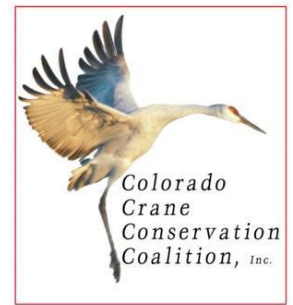




**CFO Science Session,
May 30, 2026, 1:00 PM - 4:30 PM**
Sponsored by the Colorado Crane Conservation
Coalition



Time	Presenter	Topic / Title
1:00-1:05	Sondra Bland/Christy Carello	Opening remarks and session overview
1:05-1:20	Sara Padula	Using a population genomic approach to investigate local adaptations in spatial cognition in Black-capped Chickadees
1:25-1:40	Cristina Barros	Song function in female Red-winged Blackbirds
1:45-2:00	Holden Fox	Adaptive divergence and implications for translocation in Loggerhead Shrike
2:05-2:20	Veil Camacho & Bradley Alf	Measuring urban bird biodiversity with acoustic recordings
2:25-2:40	Julia Merfeld	Mindful Birding: Exploring the wellbeing benefits of engaging with wildlife
2:45-3:00	Break	Sponsored by the Colorado Crane Conservation Coalition, Inc
3:00-3:15	Susan Bonfield	Advancing hummingbird conservation in the west
3:20-3:35	Dave Sutherland	Bird City Colorado for bird conservation
3:40-4:10	Chuck Hundertmark	The evolution of birding tools: eBird gets even better
4:10-4:15	Christy Carello	Concluding remarks
4:15-4:30		Open for discussion

Abstracts

Using a population genomic approach to investigate local adaptations in spatial cognition in Black-capped Chickadees.

Sara Padula (Sara.Padula@colorado.edu), Georgy Semenov, Theresa Burg, Scott Taylor. University of Colorado, Boulder.

Understanding how complex traits evolve in natural populations remains a central challenge in evolutionary biology, particularly for traits that are difficult to measure directly, such as cognition. Local adaptation can shape phenotypic and genetic variation across environmental gradients, but traditional approaches for testing it, such as reciprocal transplant experiments, are often not feasible in highly mobile organisms like birds. Black-capped chickadees (*Poecile atricapillus*) provide a powerful system for studying the evolution of cognition, as this non-migratory species relies on spatial memory to recover thousands of cached food items during winter, and previous work has shown that individuals from harsher environments exhibit enhanced spatial cognitive abilities. These patterns suggest that spatial memory may be an important target of selection across the species' range. In this study, I use a population genomic framework to investigate whether signatures of selection and genotype–environment associations are enriched near genes associated with spatial cognition in black-capped chickadees sampled across North America. Using whole-genome resequencing data, I combine complementary approaches, including genome scans for selective sweeps, allele frequency–based summary statistics, and genotype–environment association analyses, and integrate these results with prior work identifying candidate cognition-related genes. This work aims to evaluate whether genomic regions under selection are associated with cognition and whether environmental variation, particularly winter climate, predicts genetic variation at these loci. More broadly, this study highlights how population genomic approaches can be used to investigate local adaptation in complex traits in wild bird populations where direct experimental approaches are not feasible.

Song Function in Female Red-winged Blackbirds

Cristina Barros (cristina.barros@unco.edu), Lauryn Benedict, University of Northern Colorado

Research on female birdsong in recent decades has drastically changed our understanding of how birdsong functions, and has illuminated that females and males don't always use song in the same context, especially among temperate-zone species in which both sexes sing. Red-winged Blackbirds are a socially gregarious species in which females sing frequently, yet there has not been a wide consensus on the primary function for song use. I compared sexually dimorphic traits in acoustic features of song, and tested for six possible functions of song in female Red-winged Blackbirds. Comparisons of average song features revealed that females exhibit wide intraindividual variation, and possess song features that differ significantly from song features of male conspecifics. Females were highly likely to sing to acoustic stimuli provided by playback experiments (between 48% - 71% chance of singing), however likelihood to sing and singing latencies of adult females did not differ across playback treatments. Female song rates significantly decreased in response to playbacks of unfamiliar female rattle song. Spectro-temporal analyses showed that females significantly changed their songs in response to playback of their mates, and adult female songs. Nestlings significantly increased begging intensity after playback of female songs. My results

partially support intra-pair communication, mate attraction, intrasexual competition, and parent-offspring communication functions for female song. Female song in this species appears to be complex and multi-functional.

