

Agenda
Colorado Chapter of the Wildlife Society Annual Meeting
Feb 7th - 9th, 2024
Pueblo Convention Center – Pueblo, Colorado

WEDNESDAY, FEBRUARY 7

7:30 am - Noon Workshops

ESA Section 7 and 10 Workshop: *Darren LeBlanc, USFWS* (8 am - 11 am)

Meeting Rooms # 4 and 5

Description: Come learn about the Endangered Species Act, important sections of the Act, how they contribute to species conservation, and how those sections may affect wildlife managers/conservations/etc. The presentation will probably not exceed 2 hours, with time for questions afterward.

Avian Point Count Workshop: *TC Walker, Jen Timmer, and Matthew McLaren, Bird Conservancy of the Rockies* (7:30 to noon)

Meeting Room # 2

Description: Bird conservation begins with hundreds of devoted biologists conducting standardized avian point counts. This workshop will provide attendees the basic resources needed to join them and background information on how the Bird Conservancy of the Rockies conserves birds and their habitat. In this workshop attendees will learn about multi-species avian point-count protocol and rapid habitat assessment protocol. The workshop will include an outdoor field trip. Space is limited to just 24 participants. Attendees will need to bring binoculars, water, snacks, and suitable clothing.

12:00 - 2:00 pm Internal Meetings

Rooms Available for Internal Meetings

2:00 - 5:00 pm Special Symposium: Sensitive Species Conservation and Management in Colorado

Organizer/Moderator: Kathy Griffin (CPW Grouse Conservation Program Manager)

Introduction

Colorado's 2025 State Wildlife Action Plan: Awareness, alignment, access & action - ***David Klute & Kacie Miller*** (CPW)

Using abundance and presence to understand the habitat needs of Eastern Black Rails – ***Nora Hargett et al. (University of Illinois at Urbana-Champaign), Liza Rossi*** (CPW)

Gunnison sage-grouse – Balancing management between state and federal agencies - ***Kathy Griffin*** (CPW) and ***Whit Blair*** (US Fish & Wildlife Service)

Rangewide variability of White-nose Syndrome manifestation in the Little Brown Myotis:
Avoiding bat dogma: Why ecoregional differences of broad-ranging species matter. **Daniel J. Neubaum** (CPW)

Prairie dogs and Ptarmigan: How can they have anything in common? - **Amy Seglund** (CPW)

Tiny wildlife with a big role: Colorado Native Pollinating Insects Health Study- **Steve Armstead**
(Xerces Society; Pollinator Conservation and Nature-Based Climate Solutions Specialist)

Panel Discussion

6:00 - 9:00 pm Opening Networking reception

Location: Grand Hall B, Pueblo Convention Center, Cash Bar, Appetizers

THURSDAY, FEBRUARY 8

All Day - Wildlife Photo Contest

Organizer: Marcella Tarantino

Bring up to three of your best photos to display at the conference – **please drop off your photos at the registration desk by the end of the first break on Thursday morning** to be voted on through the end of the first break on Friday morning. Photos will be judged by popular vote in the following categories: 1. Amphibians, Reptiles, and Fish; 2. Birds; 3. Invertebrates; 4. Mammals; 5. Game Camera; 6. Human Dimensions; 7. Landscapes and Still Life (including flora); and 8. Creative/Comedic. Prizes will be awarded in each category. See CCTWS website for details: <https://wildlife.org/colorado/meetings/annual-meeting/#PHOTO%20CONTEST>

7:00 - 9:00 am Student Networking Breakfast

Grand Hall B

Organizer: Katie Gray

Including ignite-style presentations about different career paths including: USFS, BLM, USFWS, non-profit, consulting, academic, etc.

9:00 am - 12:10 pm Plenary Session: Sensitive Species Conservation Case Studies

Grand Hall A

Moderator: Nathan Galloway

9:00 - 9:05 am Welcome and Introductions – **Nathan Galloway** (Past President, CCTWS)

9:05 - 9:10 am Honoring Our Veterans in the Home of Heroes - **Mary Hiney** (CCTWS IDEA Committee)

From military service to a career in wildlife management: shifting perspectives - **Jonathan Hicks** (Natural Resources Specialist (Lead Ranger and Operations Manager), Conchas Dam, US Army Corps of Engineers)

- 9:10 - 9:45 am **Plenary Address:** DNA Deductions: How molecular tools support endangered species management - **Sara-Oyler McCance** (USGS)
- 9:45 - 10:05 am The Endangered Species Act at 50: Learning from the past to improve our future - **Jennifer Wilkening** (USFWS) and **Brenna Forester** (USFWS)
 The United States Endangered Species Act (ESA), ratified in 1973, remains as one of the strongest wildlife conservation laws in the world. Recognizing that threatened and endangered fish, wildlife and plants are of great value to current and future generations, the ESA safeguards species and their habitats through various mechanisms such as listing of imperiled species as threatened or endangered (Section 4), guidance for federal agencies to conserve listed species (Section 7), and public partnerships (Section 10). The ESA has been successful at preventing the extinction of 99% of the species it protects although complete species recovery has been more challenging. Additionally, global change (e.g., urbanization, climate change, invasive species expansion) increasingly threatens ecosystems and biodiversity and is one of the biggest drivers of species decline and extinctions today. Here we review the last 50 years of the ESA in action, describing areas of past success, pinpointing situations where implementation has been less effective, and identifying the greatest challenges for the future.
- 10:05 - 10:25 am Helping Frogs So They Don't Croak: A case study of headstarting and translocation of northern leopard frog tadpoles - a Colorado Tier-1 Species of Greatest Conservation Need - **Sarah Heerhartz** (Boulder County Parks and Open Space), **Joseph Ehrenberger** (Matrix Design Group), **Will Keeley** (City of Boulder Open Space and Mountain Parks), **Mac Kobza** (Boulder County Parks and Open Space), **Mikki McComb-Kobza** (Ocean First Institute), **Aran Meyer** (City of Fort Collins Natural Areas Program), **Ryan Prioreschi** (City of Boulder Open Space and Mountain Parks), **Jayme Sneider** (Innovation Center - St. Vrain Valley School District), and **Boyd F. Wright III** (Colorado Parks and Wildlife)
 In 2019, five partner agencies convened the Colorado Front Range Frog Working Group with the goal of working together to advance recovery and conserve the at-risk Northern Leopard Frog (NLF), a Tier-1 Species of Greatest Conservation Need in Colorado. Today the group has grown to 15 partner agencies and organizations collaborating on species surveys, habitat restoration, and invasive species management. During 2023, a subgroup of partners along with the St. Vrain Valley School District's Innovation Center (IC) focused efforts on headstarting and translocating NLFs to suitable habitat within Boulder County. We collected small portions of egg masses from secure and productive breeding sites. Our efforts resulted in the successful rearing and release of over 150 vigorous, late-stage NLF tadpoles, and effective collaboration and engagement among partner agencies, local nonprofits, high school students, and private landowners. This presentation will discuss the development of the program from initial concept to rearing frogs inside the IC, lessons learned and adaptive management during the rearing process and steps taken toward release, and post-release monitoring and planning for future headstarting activities. Early efforts of the Working Group set the pathway to success with collaboration toward recovery of NLFs on the Front Range, and with

results and lessons learned from 2023 providing building blocks for an effective NLF translocation framework.

