern forest management regimes

Holly Coates; Michael Ward; Thomas J Benson

Eastern Whip-poor-will are a species in steep decline, reliant upon early-to-intermediate-aged forests with moderate canopy cover across their life-history. With large-scale changes to Eastern US forest cover, structure, and composition across the past few centuries, silviculture and forest management regimes that produce intermediate canopy cover and basal area have been shown to be promising methods of increasing Eastern Whip-poor-will habitat, and promote their populations. We investigated the activity and percentage of time Eastern Whip-poor-will spend in differently-managed forests in the Midwest by using the natural ecological experiments created by management regime boundary lines, and an automated VHF-telemetry system. We were then able to generate more precise estimates on whip-poor-will habitat preferences, by correlating these values with prey abundance and a large suite of biotic and abiotic factors intrinsic to each forest management type.

Nest tree selection, nesting material, and phenology of Hooded Oriole at two natural areas in southeastern Arizona

Dylan A Cooper

Effective bird conservation requires up-to-date knowledge on all facets of avian life histories. However, details on even basic aspects of life history are either missing or not current for some species, including the Hooded Oriole (*Icterus cucullatus*). During the 2022 breeding cycle, I observed the behaviors of a Hooded Oriole population at The Boyce Thompson Arboretum and Arnett-Queen Creeks Important Bird Area in Pinal County, Arizona. Nest-building began in early-April, which reflected an advance in the nesting phenology of the Hooded Oriole since the late nineteenth century. I located a total of 10 nests constructed in 4 different plant species, including 3 palm (Family: Arecaceae) species. The preference to nest in palms (90%, CI: 57%, 100%) was significantly greater than expected by random chance alone (9/10, $P = 0.021$). Although the majority of nests were found in Mexican Fan Palm (*Washingtonia robusta*) (60%, CI: 31%, 83%), the preference for nesting in fan palms over any other plant was not significant (6/10, $P = 0.754$). All nests were constructed from palm fibers (100%, CI: 70%, 100%), suggesting that this material was preferred for nest-building as opposed to other available options such as Yucca and grasses (10/10, $P = 0.002$). Most breeding activity was concentrated in a densely planted grove of approximately 75 palms with high percent canopy cover and low understory growth. These results are potentially valuable to managers and property owners of sites occurring on a nexus between gardens and native riparian environments of the desert southwest.

Do morph, sex, and age influence interspecific agonistic behaviors of White-throated Sparrows (*Zonotrichia albicollis*)?

Baily Crable; Stefan Woltmann

Interspecific competition over a food resource often leads to birds displaying agonistic behavior towards each other. When there is agonistic behavior among species there is the potential for the formation of a dominance hierarchy. Species higher in the hierarchy will have better access to resources and could cause those lower in the hierarchy to have reduced access to the resource. Here we describe agonistic interactions between individually color-banded White-throated Sparrows (*Zonotrichia albicollis*) and other species at feeding stations during winter in central Tennessee. Sex and morph of White-throated Sparrow was determined via PCR; age was determined via plumage in the hand. Behavioral data were collected by placing seed on a 1m x 1m platform and video recording agonistic behaviors. We expected white-stripe morphs to show more agonistic behavior towards other species, as they tend to be more aggressive during the breeding season. We also expected agonistic behaviors of White-throated Sparrows would be less often directed at larger species, and more often at smaller species. Our preliminary results show six other species of birds interacting with White-throated Sparrows at our feeders. Of these, White-throated Sparrows showed the most agonistic behavior towards Dark-eyed Juncos (*Junco hyemalis*), but the role of age, sex, or morph has yet to be analyzed.

Investigating Spring Migration Timing and Stopover Duration of Sora and Virginia Rail in Central Illinois using the Motus Tracking Network

Chad A Cremer; Auriel MV Fournier; Michael Ward; Michael Avara

Detailed information about the spring migratory connectivity and stopover ecology of Sora (*Porzana carolina*) and Virginia Rail (*Rallus limicola*) is lacking. Much of the wetland habitat required by these secretive marsh birds during migration has been lost across the Midwest. Stopover sites are critical for survival during the most stressful portion of the annual cycle allowing birds to rest and refuel during migration. High-quality stopover sites are important to alleviate potential carryover effects, especially in spring when breeding success could be affected. Therefore, it is important to understand the migratory behavior and connectivity of rails to assess conservation priorities. Our goals are to describe migration timing and stopover duration and investigate factors influencing the departure behavior of Sora and Virginia Rail in Central Illinois using the Motus Tracking Network.

The impact of landscape characteristics on Western Meadowlark (*Sturnella neglecta*) song and body condition

Leah C Crenshaw; Jessica Salo; Lauryn Benedict

Grassland birds in North America and globally are in rapid decline, primarily due to land-conversion and habitat degradation. While the effects of landscape characteristics like land cover, fragmentation, and human presence on bird abundance and diversity are well-studied, the mechanisms behind those effects are poorly understood for many species. We conducted a two-part study to determine how individual behavior and condition may be underpinning known population changes in Western Meadowlarks (*Sturnella neglecta*). First, we investigated what natural, anthropogenic, and climatic landscape characteristics best predicted Western Meadowlark song structure using song samples collected across the U.S. Great Plains Ecoregion. Then, we conducted a similar local study augmented with individual body condition data for meadowlarks in Weld County, Colorado. Random forest modeling determined that none of the 30 measured landscape characteristics predicted meadowlark song structure at the continental scale. In Weld County, linear regression modeling determined that water bodies negatively influenced mass to tarsus ratio, roads negatively influenced culmen length, and oil/gas infrastructure negatively influenced wing chord length. Mass to tarsus ratio and wing chord had significant but weak relationships with song inflection rate and minimum song frequency, respectively. We conclude that landscape exerts selective pressure on Western Meadowlark body condition, however, differences in individual condition are not strongly reflected in song characteristics. Additionally, although many studies have demonstrated anthropogenic impacts on bird song, we failed to document that link in Western Meadowlarks across the Great Plains. This study highlights the scientific potential of remotely sensed data used in conjunction with field research to understand the large-scale trends in bird behavior and populations. Further, it shows that localized relationships between anthropogenic landscapes and song structure are not consistent across larger spatial scales or across species, warranting further research into how human-altered environments influence wildlife at several scales.

Long term changes in Clock allele lengths in Tree Swallows in response to climate change

Nayeli Cruz; Joel Ralston

The Clock gene is involved in a bird's ability to sense changes in photoperiod (daylength) and adjust seasonal behaviors accordingly. The Clock gene varies in the number of glutamine repeats known as the polyglutamine tail. The length of the polyglutamine tail has shown significant influence on the phenology of migration in birds, with longer allele lengths correlating to delayed migration. Climate change has caused changes in avian phenology, and it is hypothesized that the Clock gene is currently a target for natural selection. The Tree Swallow (*Tachycineta bicolor*) is an organism that has shown phenological shifts to early migration under climate change. The objective of this study was to determine whether there have been long term changes in Clock allele lengths associated with these phenological changes. DNA was extracted from 194 Tree Swallow samples spanning collection dates from 1900 to 2016, and Clock allele lengths were scored for each individual. We conducted a linear regression to determine if mean allele lengths have changed over time, and a Chi-squared test to determine whether allele frequencies have changed. Scored allele length sizes resulted in 180, 183, 186, 189, 192, and 195 with the most common being 186 (61%) and 189 (32%). Because of the consistently high frequency of common alleles, we found no evidence for a change in mean allele length ($p = 0.176$). However, the Chi-squared test was marginally significant, suggesting changes in the frequency of rare short and long alleles ($p = 0.051$), with long alleles associated with later migration decreasing in frequency, and short alleles associated with earlier migration increasing in frequency. Results suggest that the Clock gene may be a target of natural selection responsible for changes in migratory phenology in response to climate change.

Effects of extra-pair paternity on provisioning effort in male house wrens (*Troglodytes aedon*)

Avery Dart; Scott Sakaluk; Charles F. Thompson; Pirmin Nietlisbach

Some animals form socially monogamous pair bonds in which a male and female mate and raise young together. However, individuals within a socially monogamous pair bond may still mate with other individuals; this mating is defined as extra-pair mating (EPM). Extra-pair paternity (EPP) occurs when offspring arise from EPM. In wild birds, EPM is approximated by EPP. Males benefit from EPP by siring additional offspring without any investment aside from sperm. In contrast, from a female's perspective, EPP does not inherently increase the number of offspring they produce. Females are limited by egg production and the time it takes to raise those young, regardless of the father. However, females can still benefit from EPM. When females engage in EPM they may gain fertility assurance, access to sperm from higher quality males, and access to better foraging grounds. There are also potential costs to EPM for females, including a decrease in paternal effort by their social mates if they suspect paternity threats. I am investigating how male provisioning is affected by EPP and am studying these questions in a well-established house wren system. I am recording provisioning behaviors with video cameras and determining paternity using genetic markers. Individuals are identified by the colored bands on their legs. I am testing if males with more extra-pair young in their nests reduce provisioning rates. My research seeks to understand how EPP may benefit or cost females and how it changes male behavior. At the time of abstract submission, I do not have my final results. However, I expect to have them by the time of the conference.

Optimal Brood Sizes in Wood Ducks

J Brian Davis; Dylan L Bakner; Joe D Lancaster; Rick M Kaminski; Robert R Cox, Jr.

Nesting and brood rearing are critical annual-cycle periods for Nearctic waterfowl. Nutrient and energetic investments in eggs were long regarded as principal drivers of clutch size in ducks, whereas less is known about the effect of brood size on recruitment. North American wood ducks (*Aix sponsa*) engage in parasitic egg laying, and supernormal clutches are common. These large clutches and resulting broods call into question whether an optimal brood size(s) exists at nest exodus. Previous evidence indicated that survival of wood duck ducklings was greater for broods of 6 than broods of 14 ducklings. Despite apparent fitness benefits to female wood ducks tending smaller broods, we questioned whether net duckling recruits may be greater from larger than smaller broods. We monitored 429 radiomarked ducklings from 129 broods in Mississippi and Alabama. Brood sizes at nest exodus ranged from 3-20 and 3-21 ducklings, respectively in Mississippi and Alabama. Our index of duckling recruits was the number of 30-day old ducklings per radiomarked female in these two distinct populations of box-nesting wood ducks. At both study areas, duckling recruits increased with brood size from 3-12 ducklings, then an asymptote occurred at a brood size of ~12, resulting in a net loss of recruits. Our results correspond to what had been suggested as optimal brood sizes in a previous manipulative experiment of mallard (*Anas platyrhynchos*) clutch size and subsequent duckling survival and recruitment. Moreover, the optimal brood size from this study (i.e., ~12 ducklings) aligns with the standard clutch size of captive female Wood Ducks where conspecific brood parasitism was absent. Based on our findings, excessive brood parasitism does not benefit Wood Duck duckling recruitment, which suggests that parasitism probably evolved as an evolutionary stable strategy primarily benefiting other aspects of reproduction.

Wetland Bird Use and Management of Louisiana and Texas Gulf-Coast Ricelands

Frances E Buderman; Rick M Kaminski; Joe R Marty; Mike G Brasher; Scott A Rush; J Brian Davis

Agricultural lands are dominant landscapes across North America. Croplands, wetlands, and uplands juxtaposed within these landscapes form habitat complexes that influence abundance and distribution of waterfowl and other wetland birds. Within the Gulf of Mexico Coastal Prairie ecoregion, the Chenier Plain and Texas Mid-Coast are agricultural landscapes used mainly for rice production. These ricelands support millions of resident and migratory waterfowl and other waterbirds as they are often comprised of interspersions of production and temporarily idled rice fields, other agricultural lands, natural wetlands, pastures, and may occur adjacent to forests and urban areas. To explore how agricultural activities and land use composition influenced the distribution and abundance of waterbirds, we quantified factors associated with waterbird species richness and guild-level presence and observed abundance by conducting diurnal surveys in production, seed-, and idled-rice fields from August–March 2010–2013. This period of fall–early spring spanned rice-harvest, fall-migration, wintering, and spring-migration periods for waterfowl and other birds. We conducted 5,002 surveys in 142 fields and detected 20 waterfowl, 9 shorebird, 14 wader, 3 rail, and 7 species of other birds; 2,500 surveys were conducted in fields containing some water, which were retained for analysis. In modelling species richness, we found water depth best explained variation in waterbird richness, after accounting for spatio-temporal autocorrelation of observations. Species richness also increased with decreasing distance to the closest state or federal wildlife refuge. Water depth also best explained duck and shorebird presence and observed abundance, and both models contained negative effects of distance to nearest refuge. Field classification best explained waterbird presence and abundance, but there was a positive effect of distance to nearest refuge. Coupling the inference obtained from analyses of richness and abundance will inform landscape waterbird conservation in riceland regions.

What Birds Tell Us: Monitoring Birds in Cacao Agroforests of Western Ecuador Using Bioacoustics

Rebecca Davis; Shawn McCracken

The Pacific Forest of Ecuador is one of the most biologically important ecosystems in Latin America but is affected by extensive agriculture. Successful conservation efforts in this area must address both human and wildlife needs. Agroforestry is a land-use system that can balance both needs by cultivating crops amongst trees, thereby providing income while keeping the forest relatively intact. Potential benefits of agroforestry are due to its structural complexity. However, the threshold complexity that will benefit birds in the Pacific Forest is not known. Therefore, I am comparing the species assemblages in agroforestry plots of varying ages and structural complexity. This study is in the Jama-Coaque Reserve of western Ecuador. I sampled the bird species assemblages using automated recording units called AudioMoths. During the wet and dry seasons of 2023, the AudioMoths were deployed in fallow pastures, newly planted agroforestry plots, older agroforestry plots, and primary forest (27 sites). I carried out vegetation surveys to characterize the forest structural complexity by canopy cover, canopy height, number of shrubs and trees, and density of the understory. Initial analyses suggest young agroforestry plots are dissimilar from primary forest. Acoustic analyses, in collaboration with Rainforest Connection, are ongoing and use neural networks to identify birds by vocalization. The occupancy of bird species will be related to the vegetation results to understand how forest structure affects species presence. I predict that bird assemblages of low forest complexity (pastures and young agroforestry) to have lower species diversity, while assemblages of higher complexity (older agroforestry and undisturbed forest) will contain higher diversity. In addition, I expect forest-sensitive species to be absent in areas of low forest complexity. By comparing early-stage agroforestry plots to later-stage, this study will identify the structural complexity needed for the greatest benefit to native birds, and therefore overall biodiversity.

Effect of Urban characteristics and Land Use pattern on the Abundance of Declining Aerial Insectivore.

Anant Deshwal

Common Nighthawks are declining across their entire range in North America. This decline is attributed to several factors, such as habitat loss and degradation. The absence of Tallgrass prairies has resulted in the nighthawks nesting on flat gravel rooftops in the urban habitats. However, the absence of surveys focusing on crepuscular and urban birds has limited our ability to quantify the factors affecting Common Nighthawk populations. In this study, we used N-mixture Bayesian analysis to quantify the effects of landscape variables on the abundance of Common Nighthawks. We conducted surveys at dusk and dawn for nighthawks across the urban-rural-prairie gradient in Central Illinois. Our results show that the nighthawk abundance declined with the increase in cultivated land and pasture. The rate of decline in abundance was steeper for the pasture. Common Nighthawks prefer to nest on relatively flat lands in prairies. The advance of row crops in agricultural lands has resulted in fewer suitable nesting sites. Interestingly, the relationship between nighthawk abundance and developed areas was non-linear with quadratic response. Characteristics unique to urban landscapes, such as flat rooftops and light pollution, played an important role in determining their population abundance. Common Nighthawk abundance was not affected by other landscape characteristics.

Extralimitals as Scouts at the Leading Edge

Wendy Dorman

While we expect birds in North America to shift their ranges north in response to climate change, little attention has been paid to which species will move and the mechanism by which ranges shift. Extralimital occurrences involve individuals occurring outside of their species' core breeding distribution. The probability of extralimital occurrences may be used to infer the potential of a species to expand their range, while the location of extralimital occurrences could indicate potential areas where the range may expand. Using a Bayesian approach combining data from eBird and the Breeding Bird Survey we identified breeding season dates, delimited the breeding range, and modeled occupancy for twenty migrant passerine species. Using pattern analysis, we explored changes in these species' distributions north of the range edge to determine a given species demonstrated range plasticity over time. Range plasticity is the combined result of phenotypic plasticity and the impacts of natural selection and may serve as a proxy for a species' capacity to respond to environmental change. Incorporating plasticity could both overcome a major limitation of Species Distribution Modeling and allow land managers to direct conservation efforts to facilitate range shifts in the face of climate change. I will discuss progress towards constructing a Range Plasticity Index for all birds in North America and the implications for modeling climate change impacts.

Why are eastern whip-poor-wills disappearing across the Midwest?

Dave Edlund; Michael Ward; TJ Benson; Chris Tonra; Steve Matthews; Michael Avara; Holly Coates; Ian Souza-Cole; Grant Witynski

Calls of the eastern whip-poor-will (*Antrostomus vociferus*) were once an iconic feature of Midwest forests, though, they have become increasingly silent across the landscape. Whip-poor-wills are a nocturnal, aerial insectivore, commonly found in forests throughout eastern North America. Due to their nocturnal nature, whip-poor-wills are not as closely monitored as other species. However, data suggests a 70% decline over the last 50 years and has since been listed as a species of conservation concern by the U.S. Fish and Wildlife Service. In response to this drastic decline and lack of monitoring, we instituted a monitoring project focused on revisiting and surveying Breeding Bird Atlas blocks in Illinois, Ohio, Missouri, Michigan, and Wisconsin, to elucidate what factors are contributing to their decline. From May-July in 2022 and 2023, we conducted fieldwork at 24 study sites (12 sites per year) across the aforementioned states with the following goals: conduct whip-poor-will point count surveys, trap insects, and collect fecal samples from whip-poor-wills. Using environmental data collected on-site and GIS layers from a multitude of sources, we are quantifying habitat, landcover, and other environmental covariates to identify predictors of whip-poor-will occupancy. These data include canopy cover, canopy height, landcover class, light pollution, and soil composition. Insect sampling was conducted using light traps deployed at 5 random point-count locations and were active for 3 hours. These samples were then collected and returned to be sorted by order and family and weighed to determine relative abundance and diversity. Upon capture, fecal samples were collected from whip-poor-wills. Using DNA metabarcoding, we can identify insect prey down to order and family, providing a means to compare prey availability from insect traps and examine spatial variation in the whip-poor-will's diet. Understanding the factors contributing to whip-poor-will decline will better inform future research and conservation practices.

