Colorado Field Ornithologists' Convention Pueblo 2022
Science Session - May 21st 1:30pm - 4:30pm

Schedule:

1:30pm **Kaily Meek and Drew Bender -** Environmental Conditions That Promote Large Aggregate Feeding Behavior in Northern Shovelers

1:47pm **Richard Harness -** Avian Collisions with Utility Infrastructure: Technologies to Monitor and Mitigate

2:04pm **Brandon A. Skerbetz -** Aural Identification of Individual Mexican Spotted Owls

2:21pm **Kristen N. Amicarelle -** Managing Human/Golden Eagle Conflict: Best Practices for Relocating Golden Eagles

2:38pm **Zoe Erkenbeck -** Investigating the genomics of Mountain Plover (*Charadrius montanus*)

2:55pm **BREAK**

3:05pm **Kyle Carlsen -** Dim the lights for birds at night: the impact of light pollution on migratory birds

3:22pm **Edward Landi -** Spatial Partitioning of Cassin's Sparrow Territories

3:39pm **Cassey Weissburg -** Understanding the effects of trophic interactions on Mountain Plover brood habitat selection and survival

3:56pm **Karina Sanchez -** Development drives song changes but has little effect on reproductive success in American Robins (*Turdus migratorius*)

4:13pm **Claire V. Ramos -** Effects of drought on two species of shortgrass prairie sparrows in southern Colorado

4:30pm - 5:00pm LAST BIDS on silent auction!

Proceeds of the silent auction support avian research through CFO's Grants & Scholarships Program

Abstracts:

Environmental Conditions That Promote Large Aggregate Feeding Behavior in Northern Shovelers

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Northern Shovelers (*Spatula clypeata*) overwinter in Colorado. Between November and March, these ducks have been routinely observed feeding in large groups, often exceeding several hundred individuals. They aggregate in large circles and display a massive whirling behavior while feeding. Whirling feeding behavior is observed consistently in the same water bodies throughout the winter but is not observed in other lakes that are nearby. It is unclear why these ducks choose some lakes over others. The objective of our study is to verify where shovelers frequently display this mass feeding behavior and where they do not. A second objective is to identify what properties, both biotic and abiotic, promote this behavior. In the winter of 2020/2021, we repeatedly sampled 4 lakes near each other and determined that the mass feeding behavior regularly occurred at only one of the lakes. In the winter of 2021/2022, we expanded this study to include approximately 20 lakes. Of the 20 lakes, only two lakes consistently had over 100 shovelers mass feeding 100% of the time and this behavior was never witnessed on the other lakes. The lakes where whirling behavior was observed shared similarities in surface area that were not shared by the other lakes. Additional metrics, such as lake depth and water chemistry will be evaluated before the breeding season to establish a correlation between lake properties and feeding behavior. Northern Shovelers are experiencing population decline and our findings will provide valuable information on the specific requirements for winter feeding.

Avian Collisions with Utility Infrastructure: Technologies to Monitor and Mitigate

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Avian collisions with overhead power lines are a global conservation concern (APLIC 2012). Determining the scope of collisions and the effectiveness of mitigating measures is challenging, and thus several technologies have been developed. For example, Pandey et al. (2008) used Bird Strike Indicators developed by the Electric Power Research Institute (EPRI) and the California Energy Commission to remotely monitor transmission lines at a wildlife refuge and found 68%

(n = 154) of documented avian collisions involved the upper most static wires. Additionally an intelligent, video-based sensing and recording tool, named the Animal Activity Monitor (AAM), is under development by EPRI to allow visual review of such events. Prototype units have been tested in Colorado and at a major raptor migratory route.
Bird collisions are often mitigated through marking power lines to increase visibility of overhead lines to birds (Beaulaurier 1981). Line marking is sometimes accomplished via an expensive and potentially dangerous process of hovering a helicopter within 1 m of a wire and installing line markers by hand. To reduce this risk an Unmanned Aerial Vehicle (UAV) was developed to mark lines, offering a less dangerous, less costly alternative. This technology was developed in partnership with EDM International, Inc. (EDM) and Colorado State University. A line crawling robot is also available from another Colorado company, Power Line Sentry. Although line markers increase the visibility of power lines to birds in flight, they are limited in effectiveness at night, when many collisions occur. To address this concern, the Avian Collision Avoidance System (ACAS) was developed in Colorado to illuminate at-risk power lines. The ACAS uses near-ultraviolet light (UV) with a peak at 390 nm to illuminate power lines with a wavelength of light that many birds see, but that most humans do not. The ACAS nearly eliminated Sandhill Crane (*Antigone canadensis*) collisions in two studies at a major migratory stopover site. This presentation will go over each technology and discuss strengths and weaknesses.