10:25 - 10:45 am Morning Break

10:45 - 11:05 am Restoration of wet meadows to enhance Gunnison sage-grouse habitat and drought resilience in arid rangelands: lessons learned from the Gunnison Basin - **Nathan W. Seward** (*Colorado Parks and Wildlife*), R. J. Rondeau (*Colorado Natural Heritage Program*), G. Austin (*Bureau of Land Management*), R.S. Miller (*BLM*), S. Parker (*U.S. Forest Service*), A. Breibart (*BLM*), S. Conner (*Bio-Logic*), E. Neely (*The Nature Conservancy*), M.G. Vasquez (*USFS*), and W. D. Zeedyk (*Zeedyk Ecological Consulting, LLC*)

The arid sagebrush landscape of the Gunnison Basin, Colorado, is home to the federally threatened Gunnison sage-grouse (GUSG; *Centrocercus minimus*) and is expected to become hotter and drier with a changing climate. Wet meadows within the sagebrush ecosystem are a critical lifeline for wildlife and livestock, particularly during drought years, yet they occupy less than 2% of the landscape. Our objective was to enhance wet meadow drought resiliency by slowing the water down, reconnecting floodplains, and increasing wetland vegetation. Indirectly we also aimed to enhance GUSG habitat and improve rangeland condition. Between 2012 and 2020, we constructed nearly 900 low-tech restoration structures (Zeedyk structures), across seven drainages with wet meadows. Six of these years were drought years. We used a before-after-control-impact design to assess vegetation response. Vegetation data were collected on 135 randomly selected treated and 30 control transects. We found that 75% of ephemeral units and all of perennial units achieved or surpassed the wetland plant cover management goal of a 4% yearly increase. This led to an average enhancement of 40% in wetland plant cover in the treated drainages. There was a significant positive difference between treated and control transects in 50% of the drainages, regardless of hydroperiod status. The low-tech restoration structures were effective at re-wetting perennial and ephemeral wet meadows within the arid landscape, even during a megadrought, and reduced non-native invasive weeds in all but one of the treated units. Forbs and grasses critical to sage-grouse and important to livestock operations increased in 67% of the units.

11:05 - 11:25 am Special Status Species Management in Colorado – **Carol Dawson** (*Bureau of Land Management*)

The Bureau of Land Management (BLM) manages more land than any other federal agency in the United States. The BLM serves a vital role as a leader in conservation of species and the ecosystems upon which they depend. The BLM Strategic Plan for Special Status Species and Recovery (September 2022) provides a framework that guides collaborative, proactive conservation and recovery actions for species listed as threatened or endangered under the Endangered Species Act and Bureau sensitive species and their habitats. This presentation will highlight the overarching goals of the new strategic plan and the changes that will occur in our policy for the management of special status species (BLM 6840 Manual - Special Status Management). The BLM Colorado State Directors Sensitive Species List (September 2023) will be presented.

- 11:25 - 11:45 am Defend and growth the core for birds: How a biome-wide sagebrush conservation strategy benefits imperiled rangelands birds – **Alexander V. Kumar** (USFWS), *Jason D. Tack* (USFWS), *Kevin E. Doherty* (USFWS), *Joseph T. Smith* (University of Montana), *Beth Ross* (USFWS) and *Geoffrey Bedrosian* (USFWS)
- Population declines among sagebrush reliant birds mirror the larger deterioration of the sagebrush ecosystem. To combat this biome decline, western partners have developed a common vision using a conservation design to identify high priority areas, designated as “Core Sagebrush Areas” (CSAs) to anchor conservation actions. While this conservation design did not explicitly consider the distribution or abundance of focal species, an underlying assumption has been that the sagebrush-associated wildlife will benefit from actions targeting the larger threats to the sagebrush biome. Herein, we explicitly test whether Sagebrush Ecological Integrity (SEI), the metric used to quantify CSAs, is associated with sagebrush songbird abundance. We further examined the relative importance of the five components of SEI: sagebrush cover, tree cover, perennial grass cover, annual grass cover, and human modification, in structuring sagebrush songbird populations. We found that for all three species examined: sagebrush sparrow, sage thrasher and Brewer’s sparrow, higher population counts were associated with increased values of SEI, with up to 10x higher median counts in CSAs compared to surrounding areas. Further, we found strong evidence of large population declines as areas transitioned out of CSAs. Finally, although we found some species-specific differences in the relative importance of the five components of SEI, generally sagebrush cover and tree cover were more important than grass cover in influencing bird populations. Conservation actions designed to preserve or grow CSAs will likely benefit sagebrush obligate songbird populations and other focal wildlife especially if consideration is given to which component(s) of SEI the actions target.
- 11:45 - 12:05 pm Cows, not plows: Using cropland conversion risk to scale-up averted loss of core sagebrush rangelands - **Geoffrey Bedrosian** (USFWS), **Kevin E. Doherty** (USFWS), **Brian H. Martin** (The Nature Conservancy), *David M. Theobald* (Conservation Planning Technologies and Colorado State University), *Jeffrey S. Evans* (The Nature Conservancy), *John Patrick Donnelly* (Intermountain West Joint Venture), *Joseph T. Smith* (University of Montana), *Scott Morford* (University of Montana), *Alexander V. Kumar* (USFWS), *John Guinotte* (USFWS), *Matthew M. Heller* (USFWS), and *David E. Naugle* (University of Montana)
- Agricultural conversion is a leading cause of human modification threatening the ecological function of the sagebrush biome. Despite its prevalence relatively little is known about the total extent and risk of tilled agriculture throughout the biome as well as the landscape scale benefits of easements in combating agricultural conversion. Therefore, our goals were to 1) quantify the tilled area of the sagebrush biome, 2) identify where the highest quality sagebrush rangelands are most at risk to future tillage, and 3) estimate the ecological benefits of conservation easements to adjacent public lands. 14.4 million hectares of the sagebrush biome had a history of tillage. Our risk model identified multiple landscapes with concentrated tillage risk on private lands (e.g., Northern Great Plains), quantified the degree of risk, and provides planning tools for prioritizing conservation and restoration actions (e.g., easements, restorations). Within a case study area in north-central Montana, tillage history was highly correlated with modeled tillage probability and occurred on all

soil survey classes. Simulated conversion of easements to cropland resulted in a loss of Core Sagebrush Areas (CSAs) equal to 3.6 times the area of the CSAs on easements with most of the degraded area occurring on adjacent public lands (79.9%). This relationship was even stronger for CSAs transitioning to Growth Opportunity Areas (GOAs) and Other Rangeland Areas (ORAs; 84.5% and 91.7% on public lands, respectively). Our simulation demonstrated that concentrated conservation efforts, such as easements, can anchor intact landscapes and sustain ecosystem function at scales beyond the borders of easements.

12:15 - 2:00 pm Business Meeting and Lunch for All Members

Grand Hall B

- 12:15 - 12:20 pm Benefits of hiring veterans with military service as wildlife professionals - **Jonathan Hicks** (*Natural Resources Specialist (Lead Ranger and Operations Manager), Conchas Dam, US Army Corps of Engineers*)
- 12:25 - 12:30 pm Business Meeting Call to Order - **Nathan Jones** (*President, CCTWS*)
- 12:30 - 12:35 pm Treasurer's Report - **Nathan Jones** (*President, CCTWS*)
- 12:35 - 12:40 pm Executive Board Elections - **Robin Russell** (*President-Elect, CCTWS*)
- 12:40 - 1:00 pm Student Chapter Presentations (CSU, CSU-Pueblo, WCU)
- 1:00 - 1:15 pm TWS Updates - **Ed Arnett** (*CEO, The Wildlife Society*)