Estimating apparent adult survivorship to understand population dynamics of long-distance migratory birds: A frontier in the forest canopy

Carl Engstrom; Stephen Matthews; Christopher M Tonra; Amanda D Rodewald; Felicity L Newell

The forest canopy remains a frontier in understanding forest ecosystems. Studying birds that forage and nest in the canopy presents a unique set of challenges and numerous knowledge gaps remain about basic life history. Many canopy birds are species that annually engage in long-distance migrations between breeding and non-breeding grounds from eastern North America to the Neotropics. These species face countless obstacles on their migratory routes which can lead to high mortality rates. One knowledge gap for canopy species is obtaining accurate estimates of adult survivorship, an important metric for understanding population dynamics. However, survival still remains apparent due to the difficulties of accounting for emigration. To address these questions, we used an intensive mark-resight dataset collected across three forests over four years from 2007–2010 in southeastern Ohio's Appalachian foothill region. This dataset contained unique encounter histories ($N = 262$) for four species of migratory canopy species: Eastern Wood-Pewee, Yellow-throated Vireo, Cerulean Warbler, Scarlet Tanager. Birds were captured using mist nets, fitted with unique color band combinations, and then were attempted to be resighted in subsequent years. Apparent adult survivorship estimates for each species were made by building Cormack-Jolly-Seber models using program MARK in R. Across a suite of migratory species in the forest canopy, we investigate spatiotemporal drivers impacting survivorship of different age-sex classes including inter-annual variability, the composition and structures of forests, as well as individual-level metrics such as size and body condition. Results from this study will help to improve our understanding of the drivers of population dynamics of migratory birds, including a new frontier in the forest canopy. As long-distance migrants continue to face mounting threats across their annual cycle, our results help to provide insight into the drivers of population declines of different species.

The Effects of Tree Density in Relation to Building Fronts and Foraging Strategies on Window Collision Probability

Holly E Erickson; Emma R Robinson; Matthew B Shumar

Killing up to one billion birds annually in the United States of America alone, glass poses a significant problem towards declining bird populations. This danger peaks during migration, threatening first year birds most. Glass reflections of trees and the sky have been shown to result in higher rates of collision. Collected over several years, the collision data used in this study provide a larger picture to compare tree density, foraging strategy, building facade, and taxonomic variables with window collision concentration. As part of a long-term citizen science program, trained students from the Ohio State University have monitored window collisions since 2018. Surveys along pre-selected routes began thirty minutes prior to sunrise and lasted roughly an hour and a half. The date, time, building, building side, longitude, and latitude were gathered on site, then each collected bird was aged and sexed. We surveyed 152 buildings, resulting in 985 avian window collisions. Approximately 50% of salvaged birds were considered primarily ground foragers, while primarily subcanopy foraging birds accounted for under 20%. Long distance and short distance migrants, respectively, made up similar collision proportions. We acquired the locations of campus trees from The Ohio State University Tree & Plant App and aligned them with simplified building fronts facing the cardinal directions. Based on exploratory analyses, we hypothesize that ground foragers will have higher collision rates than species foraging in trees and shrubs, and that these rates will be focused around building fronts with high tree density. While we expect strikes to occur with higher frequency near more trees, ground foragers are expected to have less of a correlation. We anticipate these data and supporting analyses to assist in informing campus building managers which building fronts to focus on and in guiding future construction choices for the safety of birds and benefit of students.

The Role of Parental Phenotype on Nest Predation in a Facultatively Biparental Species

Facundo Fernandez-Duque; Abby Stiefvater; Saieshwar Chikoti; Jules Chabain; Thomas J Benson; Mark E Hauber

Sexual dichromatism has long captivated the attention of evolutionary biologists, with research in this area receiving significant impetus from the seminal contributions of Darwin and Wallace. While Darwin's work emphasized the aspects of male ornamentation driven by intrasexual competition and female mate choice, Wallace's perspective shifted towards the role of natural selection and cryptic female ornamentation in reducing predation risk to dependent young. Here, we investigated the role of sexual dichromatism in the nest depredation risk of Red-winged Blackbird (*Agelaius phoeniceus*), a species with facultative parental care by the more ornamented male sex. We experimentally assessed clutch survival as a function of both artificial nest placement (either over water or land) and the presence of a life-like model of either parental sex at the nest. We found that nests placed over water experienced lower depredation rates and that there was a strong effect of sex, as nests with the female models had lower depredation rates over water only. These findings support an interplay between natural and sexual selection in the context of sexual dichromatism and contribute to a fuller understanding of the selective pressures shaping parental care trade-offs.

All your eggs in one basket - the Bird Eggs of Canada website

Ryan J Fisher

There are several published books on identification of North American bird eggs and their nests. However, many of these field guides rely on in situ photographs of bird nests and eggs, without standardized backgrounds, lighting, or information on size and scale. Furthermore, these hardcopy books may not be easily carried in the field. Our goal with the Bird Eggs of Canada website (www.birdegsofcanada.ca) was to display and photograph museum egg specimens of approximately 430 species of birds that regularly breed in Canada. We recognize the incredible variability of eggs of the same species, even within the same clutch, however, for each species the website will have high resolution photographs of (1) a single egg and (2) an average clutch for each species. Each picture will be on a standardized background, with a colour palette, and measurement scale. The website will be searchable by Order, Family, Scientific name or Common name and users will be able to compare eggs of up to three species. While only high-resolution jpegs will be available online, we have retained raw format photographs if they are needed for research or other purposes. To date, we've photographed eggs of 319 species that regularly breed in Canada and the website is live and ready to use. We have also shared all the photographs with the Birds of the World and those egg photographs are being incorporated into various species accounts.

Variable response of territorial Ovenbirds to simulated intrusions that sound similar to or different from a neighbor

Jennifer R Foote

Song sharing in many species of territorial birds results from song learning such that individuals may share song types with others in their local population. Despite being similar, individuals can discriminate between similar sounding songs. Many territorial songbirds show a 'dear enemy' effect, responding less strongly to playback of a neighbour's song compared to that of an unfamiliar stranger when played at the territory boundary with that neighbour. I tested whether male Ovenbirds (*Seiurus aurocapilla*) responded similarly to playback of stranger songs when they were similar or different from the neighbour's song compared to responses to a neighbour's song (N=18 males). I performed three short 3-min playbacks of songs of 1) the neighbour, 2) a song from another male with the same song type as the neighbour, and 3) a song of another male with a different song type from the neighbour. I used a principal components analysis to compare vocal and movement responses among playbacks. I found that ovenbirds had significantly higher PC1 scores for different stranger playback than to either their neighbour or the similar stranger, which did not differ from each other. Males were generally more likely to respond to playback if they were already singing when the playback began. Song rates tended to remain higher over the hour following playback compared to the hour before when measured using autonomous recorders. My results suggest that for short duration intrusions, males may not respond as strongly to intruders when they sound like neighbors and are played in an expected location for that song perhaps as a result of not attending closely to the song of a 'dear-enemy'.

Nest survival of interior least terns (*Sternula antillarum athalassos*) and piping plovers (*Charadrius melodus*) at off-river sites and sandbars in the lower Platte River system, Nebraska

Elsa M Forsberg, Rose J Swift, Joel G Jorgensen, Mark P Vrtiska, Larkin A Powell

Nest survival is an important productivity metric for managers of protected species such as interior least terns (*Sternula antillarum athalassos*, hereafter terns) and piping plovers (*Charadrius melodus*, hereafter plovers). In the lower Platte River system (LPRS) of eastern Nebraska, terns and plovers nest on river sandbars and different types of human-created off-river sites (i.e., sand and gravel mines and their derivatives, housing developments and transition sites). However, off-river habitat is not sustainable for tern and plover nesting in the long term because of changing industry practices, and habitat availability on river sandbars has also been limited in recent years. Understanding nest survival at off-river sites can inform the role of off-river sites in future conservation and management of terns and plovers in the LPRS and the Great Plains. We evaluated tern ($n = 2386$) and plover ($n = 605$) nest survival at off-river and sandbar sites using a long-term monitoring dataset from 2008-2023. Tern and plover nest survival did not differ between off-river sites and river sandbars from 2008-2013. For plovers, there was no difference in nest survival between off-river site types from 2014-2023. However, tern nest survival differed by off-river site type, with the highest cumulative survival rate at housing sites, followed by transition and mine sites. As nest survival at off-river sites is comparable to sandbars, the predicted decline of habitat provided at off-river sites may reduce the overall productivity and abundance of terns and plovers in the LPRS.

Survival of adult and hatch-year piping plovers (*Charadrius melodus*) at off-river sites in the lower Platte River system, Nebraska

Elsa M Forsberg, Rose J Swift, Joel G Jorgensen, Mark P Vrtiska, Larkin A Powell

Vital rates help inform the conservation and management of threatened and endangered species. The piping plover (*Charadrius melodus*, hereafter plovers) is a threatened shorebird that nests in the lower Platte River system (LPRS), Nebraska. While river sandbars serve as natural nesting habitat, plovers in the LPRS often nest at different types of off-river sandpit sites (e.g., active sand and gravel mines, transition sites, and lakeshore housing developments). Although these off-river sites are not managed to prioritize plover nesting, they host many breeding plovers in the LPRS especially in years when sandbar habitat is minimally available. While off-river nesting is suspected to be important for the persistence of plovers in the region, the quantity of habitat provided at off-river sites is predicted to decline, such that evaluating adult survival among different nesting habitats in the LPRS may improve future conservation efforts. We estimated annual survival of adult ($n = 671$) and hatch-year ($n = 176$) plovers and within-season weekly survival of adult plovers ($n = 243$) at off-river sites using a long-term dataset from 2008-2023. Survival rates of adult and hatch-year plovers at off-river sites in the LPRS were comparable to other studies within the Great Plains population, indicating no consequence of off-river nesting to survival. There was also no evidence of a difference in adult survival among different types of off-river sites within years. Considering that plovers are becoming more dependent upon off-river habitats within the LPRS, continued monitoring of plover survival would allow managers to evaluate recovery implications under uncertain future habitat availability in the region.

130 years of Forbes Biological Station

Auriel MV Fournier

Forbes Biological Station was founded in 1894, giving it the honor of being the oldest inland field station in North America. In 2024 we are celebrating our 130th anniversary, and this talk would cover the station's history, from the initial work done by Stephen Forbes, to the waterfowl and wetland research powerhouse it is today.

The Influence of Climate Change on the Reproductive Success of Tree Swallows

Margaret C Friedman; Todd J Underwood

There has been little research on the impact of climate change on bird reproductive success in the Mid-Atlantic Region. We examined the long-term trends in the reproductive success of Tree Swallows breeding on the Kutztown University campus from 2009-2023. Overall, we found that temperature does influence the reproductive success of breeding in Tree Swallows, but some trends were not in the direction predicted by climate change. We found that the day they laid their first eggs was significantly related to the average temperature of May. In warmer springs, Tree Swallows laid their eggs earlier. However, we found that their average first egg-laying date increased significantly over time. This may have occurred because there was a slight, non-significant trend toward lower average May temperatures over time. Tree Swallows that lay their eggs later also had higher hatching success, tended to have higher nest success, and tended to produce more offspring. These impacts on reproductive success may have occurred because of cold snaps or adverse weather in early May. Our study reveals that the influence of climate change on bird reproductive success may not be the same at every location.

Comparison of vegetation and water-holding capacity of a waterfowl production area, pre- and post-sediment removal, in south-central Nebraska

Hailey Fuqua; Letitia Reichart; Jeffrey Drahota

Rainwater Basin wetlands provide important habitat for spring migratory waterfowl. The United States Fish and Wildlife Service manages restored basins in this region to provide stop-over habitat with important food resources. Over time restored basins fill in with sediment and undesirable vegetation becomes dominant in the basin. Undesirable plant species do not provide the appropriate forage resources needed by spring migratory waterfowl. In March 2016 sediment was removed from Theesen Waterfowl Production Area (WPA), located in south-central Nebraska, to restore vegetation that supports foraging needs for spring migratory waterfowl. For this project we resampled Theesen WPA in July 2023 to compare vegetation composition before restoration and after restoration. In addition, we also measured soil hardness across experimental units within the WPA to estimate potential water-holding ability. We collected samples from three experimental units and from a control location where sediment was not removed. Preliminary data suggests that undesirable vegetation was reduced in areas where sediment was removed, and water-holding ability was increased. Results of this study will be useful to inform habitat management for spring migratory waterfowl. Future research will also examine waterfowl use of habitat on restored sites.

Postbreeding Ecology of Wood Ducks in the Illinois River Valley

Andrew D Gilbert; Aaron P Yetter; Christopher S Hine; Joshua M Osborn; Chelsea S Kross; Joseph D Lancaster; Auriel MV Fournier;

The wood duck (*Aix sponsa*) is the most abundant nesting duck species in Illinois and consistently rank second only to mallards (*Anas platyrhynchos*) in both Illinois and the Mississippi Flyway duck harvest. Much research on wood ducks has involved their breeding ecology. However, despite the consistent and maintained harvest of this species, relatively few studies have investigated the postbreeding ecology of the species, especially in Illinois. We captured and marked wood ducks with either a very high frequency (VHF) radio transmitter or a solar charged GSM transmitter during the postbreeding period in late July and August 2018-2020. Capture locations were within the La Grange Pool of the Illinois River extending from near Pekin, IL to the La Grange Lock and Dam near Meredosia, IL. We used standard radio-telemetry techniques to track wood ducks to determine habitat use, home range size, daily movement patterns, survival, and migration chronology. We identified 13,029 point locations (diurnal: 8,367; nocturnal: 4,662) from wood ducks with VHF transmitters and 30,939 point locations (diurnal: 15,791; nocturnal: 15,148) from wood ducks with GSM transmitters. Wood ducks primarily used forested (46%), emergent vegetation (36%), and aquatic bed (12%) wetland habitats. Home range size (95% MCP) for wood ducks averaged $6,820 \pm 572$ ha. Daily movement distance from diurnal to nocturnal locations of wood ducks within the IRV was $2,906 \pm 28$ m. Comparison of means revealed that daily movement distance of wood ducks in October and November was significantly greater than daily movement distance in August or September ($F=151.1$, $P=0.000$). Most wood ducks departed La Grange Pool by early November (\bar{x} = October 28, median = November 4), and the latest bird to emigrate was on December 15th. On average wood ducks traveled 422 ± 41 km per migration event to a migratory stopover location during autumn migration.

Characterizing Window Strikes at Truman State University to Inform Conservation Efforts

Matthew Gilley; Colin Barry; Vayujeet Gokhale; Joanna K Hubbard

Window collisions are a leading contributor to human-caused mortality in birds; however, the prevalence of window strikes in the Mississippi Flyway is not fully understood. Many birds are unable to perceive glass as a barrier due to its reflective qualities, which is further exacerbated by nearby feeders or foliage. Excess artificial light that escapes from windows also attracts nocturnal migrants that use light as a tool for navigation. Since February 2023, we have conducted regular carcass surveys at academic buildings on the campus of Truman State University to understand the species that are impacted by strikes and the buildings that contribute most to strikes. Over the course of one year of observation, 26 carcasses were documented from both migrant and resident species with the most abundant strike species being the American Robin, *Turdus migratorius* ($n = 10$). Most of the strikes occurred with birds flying southbound into the north faces of buildings ($n = 14$). During the months of June 2023 through July 2023, strikes were observed more frequently during morning surveys than midday or evening surveys. To better understand how local species abundance may impact strike data on susceptible species, we are also conducting weekly point count surveys on campus. In the next phase of this project, we will test the efficiency in lowering strike incidents of UV reflective film in locations with the most window strikes. These results will ultimately inform a campus-wide mitigation plan aimed at improving Truman State University's wildlife stewardship. We have observed window strike mortality in vulnerable species (e.g., chimney swift, *Chaetura pelagica*), thus mitigation strategies that reduce window strikes on campus will improve our conservation efforts.

House Sparrows' Global Conquest: Unpacking the Enemy Release Hypothesis and Immune Dynamics

Indira Goldman; Diego Santiago-Alarcon; Lynn B Martin

Originating from Eurasia and North Africa, house sparrows (*Passer domesticus*) have expanded their populations around the globe during the last two centuries. We investigate a potential explanation for their success: the Enemy Release Hypothesis (ERH) and their immune strategies. The ERH suggests that non-native species thrive due to their ability to escape from their natural coevolved enemies, such as haemosporidian parasites, and can thus be fitter relative to their counterparts residing in native habitats. We test two main predictions: (1) non-native house sparrow populations will have lower parasite prevalence and intensity compared to native populations, and (2) these non-native populations will show health indicators of efficient immune strategies with reduced physiological costs. We analyzed blood smears from eight global house sparrow populations to assess haemosporidian parasite loads and the sparrows' cellular and physiological immune responses. We expect to find a balance between constitutive and induced defenses and a trade-off between immunity and health. We predict that invasive sparrows strategically modulate their immune investment to enhance colonization success. Expected results include higher parasitic infections and greater immunocompetence in native sparrows, and reduced infections in non-native sparrows, supporting the ERH. This research will contribute to understanding the factors facilitating the establishment and dominance of non-native species.

Analysis of foraging strategies in winter resident birds

Aidan Hand, Faiza Hafeez, Daizaburo Shizuka

During times of food scarcity, the ability to find and exploit new food sources is a valuable skill for survival. There may be multiple strategies that optimize an individual's ability to utilize food sources. These strategies could include defending reliable food sources or not relying on constant food sources because the individual is good at finding new ones. In this study, we test whether winter resident birds use different foraging strategies when feeding at bird feeders. We take advantage of an ongoing project using an array of bird feeders in fixed locations and radio frequency identification (RFID) banded birds to study foraging and social networks among mixed species flocks, primarily black-capped chickadees (*Poecile atricapillus*), white-breasted nuthatches (*Sitta carolinensis*), and downy woodpeckers (*Picoides pubescens*). During the 2021 and 2023 winter seasons, we carried out experiments to determine the first birds to arrive at new, randomly placed feeders using RFID and video cameras. We used the records of birds arriving at both the constant feeder array and the experimental feeders to determine whether birds that find the new food sources are also feeding at the fixed feeders, or if they are using some alternative strategy. We compared the average number of daily visits a bird made to fixed feeders to the probability of that individual finding a new, randomly placed feeder to determine if there is a relationship. The results will provide information on the strategies birds employ to make use of differing food resources.