Adaptive Divergence and Implications for Translocation in Loggerhead Shrike

Holden Fox¹ (Holden.Fox@colostate.edu), Amanda Carpenter¹, Joan-Ferrer Obiol¹, Jim Saracco², Christen Bossu¹, Alisa Samuelson³, Allisyn Gillet⁴, Amy Chabot⁵, Kristen Ruegg¹. Department of Biology, Colorado State University, Fort Collins, Colorado, USA; 2. The Institute for Bird Populations, Petaluma, California, USA; 3. Department of Biology, Queen's University, Kingston, Ontario, Canada; 4. Indiana Department of Natural Resources, Indianapolis, Indiana, USA; 5. African Lion Safari, Cambridge, Ontario, Canada

Global biodiversity loss has heightened concern about the erosion of genetic diversity in declining populations, fueling interest in assisted gene flow as a strategy to preserve evolutionary potential. However, successful assisted gene flow efforts require identifying source populations that minimize the risk of outbreeding depression while simultaneously enhancing standing genetic variation and long-term resilience of recipient populations in the face of global change. Advances in conservation genomics now enable decisions to be guided by patterns of both neutral and adaptive genetic variation, but comprehensive range-wide examples remain rare. We used whole-genome sequencing to evaluate the potential for assisted gene flow in the Loggerhead Shrike (*Lanius ludovicianus*), a declining grassland bird that is the focus of numerous conservation efforts in the Channel Islands, Canada and the Eastern United States. Using whole genome data from 324 individuals across their range, including both endangered populations and endemic island forms, we assess population structure, patterns of genetic diversity, and recent changes in effective population size. In so doing, we identify four conservation units across the continental range and pinpoint regions within the West and Ontario/Central populations where reductions in effective size are near or below recommended minimum values to maintain evolutionary potential and avoid inbreeding. We show how patterns of adaptive and neutral genetic variation can be used to identify the best source populations for assisted gene flow. More broadly, this study shows how combining landscape genomics and adaptive variation can guide translocation decisions and offers a framework for conservation planning in at-risk species.

Measuring Urban Bird Biodiversity with Acoustic Recordings

Veil Camacho (Veil.halligan@colostate.edu), Bradley Allf, Sara Bombaci. Colorado State University.

Understanding what drives bird diversity in urban environments is a central challenge for both ecology and conservation, yet commonly used datasets (e.g., eBird) are often spatially biased toward locations where birders choose to go. This bias limits our ability to infer how birds are distributed across the full range of urban neighborhoods and environmental conditions. To address this gap, we developed Concrete Chorus, a community science project that uses randomized site selection and standardized acoustic sampling to measure urban bird richness. In 2025, we piloted this approach in Durham, North Carolina, recruiting volunteers to collect short (3-minute) bird sound recordings at assigned sites across the city using smartphone apps. A key question for scaling this approach is whether smartphone-based recordings can provide data comparable to traditional

autonomous recording units (ARUs). Preliminary validation analyses indicate that recordings collected by volunteers using smartphones yield similar estimates of species richness to ARU deployments at the same sites. Early results from North Carolina, and emerging data from Colorado and other cities, suggest that urban bird richness is strongly associated with landscape features such as tree canopy cover, green space, and proximity to water, with additional evidence for socioeconomic gradients consistent with the “luxury effect.” Together, these findings highlight the potential of structured community science to generate high-quality, spatially representative biodiversity data in cities, offering a scalable path forward for understanding and managing urban ecosystems.

Mindful Birding: Exploring the Wellbeing Benefits of Engaging with Wildlife

Julia Merfeld (Julia.Merfeld@colostate.edu), Sarah Walker, Caitlin Wells, Jill Zaretsky. Colorado State University.