1:45 - 4:30 pm Wolf Ecology and Reintroduction

Grand Hall A

Moderator: Paul Doherty

- 1:45 - 1:50 pm Welcome and Introductions – **Nathan Jones** (*President, CCTWS*)
- 1:50 - 2:10 pm Planning for Gray Wolf Restoration in Colorado - **Eric Odell** (*Colorado Parks and Wildlife*)
 Colorado voters passed Proposition 114 in the November 2020 election. The resulting state statute directed the Colorado Parks and Wildlife Commission to “develop a plan to restore and manage gray wolves in Colorado, using the best scientific data available and to hold statewide hearings to acquire information to be considered in developing such plan, including scientific, economic, and social considerations pertaining to such restoration.” The voter-approved statute directed that steps be taken to begin the restoration of gray wolves in Colorado west of the Continental Divide no later than December 31, 2023. This is the first time that a statewide ballot initiative has been used to implement the restoration of a federally listed species. Colorado Parks and Wildlife worked with professional facilitators to hold public meetings, collecting feedback from more than 3400 members of the public. Additionally, CPW appointed two advisory bodies, a Technical Working Group that contributed expertise on the logistics of restoration, development of

conservation objectives, management strategies and damage prevention and compensation planning, as well as a Stakeholder Advisory Group consisting of wolf advocates, sportspersons, outfitters and livestock owners to provide recommendations on the social sides of wolf management. CPW presented a Draft Plan December 9, 2022, and a final plan was approved May 3, 2023. The plan is a culmination of two and a half years of extensive statewide stakeholder meetings and public outreach to develop a science-based plan that incorporates both the biological needs of Colorado's wildlife and the social concerns of Colorado's citizens. An update on the status of restoration will also be made.

2:10 - 2:30 pm

Bureaucracy for biologists: the 10(j) and wolf restoration and management in Colorado - **Scott Becker** (USFWS)

A conservation tool often used to recover imperiled species is to reintroduce them into suitable habitats. However, fears about possible land-use, or other, restrictions due to the reintroduction of federally listed species is a very real concern for many landowners. To alleviate some of these concerns, Congress added a provision under section 10(j) of the Endangered Species Act that allows the U.S. Fish and Wildlife Service (Service) to designate a population as experimental if it is released into suitable habitat where a population of that species is not currently known to occur. Designating a population as experimental provides the Service the discretion to create special regulations that allow for the management and recovery of the species. One example of a species reintroduced and recovered under the experimental population designation is that of gray wolves in the northern Rocky Mountains (NRM). In November 2020, citizens of Colorado passed Proposition 114, which became state law, and required the Colorado Parks and Wildlife (CPW) Commission to take the necessary steps to begin gray wolf reintroduction by December 31, 2023. Because gray wolves were federally relisted in February 2022, CPW requested the Service designate wolves reintroduced into Colorado as an experimental population, thus, the Service soon began a rulemaking process to complete that designation. The Service will briefly discuss the 10(j) rule, the history of its use to recover gray wolves in the NRM, and the specifics of the 10(j) related to gray wolf restoration and management in Colorado.

2:30 - 2:50 pm

Recovery of Mexican wolves in the Southwest United States: the importance of management removal, illegal killing, and other demographic factors for population growth - **Stewart W. Breck** (USDA-Wildlife Services National Wildlife Research Center), Amy Davis (USDA-Wildlife Services NWRC), John K. Oakleaf (USFWS), David L. Bergman (USDA-Wildlife Services), Jim deVos (Arizona Game and Fish Department), J. Paul Greer (AZ G&FD), Kim Pepin (USDA-Wildlife Services NWRC)

The Mexican wolf (*Canis lupus baileyi*) is an endangered wolf subspecies being recovered on shared landscapes in the Southwest United States and Mexico. We used data from the U.S. program to model population growth, evaluate the impact of management removal and illegal killing relative to other demographic factors, and test hypotheses about factors influencing rates of management removal and illegal killing. From 1998 -2019, the population growth averaged 12% per year. Rates of natural reproduction, illegal killing, and other mortality remained consistent over the 22 years; while releases, translocations, and management removals varied markedly between two time periods, phase 1:1998-2007 and phase 2:2008-2019. The number

of wolves removed for conflict management was higher during phase 1 (average ~13 per year, rate =24.8%) than phase 2 (average of ~5 per year, rate = 5.2%). This decrease in management removal resulted in the wolf population resuming growth after a period of population stagnation. Two factors influenced this decrease, a change in policy regarding removal of wolves (stronger modeling support) and a decrease in the number of captive-reared adult wolves released into the wild (weaker modeling support). Illegal mortality was relatively constant across both phases, but after the decrease in management removal, illegal mortality became the most important factor (relative importance shifted from 28.2% to 50.1%). Illegal mortality was positively correlated with rates of reintroduction and translocation of wolves and negatively correlated with the rate of management removal. Using management removal to reduce human-carnivore conflict can have negative population impacts if not used judiciously.

- 2:50 - 3:10 pm Social-Ecological Scientific Insights into Colorado Wolf Restoration - **Kevin R. Crooks** (*Center for Human-Carnivore Coexistence, CSU*)
Social-ecological science can provide valuable insight into efforts to reduce conflict and facilitate coexistence between people and predators, including wolves. Such is the case with the ongoing efforts to restore wolves to Colorado, initiated by a statewide ballot initiative in Fall 2020. Social-ecological research at the Center for Human-Carnivore Coexistence at Colorado State University is aimed at enhancing our understanding of this complex and controversial issue. Public surveys examining why the 2020 vote was so close, despite prior studies finding high levels of support for wolf reintroduction in Colorado, highlight the dynamic nature of public opinion on wolf restoration but also the need for additional methods to better understand public opinion. Research on the social-ecological drivers of the voting patterns of Coloradans found a close correlation between the presidential vote and support for wolf restoration, exemplifying the politicization of wolf conservation, and of science more generally. Public surveys also provided insights on the economic costs and benefits of wolf reintroduction to the state. In addition, integration of spatially-explicit social and ecological data have informed statewide models of habitat suitability, conflict hotspots, and landscape connectivity for wolves in Colorado. Ongoing research also is investigating the impact of public and stakeholder engagement processes on social outcomes, including trust, acceptance of management plans, learning, and conflict reduction regarding wolf reintroduction to Colorado. Overall, understanding social and ecological factors associated with wolf management and conservation are important for developing successful policies and management actions to mitigate conflict and foster coexistence with wolves.
- 3:10 - 3:30 pm **Afternoon Break**
- 3:30 - 3:50 pm Reducing Risk on the Range: Non-Lethal Practices and Cost Sharing Opportunities for Managing Carnivore-Livestock Conflicts - **Rae Nickerson** (*Utah State University*), **Matthew Collins** (*Western Landowners Alliance*), **Matthew Hyde** (*Colorado State University*), **Stewart Breck** (*USDA Wildlife Services NWRC*), **Julie Young** (*USU*), **Gary Burnette** (*Montana State University Extension*), **Jared Beaver** (*Unknown*), **Kyran Kunkle** (*University of Montana*)

The Conflict on Working lands Conservation Innovation Grant (CoW- CIG) team is researching costs, efficiency and effectiveness of carnivore conflict prevention practices including range riding, carcass management, and fencing by co-producing research with producers and practitioners from across the Western US. We collect and analyze data from seven states, including GPS collar data, camera traps, social surveys, and stress tests from cattle to evaluate the effectiveness of these strategies with the ultimate goal of promoting the adoption of these three practices for cost-sharing through Natural Resources Conservation Service Farm Bill programs. This presentation will focus on the range riding component of the research effort, particularly the skills that may improve riding's effectiveness, discuss significant emerging opportunities for cost-sharing non-lethal practices and convey planning methods for evaluating livestock risk to carnivore predation over space and time.