Deciphering survival and habitat use during the breeding and post-breeding periods for Kirtland's Warblers

Haley Haradon; Nathan W Cooper; TJ Benson; Michael P Ward

The complicated annual cycles of migratory bird species have created formidable barriers to understanding the factors that limit their populations. For migratory birds, the post-breeding period is likely an important part of the annual cycle yet has received little attention. To fill this critical information gap, we used a combination of handheld and automated telemetry to investigate the behavior and ecology of adult and juvenile Kirtland's Warblers (*Setophaga kirtlandii*) during the breeding and post-breeding periods and until final departure of each individual on fall migration. Automated telemetry towers obtaining daily detections were combined with weekly re-sighting made possible by handheld telemetry. Survival probabilities will be estimated using a robust design framework with weekly and daily primary and secondary occasions. Changes in habitat use were examined by combining individual locations derived from weekly re-sights and measurements derived from lidar. Data [NC1] were collected from May-October in 2022 and 2023 and data collection is now complete. Preliminary findings suggest that: 1) survival may differ between the breeding and post-breeding periods for adult and juvenile birds and 2) adults may relocate in the post-breeding period to habitat which differs from breeding habitat, while highly mobile juveniles appear to exhibit different movement and habitat use strategies altogether. By examining the post-breeding period, our research seeks to fill important gaps in our understanding of the full annual cycle of songbirds and potentially provides information to develop new conservation and management strategies across species with similar life histories.

Long-term change in climate and body size of songbird species captured during migration in northeastern Pennsylvania, USA.

Robert J Smith; Jason M Graham; Margret I Hatch; Erica Lasek-Nesselquist; Anne M Royer

Body size varies predictably across latitude in most endothermic species and this variation has been used to formulate hypotheses about how species will respond to climate change. We found that temperature and precipitation increased at our study site from 2004 to 2022 and used multiple morphological measurements of 36 avian species captured across the same period to show that one or more body size metrics increased in most species, opposite of the commonly invoked prediction that body size will decrease in response to global warming. Further, environmental conditions (precipitation, temperature) experienced when most young of the year were growing (June, July) were positively associated with one or more morphological measures, supporting the resource availability hypothesis (annual variation in body size is driven by fluctuations in food). Collectively, our results suggest the long-term body size increases we detected may have been due to factors associated with climate change such as increased food availability and/or reduction in thermoregulatory costs while young were growing. Our results add to the growing evidence that climate change influences avian morphology, though more work is necessary to determine if morphological change is due to developmental plasticity, selection on heritable variation or some combination.

Relatedness among Sandhill Cranes in south-central Wisconsin

Matthew Hayes

I investigated relatedness among individuals in a population of Sandhill Cranes in south-central Wisconsin that has been actively banded since 1991. I used blood samples collected 1996-2014 from 175 birds in 41 complete families (both parents banded in tandem or prior to any chicks raised by those parents) to generate alleles at 10 microsatellite loci. Using CERVUS, I used these data to establish parentage among known families to determine genetic relationships. The putative parents were matched to chicks raised by those parents in 89% of these families. In the remaining 11%, 6% of chicks belonged to one putative parent while 5% belonged to neither putative parent (adoption). Using these known relationships, I calculated relatedness among known family members (mates, parent-offspring, full siblings, half siblings) using ML-Relate (Kalinowski et al. 2006). Mates were on average unrelated ($r = 0.067$). Relatedness among banded family members was as expected (avg. parent-offspring = 0.51, avg. full siblings = 0.44, avg. half-siblings = 0.20). Among nesting wetlands, males and females were generally unrelated. Only one nesting wetland showed higher relatedness among males (0.11) compared to females (0.05). Given the demographic bottleneck that occurred among Sandhill Cranes 100 years ago, it is important to record these relationships to determine any inbreeding that may have occurred following the population nadir.

Turkey Vulture Movements on Vancouver Island: Home Range, Activity Patterns, and Habitat Use

Cara Herrington; Amanda Bates; Gillian Radcliffe

Turkey Vultures (TUVUs) have been expanding their migratory range northwards into Canada, especially in the western provinces. Despite this, no studies on the movement ecology of these raptors have been conducted in British Columbia. In 2022 and 2023, six adult and three juvenile TUVUs were fitted with GPS transmitters on Vancouver Island. Primary analysis on the GPS data received were conducted using both GIS methods and packages in the program R. Tracking data has allowed us to describe 1). home range size, 2). land type selection, and 3). activity patterns. Considerable variation amongst individuals within all three analysis categories was noted. Mean (\pm SD) home range size, calculated using Kernel Density Estimate (KDE), was found to be $204.82 \pm 150.09 \text{ km}^2$ in 2023 when all six adult TUVUs were tracked. In 2022, a single individual displayed a seasonal home range of 17.35 km^2 , the smallest home range recorded for this species in Canada. As this project continues to progress, there is potential to investigate yearly patterns as well as differences/similarities among subsets of the population.

Movements dominate population dynamics in a nonmigratory population of Loggerhead Shrikes

Chris Hill; Katie Maddox; Kyle Miles

Measurements of population size and its changes over time can give insights into the interplay of reproduction, movement and mortality. We monitored population fluctuations on a year-round basis in a resident, nonmigratory population of Loggerhead Shrikes (*Lanius ludovicianus*) in an 850 ha study area in the coastal plain of South Carolina, U.S.A. We banded adult and nestling shrikes, and nearly every shrike in our study area was individually identifiable in the field. We conducted surveys to resight banded shrikes twice monthly for four years. The total population of shrikes in our study area ranged between 30 and 74 individuals, and two patterns emerged: an overall linear decline of 44% (about 12.5% per year), and an annual cycle where numbers peaked early in the breeding season and declined through summer, fall and winter. We will discuss explanations for these patterns and their implications for managing populations of this declining species.

Eastern Screech-Owls in Kearney, NE: Descriptions of an Urban and Semi-Urban Population in the Great Plains

Ran Hirosawa; Jacob Cooper; Letitia Reichart

Eastern Screech Owls are common residents in central and eastern North America, inhabit forests, suburbs, and parks. They nest in natural or artificial cavities. Nesting locations for these birds are not well documented in many locations because they are active at night. Citizen science databases, such as eBird, have records of Eastern Screech Owls, although nest sites are not always identified. For this study we will document breeding behavior, identify territories and nests, and record songs of Eastern Screech Owls that occur within the city limits of Kearney, Nebraska. Currently, we have found two nests and recorded calls from one pair. We are just beginning field work for this project and expect to find more nests and record additional calls from multiple individuals. This data will help describe nesting habits in urban and rural areas lacking other owl species.

Conservation partners defragment bottomland forests and increase songbird nesting success

Jeffrey P Hoover; Matthew IM Louder; Thomas J Benson; Scott K Robinson

Neotropical migratory birds face continued threats resulting from the loss, fragmentation and degradation of natural habitats. Research during the past 30 years has demonstrated the negative effects of habitat fragmentation (increased brood parasitism by cowbirds and decreased nest survival) on migratory songbirds breeding in temperate bottomland forests, and land acquisition/conservation efforts that “defragment” forests are possibly the best solution to restore or improve bottomland forest ecosystems for these birds. The Cache River Joint Venture Partnership (JVP; ILDNR, USFWS, and TNC) formed in 1991 in an effort to conserve and restore some 60,000 acres of bottomland forest habitat in the Cache River watershed of southern Illinois. Through the early 2010s, the JVP had successfully acquired and re-forested over 20,000 acres of non-forested (primarily agricultural) land. During 1993-1995, and again during 2010-2012, we documented nesting success of various species of bird prior to and after most of this land-use conversion, respectively. We predicted that, as a result of the reduction of forest fragmentation, rates of cowbird parasitism would decrease and nest survival increase between the two time periods. We also predicted that some measure of landscape composition (e.g., percent landcover in agriculture within a particular radius around nests) would be correlated with nesting success. We analyzed data collected from 1554 nests (22,238 exposure days) representing 7 species. As predicted, nest survival increased and cowbird parasitism decreased between the early and late time periods. Nest survival was most affected by percent landcover in agriculture within 1 km, whereas for cowbird parasitism it was percent agriculture within 5 km. These results represent the merging of scientific research with conservation in action in an effort to evaluate the success of conservation efforts. In the end, these efforts provided tangible benefits to birds breeding in bottomland forests.

Does mercury exposure influence sexually selected plumage color variation in barn swallows?

Joanna K Hubbard; Kallista Stubblefield; Rebecka L Brasso

In North American barn swallows (*Hirundo rustica erythrogaster*), melanin-based plumage color is a sexually selected signal with darker males and females experiencing higher reproductive success. Color variation in barn swallows is influenced by both genetic and environmental variation, but the specific environmental factors that affect color development remain unknown. In birds, assimilation of heavy metal toxins, such as mercury, into developing feathers can disrupt melanin production and deposition and ultimately affect coloration. In this study, we monitored breeding populations of barn swallows in Northeast Missouri in 2018 and 2019. We quantified feather mercury concentration ([Hg]) in adult and nestling barn swallows to assess the levels of exposure at the time of feather growth. We compared [Hg] to the coloration of ventral plumage to determine whether mercury affects development of this colorful signal used for mate choice. We predicted individuals with higher [Hg] would have brighter, less saturated coloration (i.e., less ornamentation). Despite finding mercury at concentrations of 1.758 ppm in adult birds, we found no relationship between plumage color and [Hg]. While [Hg] was much lower in nestlings (0.311 ppm at 12 days post-hatching) it did impact juvenal plumage color as predicted. We also found significant inter-annual variation in mercury exposure in the barn swallow nestlings as the average feather [Hg] in 2019 was more than twice that of 2018. This difference corresponds with relevant environmental variation as there was extensive flooding in Northeast Missouri in 2019 resulting in weeks of standing water on many agricultural fields potentially resulting in an increase in bioavailable mercury. These results suggest that environmental toxins may influence the expression of sexually selected traits and temporal variation in potential exposure to such toxins can increase phenotypic variation within a population.

Landscape effects on Chimney Swift (*Chaetura pelagica*) roost sizes

Kathleen Hunter; Joel Ralston

Aerial insectivores have been facing major declines since the 1980s. Hypothesized causes include declines in prey abundance and habitat loss. Many of these population declines are occurring in urbanized and industrialized areas. Chimney Swifts are a declining migrating species that belongs to the aerial insectivore guild, and they are known to utilize urban and industrial areas for roosting. Migratory stopover is an important part of the annual cycle, and in order to understand declines we need to understand stopover behaviors. During stopover Chimney Swifts exhibit a unique behavior of roosting in large groups in man-made chimneys. This provides a unique opportunity to census the size of migrating populations of aerial insectivores in relation to landscape variables. This study aims to observe the behavior of Chimney Swifts at a large migratory roost on the campus of University of Notre Dame, and look at how different landscape, climate, and county classification variables affect roost size across the United States. The hypothesis of this study is that roosts found in non-developed locations will be larger than roosts found in developed locations. To test this hypothesis, I conducted a series of linear regressions on roost size and various landscape scale variables such as climate, human population density, and degree of urbanization. The results of this study show that climate and latitude variables have no effect on roost size, while urbanization and built-up land surrounding the roosts have a small, but significant positive effect on roost size. This finding shows that Chimney Swift roosts are larger in size in industrialized areas, and it exhibits the importance of habitat availability during stopover.

A collaborative effort to understand golden eagle (*Aquila chrysaetos*) presence, distribution, and movement in Maine, USA

Erynn Call; Tricia Miller; Evan Jackson

Golden eagles (*Aquila chrysaetos*) are of conservation concern, particularly in eastern North America, where they are listed as endangered or threatened in several states and provinces, including Maine, where they are endangered. Uncommon winter residents and a former rare breeding species in the state, the last documented breeding attempt occurred in 1997 and the last documented fledging occurred in 1984. Due to limited information about the population of golden eagles in Maine, a collaborative effort involving the state, NGOs, partners, and volunteers has begun to assess their distribution, abundance, and habitat use. Previous telemetry data suggest some eagles visit areas near historic nesting sites in summer, but the full extent of use, distribution, and movement remains unknown. The project involves deploying baited camera traps initially, followed by trapping and tagging efforts to locate areas of use within the breeding and winter seasons. The study also aims to raise public awareness about golden eagle conservation in Maine, as well as address knowledge gaps essential for their effective conservation and management.

The Effects of Age and Habitat Quality on Fall Migration Decisions in Lazuli Buntings (*Passerina amoena*)

Kenton James Bustin; John F Cavitt

The timing, routes, and duration of migration can vary greatly among small passerine species, populations, and individuals. However, knowledge of this variation is important for understanding population dynamics, as well as informing annual cycle conservation plans. We examined the migration ecology of a population of Lazuli Buntings (*Passerina amoena*) breeding within a Gambel Oak shrub community in Northern Utah. Banding station data from this site suggest that the timing of migration departure in fall may differ between adults and juveniles, with adults possibly departing two or more weeks earlier. Furthermore, the routes and duration of migration are poorly known for this species. Consequently, we examined the migration ecology of Lazuli Buntings with the radiotelemetry Motus Network to address these knowledge gaps. Ten adults and 10 hatch-year birds were captured with mist nets, banded with a numbered USGS aluminum banded, measured, weighed to the nearest 0.1g, fat level scored, flight muscle mass measured, and then fitted with a Lotek NanoTag radio transmitter. Only birds whose body mass was greater than 97% of the leg bands, harness, and transmitter were fitted with transmitters. These transmitters are connected to the Motus System and thus provide extensive coverage throughout a large portion of the Western U.S. Time of departure and meteorological conditions were obtained to test for age differences. Additional variables were also obtained including flight speed, stopover location, distance, and destination to see if differences between ages exist. Variables related to body condition (mass, fat score, and mean flight muscle mass) were tested to determine if they covaried with any of the migration data collected.

Examining the relationship between environmental temperatures, body temperature and behaviour in breeding Snow Buntings

Rebecca Jardine; F Vézina; CAD Semeniuk; HG Gilchrist; OP Love

The Arctic is experiencing rapid rates of climate change, where temperatures are increasing faster than the global average. Arctic-breeding birds that have adapted to cold conditions throughout their annual cycle may not be physiologically prepared for warming conditions, especially during the energetically demanding breeding period. Of specific concern is the Snow Bunting (*Plectrophenax nivalis*), an Arctic-breeding songbird whose populations are rapidly declining without clear mechanism. Due to high metabolic rates and correspondingly high body temperatures, effective heat dissipation during chick-rearing is vital to reduce the risk of reaching lethal body temperatures. Thus, when environmental temperatures exceed optimal levels, breeding birds working at an elevated metabolic rate must begin dissipating heat and adjust behaviorally by reducing chick-rearing behaviours to maintain body temperatures. Recent modelling applying a thermoregulatory polygon approach on high-Arctic breeding Snow Buntings predicts that chick-rearing would be impacted at environmental temperatures of only 11.7°C, temperatures regularly reached during their breeding period in the low- and high-Arctic. However, we do not know whether these predictions will apply at low-Arctic sites where temperatures fluctuate over a daily cycle, potentially offering a temperature refuge. To determine whether buntings are impacted by increasing temperatures during the breeding season, real-time body temperature and parental foraging responses were recorded using implanted Radio-Frequency Identification thermal tags. To examine the complex relationships between intrinsic and extrinsic drivers on provisioning, I will test how environmental temperature, body temperature, time of day, demand and ordinal date interact and impact provisioning rates using a Piecewise Structural Equation modelling approach. Understanding the physiological and behavioural responses of cold-adapted species to increasing temperatures is vital for improving our understanding of cold-specialist species' responses to global warming. This information is important as Snow Buntings are in decline while temperature trends in the Arctic continue to rise.

Are predator proof nest boxes really predator proof?

Julie Jedlicka; Teri Larison; Stacy Barnes; Dakota Ballard; Jacobo Barriga; Marissa Gruetze; Jessica Poush; Alyka Zahnd

Predator proof nest boxes are marketed as a safer alternative for cavity-nesting birds, but rarely has this claim been tested. By establishing both predator proof and standard nest boxes in thirty-one pairs across a 700 acre urban campus in Missouri, we analyzed whether native, cavity-nesting birds exhibited a preference for a specific box type and whether number of eggs laid and fledglings produced differed between box types. We analyzed data from the Eastern Bluebird (*Sialia sialis*), Black-capped Chickadee (*Parus atricapillus*), and House Wren (*Troglodytes aedon*). We recorded the species type, number of eggs laid, number of live young and dead young, nest status, adult and young status and parasitic presence. After predation events in standard boxes, several birds moved to a predator proof nest box to rebuild. In 2022 and 2023, there was not a significant difference in the preference of nest boxes by species or in the effectiveness of the more expensive predator proof nest boxes against predation. Multi-year data are crucial for analyzing nesting trends and we are continuing data collection in 2024. These data can be used to encourage successful reproduction of cavity-nesting birds and for more informed nest box conservation programs.

Discovery and Documentation of Breeding Presence and Preferences of the Boreal Owl (*Aegolius funereus*) in Utah

Connor Johnson; Parker Zabriskie

The Boreal Owl (*Aegolius funereus*) is a cavity-nesting raptor of boreal and sub-alpine forests. The North American subspecies *A. f. richardsoni* resides primarily in high latitude boreal forests, with scattered populations to the south through high-elevation habitat. This species of owl is listed as a sensitive species by the United States Forest Service, yet its distribution and population health in Utah is completely unknown. We used playback and habitat surveys to provide the first documentation of breeding Boreal Owls in Utah, and establish habitat preference and a breeding chronology to aid in future research. The study site was one mountain basin and its associated ridges following three established trails through varied habitat and elevation from Jan-May. In nocturnal surveys, a series of courtship songs were played every 1 km. Each stop consisted of a 3-minute listening period, followed by 2 minutes of the male staccato song, followed by another 3-minute listening period. Locations of singing males were used in habitat analysis only if an active nest or courtship site was found, or if the male was found at the same location twice. For habitat analysis, data was collected on vegetation type, forest stand size, average basal area of trees, and presence of snags and downed logs. With this information, we established an expected elevation range and forest stand preference, and created a map of viable breeding habitat throughout the state. The rate of males singing per night, adult breeding activity, and fledgling presence was recorded to establish a rough breeding chronology. This critical information will aid the management of forest land for the conservation of this species, and enable future research to assess the population size, distribution and its dynamics, including large-scale surveys in identified viable breeding habitat during appropriate times, and small-scale studies on seasonal movements and breeding productivity.

Response of boreal songbird communities to energy sector linear features in Alberta, Canada

Tharindu Kalukapuge; Lionel Leston; Erin Bayne

In Alberta, energy sector linear features create a complex network that dissects the boreal forest. Different line attributes create substantial variations among linear features, potentially influencing the associated bird communities. One such attribute, often overlooked in provincial-scale bird models, is the line width. We conducted passive acoustic surveys using autonomous recording units (ARUs) across three types of soft linear features; seismic lines, pipelines, and powerlines. We used generalized linear models, non-metric multidimensional scaling (NMDS), and various community matrices to understand the effects of line width and on-footprint vegetation on changes in songbird communities. Our findings indicate that the width of linear features is a key factor shaping the songbird communities. Wider linear features attract more early-successional and shrub-associated species, thereby altering the community composition. The characteristics of the vegetation in these wider linear features also contribute to this process. We also found that different species show specific threshold responses to linear feature width, where their abundance shows increases or decreases beyond a certain threshold width. We suggest that linear feature width should be incorporated into provincial bird models, research, and impact assessment processes that inform regulatory decision-making, moving beyond the traditional grouping of linear features.