A growing body of research has focused on the impacts of nature exposure and mindfulness practices, uncovering more tools to help combat human health and wellbeing concerns. Yet, little research has investigated wildlife’s role in the wellbeing benefits of nature. Some groups advocate ‘mindful birding’, which pairs principles of mindfulness with nature exposure to improve wellbeing, but the impacts of engaging with wildlife through a mindfulness practice are still unknown. Building from previous research on the beneficial impacts of spending time in nature and the effects of engaging in mindfulness on mental health and well-being, birding may have similar positive implications. This study investigated potential wellbeing benefits people receive from birding, the key qualities of those benefits, and how those benefits compare between student and general populations. Participants were interviewed about their experiences of birding and the perceived qualities of impactful birding practices. The impacts and qualities were visualized by creating a diagram of participants’ mental models during the in-person interviews, with an opportunity post-interview for revision or clarification from the participant. Study results indicate that, as a result of birding, participants perceived increased well-being socially, emotionally, and in connection to nature. We conclude with recommendations regarding nature exposure and mindfulness practices that support the wellbeing of people and wildlife.

Advancing Hummingbird Conservation in the West

Susan Bonfield (sbonfield@environmentamericas.org), Environment for the Americas

Hummingbirds are charismatic pollinators across the Americas, yet many migratory species face growing threats from habitat loss, climate change, and declining floral resources and insects. The Western Hummingbird Partnership works to advance the conservation of hummingbirds through collaborative research, habitat stewardship, education, and community engagement across the western United States and beyond. This presentation will provide an update on current initiatives focused on protecting migratory hummingbirds and the habitats they depend on. We will highlight recent research efforts that are improving our understanding of hummingbird distribution, migration patterns, and conservation needs. In addition, we will introduce the Hummingbird Feeder Project, an initiative that explores nectar feeders, their users, and how we can gather data and improve feeder maintenance. Participants will also learn about the upcoming Hummingbird Training Workshop to be held in Sedona, Arizona which will bring together researchers, land managers, educators, and community scientists to share knowledge and practical tools for hummingbird monitoring and

conservation. The workshop will include hands-on training, field experiences, and opportunities to build partnerships that strengthen hummingbird conservation efforts across the region.

Bird City Colorado for Bird Conservation

David Sutherland (dsutherland@environmentamericas.org), Environment for the Americas

The Bird City Colorado program motivates cities and towns to make their communities safer and more sustainable for birds through a structured framework of conservation actions. Participating communities commit to implementing activities that protect and restore habitat, reduce threats such as window collisions and light pollution, provide sustainable landscape practices, engage residents in community science and education, and celebrate World Migratory Bird Day.

In this presentation, we will introduce the Bird City Colorado program and outline the requirements for communities seeking designation. We will share practical examples from participating communities along the Front Range, highlighting successful initiatives such as habitat restoration projects, bird-friendly policy development, public education campaigns, and community events that bring residents together around bird conservation. These stories demonstrate how local governments, nonprofits, educators, and volunteers can collaborate to create measurable conservation outcomes while strengthening community connections to nature.

Attendees will gain a clear understanding of how the program works, the types of actions communities can implement, and the benefits of participation for both birds and residents. We will also discuss opportunities to expand the program to additional communities and share resources available to help municipalities begin their Bird City journey.

The Evolution of Birding Tools: eBird gets even better

Chuck Hundertmark (chundertmark@cobirds.org), President, Colorado Field Ornithologists

In the mid-20th century and early 21st century, birders who started looking beyond their own back yard quickly added one or more bird-finding guides to their libraries. As birding moved rapidly into the digital world in the 21st century, online bird-finding guides emerged including CFO's County Birding web sites. Concurrently, Cornell Laboratory of Ornithology launched eBird. In 2023, CFO shared its County Birding data with Birding Hotspots, a crowd-sourced bird-finding web site intended to cover every eBird hotspot in the United States, and indeed, the world. This spring, Birding Hotspots data has been merged with eBird, making eBird the comprehensive birding tool that many of us wished for. That vision needs the help of many birders to make it complete. This talk will explore where we've come, how you can use the new eBird tools, where patience will be needed, and where you can help.