Aural Identification of Individual Mexican Spotted Owls

BRANDON A. SKERBETZ *brandon.skerbetz@western.edu*
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Identification of individuals in wildlife populations is a critical component to several types of biological investigations. Standard methods being used to achieve individual identification generally involve capturing and marking individuals with brands, paint, tags, collars, and/or bands. Although these techniques often successfully produce informative results, the process can be highly invasive and potentially lead to negative effects on the captured wildlife. In effort to mitigate these negative impacts, I have implemented a newly developed technique of individual identification using passive acoustic monitoring data for Mexican spotted owls. Autonomous recording units were deployed in six sites with recent detections of Mexican spotted owls to capture their vocalizations. Successfully recorded male four-note calls were measured and analyzed. The results from this analysis indicate that it is possible to distinguish individual owls using their vocalizations alone. It is important to note that there are some limitations to using this method, but the technique is in its infancy and still offers a practical use to wildlife researchers. This study shows support for the development of a novel means to individually recognize vocal animals in a non-invasive manner.

Managing Human/Golden Eagle Conflict: Best Practices for Relocating Golden Eagles

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Golden Eagle (*Aquila chrysaetos*) depredation on sheep is causing a significant human wildlife conflict that is negatively impacting ranchers and eagles. Identifying and introducing best conservation practices for eagle relocation can help reduce this conflict, and in turn improve the economic livelihood of the ranchers, while reducing potential eagle impacts. The objective of this research is to identify quality habitat areas that meet specific conditions to relocate eagles and then understand how habitat and distance from trap sites effect spatial patterns once released. We are sampling vegetation, prey abundance, human disturbance, and eagle nest densities at randomly selected, spatially balanced sample sites to identify appropriate habitat and to aid in release site selection. We are trapping 12 eagles per year and fitting them with cellular GPS transmitters that will provide insight into their movement patterns and habitat preference after relocation. Eagles will be relocated at distance intervals, ranging from 100-400 miles. We will then identify movement patterns over time, so we can determine if the eagles return to the depredation area or stay at the relocation site. Hoping to find resources that keep eagles on the relocation site, we will model resource selection using Akaike's Information Criterion to determine habitat preference.
The management application for this project is to identify best practices for eagle relocation to reduce persecution as well as gain further insight into their spatial ecology. This project will help facilitate a long-term cooperative effort between falconers, biologists, and ranchers.

Investigating the genomics of Mountain Plover (*Charadrius montanus*)

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The mountain plover (*Charadrius montanus*) is a species of special concern in Colorado and the state may encompass over half of the breeding population. However, little sequencing has been performed on the species and we have a poor understanding of the species genomics, it's relationship with other plover species and possible variation between breeding populations

within the species. Within *Charadrius* plover species chromosomal structure seems to be highly conserved so by full genome sequencing of the mountain plover and alignment to the chromosome level assembly of the European golden plover (*Pluvialis apricaria*) I investigated the chromosomal structure of Mountain Plover. I used alignments of mitochondrial sequences for 14 available Charadriiformes plovers to the mitochondrial contigs for mountain plover and compared to previously published phylogenies to investigate and suggest the relationships between species. In addition to comparative genomics between species, ongoing work is investigating possible variation of breeding populations in the species. Samples from 4 breeding locations in Colorado and up to 4 additional locations outside of Colorado will be used to define within and between population levels of variation.

Dim the Lights for Birds at Night: the Impact of Light Pollution on Migratory Birds

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Most birds migrate at night. These nocturnal migrants include ducks and geese, plovers and sandpipers, and songbirds of all kinds. However, the night sky is under threat. Artificial light is increasing globally by at least two percent a year, presenting a problem for birds. Light pollution from homes, businesses, and other infrastructure attracts and disorients migrating birds, making them more likely to land in areas where they are more vulnerable to collisions and other dangers. Artificial light also disrupts foraging, nesting, and other vital behaviors in birds. The impact of light pollution is the focus of this year's World Migratory Bird Day, an annual global campaign that celebrates the migration of birds across countries and continents. This presentation examines the impact of light pollution on migratory birds, highlights recent research, and explores the ways in which individuals and communities can take action for birds at night.

Spatial Partitioning of Cassin's Sparrow Territories

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North American grasslands are one of the most threatened ecosystems in the world. Grassland bird populations have declined by 53% in the last 50 years. Species like the Cassin's Sparrow

(*Peucaea cassinii*) declined by 43%. Male Cassin's Sparrows select breeding territories with resources like dispersed shrubs on grasslands for nests and insects to feed their offspring. Due to their elusive nature, little about resource selection on their breeding grounds has been quantified. Male Cassin's Sparrows breed in high densities on sites with highly selected resources and can incur fitness costs from intrasexual competition between territorial males. Spatial partitioning of territories may be used to reduce competition because neighboring males may not overlap their areas of high resource selection. Areas of high resource selection may contain high grasshopper biomass and shrub cover. To address this hypothesis, we evaluated movement patterns of neighboring male Cassin's Sparrows in Southeast Colorado during the summer of 2021. We used an automated telemetry system and solar powered LifeTags by Cellular Tracking Technologies to track locations of 13 Cassin's Sparrow. We measured two resources on the study site: vegetation cover and grasshopper abundance. We quantified shrub cover from 0-100% cover over all territories using satellite imagery. We found Cassin's Sparrows selected Low Shrub Cover (1 -20%) the most compared to other shrub cover classes (0% and 21-100%). Low shrub cover had the highest predicted probability of selection at 27%. Our research supports the need for shrubs to be present and not the dominant cover on Cassin's Sparrow territories.