Wilson, Audubon, and the struggle to classify American warblers.

Kenn Kaufman

This talk is about Kenn's most recent book "The Birds that Audubon Missed". It's about discovery of bird species (by Western or Linnaean standards) in eastern North America up to about 1844, emphasizing various bird groups rather than individual naturalists. No group proved harder to classify than the birds now known as the family Parulidae. Some species were described repeatedly under different names, and early authors tried to place different species in a wide variety of unrelated Old World groups. Wilson, Bartram, Bonaparte, Vieillot, Audubon, and others added to the discussion (or to the confusion!) before the concept of American warblers came into focus.

Female space use and plumage color are correlated with extra-pair mating in barn swallows

Heather V Kenny-Duddela, Drew R Schield, Kayleigh P Keller, Rebecca J Safran

Extra-pair mating is a common feature of avian systems and can modulate the strength of sexual selection. Mate searching behavior of female birds may be an important predictor of mating opportunity and extra-pair mating, yet notable gaps in knowledge remain due to lack of fine-scale movement data and a historic focus on male phenotypes. Accordingly, much is still unknown about whether and how female phenotypes contribute to extra-pair mating. Individual movement behavior can influence mate encounters and mating opportunity and is therefore important for understanding the scale of mate choice and the process of sexual selection in natural populations. Here, we examined how female space use and female and social mate plumage color are associated with extra-pair mating outcomes and multiple mating in wild barn swallows (*Hirundo rustica erythrogaster*). We tracked 10 females breeding in Colorado, USA with GPS backpack tags during their fertile period after an experimental nest failure. We then used low-coverage whole-genome sequencing to determine offspring paternity and extra-pair mating. Females who spent more time away from the nest had a higher proportion of extra-pair offspring. Furthermore, this relationship was stronger for females with darker plumage, suggesting that a female's own plumage helps determine whether differences in space use translate to differences in fertilizations. Surprisingly, we found no evidence for an interaction between female space use and her social mate's plumage color to influence extra-pair mating. In contrast to the historic emphasis on male traits, our study highlights female movement ecology and phenotype as important predictors of mating outcomes in natural populations.

Characterization of song repertoire variation in the Vervain Hummingbird

Katja H Kochvar; Joshua B LaPergola

Vervain Hummingbirds (*Mellisuga minima*), like many species in the Trochilidae family, produce song as part of their territorial defense and courtship displays. Remarkably, no information has been published on the structure, organization, or plasticity of the vocal repertoire of this Caribbean species. In this study, we seek to 1) characterize the vocal repertoire of Vervain Hummingbirds for the first time, and 2) explore how song in this species varies across a heterogeneous landscape. In January 2024, we recorded Vervain Hummingbird song at 30 distinct sites across a ~3 km² range of semi-urban to forested habitat in Punta Cana, Dominican Republic. Inspection of spectrograms and automated detection in Raven Pro revealed that song in this species consists of short high frequency syllables (duration: 0.15 ± 0.05 s, mean frequency: 7.58 ± 1.32 kHz) with small but clear separation between syllables within a bout (0.31 ± 0.17 s). We are currently in the process of classifying distinct syllable types, and thus repertoire size, by calculating similarity indexes from filtered ambiguity spectra and performing hierarchical clustering analysis. By spatially mapping repertoires, we will be able to discern whether this species exhibits song sharing or dialects, and how urbanization may shape individual repertoires. These results will pave the way for future research on vocal communication in this understudied hummingbird, while broadening our understanding of key avian acoustic phenomena like song sharing and plastic responses to anthropogenic noise.

Assessing Migratory Influence: West Nile Virus Dynamics in American Robins of West-Central Illinois

Moshood K Ayinde; Maggie MacPherson

Understanding how migratory behavior influences population health and genetic diversity can help inform disease management and conservation strategies. I am investigating the degree to which migratory American Robins (*Turdus migratorius*; AMRO) in West Central Illinois a) breed with resident populations and increase the genetic diversity of residents, and b) introduce West Nile Virus (WNV) to resident populations. The research spans a rural-to-urban gradient from the Kibbe Biological Research Station in Western Illinois to Macomb in West-Central Illinois. In May 2024, I will mark AMRO with unique combinations of color bands for ongoing identification. I will monitor Nests, and unbanded nesting adults will be captured and marked. I will use stable hydrogen isotope data from claw samples to distinguish migratory from resident individuals and assess reproductive isolation. I expect migratory robins to breed with residents, potentially increasing heterozygosity and resilience to zoonotic diseases while also introducing WNV. Serology data on WNV antibodies in blood samples from nesting adults will help assess exposure, with the hypothesis that more residents will test positive for WNV antibodies when in proximity to migrants carrying the virus. This study underscores the importance of considering migratory behavior in disease management and conservation within a metapopulation framework. Proactive surveillance and management strategies are essential for promoting genetic diversity and population resilience to zoonotic diseases like WNV. Insights from AMRO genetic and disease dynamics can inform conservation practices and disease management for other wildlife populations. Further research is needed to clarify the mechanisms of gene flow between migratory and resident populations and the long-term impacts of migratory behavior on disease transmission dynamics.

A no-win situation: Mismatch between whip-poor-will home ranges and harvest setbacks are bad for both the birds and the forestry industry

Alicia M Korpach; Valerie von Zuben; Kevin C Fraser; Christina M Davy

Management of harvested forest landscapes requires a balance between resource extraction and the habitat needs of wildlife. The breeding habitat of at-risk birds is often delineated for protection by applying fixed spatial buffers around observations of nesting pairs, which are expected to encompass the territory and nesting site. Selecting an appropriate buffer size requires accurate characterization of species' space and habitat requirements, but the accuracy of such data varies depending on the collection method. In harvested forests in Ontario, Canada, current buffers used to protect Eastern Whip-poor-wills (*Antrostomus vociferus*) are informed by estimates of home range size based on radio-telemetry or call surveys. To assess the efficacy of these buffers, we GPS-tracked 32 male whip-poor-wills during the breeding season and estimated home range sizes using continuous time movement models. Home range sizes in our study were highly variable, ranging from 6.8 ha to 135.8 ha (mean 53.6 ha). We evaluated potential ecological determinants of this home range size variation, focusing on home range characteristics that we hypothesized might influence food availability. We found that the density of forest edge, distance to wetland, and density of neighbouring birds were weakly related to home range sizes, but primary productivity was not. We also tested how well the empirically-measured home ranges would be protected by a range of potential habitat protection buffers by overlaying various buffers around simulated Whip-poor-will observations. We found that a standardized circular habitat protection buffer would need to be twice the average home range size to achieve 80% protection of home ranges, due to high variation in home range size and shape. Our tracking data can inform refinements of current habitat protection policies to benefit both Whip-poor-will conservation and forestry operations, and we discuss ways forward for more effective habitat protection in harvested areas.

Habitat Associations and Responses to Prescribed Fire of Wintering Henslow's Sparrows (*Centronyx henslowii*) in south Arkansas

Kevin J Krajcir; Ben E Benton; William C Holimon

Henslow's Sparrows (*Centronyx henslowii*; hereafter, "sparrows") are a species of conservation concern across their range, which has prompted ecological studies throughout their annual cycle. In Arkansas, these sparrows primarily occur during the winter and are well known from saline soil barrens (hereafter, "barrens") in south Arkansas. Holimon et al. (2008) previously surveyed sparrows and described their habitat associations at Warren Prairie Natural Area; however, proper surveys of these populations have not been conducted since then. Thus, our objectives were (1) to re-census sparrows at Warren Prairie and other natural areas with similar habitats and (2) to determine any changes in habitat preferences, including responses to prescribed burns, since the initial study. To do this, we walked transects through 76 barrens and woodland sites at four natural areas. Wherever we flushed a sparrow, we marked the coordinates and attempted to confirm the bird's identity. Following methods from Holimon et al. (2008), we also conducted vegetation surveys at thirty used points where sparrows were confirmed. Finally, we measured the area of each site surveyed and determined when each site was most recently burned. In total, we found 41 possible sparrows (with 31 confirmed) across three natural areas. Most sparrows were found in barrens, and we had higher odds of finding sparrows as the site's area increased. We also found a quadratic relationship between the number of growing seasons since last burn on sparrow abundance. Lastly, our vegetation surveys suggested that *Dichanthelium* spp. (rosette grasses) have become dominant species within the plant communities of most used sites rather than *Aristida* spp. (three-awn wiregrasses) that were common in Holimon et al. (2008). These results provide an update on the status and habitat preferences of this population, inform management strategies, and allow us to hypothesize about emerging threats to this sensitive species and these habitats.

Using passive acoustic monitoring to investigate occupancy patterns of Timaliidae and Pellorneidae Babblers in Sarawak, Malaysia

Kayleigh Kueffner; A. Styring; H.C. Lim; J. Unggang; F.H. Sheldon; D. Froehlich; M. Tarang; A. Jukie; K. Sekina

Situated within the Sundaland hotspot, the biodiversity-rich island of Borneo faces escalating threats due to deforestation and habitat fragmentation, largely driven by global demands for natural and agricultural resources. Focused on the Malaysian state of Sarawak's Planted Forest Zone (PFZ), we use autonomous recording units to survey bird community composition in different aged groves of acacia (*Acacia mangium*), eucalyptus (*Eucalyptus pellita*), albizia (*Paraserianthes falcata*) and native logged forest. We use pattern matching recognition and analysis techniques in ARBIMON to identify species present in recorded audio and investigate which environmental predictors best determines the occupancy probability of Pellorneidae and Timaliidae babbler species. Results indicate that primary canopy height, shrub layer height, and number of forest layers significantly influence babbler occurrence. This research emphasizes the importance of maintaining complex native forest structures and provides valuable insights to avian ecology in transformed habitats, utilizing advanced monitoring techniques for informed conservation strategies.

Investigating arthropod community diversity using environmental DNA (eDNA) and a potential role of bryophytes in the nests of the Prothonotary Warbler (*Protonotaria citrea*)

Skadi Kylander; Michael Brewer

Birds construct nests to protect their young, but those nests have other inhabitants. The microhabitats that develop in nests are desirable to arthropods like avian ectoparasites, arthropods that may benefit the birds by depredating ectoparasites, and those simply looking for a place to live. Most studies of nest arthropods have focused on ectoparasites, but few have attempted to characterize the entire community (perhaps due to challenges associated with conventional techniques). Environmental DNA (eDNA) methods may allow for more streamlined and complete community characterizations. To moderate arthropod communities, especially ectoparasites, in their nests, birds may use fresh plants as nest material. Studies of birds that incorporate fresh vascular plants inconsistently support this idea, but little is known about birds that use bryophytes like mosses and liverworts. With this project, I am using eDNA to characterize arthropod communities in the nests of the Prothonotary Warbler (*Protonotaria citrea*), a watchlist species that uses bryophytes in its nests and the only cavity-nesting warbler in eastern North America, in five Coastal Plain forested wetland habitats. I am also identifying bryophytes used in these nests and completing chemical analyses of volatile compounds produced by these plants. This work will catalog arthropods and bryophytes associated with this warbler in varied habitats, identify those that may support healthy nesting conditions for birds, and generate information that will foster future research and strengthen management strategies in these habitats that are threatened by the consequences of global climate change.

Large river research and monitoring at the Illinois River Biological Station

Jim Lamer

The Illinois River Biological Station (IRBS) is part of the Illinois Natural History Survey, Prairie Research Institute and the University of Illinois Urbana-Champaign and our mission is to advance the understanding of riverine ecosystems through long-term monitoring, comprehensive scientific research, and innovative river science. Our long-term monitoring programs are the foundation of our field station and are used to identify status and trends of our aquatic resources over time, such as, water quality, fishes, zooplankton, and macroinvertebrates. When evaluated with abiotic and biotic drivers, these data can help inform resource status, conservation and management strategies. Our monitoring programs span more than 500 river miles on the Mississippi and Illinois rivers and as one of the six field stations of the Upper Mississippi River Restoration Program's Long Term Resource Monitoring Element and one of four field stations of the Long-term assessment of Illinois fishes, our collaborative interagency standardized data collection allow for a comprehensive data set across the Upper Mississippi River and all of Illinois border waters. These powerful networks are leveraged for targeted research, native/invasive species management, and habitat restoration and have yielded a variety of important ecological research projects over the years on mussel fleeting, large river fish telemetry, sediment toxicity, fish genetics, mussel/fish host interactions, fish and mussel age and growth, and fish, zooplankton, vegetation, and macroinvertebrate studies to name a few. The wide variety of aquatic ecology projects have resulted in over 1000 peer-reviewed articles that have been cited over 32,000 times. This presentation will provide an overview of the Illinois River Biological Station monitoring and research and how these data are being used to inform management and restoration.

Band recovery data illustrate spatial and taxonomic patterns of seabird collisions with buildings and other structures

Riley R Lawson; Holly M Todaro; Lucas R Bobay; Matthew S Broadway; Dylan A Cooper; Madeline M Eori; Alexander J Harman; Landon K Neumann; Scott R Loss; Timothy J O'Connell

Threats to seabirds from invasive species, commercial fishing bycatch, plastic ingestion, and climate change are well known, but seabirds are also susceptible to collisions. Other than some efforts to quantify collisions with coastal and offshore wind turbines, information on seabird collisions with anthropogenic structures is at present anecdotal and conservation actions toward these species could benefit from more formal inquiry. We conducted an exploratory analysis of seabird collisions using data on band recoveries from the U.S. Geological Survey's Bird Banding Lab. The data included incidental recovery records of birds banded in the U.S. and offshore possessions. Our objectives were to describe taxonomic, spatiotemporal, and life history patterns in seabird collisions, and to develop a predictive model to help clarify specific research needs for the potential development of future management recommendations. There were 459 records of 39 seabird species in the band recovery database that were listed under Code 13, indicating "collided with anthropogenic structures excluding power lines and turbines." Approximately 38% of Code 13 band recoveries occurred in the U.S. east of the Mississippi River, with most concentrated on the Atlantic Coast and Great Lakes regions. Taxonomic and geographic representation in the data likely reflects sampling biases in the number of birds banded and human population density, both of which would contribute to the likelihood of a band recovery. A small but significant increase in band recovery probability was positively associated with body mass. Our results highlight the need for increased monitoring of bird collisions in coastal areas and at offshore structures. Establishing more

formal mechanisms for reporting seabird mortalities that account for sampling and detection-related biases is essential for increasing understanding and mitigating the impact of anthropogenic structures on seabird populations.

Sitting Ducks: Physiological and behavioural responses of incubating common eiders facing thermal stress in the Canadian Arctic.

Emily C MacDonald; Christina AD Semeniuk; H Grant Gilchrist; Sara Bellefontaine; Reyd Smith; Erica Geldart; Hannah Ter Hofstede; Oliver P Love

Rising ambient temperatures driven by climate change can heighten an endotherm's risk of heat stress, negatively impacting their physiology and behaviour. Cold specialist species may be particularly vulnerable to over-heating due to their adaptive ability to retain body heat in cold environments. Moreover, their risk of heat stress may be exaggerated during reproduction, when body temperatures and energetic workloads approach their annual maxima. In this study, we investigate whether a cold-specialist sea duck, the arctic-breeding common eider (*Somateria mollissima*), experiences heat stress during incubation - a ~25 day period of fasting on sun-exposed nests - by examining their heart rate and incubation behaviour at a long-term breeding colony in the Qaqsauqtuuq (East Bay) Migratory Bird Sanctuary, Nunavut. During the summers of 2019, 2022, and 2023, one egg from each focal eider nest ($N = 62$; $n = 12, 14$, and 36 , respectively) was replaced with a previously validated 3D-printed microphone egg that recorded the hen's heart rate. Concurrently, thermal probes were placed in nests to monitor hens' incubation behaviour. Further, ambient/radiative temperature were recorded at the nest and additional weather parameters (e.g. wind) were recorded site-wide using weather monitoring devices. Early results show significant seasonal variation in ambient temperatures, with yearly maximums ranging from $19.8^{\circ}\text{C} - 26.7^{\circ}\text{C}$. Additional findings include large inter-individual variation in heart rate and incubation behaviour in response to thermal conditions. We will be assessing the relationship between variation in environmental parameters, heart rate (a proxy for metabolic rate) and incubation behaviour (nest-attendance and agitation) within and among studied years to determine whether incubating eiders are undergoing heat stress, and its potential impact on incubation consistency. Our results will help determine the vulnerability of an already declining population of cold-adapted sea duck to the direct effects of climate change, thus informing timely management strategies and encouraging protective policy action.

Impacts of vegetation and elevation on nest-site selection and reproductive success in American Oystercatchers

Trevor MacLaurin; Lyn Brown; Erica Nol

Barrier islands are dynamic systems, and many shorebird species who use them to reproduce must be able to adapt and shift their reproductive strategies. The primary drivers of nest-site selection and success in American Oystercatchers (*Haematopus palliatus*) are not yet well understood. We aim to assess if American Oystercatchers select areas of available habitat with less dense vegetation and at higher elevations due to the risk of overwash nest mortality, and if nests laid in dense vegetation and at lower elevations experience decreased hatching and fledging success. Nest-monitoring surveys took place on two study islands at Chincoteague National Wildlife Refuge, Virginia, between 2007 and 2022. United States Geological Survey Landsat imagery was used to calculate Normalized Difference Vegetation Indices to assess vegetation density. American Oystercatchers did not select areas with less dense vegetation. Vegetation density did not influence hatching or fledging success. Consistent with our predictions, higher elevation sites were more likely to be chosen and experienced higher hatching success. Lower elevation sites were less likely to be selected and had lower hatching success. Our findings suggest that declines in American Oystercatcher productivity are unlikely to be associated with vegetation encroaching upon their habitat. Selection for higher nest sites will likely play an increasingly important role in providing safe nesting habitats for this coastal nesting species.

Predictors of short- and long-term survival in a long-lived seabird

Terri J Maness; JK Grace; MR Hirschak; EM Tompkins; DJ Anderson

Assessing stress in wild populations is important in many ecological and conservation contexts because the physiological responses of individuals to stressors can be used to identify at-risk populations and the ability to respond appropriately to stressors is related to individual quality and fitness. Yet, one of the great challenges in ecophysiology is linking physiological measures in wild animal populations with changes in individual fitness. Here, we examined two indices of stress, namely, circulating baseline corticosterone concentration ([Cort]) and the heterophil:lymphocyte (H/L) ratio, in a long-lived seabird, the Nazca booby (*Sula granti*) and their relationship with current individual state and subsequent survival and residual and lifetime reproductive success. [Cort] was related to sex, age, and current reproductive effort in that males, older birds, and birds currently engaged in a breeding attempt birds had higher [Cort]. [Cort] was negatively associated with survival to the next breeding season. The H/L ratio was not associated with the current state of birds but predicted cohort-specific long-term survival. Lifespan and reproductive performance are correlated in Nazca boobies; therefore, our results suggest that the H/L ratio may be useful as an indicator of overall fitness, while [Cort] can be used to predict current or near-term fitness in this species.