3:50 - 4:10 pm

Place-Based Collaboratives for Minimizing Human-Carnivore Conflict: Collective Factors Driving Success Throughout the American West - **Matthew Collins** (*Western Landowners Alliance*)

Across the western US, iconic wildlife including grizzly bears and wolves share lands with humans and their livestock. This comes with inevitable conflicts – elk damage fences and eat hay and grizzly bears and wolves depredate and stress livestock – and responding to these conflicts requires additional time from land stewards. The 4Cs – compensation, conflict prevention, control (lethal) and collaboration – comprise a systems-based conflict reduction framework that supports conservation and provides opportunities to address the social, ecological, and economic situations unique to each region, community, and operation within a landscape shared by people and wildlife. This presentation will introduce the 4 C's framework, and then focus on two of the C 's; collaboration and conflict prevention. Place-based rangeland collaboratives are effective institutions for addressing community-scale resource concerns and, increasingly, are forming conflict reduction programs throughout the West. In this presentation, we investigate the following questions: 1) how do collaboratives form across diverse social and ecological contexts; and 2) how do collaboratives help motivate community actions towards reducing conflict with carnivores? We examined these questions through 27 semi-structured interviews with representatives from 10 rangeland collaboratives. We find that collective factors (i.e. the group-level influences on behavior, including social norms, social diffusion, and group efficacy) are crucial drivers of the formation, maintenance, and relative success of different collaboratives in reducing livestock-carnivore conflict. When a group's thought leaders model acceptance and success of collaboratively managed conflict reduction programs, group efficacy is fostered, and new social norms are created that support landowner coordination for conflict reduction.

4:10 - 4:30 pm

Characterizing the Stakeholder Conflict about Wolf Reintroduction in Colorado - **Mireille Gonzalez** (*Center for Human Carnivore Coexistence, CSU*)

In November 2020 Proposition 114, a measure to reintroduce wolves into Colorado by 2023, passed with a narrow margin. As seen in the broader American west, wolf reintroduction is a highly contentious and polarizing issue in Colorado. Stakeholder conflict about wolves exacerbates the already deepening urban and rural divide and impedes wolf management objectives. To develop insight into how to reduce such social conflict, we conducted stakeholder interviews before the election to identify

the perspectives and assumptions that fuel the conflict between groups. To characterize the conflict, we created a social-psychological framework of intergroup conflict, developed from well-established theories in the conflict and peace-building fields, and applied it to our interviews during analysis. Here, we present on the framework we developed and report on our key findings regarding the factors driving social conflict over wolf reintroduction in the state. Additionally, we share theory-based suggestions for developing conflict reducing interventions via a collaborative stakeholder engagement process.

4:30 - 5:00 pm IGNITE Session

Grand Hall A

Moderator: Marcella Tarantino (Bird Conservancy of the Rockies)

4:30 - 5:00 pm Introduction to the IGNITE session - **Marcella Tarantino** (CCTWS)

Insights from a Marine Corps veteran in overcoming challenges as a natural resources manager - **Jonathan Hicks** (*Natural Resources Specialist (Lead Ranger and Operations Manager), Conchas Dam, US Army Corps of Engineers*)

Breeding Bird Monitoring: Collaboration & Application – **Jennifer Timmer** (*Bird Conservancy of the Rockies*) and **Matthew McLaren** (*Bird Conservancy of the Rockies*)

Recent reports indicate that many bird populations in North America are declining across a variety of habitats, highlighting a need for robust population information. Bird Conservancy of the Rockies and agency partners created the Integrated Monitoring in Bird Conservation Regions (IMBCR) program in 2008 in Colorado in response to national recommendations for improving avian monitoring. Today, the IMBCR program is the largest probabilistic, non-road-based breeding bird monitoring program in the country, spanning the Great Plains to the Great Basin. The strength of the IMBCR program lies in its partnership with multiple state and federal agencies, joint ventures, and nonprofit organizations, which creates efficiencies in data collection and analysis. Each year, we provide several population metrics for 300+ species, as well as estimates of uncertainty, which are available at the scale of management units up to regional or statewide scales for context. Biologists and land managers use these estimates for a variety of purposes, such as tracking and identifying species of concern and determining potential population impacts on migratory birds for environmental assessments. The estimates are publicly available on Bird Conservancy's new and improved data portal. Additionally, researchers conduct separate analyses with the monitoring data to answer specific questions or address hypotheses, and partners conduct targeted monitoring in project areas to evaluate management or conservation efforts. To be a part of this collaborative effort, either as a data user or data collector, please reach out to Bird Conservancy for more information.

The changing climate may create more challenges for songbird during migration - **Claire Varian Ramos** (*Colorado State University - Pueblo*)

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 is 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. 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.

Cheatgrass and Gunnison Sage-Grouse – ***Petar Simic*** (*Gunnison County*)

Cheatgrass (*Bromus tectorum*) is an invasive annual grass that is increasing in prevalence in the Gunnison Basin, which is home to ~90% of the global population of the Gunnison sage-grouse (GUSG), a federally threatened species listed under the Endangered Species Act (ESA). Cheatgrass is widely considered the largest threat to the GUSG. The GUSG depends on intact sagebrush ecosystems for survival but have a range of specific habitat requirements that vary seasonally. Cheatgrass threatens to convert intact sagebrush ecosystems that are rich in the forbs, perennial grasses, and sagebrush that GUSG depend on to cheatgrass monocultures. Widespread conversion in the Gunnison Basin would spell the end of the GUSG. During this presentation, I will discuss what is most severely threatening GUSG habitat, how they are being addressed, and how a diverse set of stakeholders have come together to collaboratively stop the spread of cheatgrass and save the GUSG as well as other sagebrush-obligate species, despite differences in beliefs, lifestyles, and priorities. Additionally, I will discuss current efforts and research being done as well as challenges and barriers we face as natural resources managers to maintain and restore the health of sagebrush ecosystems within the GUSG range.

Questions for Ignite Presenters

5:00 - 6:30 pm Poster Session & Reception

Heroes Pavilion (*Set Up Your Posters By Noon Thursday*)

Organizer: Marcella Tarantino

*Denotes student presenter (** = undergraduate student, * = graduate student)

Student Chapter of the Wildlife Society (Colorado State University)

The Colorado State University student chapter of The Wildlife Society offers student members a variety of ways to get involved. The two main events the student chapter

holds are biweekly raptor monitoring and a biweekly camera trap project. CSU TWS raptor monitoring occurs on every other Sunday at Boyd Lake state park in Loveland, Colorado. Volunteers from CSU TWS count and identify any raptor species spotted in five different zones, as well as monitor nesting activities of kestrel. The data is then given to Colorado Parks and Wildlife who assess if any management actions need to be taken based on the observations collected by TWS volunteers. The second main student engagement offered through CSU TWS is the biweekly camera trap project. CSU TWS has partnered with the Urban Wildlife Information Network (UWIN), a global database for camera trap data on urban wildlife. CSU TWS has placed trail cameras at around a dozen sites at Fort Collins' various natural areas, and every other Saturday volunteers upload photos from the cameras to UWIN. It is through these events, among others, that student members can engage with CSU TWS.

Green Pathways: Drawing Connectivity Between Forest Habitats for Bottom-Up Endangered Species Management – **Daniel Rice**** (*Colorado State University*), *Jake Ivan (Colorado Parks and Wildlife)*, and *Sara Bombaci (Colorado State University)* For elusive predator species, bottom-up habitat and prey management are effective techniques to indirectly support populations. In the case of the Canada lynx, a reintroduced and state endangered predator, bottom-up management may be a viable management option, especially with the species' close relationship with the snowshoe hare. However, in managing for snowshoe hares as a bottom-up strategy for Canada lynx conservation, specific habitats are known to be better support for hare populations. These habitats are characterized with factors that vary based on forest management. Further, these prime habitats may vary in proximity to one another and may be fragmented by land ownership, forest demographics, or forest management site locations. Here, we use extant snowshoe hare pellet data in conjunction with snowshoe hare habitat suitability indices to model habitat connectivity for the species on United States Forest Service lands in Colorado. Due to the predator-prey relationship between the two species, we provide evidence to support the potential for identifying prime habitat corridors for Canada lynx as the population grows and spreads across the state.