Understanding the Effects of Trophic Interactions on Mountain Plover Brood Habitat Selection and Survival

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The Mountain plover provides a unique opportunity to examine predator-prey interactions, inhabiting prairie ecosystems with varying suites of predators and vegetation features as well as differing seasonal phenology. Chick survival has been shown as the vital rate that affects Mountain plover population growth the most after adult survival during migration, and so this research focuses on the brood-rearing phase of this species as a lens to examine the impacts of these trophic interactions. We hypothesize that Mountain plover brood habitat selection patterns, as well as chick survival rates, depend on variation in predation risk, mediated by forage availability and vegetation structure. Brood monitoring is conducted for every known brood from hatching day or discovery until fledging or death was confirmed, with daily locations obtained by VHF radio-transmitting tags deployed on one chick per brood. Data is collected on mammalian and avian

encounter rates, insect and grasshopper biomasses, and percent bare ground, groundcover height, and shrub density, to evaluate the three environmental covariates of predation risk, forage availability, and vegetation structure, respectively. During 2021, the first of two field seasons, we monitored 25 broods between our two study sites. Brood habitat selection was evaluated through mixed-model resource selection functions and chick survival from estimated daily survival rates, both in series of a priori models. Preliminary results will be presented.

Development Drives Song Changes but has Little Effect on Reproductive Success in American Robins (*Turdus migratorius*)

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Urbanization has altered ecosystems across the globe. Research shows that urban environments support less biodiversity than native ones but the mechanisms leading to this decrease are unknown. Urban birds have been observed to alter their songs, an important behavior for reproduction, to avoid masking by anthropogenic noise. Other studies found that urban birds alter the time of singing in areas with light pollution. These changes may be strategies to cope with the presence of noise and light to maintain effective communication. However, little is known about the benefits of these changes on reproduction. Furthermore, much of these changes have been attributed to noise, but noise is not the only urban characteristic that can shape acoustic signals. To better understand the effects of urbanization on song behavior and reproduction, we measured three key urban characteristics; noise light and development, to test for effects on song and reproduction of American Robins (*Turdus migratorius*). We hypothesized that birds in areas with more development and noise would have higher minimum frequency songs and that all three urban characteristics would negatively affect reproductive success. We found that American Robins are successful in several habit-types with no significant effects on reproductive output, though landscape was present in most models of best fit. Minimum frequencies were significantly affected by landscape but not anthropogenic noise. Understanding the selective pressures that shape birdsong in a world of rapid land changes is necessary to anticipate and plan for the ecological and evolutionary consequences of species in areas of rapid urbanization.

Effects of Drought on Two Species of Shortgrass Prairie Sparrows in Southern Colorado

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The North American prairies are perhaps the most imperiled ecosystem on this continent. Shortgrass prairie is threatened by conversion to agriculture use, changes in fire and grazing regimes, fragmentation, and increasingly, climate change. Climate models indicate increased probability of hotter, dryer summers across much of the region. Prairie birds are experiencing steep declines, more dramatic than for any other community of birds. Despite this, shortgrass prairie birds remain significantly understudied. Here we studied the reproductive behavior and success of two declining shortgrass prairie sparrows, Cassin's Sparrow (*Peucaea cassinii*) and Lark Bunting (*Calamospiza melanocorys*) at the US Army Pueblo Chemical Depot, a relatively undisturbed shortgrass prairie ecosystem in southern Colorado. Over the 4 years of this study (2017-2020), southern Colorado experienced two summer droughts and two summers with above average rainfall. Cassin's Sparrows and Lark Buntings responded to these variable rainfall conditions differently. Lark Buntings were only present and breeding at the Pueblo Chemical Depot during wet summers. In dry summers, they were entirely absent from the site after migration. Cassin's Sparrows, in contrast, bred at the site every year, however, their reproductive success tended to be lower in drought years than in wet years. These differences in response to drought may reflect differences in behavioral plasticity, which may make Lark Buntings better able to adjust to the effects of climate change, whereas Cassin's Sparrows may be more sensitive to these effects. Findings from this study could be critical in determining future management strategies to conserve these declining species.