Detection and Projection of Environmental Impacts on Different Bird Species at Scale

Neha Mariya Shafi Ibrahim

This research investigated the impact of environmental changes, including temperature and humidity, on various bird species, to promote ecosystem conservation efforts. A Raspberry Pi system integrating a USB Microphone, Pi SENSE Hat sensors, and BirdNET, an AI-powered bird voice recognition system was developed. Deployed in the backyard, the unit conducted data detection and classification, transmitting results to the cloud (AWS S3). Using the AWS SageMaker service, a prediction multiclass classification (3+ category prediction) ML model was developed to predict confidence of bird sighting based on environmental variables. The model reported an average accuracy of 98.195% using initial training data. The analysis highlighted temperature and specific times of the day as major influencers on bird sightings, while humidity and pressure had a less pronounced impact during daylight hours. Distinct species exhibited varying activity patterns based on environmental parameters; for instance, the Black Phoebe demonstrated heightened activity at lower temperatures (e.g., 58°F to 62°F) around sunrise, with humidity playing a minor role. On the other hand, the American Crow was more active in warmer temperatures (68°F to 74°F) during noon. This confirms the correlation of environmental factors on different bird species and how changing weather patterns can impact each of them in different ways. The model successfully predicted bird sightings' probability by varying different environmental parameters. Continuous training and refinement will enhance accuracy. Future plans involve constructing additional ML models for studies from data collected worldwide and working with environmental conservation organizations to implement this device in various ecosystems

Does LeConte's Sparrow (*Ammospiza leconteii*) song type use vary with time of day?

Avery Marsh, Kevin Hannah, Jennifer Foote

Vocalizations are important for communication in birds and bird songs are typically associated with mate attraction and territorial behaviours. Some passerine bird species, including some wood warblers and sparrows, sing two song types: primary and extended songs. Studies show that in certain species the primary song is most common in the daytime and the extended song at night. The vocal behaviour of the LeConte's Sparrow (*Ammospiza leconteii*) has been poorly studied, and there are no recordings of its extended song. The purpose of our study was to determine if the LeConte's Sparrow sang both primary and extended song types, and whether song type use varied with time of day. Song meters were used to record singing birds from June to August 2013 in an area of northwestern Ontario. For each location (N=26), we scanned two 3h recordings from a single day, one beginning at 11pm EST and the second beginning at 2am, and annotated all LeConte Sparrow primary and extended songs. Using linear mixed effects models, we found that use of primary song varied significantly with period of day, and that primary song use was significantly higher after morning civil twilight but before sunrise than during the night. This timing lines up with the dawn chorus, where the song may have been performed to optimize its sound transmission distance and consistency for territorial defense. Use of extended song was not found to not vary significantly with period of day, but tended to be detected more often during the night. Our results show that LeConte's Sparrows are vocally active during the night and sing two song types, like some other sparrow species. Future research should investigate song delivery patterns at other times of day, increase sampling effort for extended songs, and examine the acoustic structure of the LeConte's Sparrow song.

Restoration, Management, and Recreational Use of Illinois River Valley Wetlands Managed by the Illinois Department of Natural Resources

Doug McClain

The backwater lakes and wetlands along the Illinois River support millions of migratory birds as they make their way between breeding and wintering areas annually. Historically, these areas were passively managed with predictable flooding patterns of the Illinois River. Today, anthropogenic changes resulting in unpredictable flooding regimes, increased sedimentation, and invasive species have resulted in active habitat management being a requirement for these areas. The Illinois Department of Natural Resources manages several areas along the Illinois River, both in habitat to support migratory birds, and in recreational opportunities for hunters, birdwatchers, and other outdoor user groups. The IDNR works internally, as well as externally with partners, to restore floodplain wetlands when possible and manages these wetlands to benefit both migratory birds and the people that benefit from migratory birds.

Wide open spaces?: Habitat preferences of grassland birds in areas of varying amounts of woody encroachment

Cody McGregor; Jacob Cooper; Letitia Reichart

North American bird populations have declined over the past 60 years, with grassland birds proportionately seeing the highest decline of any group. Many factors have played a role in the grassland bird declines including fire suppression, conversion to cropland, urbanization, and energy development. In many native grasslands maintained for ranching, woody plant encroachment is the strongest factor in the decline of grassland bird numbers. In Nebraska, the Eastern Redcedar (*Juniperus virginiana*) is the biggest contributor to this encroachment. The most effective way for managing against this habitat conversion is prescribed fire. To understand the efficacy of prescribed burns for maintaining and restoring native bird communities in mixed-grass prairie, we will conduct breeding-bird surveys in the Central Loess Hills of Nebraska. We will compare regions of varying densities of living and dead cedar trees, as well as areas of native grassland, to determine the best management practices for maintaining native grassland bird populations.

Structured Decision Making to support recovery of one of the world's rarest birds

Ann E McKellar; Mark T Bidwell; John A Conkin; Brian A Crawford; Hannah A Edwards; Katherine M O'Donnell; Scott Wilson

Whooping Crane (*Grus americana*) is a flagship species for conservation in North America and the Aransas-Wood Buffalo Population (AWBP), which summers in northern Canada and migrates over 4,000 kilometers to wintering locations on the Texas Gulf Coast, is its last wild, self-sustaining population. By 1938 the AWBP was nearly extinct with only 14 individual cranes, but conservation actions resulted in population growth to its current size of nearly 550 individuals. A captive population was created via collection of wild eggs from the AWBP (1967-1998), and several attempts were made to establish new wild populations. However, reintroduced populations are not self-sustaining and concerns exist about the size, genetic quality, and age structure of the captive population. We used a Structured Decision Making (SDM) process to take a deliberative, decision-focused approach for comparing management alternatives to advance crane recovery at population-level and range-wide scales in alignment with Recovery Plan goals, while also considering social, cultural, and economic interests. Working with an advisory committee

of scientists, land managers, traditional land users, and representatives of Indigenous communities, we developed a set of nine alternative management scenarios involving different combinations of actions and predicted their outcomes using expert opinion and population growth models. The committee reached consensus to recommend resumption of limited egg collection from the AWBP (10 eggs/year for 10 years) into the captive population, to improve its capacity to support continued reintroductions. Our model suggests this management action would not alter the expected time (~25 years) to reach AWBP recovery goals but would increase the probability of new populations becoming self-sufficient, thus improving resiliency and redundancy of the species. Our results demonstrate the value of SDM for making conservation decisions in the face of uncertainty and when there are multiple biological and socioeconomic factors to consider.

Egg Morphometrics and Egg Hatchability in Box-Nesting Wood Ducks

Hunter E Mentges; J Brian Davis; Pratima A Adhikari; Scott A Rush; Beau A Bauer

The avian eggshell is among the most impressive and unique structures in the natural world. However, in wild birds, little is known about the relationship between egg morphometrics and hatchability. Chicken eggs are well studied because of their economic importance and the greatest hatchability occurs in medium-sized eggs compared to small and large eggs. In lesser snow geese (*Anser caerulescens*), goslings hatched from heavier eggs survived starvation longer than goslings hatched from lighter eggs. Given this intriguing but relatively understudied topic, we studied the egg dynamics of box-nesting wood ducks (*Aix sponsa*) in Mississippi. Understanding egg hatchability in this species may be especially important as wood ducks commonly share nest space with hooded mergansers (*Lophodytes cucullatus*) and black-bellied whistling ducks (*Dendrocygna autumnalis*). Moreover, ducklings produced from larger eggs often survive better than those emerging from smaller eggs. To better understand egg breakage characteristics in wood duck eggs, we marked wood duck eggs uniquely with non-toxic markers and collected mass (g), length (mm), and width (mm) measurements from each along with other clutch metrics. When comparing eggs from successful clutches, those that hatched had an average mass of 38.83g while mass of unsuccessful eggs averaged 37.26g ($P < 0.001$). Clutch size also differed, as successful eggs came from clutches of 20.1 eggs, compared to unsuccessful egg clutches averaging 23.2 eggs ($P < 0.001$). We will use a binomial generalized linear model to examine effect size of these egg metrics on the success of individual wood duck eggs, across the range of masses and clutch sizes, for box-nesting females in Mississippi.

Advances in Weather-Related Indices of Waterfowl Abundance in the Central Flyway during Autumn-Winter

Emily Miller; Michael Schummer; Tom Bidrowski; Richard Schultheis

During the annual waterfowl migration between breeding and wintering grounds, millions of birdwatchers and hunters observe and harvest waterfowl which provides diverse economic and cultural benefits. However, waterfowl distributions and timing of migration vary annually which can cause economic shifts in terms of hunter and birdwatcher participation. Projected prolonged changes in migration timing in addition to decreasing weather severity may require managers and state agencies to adjust waterfowl hunting seasons, which could impact local economies and increase waterfowl foraging and hunting pressure at mid-latitude wetlands, where 50-85% of historic wetlands have been lost in North America. Development of weather severity index models (WSI) help managers understand how a changing climate may influence waterfowl hunting and watching opportunities. However, WSI models have not been developed for larger bodied waterfowl such as geese and diving ducks, nor have WSI been developed outside of the Atlantic and Mississippi Flyways. Sixty years of biweekly waterfowl surveys conducted by Kansas Department of Wildlife provide a unique opportunity to continue development of WSI and examine potential impacts of decreasing weather severity on diving ducks and geese. I obtained available historic Movebank weather variables (mean daily temperature and snow depth) and the Kansas biweekly waterfowl surveys to examine how weather severity may influence the relative abundance of geese and diving ducks during autumn-winter, 1981 to 2020. Results will inform managers and biologists of potential decreasing autumn-winter departure dates of large-bodied waterfowl and potential economic impacts.

Investigating the Role of Drought and Air Pollution on Oxidative Stress in Different Diet Guilds of Migratory Birds in Southern Colorado

Megan Miller; Claire Varian-Ramos

Little information is available on the sublethal physiological effects of drought and wildfire on migrating birds. The relationship between oxidative balance, pollutant exposure, and increased metabolic effort makes it an important tool for evaluating sublethal impacts during migration. I intend to focus on the intersection of three questions. How is oxidative balance influenced by diet guild, how is oxidative balance impacted by emaciation and fat load, and how is oxidative balance influenced by drought and air pollution? Independent of diet guild, many species consume antioxidant rich fruit during fall migration. I predict birds in the fall will have higher antioxidant capacity than birds in the spring. Due to the oxidation of lipids during migration, I expect birds with low fat to have higher oxidative damage. Drought may play a role in the yearly abundance of fruit, therefore, I predict that in dry years proportion of birds with emaciation and low fat will increase. Because heavy metals are present in air pollution I predict that oxidative stress will increase when exposed to air pollution. All data will be collected during migration banding. Blood samples will be centrifuged, plasma separated and frozen the day of capture. I will run a d-ROM assay to test for hydroperoxides, an early product in the oxidation cascade and a measure of oxidative stress. I will run a Total Antioxidant Capacity (TAC) assay to capture both endogenous and exogenous antioxidants combined. A 24-hour air quality station is installed at our field site and drought index scores will be used at a local and national level from the Environmental Protection Agency. If compounding climate events like wildfire and drought are reducing birds' ability to maintain oxidative balance during migration it could mean reduced overwintering survival, reduced fecundity, and other impacts to the birds' life history.

Fire Effects on Breeding Marsh Bird Success with Implications for Eastern Black Rail

Lauren Monopoli; Thomas J Benson; Auriel MV Fournier; Erik Johnson; Chelsea Kross; Jonathon Lueck

The continued loss of coastal marsh habitats within the United States poses a serious threat to marsh-dependent species like the federally threatened Eastern Black Rail (*Laterallus jamaicensis*). The elusive nature of the species has made studying Black Rail challenging, resulting in the species being poorly understood. This lack of knowledge regarding Black Rail ecology further complicates conservation efforts, particularly management decisions related to prescribed fire. The goal of this study was to determine the effect of varying fire regimes on breeding marsh bird success in southwest Louisiana. Due to the Black Rail being federally protected, Red-winged Blackbird (*Agelaius phoeniceus*) and Seaside Sparrow (*Ammodramos maritima fisheri*) were used as surrogate species. From March to July 2024, Red-winged Blackbird and Seaside Sparrow nests were routinely searched for and monitored to determine nest success. In addition, miniature cameras were placed at a subset of nests once they reached full clutch. By using miniature cameras, nests can be recorded continuously thus providing a more detailed account of nest fate. With Eastern Black Rail populations having declined by 75 % over the last decade alone, understanding the timing of prescribed fire in relation to breeding marsh birds is a necessary and critical step in managing for Eastern Black Rail.

Impacts of Urbanization on Nestling Growth and Begging Behavior

Sara Moore; Diane Neudorf

With the ever-growing human population and increases in urbanization, many animals are learning to coexist with humans in manmade environments whereas others experience detrimental effects. Birds are particularly vulnerable to the negative effects of urbanization, some of the most notable being light pollution, invasive species, and noise pollution. Noise pollution has not been very well studied until recently, with some research showing changes in the characteristics of bird calls as well as the times of day birds sing. Birds may alter calls based on ambient noise as early as the nestling stage. We investigated nestling begging calls of the Carolina wren (*Thryothorus ludovicianus*), an insectivorous, cavity-nesting bird found throughout the Eastern United States. Nest boxes were erected around the city of Huntsville Texas as well as in Sam Houston State University's Pineywoods Environmental Research Laboratory (PERL) located in the Sam Houston National Forest. We recorded nestling begging calls twice per day at two stages of development. Along with audio, for the past 3 years we have collected body condition data from nestlings in both environments at different stages of development. We compared nestling begging calls and growth between the rural environment and urban environment to measure the impact of urbanization on Carolina wrens. We will discuss the results of our study and its implications for songbirds in urban environments.

Nest Site Selection in Eastern Wild Turkeys: Do Hens Prospect Prior to Egg-Laying?

Gracie Moreno; Luke Garver; Jeff Hoover

Nest site selection in avian species is imperative to the survival of both parent and offspring. Locating suitable nesting habitat often involves prospecting/habitat sampling phases, where individuals visit sites to gather personal and social information on the local habitat's quality. This study focuses on the nest site selection behavior of Eastern wild turkey (*Meleagris gallopavo*) hens in central Illinois; examining whether they prospect prior to egg-laying, and the relationship between pre-nesting ranges, movements, and their nest site location. Specifically, we will determine if turkey hens visit nest sites before laying eggs and if there is evidence of prospecting behaviors at larger spatial scales. Contrary to past hypotheses, we predicted that turkeys may not prospect for specific nest site locations due to the stochastic nature of their environment and the unpredictable effects of nest site characteristics on hen survival and reproductive success. We analyzed GPS movement data throughout the pre-nesting, laying, and incubation periods of female turkeys captured at four different sites in Illinois during 2019-2022. To test for prospecting we calculated the frequency that each 30-minute connected linear movement path segment between two consecutive GPS location points intersected the boundary of buffers around nests during the pre-laying period. We also determined how daily means and minimums of the distances between hen locations and the nest site location change during the weeks leading up to the commencement of egg laying, and plan to determine how 50% Continuous Time Movement Model home ranges change in relation to where the nest location is in 2-day increments leading up to egg laying. Together, these three layers of analysis will determine whether hen turkeys visit nest sites, or the general area where they ultimately place their nest, prior to laying their first egg.

Tail plumage signaling in Grey Fantails: Exploring age and sex-based variation

Lorena Munoz; Matthew Reudink; Peter A Biro; Christa Beckmann

Grey Fantails (*Rhipidura albiscapa*) are a common insectivorous bird resident in woody, rainforest, farmland, and human modified habitats throughout Australia. When fully closed, their tails appear black (due to the central tail feathers being black), but when fanned open the remaining rectrices show varying proportions of white and black. Grey Fantails are understudied, but studies on the role of variable black and white tail colouration in birds like the Dark-eyed Junco (*Junco hyemalis*), a common North American passerine, demonstrate that variation in the amount of white is associated with both attractiveness and dominance, but does not necessarily differ by sex. Our aim is to determine if tail colouration in the Grey Fantail varies across age, sex, and body size/condition. To do so, we captured and banded fantails using call-playback and mist nets in Brisbane Ranges National Park, Australia. We recorded age, sex, and body measurements of each individual and photographed individual tail feathers. We next quantified the proportion of black and white on each feather using photoshop. Finally, we examined the differences in plumage across age, sex classes, and body size with a general linear model in R. Our results indicate marked variation across individuals within the population; however, we found no differences across age or sex classes. Similarly, there were no differences in asymmetry across age and sex classes. Though not associated with age or sex, the proportion of white in feathers may be associated with body condition, dominance status, attractiveness, or foraging—all of which we are beginning to explore. This study provides baseline data on the potential signaling functions of tail colour variation in Grey Fantails and sets the stage for future studies on the role of tail colouration in communication and foraging.

Nesting Success of Grenadas Native Landbirds: Examining Depredation Rates of Invasive vs. Native Predators

Zahra Nanji

Bird population trends provide insights into ecosystems' overall health and functioning, making them vital environmental indicators. Nest predation is one of the most critical factors affecting avian reproductive performance and population growth, particularly in island populations. Due to their low genetic diversity, island avifauna are more vulnerable to extinction. Despite this vulnerability, many Caribbean islands lack nest fate data crucial for understanding population trends. This research focuses on Grenadas avifauna, which initially evolved without native mammalian predators until early European colonizers introduced several ground predators. To better understand the impacts of these exotic predators, we examined the nesting success of terrestrial birds, monitoring nest depredation rates by invasive and native predators. During the peak breeding season, April to July 2023, we found 250 active nests of 12 terrestrial species with open and closed-cup nests using behavioural cues and systematic searching. Searches were conducted at 2 sites with differing habitats at Belmont Estate on the north part of the island. Nests were monitored and checked every 3-5 days until the end of the breeding attempt. Early findings suggest that nest height and conspicuousness do not greatly affect success rates. However, open-cup nests were more likely to have fledged offspring than closed-cup nests. Identifying these factors is essential for effective conservation planning, enabling the development of targeted strategies to safeguard Grenada's avifauna, and inform conservation efforts for other island populations. Effective management practices are essential for ensuring the long-term survival of these vulnerable bird populations.