Phagocytic Function of Leukocytes Across Seasons and Temperatures in the Mojave Desert Tortoise – **Holly Nelson*** (*Colorado State University - Pueblo*), *William Fikan (CSU-Pueblo)*, *Rylee Conklin (CSU-Pueblo)*, and *Franziska Sandmeier (CSU-Pueblo)* Climate change can have drastic effects on many species, but ectotherms, whose physiology is heavily influenced by temperature, may be particularly vulnerable. For example, as temperatures warm, ectotherms may face potential exposure to new pathogens. How the immune systems of these animals may thermally acclimate, is an important research question, with broad applications for the conservation of ectothermic vertebrates. Phagocytosis is an important process in the immune functions of all animals. In phagocytosis, cells consume exogenous particles to eliminate them. The Mojave Desert tortoise (*Gopherus agassizii*) is an ideal model organism for investigating the phagocytic function of B1 lymphocytes, in comparison to other phagocytic cells such as macrophages and heterophils (Sandmeier et al. 2018). Very little research has evaluated how different types of phagocytic cells function across temperature ranges. We took blood samples across the tortoise's

active seasons, and blood was incubated with fluorescent beads at seven different temperatures (13 - 40 °C) for four hours. We hypothesized that the thermal performance of phagocytosis will vary by season, incubation temperature, and the leukocyte subpopulations.

Planting a native pollinator garden and its effect on Apidae diversity– **Jake Powers**** (*Colorado State University - Pueblo, Creating Connected College Research Communities (CUATRO), MAPS*) and *Claire Ramos (CSU-Pueblo, CUATRO, MAPS)*
Colorado contains the 5th highest native bee diversity in the United States with 946 native bee species. Within the last 30 years, native bee populations have dwindled dramatically due to disease, pests, climate change, habitat loss, pesticides, and other chemical applications. Previous research has shown that among native bee species with sufficient population data to assess, more than half are facing decline with 25% of these species facing risk of extinction. 80% of all flowering plants require external pollination, and bees provide a vast majority of this, adding \$15 billion dollars in crop value each year. The European Honeybee, *Apis mellifera*, is a work horse for agriculture, but it is a poor pollinator of plants native to the Americas, such as blueberries, cherries, and squash; it is also completely incapable of pollinating tomatoes and eggplant. Native bee species on the other hand, have evolved alongside these plants and perform most pollination for a plethora of plants. The goal of the pollinator garden is to boost native bee diversity and populations by incorporating flowering plants and grasses native to Colorado. The Denver Botanic Garden's native plant list was utilized when selecting plants and observational surveys for data collection will be employed next summer. By displaying the benefits of removing European and Asian ornamental plants and grasses in favor of natives, I hope to lend valuable insight into how these plants can be utilized for conservation, landscape remediation, and agricultural benefits.

The effects of temperature and seasons on microbial growth of nasal bacteria in Mojave Desert tortoises – **Jenna Morales*** (*CSU – Pueblo*), *Joseph Harker (CSU – Pueblo)*, *Daniela Ramirez (CSU-Pueblo)* and *Franziska Sandmeier (CSU-Pueblo)*
Thermal environment plays an important role in the regulation of body temperature in ectotherms. These thermal regimes may also impact the growth of microbial communities. We sampled the nasal cavities of eighteen captive Mojave Desert tortoises (*Gopherus agassizii*) and incubated the samples at seven different temperatures (13-40 degrees Celsius) between time frames of 24-72 hours. We measured turbidity of nasal lavage samples to determine total microbial growth. We repeated sampling for the spring, summer, fall, and winter seasons. We examined differences in the temperature at maximum turbidity per tortoise across spring, summer, fall, and winter seasons. We hypothesized that the in vitro microbial growth of nasal bacteria will vary as the seasons and incubation temperatures change.

Do hatch-year White-Crowned Sparrows or after-hatch-year White-Crowned Sparrows have better body condition during fall migration? – **Lacey Sprouse**** (*Colorado State University - Pueblo and MAPS*) and **Julian Golz**** (*CSU-Pueblo, Creating Connected College Research Communities (CUATRO), MAPS*), and *Claire Ramos (CSU – Pueblo, CUATRO, MAPS)*

Migration is energetically expensive for birds, and prior to migration, birds must undergo physiological preparation in order to survive the journey. Physiological preparation includes gaining weight by storing and depositing fat throughout the body to create energy reserves. They then use these stores to fuel their migratory flight. White-crowned Sparrows (*Zonotrichia leucophrys*) are a common bird that migrate along the Front Range. We hypothesized that after-hatch-year Sparrows would have more fat and weigh more than hatch-year sparrows since they have survived previous migrations, thus, they would be more efficient during migration and maintain higher fat reserves. During September and October of 2017-2022, we caught 197 White-crowned Sparrows in El Paso and Pueblo County. For each bird that was caught, the fat value was recorded as a qualitative estimate on a scale ranging from 0-7, and the weight was recorded as a quantitative measurement in grams. Weight was divided by the tarsal measurement of each individual to account for size variation. Utilizing R Studio, a t-test was used to compare the fat and weight scores between hatch-year birds and after-hatch-year birds. We found that there was no significant difference between the fat values of the two ages, but there was a significant difference between standardized weight scores. These findings suggest that after-hatch-year White-crowned Sparrows may have an advantage over hatch-year Sparrows in terms of energy reserves and may be more efficient during migration. More research is needed to understand if the chances of a successful migration are decreased for hatch-year Sparrows due to having lesser energy reserves than after-hatch-year Sparrows.

Temperature dependence and seasonality of antimicrobial capacity of leukocytes in the Mojave Desert tortoise – **Mariah Painter*** (*Colorado State University - Pueblo, National Science Foundation*), *Lexi Anderson (CSU-Pueblo, NSF, Creating Connected College Research Communities (CUATRO))*, and *Franziska Sandmeier (CSU-Pueblo and NSF)*

In the 30 years since the Mojave Desert Tortoise (*Gopherus agassizii*) was listed as threatened by the U.S. Fish and Wildlife Service, there has not been an increase in population numbers. One threat impacting their numbers is upper respiratory tract disease caused by the microbe *Mycoplasma agassizii*. As anthropogenic climate change continues to cause changes in the natural thermal environment, it is becoming increasingly important to study the immune system's ability to acclimate to changing temperatures across season. Here, we utilized a simple bacterial killing assay to observe innate immune function by leukocytes across a range of ecologically relevant temperatures during spring, summer, and fall of 2023. We found that bactericidal ability was conserved across temperature and did not change significantly across season, with slightly suppressed killing observed at the lower temperatures.

The Rate of Pollution is Too Darn High!: Investigating the Role of Oxidative Stress on Migratory Birds in Southern Colorado – **Megan Miller*** (*Colorado State University - Pueblo*), and *Claire Ramos (CSU-Pueblo)*

Migration is an energetically costly time frame for birds; they are subjected to a variety of dangers and stressors throughout their journey. In the Fall of 2020, a combination of abiotic and anthropogenic stressors such as wildfires, smoke, and a premature blizzard caused a large avian mortality event in the American Southwest.

Increasingly stochastic climate events have compelled researchers to investigate how climate events impact bird physiology during migration. We are investigating how smoke presence during migration and at stopover sites might affect physiological factors such as oxidative stress, weight gain, migration timing, fat load and overall body condition. Pollution is known to exacerbate oxidative stress in birds, and prolonged contact with high particulate concentration can cause oxidative damage. We are collecting blood samples, weight, fat scores, and body condition measurements from migrating passerines at a banding station outside of Colorado Springs, Colorado. We predict that birds with less fat and lower average body weights will have higher oxidative stress because of the increased metabolic rate required to maintain body condition and migratory pace. We predict that oxidative stress and organ damage will increase with higher concentrations of pollution. This project will bolster our understanding of the physiologic impacts of migration in combination with outside stressors. The results could help us predict climate conditions that increase likelihood of a mortality event. This research has the potential to be used in tandem with MOTUS or GPS systems to determine if air quality plays a role in migration and stopover length, and migration timing.