Effects of anthropogenic and natural noise on songbird vocalizations in North-Central West Virginia

Joseph Niederhauser; Brooklyn Farley; Kyan Gillespie; Paige Murray-Shrader

Anthropogenic noise and its effects on wildlife, especially on the vocalizations of songbirds, has received much attention in the past decades, but the effects of natural noise (e.g. wind, water) on wildlife have only been recently explored. Our objective was to build on those recent studies to see how anthropogenic and natural noise affected songbird vocalizations in a relatively understudied area of North America. We hypothesized that anthropogenic and natural noise would affect songbird vocalizations differently because their peak frequency ranges are different. We conducted an experiment that played either anthropogenic (traffic noise) or natural (waterfall) noises to different species of songbirds at various sites across North-Central West Virginia, and we recorded the birds' vocalizations and behavior before and after the noise playbacks. Although both types of noise affected songbird behavior during the playbacks, neither the amount of vocalizations nor the pitch of vocalizations differed among the anthropogenic and natural noise playbacks. This research supports the idea that natural soundscapes influence bird vocalizations and that these species of songbirds already change their vocalizations to adjust for any noise, not just anthropogenic noise. However, anthropogenic noise may be more disruptive because of its concentration, consistency, and the range of frequencies that overlap with the vocalizations of songbird species. This illustrates the importance of regulations that limit all noise pollution, especially in and around natural areas.

Trends in Waterfowl and Habitat Restoration in the Illinois River Valley

Joshua M Osborn; Auriel MV Fournier; Aaron P Yetter; Andrew Gilbert

The Illinois and Mississippi river valleys are major migration and wintering areas for nearly 30 species of waterfowl in the Mississippi Flyway. Many important private, state, and federal waterfowl areas and refuges exist within these river floodplains, including the Mark Twain National Wildlife Refuge (NWR), the Illinois River National Wildlife and Fish Refuges, and Keokuk Pool. The Illinois Natural History Survey (INHS), with support from the Illinois Department of Natural Resources (IDNR) and the Federal Aid in Wildlife Restoration Fund through the U.S. Fish and Wildlife Service (USFWS), has conducted aerial inventories of waterfowl along the Illinois and Mississippi rivers since 1948 (flown each year but 2001). As a result, 75 years of data exist on autumn-migrating waterfowl for these critical ecoregions, collected by only 5 observers. This undertaking represents the longest known inventory of waterfowl, preceding even the USFWS breeding waterfowl counts and mid-winter inventories established in 1955. Aerial inventory data are frequently requested and used by federal and state agencies for regulatory decisions, evaluation of management or enhancement projects, and conservation prioritization. Specifically, the IDNR relies on these inventories to guide the establishment of hunting season dates, zones, and other regulations and to prioritize wetland habitat acquisitions. Further, these data have been used to evaluate objectives and monitor waterbird response to wetland restoration projects in the region (e.g., The Nature Conservancy's Emiquon Preserve and The Wetland Initiative's Wes Dixon Refuge). Herein we describe the methods of the aerial survey and the work necessary to maintain this long-term dataset. Additionally, we provide trends in waterfowl abundance and distribution, specifically in relation wetland restoration and habitat management efforts on the landscape. In doing so, we present how these data may be used to aid waterfowl and wetland management decisions in this region.

Insights into corncrake (*Crex crex*) movements in a fragmented agricultural landscape using bioacoustics with implication for nature conservation strategies

Andrea Parisi; James Moran; John Carey; Joanne O'Brien

Movement ecology data are often collected by catching the animals and fitting GPS tags. This technique is expensive, biased and comes at an extra cost for the caught individuals. New conservation technologies allow unbiased data collection, providing ecological knowledge to aid the conservation of endangered species. Using bioacoustics, we investigated intra-season and between-year movements for the red-listed corncrake (*Crex crex*) and their relationship with landscape structure in Ireland. Our goals were to track corncrake movements with minimal disturbance to the species and determine which landscape features promote or impede these movements. We recorded males over two consecutive breeding seasons in 2022 and 2023 in an extensively farmed agricultural landscape in the West of Ireland. Individual identity was obtained through vocal characteristics of the calling males which were grouped into clusters. The areas of semi-natural grassland and margin features, presence of bird refuge strips and suitable habitat connectivity were extracted from buffers between locations of two matching recordings (same calling male). These landscape features were used as predictors in a model to determine the distance that the same male covered. We found that, in a season, males moved 415m on average (min = 10m; max = 1805m) between calling locations, which was more than previously thought in the Western Europe. Males also reoccurred on average 375m (min = 23m; max = 1231m) away from the previous year's location. Landscape connectivity ($p=0.01$, $N=42$) and semi-natural grassland area ($p=0.02$, $N=42$) were positive predictors of intra-season movements, whereas the margin area ($p=0.01$, $N=35$) predicted further between-year movements. Considering our non-invasively sampled results in Irish context, we suggest increasing the protection area around a calling male to 500m. In this buffer, we

also suggest improving the availability of semi-natural grassland to 30% and presence of margin features to 3% of the protection area.

Relationships between city characteristics and avian diversity and occurrence in Ontario's cities

Paul J Preston; Fran Bonier

Urbanization is a major driver of global habitat change and has profound impacts on the abundance and diversity of species found in cities. This change in habitat presents a challenge to species that live in cities, and, in general, urbanization leads to a decrease in biodiversity. However, cities vary in their effects on local avian biodiversity, with some cities harbouring a higher diversity of bird life than others. To understand why this difference exists, we need to understand how species occurrence relates to characteristics of the cities themselves. We assessed relationships between urban factors such as light pollution, population density, greenness, and traffic volume and among-city variation in species occurrence and species richness across 15 cities in Ontario, Canada. Our findings reveal that features of cities predict avian diversity, suggesting means of preserving biodiversity in cities and mitigating effects of urbanization on birds.

Range-wide evidence of carry-over effects of nonbreeding habitat in the Prothonotary Warbler

Rebecca Ralston; Christopher Tonra

While many North American bird species are advancing their spring migration timing due to climate change, other species demonstrate little sensitivity to rising spring temperatures or earlier vegetation green-up. However, few studies have explored alternative drivers of variation in species-level arrival timing. We used eBird data from 2012-2022 to determine the effects of nonbreeding and stopover habitat quality on Prothonotary Warbler (*Protonotaria citrea*) arrival phenology. We predicted that stopover habitat quality would drive arrival timing at northern latitudes while nonbreeding habitat quality would drive arrival timing at southern latitudes. To measure habitat quality, we calculated monthly enhanced vegetation index (EVI) values and average precipitation for the nonbreeding range and high-use stopover sites in Central America and the southern United States. Using generalized linear mixed models, we determined that Prothonotary Warblers arrive later during years with lower seasonal nonbreeding EVI. This effect most strongly impacts warblers in the Atlantic Flyway. Understanding how carry-over effects of nonbreeding habitat impact a species' phenology may assist in explaining patterns of differential population decline, as late arrival has high productivity costs. Additionally, climatic trends predict a growing risk of drought in tropical regions, which may decrease nonbreeding habitat quality for many neotropical migrants and increase delays caused by carry-over effects of nonbreeding habitat.

Effects of climate on plumage coloration within and across species of Toxostoma Thrashers

Joel Ralston; Charlotte Probst; Satin Garman; Campbell Washer; Ian Bentley

Avian plumage coloration can vary within and across species from lighter to darker because of thermoregulation, photoprotection, camouflage, or protection from feather-degrading bacteria. Two ecogeographic rules describing the effects of climate on plumage coloration are (1) Gloger's rule, which states that plumages are darker in humid environments and lighter in arid environments; and (2) Bogert's Rule, which states that plumages are darker in cold environments and lighter in warm environments. Previous studies have found mixed support for both Gloger's and Bogert's Rules. Additional studies may help to assess the generality of these ecogeographic rules across North American birds. Here, we examine the effects of climate on plumage coloration within and across 10 species Toxostoma Thrashers, which occupy ranges with varying climates across North America. We obtained and photographed 423 museum specimens across all 10 species and quantified dorsal plumage color in Scientific Image Analysis, a MATLAB based program. We used geolocation information for each specimen to extract data on temperature and precipitation from the WorldClim dataset, and an aridity index from Trabucco and Zomer (2018). Summer precipitation and the aridity index both had a significant effect on plumage coloration across species, with lighter colored species found in drier climates, consistent with Gloger's Rule. We found no evidence for an effect of temperature on coloration across species. We found few consistent significant effects of climate on plumage coloration within species. However, 4 of the 10 species had a positive significant relationship between coloration and aridity index, further supporting Gloger's Rule. Our results suggest that thermoregulation is not a major driving factor on plumage coloration in Thrashers. Instead, our support of Gloger's Rule suggests camouflage of lighter colored birds in arid environments, or better protection of darker colored birds from feather-degrading bacteria in humid environments may be more important.

**Management of Depredatory Birds in Sorghum Crop at College Research Farm, Pjtsau, Hyderabad,
Telangana, India**
V.Ravinder Reddy

The Baya weaver birds, Munias and Sparrows are the serious bird pests to the Sorghum crop (Sorghum bicolor) under unprotected conditions. This is mainly due to decreasing of the growing area of the cereal crops throughout the Telangana State mainly because of less availability of water, high investment, less labour availability and birds and wild animal problems. In sorghum crop higher number of Passerine birds were observed around the experimental crop field areas and damaging field crops under unprotected conditions, complaints were also from the nearby field farming community. Though the number of species damaging the crop is very less, the severity of damage is very high. To tackle these problems in sorghum, crop different management practices for implemented during 2022-23 Kharif and Rabi season at the college research farm at PJTSAU, Rajendranagar, Hyderabad, Telangana State, India. The results of this experiment reveals that the sorghum crop protected by different management methods such as egg+ hinge @ 25ml/lit (2744 kg/ha, 1568 kg/ha), Salt solution 25g/lit (2543 kg/ha, 1522 kg/ha), Ginger + garlic @30ml /lit (2156 kg/ha, 1456 kg/ha) and Deepam oil@25ml/lit (1955kg/ha, 1360 kg/ha) were showed higher yields than the Control (1144 kg/ha, 1150 kg/ha) during the Kharif and rabi seasons of 2022-2023. It is suggested that various types of control measures such as egg+ hinge, Salt solution, Ginger + garlic, Deepam oil have protected the Sorghum crop, particularly during the milky setting stage to till the harvest of the crop.

Agonistic behavior of wintering White-throated Sparrows
Daniel Redwine; Stefan Woltmann

Seasonality can mediate changes in avian sociality and alter the occurrence and function of social behaviors. In seasonally territorial bird species agonistic interactions can determine territory holders and influence territory boundaries as individuals arrive to and maintain territories. During the nonbreeding season agonistic interactions can influence and reinforce social hierarchy and may influence which individuals can utilize resources in species which aggregate. Intrinsic factors such as age and sex of individuals can modulate how agonistic interactions manifest, and may influence broader behavioral syndromes if behavior remains consistent through time and across contexts. Although the influence of intrinsic factors on behavior for many species is generally better categorized on the breeding grounds, how breeding season behaviors translate to the nonbreeding season is often poorly understood. The White-throated Sparrow (*Zonotrichia albicollis*) is a migratory passerine often used as a behavioral model because of the unique mating system involving disassortative pairing of white-stripe and tan-stripe morphs. White-stripe individuals of both sexes are typically characterized as more aggressive than their tan-stripe counterparts during the breeding season. However, few behavioral correlates associated with morph have been identified in the nonbreeding season. We recorded agonistic interactions of color-banded White-throated Sparrows of known sex, age, and morph to assess correlates of occurrence and frequency of agonistic interactions for both aggressors and recipients of aggression. Although the likelihood of an individual engaging in aggression appears to increase with time spent foraging with conspecifics and not other factors, the rate of aggression appears to increase with foraging density and possibly age. Both the likelihood and rate an individual receives aggression appear to increase for first winter individuals and at higher feeding densities. However, morph may influence the rate at which an individual receives aggression, with white-stripe individuals targeted more frequently by aggressors than their tan-stripe counterparts.

The role of environmentally-induced synchronization between arthropod prey and breeding phenology on success in the Snow Bunting (*Plectrophenax nivalis*)

Alysha Riquier; H G Gilchrist; O P Love

Snow Buntings are Arctic-breeding passerines currently suffering from large population declines. Since Snow Buntings rely entirely on arthropods to provision their offspring, a laying phenology that matches arthropod abundance to the peak of eventual offspring demand is expected to be especially important. However, we do not yet know whether buntings can flexibly adjust laying date in response to environmental cues to match the chick-rearing period with the peak of arthropods, a critical knowledge gap with climate change increasingly affecting the timing of snowmelt and the emergence of arthropods. Moreover, it is critical to determine whether buntings can track changes in environmental conditions to continue to phenologically match the chick-rearing period with the timing of arthropods. Our goal is to examine the links between environmental conditions, food availability and bunting laying phenology, and then use these relationships to forecast whether the synchronicity of timing between arthropods and buntings will diverge as climate change accelerates. To examine these questions, we are using a long-term dataset (2007-2019) supplemented by two years of my own research (2022-23) to relate variation in environmental conditions to arthropod abundance and diversity data (collected from pitfall traps) and bunting lay date, clutch size, and success outcomes (e.g., hatching and fledging success) from Qikiqtakuluk, Nunavut. The results of this work will indicate whether Snow Buntings have the adaptive capacity (i.e., the flexibility in their laying decisions) to respond to increasing inter-annual variability in spring weather conditions. In turn, this work will provide broader insight into whether climate change induced mistiming may be a possible mechanism behind population declines. Given the key roles that arthropods play in many Arctic food chains, results will help us to understand whether other understudied Arctic vertebrate species (e.g., other songbirds, shorebirds) relying on arthropods might also be facing similar stressors.

Hummingbird Migration: Are Ruby-Throated Hummingbirds better prepared for their fall migration in years with a wetter or drier summer?

Coralie Rossbach

Because of climate change, weather in Texas (and all over the world) has been getting stranger and more extreme. This could affect hummingbirds' sources of food, since flowers produce more nectar, and there are more small insects like mosquitoes, when there is more rain. Therefore, in years with more rain, hummingbirds may be able to better prepare for their migration by storing up on food and energy. If we figure out whether drier weather affects their weight, we can determine if migration could become more difficult for them to survive. I obtained data on Ruby-Throated Hummingbirds' weight and date of banding from the Bird Banding Laboratory, and data on total rainfall from the National Centers for Environmental Information. I analyzed the data by comparing average hummingbird weights to the total rainfall from each year. The data seems to support my hypothesis, because the hummingbirds' weight appears to follow the pattern of the rainfall. In years with more rain, the hummingbirds weigh more on average. Strangely, female hummingbirds' weights are more closely related to the rainfall than the males. I think there is a relationship between hummingbird weight and precipitation because plants produce more nectar when there is more rain, so the hummingbirds can eat more nectar and, as a result, weigh more, in wetter years. Therefore, the hummingbirds can be better prepared for migration.

Three-dimensional vegetation structure drives patterns of seed dispersal by African hornbills

Nicholas J Russo; Docas L Nshom; António Ferraz; Nicolas Barbier; Martin Wikelski; Michael Noonan; Elsa M Ordway; Sassan Saatchi; Thomas B Smith

Three-dimensional (3D) vegetation structure influences animal movements and, consequently, ecosystem function. Tropical rainforests are among the most structurally complex ecosystems on earth, where animals disperse the seeds of most trees. Black-casqued (*Ceratogymna atrata*) and white-thighed hornbills (*Bycanistes albotibialis*) are two of the largest seed-dispersing birds in Central African rainforests and undertake seasonal, long-distance movements. We tagged individuals of both species in southern Cameroon with solar-powered GPS tags and tracked their movements within an area surveyed by Light Detection and Ranging (LiDAR). We investigated the influence of 3D vegetation structure on hornbill movements using LiDAR metrics in an integrated Step Selection Analysis. We found canopy height to be a strong predictor of movements for both species. In addition, we observed strong individual variation in habitat selection with respect to both small and large canopy gaps. Black-casqued hornbills preferred *Raphia* palm-dominated swamps during late afternoons, when temperatures peaked, while white-thighed avoided them. Finally, we used selection coefficients for 3D structural attributes to simulate movement paths of both hornbill species after visiting trees within our study area and mapped spatial probabilities of seed dispersal based on gut passage times of seeds. Our results show that 3D vegetation structure influences spatial patterns of seed dispersal by influencing hornbill habitat selection, thereby presenting evidence for a potential feedback loop between vegetation structure and seed dispersal. This interaction between seed dispersers and vegetation structure will be important for predicting how tropical rainforests respond to disturbance.

Year-round nesting of Little egrets (*Egretta garzetta*) in three fish landing centre dependent populations

Pathissery John Sarlin; Sancia Morris; Polycarp Joseph

A 42 month study on the breeding little egrets (*Egretta garzetta*) that revealed year round nesting is reported. Little egrets are seasonal breeders and considered single brooded. The breeding season of little egrets typically varies depending on their geographical location. In their native range, which includes parts of Europe, Africa, and Asia, the breeding season generally occurs during the spring and summer months. They mostly lay their eggs between July and August in most parts of India. The Little Egrets usually breeds in Kerala, India from July to September, corresponding with the onset of Southwest monsoon. Little egrets breeding continuously in three fishing harbour dependent multispecies heronries were noted in 2020. Though there were more than 25 heronries away from the harbour area where little egrets also nested, none of them exhibited the unusual nesting. The extended breeding is observed in the heronries that are adjacent to or within the fishing harbors. These harbors are characterised by the presence of abundant discarded fishes and fish landings in artisanal and mechanized fishing vessels. Several little egrets can be seen idling in the harbour premises and depredating the landed catches and scavenging on the discards. We believe the year round nesting of the little egrets could be due to the abundance of food in the harbors in which they nest and forage. A dip in the number of nests during the months of December-January could be attributed to the decreased availability of fishes due to the period of low food abundance (off season of the fishers). Peak nesting was observed in July-August that coincides with the known nesting season corresponding with the Southwest monsoon. We could not determine if the same individuals nested more than once as they were unmarked.

Migration and Breeding Ecology of King Rails in Arkansas
Jessica M Schmit; Auriel MV Fournier; Caleb P Roberts; Karen R Rowe

King Rails (*Rallus elegans*) are a secretive marsh bird species of conservation concern in Arkansas. Freddie Black Choctaw West WMA in southeast Arkansas has multiple pairs of breeding King Rails and offered an opportunity to investigate King Rail migration ecology, as well as nesting ecology and nest site selection. We captured and outfitted 23 birds with Argos GPS tags to track migration patterns throughout the season. We found that most of the population did not make long distance migrations and were residents year-round. We examined monthly movements on the landscape to determine how their movement changed seasonally to help understand how management impacts their use of habitat. To investigate nest site selection, we performed 679 habitat surveys to assess what characteristics are significant to King Rails at confirmed nest sites and random points throughout the WMA. We ran generalized linear models to see what rails select for in a used versus available habitat framework. King Rails selected for nest sites that had higher average vegetation density and percent of rush cover. As a vulnerable and threatened species both in Arkansas and the US, understanding their habitat needs during the breeding season could have implications for biologists and land managers to provide more suitable habitat during this critical part of their life cycle.