Bullfrogs (*Lithobates [Rana] catesbeianus*) in Southeast Colorado: Are they Invasive or Native? – **Michelle Luna**** (Colorado State University - Pueblo and Creating Connected College Research Communities (CUATRO)) and Daryl Trumbo (CSU-Pueblo and CUATRO)

The presence of amphibians is beneficial to ecosystems, as they are both predator and prey to many species, help control insect populations, and are indicator species of water quality and wetlands health. The American bullfrog (*Lithobates [Rana] catesbeianus*) is native to the eastern USA and Great Plains, but is a damaging invader west of the Continental Divide. Although some researchers consider bullfrogs to be invasive throughout Colorado, the U.S. Geological Survey reports them as native to the Arkansas River basin throughout Kansas and into eastern Colorado, up to approximately Las Animas and John Martin Reservoir. To date no studies have documented their potential impacts in southeastern Colorado on native amphibians. Therefore, the focus of this research is to identify the location of bullfrogs and other native amphibian species in the southeast region of Colorado in and around Pueblo, Colorado. A variety of pond, stream, and wetland locations were surveyed for the presence of amphibians. Surveys were conducted over the breeding season, targeting peak vocalization times. Six species of frogs and toads were identified at fourteen different sites with bullfrogs being the most prevalent. Bullfrogs, Plains and Northern leopard frogs, and Boreal chorus frogs overlapped at several study sites, and were found in or near permanent water bodies; while Mexican spadefoot toads were found in more ephemeral, upland water bodies, and Woodhouse toads were found throughout the study area. Future research will focus on determining amphibian population and diversity changes, genetic evidence of invasion, and the role of bullfrogs and disease.

The effects of urbanization on stress levels in *Aspidoscelis neotesselata* – **Paige Stephens**** (CSU-Pueblo), Holly Humphries (CSU-Pueblo), Brianna Fong (CSU-Pueblo), Jenna Morales* (CSU-Pueblo), Danni Moran (CSU-Pueblo), and Franziska Sandmeier (CSU – Pueblo)

The effects of urbanization on animal populations have been well-researched. However, existing literature on the Colorado checkered whiptail (*Aspidoscelis neotesselata*) is limited. The Colorado checkered whiptail lizard is a triploid parthenogenetic species native to Colorado. Due to their lack of genetic diversity, this species may be susceptible to environmental disturbances. To study such environmental effects, we divided sampling sites into 3 different habitat types: natural, semi-natural, and urban. The sites were categorized by human activity, structures, vegetation, and irrigation. We captured lizards and collected data including body weight, snout-vent, and vent-tail lengths to determine their relative age. We also quantified relative-predation-risk by the frequency of dropped and regrown tails. We analyzed differences in tail drops across habitat types with contingency analysis. There was no correlation between habitat type and predation risk. We collected a blood sample and performed comparative white blood cell counts. Heterophil-to-lymphocyte ratios -indicative of stress levels- were statistically different among habitat types but in animals, elevated ratios were only found in urban environments. This displays a possible correlation between elevated stress levels and urban environments. Our findings help fill the knowledge gap and great lack of literature on this species. It also gives insight into possible conservation strategies to reduce negative impacts on the survival and health of the Colorado checkered whiptail.

Woody Habitat Availability and Distribution in Colorado Forests – ***Savannah Lehnert***
(*Colorado Forest Restoration Institute*)

Raptors, cavity nesting birds, and mammals utilize woody structures provided by snags, coarse woody debris, and living trees with decay and deformities. Features such as cavities, lightning scars, brooming, and broken tops enhance woody structures for wildlife activities including foraging, nesting, and denning. While the distribution and abundance of woody structures with important habitat features is partially documented in other forested regions (e.g., the Pacific Northwest and the Southwest), there is little understanding of the current distribution and abundance of these features in the Colorado Rocky Mountain region. Understanding the prevalence of these features in fire suppressed untreated forests is important to gaining a baseline understanding of habitat availability before forest treatments are implemented that may impact at-risk wildlife. We quantified the current abundance and distribution of woody habitat features and identified predictor variables in two Colorado forest types: ponderosa pine-dominated and mixed conifer forests. Stand metrics and habitat data were collected at 65 plots from three sites in Colorado. While roughly half of all living trees and snags have at least one habitat feature, only 14% of all coarse woody debris large enough to be considered wildlife logs provide such features, including cavities and hollow interiors. Additionally, despite higher ratios of snags with habitat features, overall snag density remains low, especially in large size classes that are often more important for cavity-nesters. We recommend that managers target all woody structures with habitat features for retention during forest treatments to maintain a mosaic of woody structures for wildlife use.

6:30 - 10:00 am Banquet, Awards, Silent Auction

Grand Hall B

Invited Speaker: Celebrating, Honoring and Elevating Military Veterans in the Wildlife Profession - **Lacey Sprouse**, *President of CSU-Pueblo Student Chapter of the Wildlife Society and U.S. Army*

Keynote Speaker: **Jeff Davis**, *Director of Colorado Parks and Wildlife*

Awards: Allen Anderson Outstanding Wildlife Student Award and Jim Olterman Scholarship Award - **Jeff Henderson** (*CCTWS Student Awards Chair*)

FRIDAY, FEBRUARY 9

7:00 - 8:00 am **Light Breakfast**
Grand Hall B

8:00 - 10:00 **Contributed Papers Session: Avian Ecology**

Grand Hall A

Moderator: Kathy Griffin (Colorado Parks and Wildlife)

*Denotes student presenter (** = undergraduate student, * = graduate student)

8:00 - 8:05 am Welcome and Introduction: **Kathy Griffin** (*CPW & CCTWS*)

8:05 - 8:10 am From military Service to a career in wildlife management – **Jonathan Hicks**, *Natural Resources Specialist (Lead Ranger and Operations Manager), Conchas Dam, US Army Corps of Engineers*

8:10 - 8:30 am Occupancy and abundance of burrowing owls nesting in eastern Colorado – **Sarah Albright*** (*Colorado State University Cooperative Fish and Wildlife Research Unit*), **William Kendall** (*CSU Cooperative Fish and Wildlife Research Unit and USGS*), and **Reesa Conrey** (*Colorado Parks and Wildlife*)
Burrowing owl (*Athene cunicularia*) populations have been declining in regions across the Great Plains due to nesting habitat loss, degradation, and fragmentation. This decline has been closely linked to declines in black-tailed prairie dogs (*Cynomys ludovicianus*), which provide important nesting habitat for burrowing owls and other grassland birds. We examine the effect of black-tailed prairie dog colony attributes on burrowing owl occupancy and abundance. We specifically look at how colony size, activity status, and vegetation characteristics influence these population parameters on 180 survey plots throughout eastern Colorado across two sample years. Occupancy estimates are calculated using a multistate occupancy model framework and abundance and density estimates are calculated using distance sampling methods. Results are based on detections of adult and juvenile owls, along with the distance of these detections, collected by paired observers traversing transects through study plots during the 2022 and 2023 burrowing owl nesting seasons (May-August). Our top multistate occupancy model indicates that prairie dog colony activity level and latitude have significant effects on occupancy probabilities. Prairie dog activity level has a slight negative effect on the probability that a plot is occupied (regardless of reproduction status) but has a strong positive effect on the probability that a plot is occupied with successful reproduction.