**Short -Term Effects of the Site C Dam and Reservoir on Bank Swallow Populations
Along the Peace River**

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

Hydroelectricity is one of the largest sources of renewable energy globally, and currently generates the majority of Canadian power. However, dams reduce water velocity slowing down erosion processes, reduce the availability of low-lying wetlands for foraging, and likely may cause environmental contamination causing accumulation of heavy metals in the environment. Located in Northeastern British Columbia, along the Peace river is the site for BC Hydro's third hydroelectric project, Site C dam. Along this same river is one of the largest populations of Bank Swallows *Riparia riparia* in the province, with an estimated 60+ breeding colonies with over 1,700 nests. Bank Swallows are a Threatened species in Canada under the federal Species at Risk Act, and since the 1970s, Bank Swallow populations have declined by an estimated 98%. During the 2021 and 2023 breeding seasons, 212 feather and 195 blood samples were collected from 22 colonies, both upstream and downstream of the dam construction. We will compare how Bank Swallow diet quality has changed both over time and spatially, whether heavy metals and mercury are being bioaccumulated through the food web, and how nesting distribution may have changed over time. Overall, we are exploring how the cumulative effects of dam construction and completion may alter the environment and consequently affect the health, survival, and fitness of this threatened species. These potential negative effects of hydroelectric projects have not yet been assessed for Bank Swallow populations, particularly on a large scale.

Breeder-helper conflict along environmental gradients

Daizaburo Shizuka; Allison E Johnson

Cooperative breeding is a widespread social system characterized by the presence of non-breeding subordinate group members, often called helpers, who aid breeders in rearing non-descendant young. Cooperative breeding species can differ in how helpers contribute to breeder fitness, for example through territorial defense or provisioning of offspring. Our recent study showed that two species of cooperatively breeding fairywrens with contrasting patterns of helper contributions (Purple-backed and Superb Fairywrens, *Malurus assimilis* and *M. cyaneus*) exhibit opposing patterns of group size clines across a steep environmental gradient. We hypothesized that species in which group augmentation occurs, breeder-helper conflict is reduced in harsh conditions, while the opposite is true in species where helpers stay in natal territories due to ecological constraints. Here, we test the generalizability of this hypothesis with a theoretical model. We tracked the discrepancies between optimal group size from breeder and helper perspectives along a gradient of environmental conditions. We show that, given certain assumptions about the relationships between environmental condition and within-group competition, our model predicts opposing patterns of breeder-helper conflict along environmental gradients depending on how helpers contribute to breeder fitness, similar to our empirical observations. Our model further shows that these patterns may be common across cooperative breeders, and points to conditions that may make group size clines more or less apparent. More generally, we show that within-species variation in social systems can provide important clues about social group dynamics that may not be apparent in single-population studies.

Using Motus to determine Dark-eyed Junco (*Junco hyemalis*) migration strategies

Daniel P Shustack

Within a bird species different populations may display different migratory strategies. In Dark-eyed Juncos (*Junco hyemalis*) of eastern North America, northern populations are obligate latitudinal migrants whereas populations in the southern Appalachian Mountains are altitudinal migrants or are nonmigratory. It is unknown how migratory strategies vary in populations that occur between these endpoints of the junco's eastern range. In March 2023, I deployed 20 nanotags on overwintering juncos at three sites in western Massachusetts, USA, where juncos are found year-round. My goal was to determine the migratory strategies of those individuals via the Motus network of automated radiotelemetry receiving stations. Based on detections at Motus stations away from the tagging sites, we confirmed that 10 (50%) of overwintering juncos migrated north of our study area during April 2023. The other 10 juncos were not subsequently detected at other Motus stations, nor during the subsequent breeding season at our study sites. This project is ongoing with additional nanotags being deployed on juncos during March 2024.

Using radio tracking technology to examine environmental influences on movement decisions in Snow Buntings

Samuelle Simard-Provencal; Emily A McKinnon; Oliver P Love

The Snow Bunting (*Plectrophenax nivalis*) is an Arctic-breeding passerine facing population declines. The cause for these declines, however, is not well understood because of the difficulty of studying this species due to their remote breeding grounds in the Arctic and nomadic wintering movement. With climate change increasing ambient temperatures and affecting weather systems at a global scale, Snow Buntings will be affected at all life stages. Quantifying the movement ecology and connectivity patterns of this under-studied species will help to determine whether buntings have the capacity to adapt to an increasingly changing landscape across multiple life stages. The goal of this research is to understand patterns of movements of Snow Buntings overwintering in Ontario, Canada. Specifically, we will investigate which environmental and biological factors are influencing space use in the wintering period and use this to determine spring migration initiation. While Snow Buntings have always been referred to as winter nomads, we hope to better quantify this label. This will be accomplished using automated radiotelemetry (Motus Wildlife Tracking System) tags deployed on 72 wintering buntings in southwestern Ontario. Additionally, while some birds were banded, tagged, and released where they were caught, some birds were strategically displaced by several hundred kilometers to causally test their response to different weather conditions (i.e. moved from a preferred northern location to a less preferred southern location). The high density of radio-receiver towers in southwestern Ontario makes it an ideal location to conduct this research. Preliminary data analysis resulted in 22 individuals where winter movement was detected. We assessed differences in bird movements between sexes, ages, and experimental treatments across the landscape and looked for correlations between bird movements and fine-scale weather factors. We will discuss the movement results in more detail and its implications for nomadism, winter movement, and the timing of spring migration.

Characteristics of irruption in three montane passerine species

Sydney Sjoblom; John Cavitt

Due to unpredictable year-to-year seed production in mast trees, some granivorous passerine species migrate erratically in response to changing food abundance. Irruptive migrations occur when seed crops are low, forcing flocks of birds to find food in areas outside of their normal range. During irruption years, these species are observed in large numbers in locales where they normally occur in low numbers or not at all. At our banding station in a Gambel oak community along the Wasatch Front foothills of Northern Utah, we observed irruption events in Cassin's finches (*Haemorhous cassinii*), Pine siskins (*Spinus pinus*), and Red-breasted nuthatches (*Sitta canadensis*). Using capture data gathered during 2019-2023, we estimated the age demographics and sex ratios of these irruptive populations. In addition, we estimated the average body condition scores of each species during irruption and compared them to the average for each species in their normal winter range. We tested for correlations between irruptive behavior and cone crop yields, spring productivity, and winter snowpack by regressing counts for each of the three species from Audubon Christmas Bird Counts (CBC) in Northern Utah against cone crop data, breeding bird survey data, and yearly winter snowpack, respectively, between the years of 1980 and 2023. Finally, we created a model to predict irruptive behavior. This study elucidates heretofore unstudied population demographics in irruptive populations of seed-eating passerines. Moreover, our proposed model helps to predict irruptive migrations in these species.

TNC's Illinois River Program and Emiquon Preserve Restoration

Randy Smith; Doug Blodgett; Sally McClure; Denim Perry

Abstract: The Nature Conservancy's Emiquon and Spunky Bottoms Preserves span 8,000 acres along the Illinois River. The Illinois River valley (IRV) has a unique geological and anthropogenic history with periods of very high waterbird use making wetland conservation and restoration a high priority within the Midwest. The Preserves are comprised of floodplain lakes that were historically very productive for fish and wildlife prior to separation from the Illinois River with levees, wetland drainage and conversion to row-crop agriculture for decades. Restoration has included reestablishing floodplain wetland, bottomland forest, prairie and upland forest habitats. Levee protection prevented stressors indicative of the IRV from impacting these sites, allowing diverse wetland communities to develop, atypical of other IRV wetlands. A unique water control structure that facilitates water level management as well as the exchange of nutrients and aquatic species between the Illinois River and Emiquon further enhances the benefits of this site.

Factors affecting detectability of RFID feeder systems

Daizaburo Shizuka; Sagan Smith; Faiza Hafeez

The use of RFID technology in ornithology has introduced new potential for the closer study of birds while minimizing disturbance. It creates new avenues for studying foraging behavior, sociality, and movement. To make the most of RFID-based data, we must ensure that such autonomous data collection systems are efficient, unbiased, and minimize failed detections. In this study, we highlight this need for more effective feeder-based RFID detection design by showing the results of experiments conducted at Reller Prairie Field Station in Nebraska on three select bird species: *Picoides pubescens*., *Poecile atricapillus*., and *Sitta carolinensis*. We investigated differences in RFID detection probabilities based on bird species, time spent at feeder, and temperature conditions by analyzing video recordings of our feeder and by collecting information from our RFID data logger. In our initial tests, RFID detection probabilities ranged from 48.9% - 58.2%. For chickadees and nuthatches, detection probabilities were highly influenced by the time spent on feeder, while detectability in woodpeckers appeared to be more influenced by body position on the perch. Based on our initial findings, we redesigned the perch and antenna at our RFID-feeders to encourage birds to reposition their orientation to the feeder opening and re-collected data. Our results will have implications for the rapidly emerging monitoring technique in ornithology.

Multigenerational fitness outcomes of double-brooding in Savannah sparrows

Hayley A Spina; D Ryan Norris; Nathaniel T Wheelwright; Daniel Mennill; Stéphanie M Doucet; Joseph B Burant; Sarah L Dobney; Sarah D Mueller; Greg W Mitchell; Amy EM Newman

Rearing multiple broods per season can substantially increase annual fecundity in passerines. Despite this benefit, some females in multi-brooded populations rear only one brood per year, raising the question: why do some females single brood? Life-history theory predicts trade-offs between current and future fitness, such that single-brooded individuals may prioritize future reproductive success or survival over current reproductive investment. The Quality Hypothesis posits that multi-brooding is more likely in high quality individuals, who are expected to have greater lifetime fitness compared to single-brooded individuals. Using 30-years of reproductive data on female Savannah sparrows (*Passerculus sandwichensis*) from Kent Island, NB, we tested whether individual variation in double-brooding behaviour could be explained by life-history theory or the quality hypothesis. We did not detect evidence of a tradeoff: double-brooded females had higher annual survival rates and offspring from first broods of double-brooded females were more likely to recruit compared to offspring from single-brooded females. Lifetime fitness (F1 recruitment) was positively related to the number of seasons that a female double-brooded. Uniquely, we also show that lifetime fitness (F2 recruitment) did not differ for offspring (F1s) hatched to first broods of double-brooded females and offspring of single-brooded females. Overall, our results suggest that double-brooded females are high quality individuals that can mitigate the energetic costs associated with rearing two broods per season. Consequently, individuals capable of double-brooding do so without incurring high costs to future survival or reproductive success.

Avian annual survival rates heavily influenced by climate cycles on a continental scale

Madison O Sutton; T Luke George; James F Saracco; Rodney Siegel; Joseph A LaManna

Understanding how climate variability influences avian survival at continental scales is essential to predict how populations will respond to climate change. This is especially relevant given recent widespread declines in North American bird populations. Climate cycles like the El Niño-Southern Oscillation (ENSO) and the North-Atlantic Oscillation (NAO) are predicted to become more extreme as the climate changes, but effects of climate cycles on animal populations remain uncertain. Here, we use bird-banding data from the Monitoring Avian Productivity and Survivorship (MAPS) network collected at a continental scale during the breeding seasons of 1992-2018 to estimate changes in annual apparent survival and to test the influence of ENSO and NAO on survival rates for 49 passerine species. We found that ENSO and NAO influenced annual survival in about 60% of species. There are not strong differences in the effects of climate on survival as a function of their migratory status or range. If responses of bird survival to climate cycles are indicative of responses to climate change, our results suggest that climate may strongly impact demographic rates. Climate cycles are likely to influence survival rates by affecting migration efficiency or the quality of habitats encountered during migration or stationary nonbreeding seasons. Responses of migratory and resident birds to climate variability may also include other demographic parameters such as reproductive success, calling for more comprehensive studies aimed at understanding links between variation in climate cycles and the demography and population trends for species of conservation concern.

The impacts of differential migration on energetic condition in parulid warblers during spring migration

Madison O Sutton; Michelle L Gianvecchio; Mark E Deutschlander

Individual variation in the timing of spring migration affects survival and may impact subsequent reproductive success. Pressure to breed early influences arrival to the breeding grounds, with differential migration often occurring between sexes and ages. Earlier arriving individuals may face difficult conditions, such as poor resource availability, thermoregulatory challenges, and limited refueling opportunities during stopover or at breeding grounds. The goal of our study was to understand how sex, age, and arrival date influence energetic condition during spring stopover in warblers. We created path analysis models to examine the direct and indirect effects of sex, age, and arrival date on energetic condition in 11 species of parulids captured at Braddock Bay Bird Observatory. Energetic condition was estimated using standardized mass index. Mass gain was examined to estimate refueling rates; 10 species gained mass during stopover. Differential timing in migration was associated with sex and age for all 11 species. Variation in energetic condition explained by our models ranged from 10-30%, but trends were consistent across species. Later arriving individuals, females, and juveniles were associated with higher energetic condition. Arrival date was the best predictor of condition for 8 species, and sex was the best predictor in 3 species. In most species, the direct effect of age and sex was greater than indirect effect of age or sex through arrival date. Differential timing explains some of the variation in energetic condition associated with sex and age, but there are inherent sex and age differences in condition independent of migration timing.

Implications of natal philopatry for Great Black-backed Gull breeding success

F Dylan Titmuss; Mary Elizabeth Everett; Sarah J Courchesne

Declining by more than 45% between 1985 and 2021, the global population of Great Black-backed Gulls (*Larus marinus*) is on a concerning trajectory, and the North American population even more so with a decline of almost 70% over the same period. Despite this, data on Great Black-backed Gull population dynamics are considerably lacking, hindering our capacity to identify the underlying causes of this trend. Considering one potential factor, this project examines the relationship between the natal philopatry exhibited by many individuals in a focal Great Black-backed Gull colony and the reproductive success of individuals across the colony. Common among colonial seabirds, natal philopatry refers to an individual's act of returning to the area in which it hatched to breed. The behaviour may aid new breeders in locating high-quality nest sites and potential mates as well as offering benefits such as the possibility of cooperative nest defence among kin, but it may simultaneously increase the likelihood of competition, inbreeding, or the development of an ecological trap (wherein individuals preferentially select poor-quality habitats that ultimately compromise their fitness). During the 2022 and 2023 breeding seasons, data from the Great Black-backed Gull colony breeding on Appledore Island in the northwest Atlantic revealed a 70% or higher rate of natal philopatry among the colony's banded individuals, and in a subsequent investigation during the 2024 breeding season, reproductive success will be monitored for breeding adults that either do or do not demonstrate natal philopatry, with success assessed through measures including clutch size, proportion of eggs producing chicks, proportion of breeding pairs raising chicks to fledging, and individual fledging success per nest. Potential age- and sex-based interactions will also be explored, and together, these data will elevate our understanding of the demographic drivers of productivity in a declining seabird species.

Species-specific evaluation of BirdNET: varied performance on species and impact of confidence threshold setting

Yi-Chin Tseng; Dexter Hodder; Ken Otter

BirdNET Analyzer, an open-source platform developed by Cornell Lab of Ornithology and Chemnitz University of Technology for bird sound recognition, has been widely applied in avian acoustic research. BirdNET reports detections with associated confidence values, which represent the algorithm's certainty level in identifying species. Setting thresholds on these confidence values is crucial to filter out less reliable bird detection, but comes at the cost of lowering the number of detections retained. There is still a lack of evaluation on how to balance the results' reliability and number of detections retained by setting confidence thresholds. In this study, we used a two-year audio dataset collected in western Canada to assess BirdNET's ability to detect 19 target species that varied in complexity of vocalizations. BirdNET had a greater precision - % detections correctly identified - for species with more complex vocalizations (e.g. warblers) than for species with simpler vocal structure (e.g. Varied Thrush or Brown Creeper). This suggests BirdNET may have better capacity to identify species with more unique vocal signatures, especially if other species in the area do not overlap in vocal structure. When setting a universal high confidence threshold of 0.7 across target species, the precision of BirdNET ranged from 72% to 100%. However, setting a high universal confidence threshold resulted in only 17% of BirdNET's original detection of these species to be retained, and many true detections associated with lower confidence values were lost. By setting species-specific confidence thresholds, we found that 16 out of 19 species were able to achieve a high precision of 90% with confidence thresholds lower than 0.3. These customized confidence thresholds resulted in higher number of detections retained, around 71% of original detections. Our results suggested that species-specific confidence thresholds, compared to a general confidence threshold, can provide higher identification precision and retain higher number of detections at the same time.

The role of prealternate moult in carry-over effects for Nearctic-Neotropical migratory warblers

Shae Turner; Christopher Tonra; Ivy Ciaburri; Bryant Dossman; Peter Marra; Christina Robinson; Mateen Shaikh; Matthew Reudink

Despite the importance of moult for feather function, it remains one of the least understood events in the annual cycle of migratory birds. In Parulidae, prealternate moult has received far less attention than prebasic moult because it typically occurs away from the breeding grounds, during one of the least-studied periods of the annual cycle: the stationary nonbreeding period. Understanding the factors that shape prealternate moult phenology is critical for understanding the evolution of this moult strategy and how it interacts with other life history events across the annual cycle. Here, we investigated 1) the role of stationary nonbreeding habitat quality in influencing patterns of prealternate moult and 2) if the timing and intensity of moult carried over to influence the timing of pre-breeding (northward) migration. From January through April 2023, we studied six Nearctic-Neotropical migratory species (family Parulidae) in Jamaica in two distinct habitats that varied in quality. We captured individuals throughout the period to measure birds' physical condition and document the timing and intensity of their moult, then used radio-telemetry tags and a global network of automated receiving towers (The Motus Network) to track migration departure dates. We predicted that birds from high-quality nonbreeding habitat would have better physical condition than those from poorer quality habitat, and as a result, moult more intensely. For those birds in better physical condition, we predicted they would moult earlier when compared with birds in poorer condition, and depart earlier from Jamaica. Ultimately, these results advance our understanding of prealternate moult in Parulidae warblers and will serve as a foundation for examining the role of moult in carry-over effects from the stationary nonbreeding period to pre-breeding migration in our study population.

Urban Seasonal Waterlogged Areas As An Alternative Habitat for Wide-Array of Avian Species in Hyderabad Sindh

Anees Ur Rahman; Arshad Ali; Jawad Danish

This study conducted in Hyderabad, Sindh, examined the ecological significance of seasonal waterlogged areas for avian species through direct observations. A total of 39 species comprising 21,080 bird individuals were recorded, with Northern Pintail, Common Teal, Green-winged Teal, Mallard, and Gadwall being the most dominant. Migrant species constituted a significant portion, while River Tern and Black-winged Stilt emerged as the most common species. Scolopacidae was the most dominant family, while omnivore guilds, primarily composed of ducks, dominated the foraging spectrum. The study highlights the vital role of urban waterlogged areas in providing essential habitats for diverse bird communities, including migrants and residents.