Occupancy was higher in southern CO compared to northern CO. This two-year study will provide an updated state status assessment of burrowing owl populations across the black-tailed prairie dog range in Colorado that will help calibrate burrowing owl population models incorporating prairie dog colony characteristics and inform future monitoring plans.

- 8:30 - 8:50 am Impacts of Land Management and Colony Site Selection of Pinyon Jays in Colorado – **Emily Macklin*** (*South Dakota State University*), *Amanda E. Cheeseman (South Dakota State University)*, *David McNitt (Bureau of Land Management)*, *Amy Seglund (Colorado Parks and Wildlife)*, and *Scott Somershoe (U.S. Fish and Wildlife Service)*
As the diverse landscape of the Intermountain West evolves with climate change impacts, land conversion, and habitat loss, many wildlife species face novel environmental conditions that may impact their fitness and use of resources. One such species of conservation interest is the Pinyon Jay (*Gymnorhinus cyanocephalus*), a highly social corvid endemic to the interior western United States. Pinyon Jay populations have experienced significant population declines over the last 50 years, resulting in their consideration for listing on the Endangered Species Act (ESA) and the elevation of their conservation status as a species of concern across multiple government agencies and organizations. Pinyon jays inhabit piñon-juniper and other pine-juniper woodlands that are routinely treated for numerous management objectives, including wildfire mitigation through fuels reduction, forest health restoration, habitat improvement for other species, and increasing rangeland for livestock. The silvicultural methods and scale of land management projects vary throughout the Pinyon Jay range, and regionally focused research is needed to understand the immediate and long-term impacts of woodland treatments on Pinyon Jay populations. We are currently evaluating the influence of woodland composition and scale on Pinyon Jay nesting site suitability across Colorado, as well as the impact of silvicultural prescriptions on relative superpopulation abundance and habitat use of Pinyon Jay. The results of this study will inform sustainable land management practices and provide guidance for future research efforts in Colorado to mitigate negative impacts on breeding Pinyon Jays and aid in vital recovery efforts for this imperiled species.
- 8:50 - 9:10 am Analyzing Northern Goshawk Nesting Habitat Selection in Colorado – **Derek Schleicher*** (*Colorado State University - Pueblo*), *Lacey Sprouse (CSU-Pueblo)*, *David McNitt (Bureau of Land Management)*, and *Nate Bickford (Oregon Institute of Technology)*
The northern goshawk (*Accipiter gentilis*) is a sensitive species in five of nine Forest Service regions in the United States. Goshawks have never attained threatened status despite the lack of data and knowledge on population numbers. Past research has had mixed results whether or not forest management is affecting species abundance along with not knowing what environmental variables goshawks are selecting for nesting habitat. We chose a study area near the southern edge of their known range in south-central Colorado on various public lands. By using game call devices, acoustic recorders, and field searches, we were able to locate goshawk nests. Recording GPS coordinates at each nest allows us to extract vegetative, physiographic, anthropogenic, and landscape spatial variables in comparison with random nests. Using an absence versus presence study design, we constructed

generalized linear models and employed Akaike's Information Criterion to rank the models. Our best ranking models all contained canopy closure and distance to streams as explanatory variables. Our top model contained both of these variables as well as nest proximity to aspen stands. With our top models we can create habitat suitability maps to inform land managers in the region where the most suitable nesting habitat is located. During the summer we were able to net two female goshawks and fit them with transmitters with plans to capture more next season. GPS data will allow us to understand nesting habitat variables, variation in summer and winter home ranges, and movement at various scales to inform land managers.

9:10 - 9:30 am Bald Eagle Home Range Size in an Urban to Rural Gradient – **Miranda Middleton*** (Colorado Parks and Wildlife and Colorado State University), Reesa Conrey (Colorado Parks and Wildlife), Liba Pejchar (Colorado State University), Jim Gammonley (Colorado Parks and Wildlife), and Bruce Snyder (Bird Conservancy of the Rockies)
The population of bald eagles (*Haliaeetus leucocephalus*) in Colorado has made a dramatic recovery since the 1980's, growing from just a few known nests 40 years ago to over 100 nests in the northern Front Range region alone. At the same time, this region is currently experiencing one of the highest rates of urbanization in the United States. Historically bald eagles were thought to avoid human development, but recent evidence suggests otherwise. To inform appropriate policy and management, it is important to understand how eagles utilize a landscape increasingly characterized by human development. From July 2020 through the present, Colorado Parks and Wildlife outfitted 29 breeding bald eagles with GPS/GSM transmitters in Colorado's northern Front Range along a rural to urban gradient. Using these data I calculated each eagle's home range using a dynamic Brownian bridge movement model during five different phenological stages: pre-nest, incubation, nestling, post-fledge, and non-nesting. The home ranges varied in size from 0.6km² to 421km² and averaged 48.71km². Mean home range size did not vary with phenological stage; however, when assessed for individual tagged eagles over time, home range size was highly variable. Using a linear regression model, I am evaluating which environmental and anthropogenic factors are most strongly associated with home range size. My research will advance understanding of habitat use of bald eagles and help inform local wildlife agencies on how to better manage for an urbanizing landscape that can support bald eagles.

9:30 - 9:50 am Sapsucker wells as a keystone food resource: new methods for detecting secondary users – **Rick Clawges*** (*University of Idaho*), Lee Vierling (*UI*), Jan Eitel (*UI*), Leona Svancara (*UI and USGS*), and Kerri Vierling (*UI*)
North American sapsuckers are considered double keystone species because they (1) excavate nest cavities that are later used by a variety of other birds, small mammals, and invertebrates, and (2) create and maintain sap wells, a temporary food resource available to a variety of secondary users. Most previous reports of sap consumption by secondary users are either brief or incidental and utilized human observers. Longer-term studies using a variety of detection techniques are needed to examine sap well use frequency on daily and seasonal time frames and determine what ecosystem services these users may provide (e.g., pollination). Here, we use traditional observation surveys as well as camera traps and environmental DNA

(eDNA) acquired by swabbing sap wells to identify secondary use at sap wells created by Red-naped (Sphyrapicus nuchalis) and Williamson's (S. thyroideus) Sapsuckers in shrubs and trees we located in the Wet Mountains of south-central Colorado. Preliminary results using data from 2022 indicate that new survey methods reveal users not identified during traditional observation surveys. Camera traps, for example, were useful in detecting nocturnal sap well visitors such as seed-caching small rodents and pollinating moths as well as occasional diurnal users that were not detected during observation surveys. Results from eDNA analyses showed promise in both corroborated results from the other methods and identifying additional species that may use, or have contact with, sap wells. Improvements in eDNA analytical techniques and genetic sequence databases hold promise in increasing identification potential of secondary sap well users.

- 9:50 - 10:10 am Evaluating conservation efforts on private lands for bird population dynamics in the Northern Great Plains - **Quresh Latif** (*Bird Conservancy of the Rockies*), **Chris White** (*Bird Conservancy of the Rockies*), **Jennifer Timmer** (*Bird Conservancy of the Rockies*), and **Seth Gallagher** (*National Fish and Wildlife Foundation*)
Habitat loss and degradation have caused steep population declines for grassland birds. Most remaining grasslands are privately owned, so conservationists work with land owners to address these declines. Evaluating these efforts requires population monitoring, but complex population dynamics make simple spatial relationships with management inadequate for meaningful evaluation. We leveraged Integrated Monitoring in Bird Conservation Regions to evaluate National Fish and Wildlife Foundation (NFWF) funded conservation on private lands within the U.S.A. portion of the Northern Great Plains (NGP). We analyzed population dynamics for eight grassland bird species (thick-billed longspur [TBLO], Baird's sparrow [BAIS], Lark Bunting [LARB], chestnut-collared longspur [CCLO], Brewer's sparrow [BRSP], Sprague's pipit [SPPI], grasshopper sparrow [GRSP], and western meadowlark [WEME]) on three properties under conservation easement and nine subject to grazing management. After accounting for environmental heterogeneity and species detectability, four-year (2018–2022) population trends for seven species (all except TBLO) were greater (with ≥90% confidence) on conservation easements compared to regional trends. We found positive effects of grazing management on LARB and BRSP trends and negative effects for GRSP and WEME. The latter primarily reflected negative effects on abundance within occupied sites, suggesting these species maintained their range despite declining in numbers on grazing management properties. Additionally, although we found no supported effect on CCLO trend overall, colonization of unoccupied areas was greater on grazing management properties, suggesting possible expansion of habitat. Our results demonstrate the value of modeling grassland bird population dynamics for evaluating broad scale conservation initiatives.