Nighthawk: A new tool for acoustic monitoring of nocturnal bird migration in the Americas

Benjamin M Van Doren; Andrew Farnsworth; Kate Stone; Dylan M Osterhaus; Jacob Drucker; Grant Van Horn

Migratory birds are among the most well-studied animals on Earth, yet relatively little is known about in-flight behavior during nocturnal migration. Because many migrating bird species vocalize during flight, passive acoustic monitoring shows great promise for facilitating widespread monitoring of bird migration. Here, we present Nighthawk, a deep learning model designed to detect and identify the vocalizations of nocturnally migrating birds. We trained Nighthawk on the in-flight vocalizations of migratory birds using a diverse dataset of recordings from across the Americas. Our results demonstrate that Nighthawk performs well as a nocturnal flight call detector and classifier for dozens of avian taxa, both at the species level and for broader taxonomic groups (e.g. orders and families). The model accurately quantified nightly nocturnal migration intensity (80% variation explained) and species phenology (78% variation explained) and performed well on data from across North America. Incorporating modest amounts of additional annotated audio (50–120 h) into model training yielded high performance on target datasets from both North and South America. By monitoring the vocalizations of actively migrating birds, Nighthawk provides a detailed window onto nocturnal bird migration that is not presently attainable by other means. This tool will empower diverse stakeholders to efficiently monitor migrating birds across the Western Hemisphere and collect data in aid of science and conservation.

The changing climate may create more challenges for songbirds during migration.

Claire Varian Ramos

Conservation of migratory songbirds can be particularly challenging as these animals require three distinct habitats for successful completion of their life cycle: breeding habitat, wintering habitat, and migratory habitat. The migratory phase of the life cycle of these animals may be the most critical as migratory behavior is physiologically stressful and dangerous. This was clearly demonstrated by a mass migratory songbird die-off that occurred in early Sept. 2020 in the southwestern United States. Thousands of dead migratory birds were found over the span of just a few days. It is thought that this die-off was a result of a lethal combination of drought conditions reducing food availability, poor air quality caused by wildfires, and a freak snowstorm. In the southwest, the frequency of drought, wildfire, and severe weather are predicted to become more common as the climate continues to change, increasing the challenges faced by migratory birds. Migratory songbirds were captured and their condition assessed during migration in Southeastern Colorado over the past ten years. Measurements of condition were found to be correlated with drought and air quality indices, however there is variation in how different groups of birds respond to these challenges. These data represent a starting point to help understand how birds respond to environmental challenges. Future research will focus on additional measures of physiological stress and individual survival.

Wetland use and movements of post-breeding trumpeter swans (*Cygnus buccinator*) in the Nebraska Sandhills

Mark P Vrtiska; Katie Krager; Dessalegn Ejigu; Larkin A Powell

Understanding of a migratory bird species' home range and movements provides knowledge of its demography, habitat needs and use, and aids in conservation planning efforts. Trumpeter swans (*Cygnus buccinator*) were re-introduced into the Nebraska Sandhills beginning in the 1960s and have become established as part of the High Plains flock; however, few data exists regarding the ecology of the High Plains flock. Both conservation and management planning depend on a better understanding of their ecology. Thus, the objective of this research was to examine the post-breeding (1 September to date of departure to wintering grounds) wetland use and movements of swans in the Nebraska Sandhills, between 2014–2020. We captured and fitted solar-powered GPS transmitters via neck collars to 38 swans during the summer molting period. We used movement data to estimate the number of movements, number of wetlands used, and mean distance moved between wetlands. We also compared these parameters between swans with cygnets and those without. The number of movements was similar ($U_{17,6} = -34.5$; $P < 0.05$) between swans with and without cygnets. Also, mean distance moved between wetlands between swans with cygnets to those without was similar ($U_{17,6} = -49$; $P < 0.05$). Swans with cygnets used a mean of 5.1 wetlands whereas swans without cygnets used 9.7 wetlands. We expected swans with cygnets to move less, but the density of wetlands in the Sandhills may preclude the necessity to move large distances by all swans. Conservation planning for swans in the Sandhills should reflect all swans regardless of breeding status. Conservation and management planning should also consider quality of wetlands (i.e., abundance or presence of submerged aquatic vegetation) and how to manage them.

Breeding Site Fidelity of Trumpeter Swans (*Cygnus buccinators*) in the Nebraska Sandhills

Mark P Vrtiska; Anna Crist; Dessalegn Ejigu; Larkin A Powell

The trumpeter swan (*Cygnus buccinators*) is the largest of all species of waterfowl, and the species is abundant and widespread across most of the northern United States and Canada. Trumpeter swans were re-introduced into the Nebraska Sandhills beginning in the 1960s and have become established as part of the High Plains flock. Although trumpeter swans are known to exhibit breeding site fidelity, few quantified estimates are available. The objective of our study was to quantify breeding site fidelity of trumpeter swans in the Nebraska Sandhills, 2014–2020. We captured and fitted solar-powered GPS transmitters via neck collars to female trumpeter swans during the summer molting period and obtain location data throughout the year. We used movement and location patterns to determine movements from wintering areas to breeding sites (where captured previous year) and nesting attempts. We estimated two parameters of fidelity: 1) return to breeding site; and 2) return to breeding site and an apparent nesting attempt. For swans returning to breeding sites, fidelity was 0.93. Fidelity rates for return to breeding sites and an apparent nesting attempt, fidelity was estimated at 0.65. However, in 7 instances, although location data did not confirm an actual nesting attempt, nests may have failed early in incubation stage. Trumpeter swans breeding in the Nebraska Sandhills exhibited high fidelity to their breeding sites. Given their fidelity to wintering areas as well, dispersal among swans across the Nebraska Sandhills and to other areas may be gradual. Sub-populations also may exist for the High Plains Flock and may help explain the relatively low genetic diversity.

Measuring Eastern Bluebird embryo heart rate in the field using a digital egg monitor: successes and challenges

Lindsey Walters; Marissa Tendam; Caitlin Thornberry

Measuring embryonic development inside the egg can provide useful information for research on the breeding biology of birds. Because embryo heart rate is correlated with oxygen consumption, it provides a way to quantify embryo metabolism as a proxy for development, but it can be difficult to non-destructively measure embryo heart rate in the field. We used a relatively new technology, the Buddy digital egg monitor, to measure the heart rates of Eastern Bluebird (*Sialia sialis*) embryos. This device non-invasively detects the pulse of an embryo inside an egg using infrared light. It is also battery powered and portable so it is easy to use in the field. However, using this monitor presented some challenges. We frequently could not obtain a heart rate reading when the embryo was moving. In addition, sometimes no heart rate was detected, even in eggs that did eventually hatch. From the successful readings, we found that heart rate significantly increased as the age of the embryo increased and as the temperature of the egg increased. However, there was no relationship between heart rate and clutch size, suggesting that even females with larger clutches are able to maintain nest temperature at a level that supports embryo development. Overall, we found that this device has the potential to be useful in a wide variety of field studies, but that researchers should be prepared for a decrease in sample size due to unsuccessful measurements.

The ecology of Eastern Whip-poor-wills on their wintering grounds and why are they so difficult to locate on their Latin American wintering grounds.

Michael P Ward; Chris Tonra; Steve Matthews; Ian Souza-Cole; Grant Witynski; David Edlund; Mike Avara; Robert Sosa

The eastern whip-poor-will (*Antrostomus vociferus*) is a declining, though still widely distributed nightjar of eastern North America. The whip-poor-will's distinctive vocalization given at dusk, dawn, and night make them a species that can be readily monitored on their breeding grounds. Recent research using archival GPS tags have found that populations from Canada, the northeast United States and the Midwest generally winter in southern Mexico and northern Central America. We also know from historic and more recent eBird records that eastern whip-poor-wills also winter in Florida. We have searched for eastern whip-poor-wills in Oaxaca and Chiapas, Mexico on three occasions in winter in locations where eastern whip-poor-wills are known to winter (via archival GPS locations). While eastern whip-poor-wills are easily monitored on the breeding grounds and we detected many other species of nightjars, we had only one confirmed sighting, and 2 other potential detections. In January of 2024 we visited Florida in search of wintering eastern whip-poor-wills and over the course of six nights detected more than a dozen birds and archival tagged 10 individuals. We will discuss why eastern whip-poor-wills are so difficult to locate on their wintering grounds (outside of Florida), what habitats the species uses on the wintering grounds, and what research is needed to understand if the species is being impacted by loss of habitat on the wintering grounds.

Body mass, colony size, and survival in Cliff Swallows

Amy C West; Charles R Brown

An optimal body mass can promote greater rates of survival in birds. However, body mass can fluctuate over the course of a year to reflect energetic requirements of different stages of the life cycle. Additionally, the optimal body mass may change from year to year depending on environmental conditions resulting in either fluctuating or stabilizing selection on body mass within a population. We examined the effects of body mass on survival in a colonially nesting bird, the Cliff Swallow (*Petrochelidon pyrrhonota*), over the course of 20 years to see 1) if there is an optimal body mass and how it may have changed over time and 2) if colony size and weather interacts with body mass to influence survival. Over the course of the 20 years, we found that with the exception of a few years with atypical weather, Cliff Swallows of varying body mass had similar survival outcomes, unless their weight was extremely high or low. In general, body mass seemed to be under stabilizing selection. Birds in small colonies tended to have lower survival rates regardless of body mass. Years with a higher rainfall in June tended to result in lower survival with birds of intermediate masses doing better, suggesting that annual weather conditions can be a driver of variation in body mass of birds.

Evaluation of eBird data validity using wetland point-counts in the Red River Basin

Zoe Williams; Jessica L Coleman; Matthew J Greenwold

Citizen science is a fast-growing source of biological data for use as additional data points within more complex studies. This is in supplementation to more common surveys such as nest and aerial surveys, point-counts, and capture-recapture. But can eBird data be used by itself to predict trends and produce an accurate portrayal of species makeup in an area? Evaluating the efficacy of using eBird data as a sole provider of data drastically increases the ability for Ornithologists to monitor populations without the accompanying funds, or even in other countries without the proper infrastructure for conservation monitoring. The species that inhabit wetlands in the Red River Basin of Texas and Louisiana are important indicators of environmental health and diversity, with specific vegetation requirements and water quality values. Point-count data taken from natural, constructed, and alternatively used wetland habitats from the Red River Basin area of northern Texas and Louisiana during the winter and spring months was compared to over 10,000 eBird checklists from the same area and time frame. Metrics of species richness and diversity, and ANOVAs were performed to evaluate the accuracy and efficacy of citizen science data.

3D Analysis of Morphological Diversity in Hawaiian Hawks (genus *Buteo*) Across Time and Space, from Pleistocene to the Present

Nate C Wilson; Helen F James; Megan Spitzer; Michael Hanson; Grace Musser

Over 60 endemic Hawaiian bird species have gone extinct since human arrival, thus little is known about Hawai'i's ecological structure pre-extinction. Study of the last remaining endemic raptorial species—the Hawaiian Hawk or 'Ō (Buteo solitarius)—can provide us with key predator/prey information through their island-specific morphological adaptations; moreover, morphological changes post-extinction may reflect their new environment. We studied limb elements of fossil and extant Hawaiian Hawks using 3D morphometrics to gain insight into its extinct ecosystem. While the Hawaiian Hawk's current range is limited to the main island of Hawai'i, hawk fossils have been found at the mid-Pleistocene site, Ulupa'u Head on O'ahu, and the Holocene site, the Makauwahi Cave on Kaua'i, thus our specimens compare 'Ō morphology across space and time. Additionally, we analyzed the Swainson's Hawk (Buteo swainsoni), its closest continental relative, to aid in comparing morphological adaptational trends in Buteo. For fossils identified as Buteo, and modern specimens of B. solitarius and B. swainsoni, we obtained 3D surface scans of carpometacarpus, femur, humerus, tarsometatarsus, and tibiotarsus (only carpometacarpus and tarsometatarsus for B. swainsoni) and applied morphometric landmarks to them. We analyzed the landmark data using Procrustes transformation and principal components analyses for each bony element. Results of analyses on Hawaiian Hawk specimens suggest higher levels of morphological disparity within mid-Pleistocene and Holocene populations and thus between different islands, than in the present-day hawk population. Additionally, trends in morphospace distribution appear congruent between the three time periods, however, analysis of Swainson's Hawk is necessary to support this trend in the Buteo genus. The results of our analyses will aid our understanding of the ecological niche the Hawaiian Hawk occupied in the extinct Hawaiian ecosystem, and how the raptorial body plan adapts to changing environments.

Variation in Brown Creeper, *Certhia americana*, song at the individual, population, and subspecies level

Jordan Winter; Jennifer Foote

The Brown Creeper (*Certhia americana*) is a cryptic songbird species found throughout North and Central America. While morphological differences are slight across its range, genetic studies suggest significant diversity across subspecies. While Brown Creeper songs have been studied in select portions of its range, there has yet to be a geographically-widespread investigation of song variation. We examined Brown Creeper songs among three Ontario populations of *C. a. americana*, and examined songs from across the species range using recordings obtained from the Macaulay Library and Xeno Canto. We took fine spectral measurements from each note within the song as well as for the whole song. We also used spectrogram cross-correlation (SPCC) and dissimilarity scores from dynamic time warping (DTW) to compare songs among populations of *C. a. americana* and across the range. SPCC and dissimilarity scores showed songs were significantly variable among individuals within populations and among populations in Ontario. SPCC and dissimilarity scores also showed some subspecies-level differences. Spectral measurements further showed structural variation among populations, and between some subspecies. Our results suggest individual distinctiveness of *C. a. americana* songs, population-level variation within subspecies, and variation between subspecies. Our findings align with genetic evidence of Brown Creeper geographic variation, and add to our understanding of this widespread and cryptic species.

Conservation implications of breeding Eastern Whip-poor-will prey preferences assessed via comparison of fecal DNA metabarcoding and UV light insect trap samples

Grant C Witynski; Olivia Moline; Michael P Ward; Sonia Tomczyk; John D Gillece; Jeffery T Foster; Thomas J Benson

An understanding of how dietary requirements and preferences shape the ecology of declining species is one of the most fundamental components of planning for their conservation. The role of diet in conservation is especially pronounced for species that have specialized feeding strategies, limited spatiotemporal foraging windows, and inconsistent prey availability. Nightjars are highly susceptible to dietary constraints on breeding success because they are active only during crepuscular or nocturnal periods and rely on flying nocturnal insects –many of which are in steep decline– as their primary prey. Likely due in part to these restrictions on their foraging capacity, many nightjars have experienced rapid range contractions and population declines in recent decades, including the Eastern Whip-poor-will (*Antrostomus vociferus*), whose call was once near-ubiquitous across nighttime soundscapes in eastern North American woodlands.

Although recent studies have confirmed whip-poor-will's reliance on moths as their primary food source, very limited information is available on their prey preferences below the order level. To better understand whip-poor-will dietary preferences and requirements, we are conducting DNA metabarcoding on fecal samples collected from whip-poor-wills on breeding territories in central Illinois, USA from 2021 to 2024. We are comparing these sequences with prey availability measured through ultraviolet light insect trapping that was conducted concurrently at our sites across three habitat classifications: forest, edge, and grassland. We present our preliminary analyses of these data investigating the taxonomic, size, and habitat affinities of prey consumed by breeding whip-poor-wills as well as the host plant requirements of preferred prey species. These dietary requirements have far-reaching implications for the conservation of moths and whip-poor-wills alike, and we hope our methods will provide roadmap for conservation research on aerial insectivores and their prey beyond our study system.

Quantifying Color Variation in Basic and Formative Plumage of White-throated Sparrows

Jacob A Wyco; Stefan Woltmann

The color of a birds' plumage is an important component in social signaling. Plumage color and patterns can convey information such as sex and age. In this study, we investigate the color variation in the formative and basic plumages of overwintering White-throated Sparrow (*Zonotrichia albicollis*). White-throated Sparrows are a polymorphic species, exhibiting a white or tan-stripe morph in both sexes, although differences are not as pronounced in the non-breeding season as they are in the breeding season. We took reflectance measurements of the throat, lore, supercilium, and median crown stripe of 60 birds wintering in central Tennessee. We quantified color variation of formative and basic White-throated Sparrow plumage and asked whether there are differences in color between age, sex, and morph. Birds measured were defined as First Winter (FW, in formative plumage) and After First Winter (AFW, in definitive basic plumage). Preliminary results show white-stripe birds of both sexes showed increased mean brightness on their median crown stripe compared to tan-stripe birds. White-stripe birds of both sexes also had increased mean brightness values of their supercilium when compared to tan-stripe birds. The UV chroma of the throat did not differ between FW and AFW birds. Within FW birds, female tan-stripes had the lowest UV chroma on the throat. Our results suggest there is age, sex, and morph variation in the head color of formative and basic plumaged White-throated Sparrows. Whether this variation is important in signaling social status is unknown.

Weight deposition of passerines during migration in the Wasatch Front

Parker Zabriskie; Connor Johnson; Sydney Sjoblom

During migration, most birds travel at night and then stopover during the day to replenish energy stores. The choice and availability of high quality stopover locations can be critical to the survival and success of migrating individuals. The rate of refueling is linked to the length of time at the stopover location, migration speed, and the timing of critical life stages, such as breeding. A bird utilizing an optimal strategy would maximize fuel intake and minimize stopover length. Using banding data, we examined the processes shaping stopover dynamics among a diverse migrant assemblage using locations along the Wasatch Front in Utah during both spring and fall migration. Specifically, we assessed variation in fuel deposition rates as well as the associations between mass gain, stopover length, and departure probability. In addition, we compared a small fragmented urban site to a larger more contiguous site to determine if differences exist in the fuel deposition rates of birds using these locations. We will explore the results that show some birds show a significant increase throughout the day while others do not. Using this data, we can look at the habitat that is important for birds during stopover and find ways to conserve similar habitat.

The Art of the Decoy

Zac Zetterberg

The wooden duck decoy is an American innovation and a symbol of American freedom, national pride, and entrepreneurial spirit. Originally conceived by the Native Americans, the waterfowl decoy has developed over thousands of years into an exceedingly effective tool for hunting and subsequently became a culturally predominant art form, sought after by collectors and institutions across the country. Since their inception, decoys have taken on unimaginable forms and procured patinas that demand attention and pique curiosity. The Peoria Riverfront Museum, situated in the heart of the Illinois River Valley, is an ideal location for the recognition of the historical significance of the decoy. With the establishment of the Center for American Decoys, Peoria Riverfront Museum continues to preserve the traditions of American waterfowl history through the art of the decoy, with a particular emphasis on carvers from the Illinois River Valley.