10:10 - 10:30 am Morning Break – Refreshments Provided

10:30 - 11:50 am Contributed Papers Session: Wildlife Ecology
Grand Hall A

Moderator: Kathy Griffin

*Denotes student presenter (** = undergraduate student, * = graduate student)

10:30 - 10:50 am Bears, watch your step. Influence of garbage-securing experiment on fine scale individual bear movements in a developed area – **Cassandra Venumiere-Lefebvre*** (*Colorado State University and Center for Human-Carnivore Coexistence*), **Stewart Breck** (*National Wildlife Research Center, USDA*), **Heather Johnson** (*Alaska Science Center, USGS*), **Mat Alldredge** (*Colorado Parks and Wildlife*), and **Kevin Crooks** (*CSU and Center for Human-Carnivore Coexistence*)

For wildlife, developed areas can bring access to novel sources of food and increased mortality risk. For American black bears, anthropogenic refuse in urban areas alters activity patterns, time budgets and leads to increased rates of human-bear conflict. However, it is unknown whether effective management solutions can alter bear movement in developed landscapes and reduce conflict potential. CPW, USDA, the City of Durango, and CSU collaborated on a large-scale experiment that tested the effectiveness of wildlife-resistant garbage containers to reduce human-bear conflict in Durango. In 2010, an ordinance required residents to secure attractants. In 2013, wildlife-resistant containers were distributed in two treatment areas, while residents of two control areas continued to use mostly regular containers. Between 2011 and 2016, bears were captured around the city and fitted with GPS collars. We also monitored the quantity of natural foods available annually and the consistency of residents in properly locking their containers. To investigate the efficacy of bear-resistant containers in modifying bear behavior, we used third-order selection ratios and integrated step-selection functions. We accounted for natural food availability and resident compliance with the ordinance (locking containers) in our analyses. Preliminary results indicate that bears reduced their use of development after residential garbage was secured. Areas with reduced garbage availability were also traversed at a faster pace by bears, although this depended on individual movement preferences. Our study demonstrates that wide-scale deployment of bear-resistant containers changed how bears moved and used the landscape, a strategy that can be used to promote human-carnivore coexistence.

10:50 - 11:10 am Survival Trade-offs of Migratory and Resident Behavior in Mule Deer – **Anneke Hart*** (*Colorado Cooperative Fish and Wildlife Research Unit*), **William Kendall** (*USGS and Colorado Cooperative Fish and Wildlife Research Unit*), and **Mat Alldredge** (*Colorado Parks and Wildlife*)

Migratory behavior is thought to provide ungulates with prolonged access to nutritious forage as the quality of vegetation changes seasonally across landscapes. However, migratory behavior in herbivores appears to be decreasing globally, suggesting that the risks of these movements outweigh the benefits at large scales. Migratory strategies that historically benefited ungulates may be increasingly costly due to changing weather patterns and increasing human disturbance. Migration may additionally offer few benefits in systems where winter ranges provide adequate nutrition year-round. To examine potential trade-offs in migratory versus resident behavior, we modeled known-fate survival in two predominantly resident mule deer herds in south-central Colorado using data collected between 2017-2022. We found

no difference in survival between migratory and resident adult and yearling deer. Environmental covariates, evaluated at the scale of Game Management Units, had minimal effect on adult and yearling survival, except for NDVI, which negatively influenced survival. We plan to also evaluate survival of resident versus migratory fawns using a multi-state state-uncertainty modeling approach to account for early mortalities that occur before movement behavior can be classified. Our initial results suggest that migration offers no benefit to survival in this system; however, fawn survival is generally more variable and may illuminate possible trade-offs in these strategies.

- 11:10 - 11:30 am How high temperatures influence selection for snow in cold-adapted species – **Forest P. Hayes** (Colorado State University), *Larissa L. Bailey (CSU), Kenneth R. Wilson (CSU), Daniel McGrath (CSU), and Joel Berger (CSU and Wildlife Conservation Society)*
- Rapid changes to climate in montane environments are reshaping ecological communities. Within these, cold-adapted organisms are among the most strongly impacted as they may experience thermal stress at moderate temperatures. Thermal challenges to persistence are evidenced by recent and historical extirpations at low elevations or the heated edges of former distributional ranges. The importance of adaptive mechanisms to thwart thermal and other stresses are well studied, but attention to snow as a driver of summer resource selection remains under-investigated. We hypothesized that 1) spatial use by cold-adapted species is modulated by the presence of persistent snow during summer months, and 2) avoidance of heat will result in increased use of snow during peak summer temperatures. We tested these posits using GPS location data spanning a decadal period for mountain goats (*Oreamnos americanus*) near the southern terminus of their present continental natural range. Contrary to expectations, mountain goats exhibited only modest selection for proximity to snow. During periods of peak temperatures, selection increased for areas associated with reduced thermal exposure and decreased for snow. Additionally, individuals used areas further from escape terrain during the warmest periods. Our results highlight that snow plays only a small role in the summer resource selection of mountain goats. More broadly, responses to warming temperatures may expose individuals to greater predation risk. As montane environments continue to warm, understanding changes in resource selection during the warmest periods today offers an invaluable lens for understanding challenges for populations tomorrow.
- 11:30 - 11:50 am Ornate box turtle ecology in Pueblo, CO.: efficacy of remote tracking, home range approximations, and habitat use - **Franziska Sandmeier** (CSU-Pueblo), *E. Norton (CSU-Pueblo), M. Sena (CSU-Pueblo), J. Moreno (CSU-Pueblo), J. Morales (CSU-Pueblo), M. Gomez (CSU-Pueblo), N. Bickford (Oregon Institute of Technology), and Claire Ramos (CSU-Pueblo)*
- We radio-tracked 20 box turtles in sand sage-dominated short grass prairie outside of Pueblo, CO in 2020 and 2021. Turtles were located primarily with remote tracking technologies (Cellular Tracking Technology (CTT)), using a grid of nodes that receive signals from long-lived “power-tags” (CTT). Turtles were also tracked using a handheld receiver (CTT). We found that detection of turtles was much weaker than with the use of traditional radio-telemetry (Advanced Telemetry Systems (ATS)) in a

similar study, and most turtles were not detected accurately when they were in both shallow and deep burrows. However, we were able to remove points with high levels of inaccuracy from our large dataset and used weighted autocorrelated kernel densities (wADKES) to approximate home range sizes. We did not find an effect of sex on home range size, but found a relatively large variation in size among individuals. We also characterized the vegetation in locations where we visually observed turtles while tracking with the handheld receiver and compared that to random locations in each turtle's home range. Using resource selection models, we found that turtles were preferentially found under sand sage. Sand sage likely provides cover from predators as well as thermal refugia during the summer.

- 11:50 - 12:00 pm Student Poster and Paper Awards, Photo Contest Awards
- 12:00 pm Conference Concludes - Closing Remarks - **Robin Russell** (*President, CCTWS*)
- 12:30 pm CCTWS Executive Board Meeting (Offsite)

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