



**Parks &  
Open Space**

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**2020**

**Winter Meeting  
Program**



**Parks &  
Open Space**



## **Steering Committee**

### **2020**

**Andrew DuBois, Co-Chair**  
**Tim Warfel, Co-Chair**

**Karen Green**  
**Erin Jackson**  
**Hunter Johnson**  
**Melissa Johnson**  
**Kari Soltau**  
**Stephanie Townsend**  
**Kelly Triece**

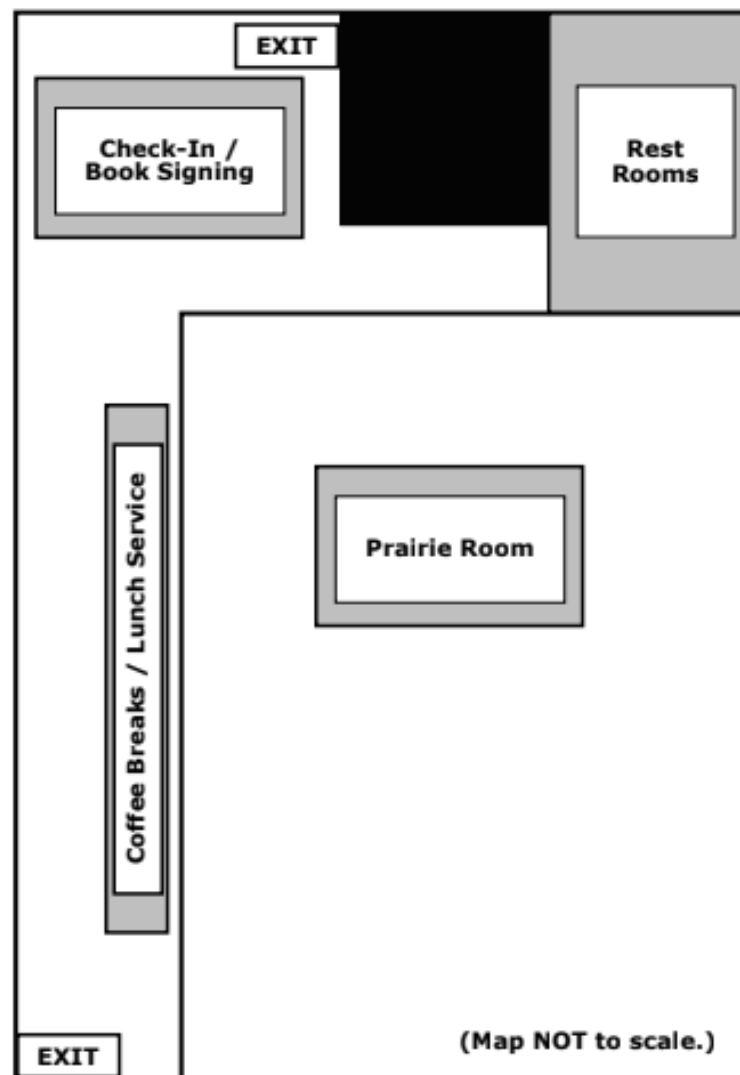
Interested in serving on the CO PARC steering committee?

Please visit a current member for more information.

## Program Overview

8:30 AM	Registration
9:00 AM	Welcome
9:15 AM	Keynote Speaker – Mike Pingleton
10:00 AM	Morning Break - Photo Contest and Exhibition Tables
10:15 AM	Morning Presentations
12:00 PM	Lunch (on your own)
1:30 PM	Herp Quiz
2:00 PM	Plenary Speaker – Tim Trout
2:45 PM	Colorado Parks & Wildlife Update
3:00 PM	Afternoon Presentations
4:10 PM	CO PARC Update Elections, announce 2020 meeting, CO PARC field trips
4:30PM	Adjourn
5:30 PM	Dinner and Social at the Red Zone
6:30 PM	Live Auction, Herp Quiz and Photo Contest Results

## Boulder Parks and Open Space Map



## Program Schedule

### Welcome, Acknowledgments, and Introductions

**9:00 AM**

Andrew DuBois, CO PARC Steering Committee Co-Chair

### Keynote Speaker – Mike Pingleton

**9:15 AM**

Mike Pingleton, Co-creator of HerpMapper, co-author of *The Field Herping Guide*

### Morning Break

**10:00 AM**

Be sure to check out the photo submissions and vote in the photo contest!

### Morning Session – Lightning Talks

**10:15 AM**

In order of delivery

#### **Dana Coelho**

**Metro Denver Nature Alliance, 1536 Wynkoop St, Suite 915, Denver, CO 80203**

#### ***Metro Denver Regional Conservation Assessment***

Along with almost 3 million people, 19 amphibian and reptile species call the seven-county Metro Denver region home. They all need your help! Learn about and begin contributing to the Regional Conservation Assessment, a collaborative project of the Metro Denver Nature Alliance informing strategic conservation and restoration of nearby nature and the values it supports. Metro DNA is a growing coalition of more than 40 partner organizations and agencies committed to a thriving region for people and nature.

**Ken Honeycutt, Asila Bergman, and Wendy Estes-Zumpf**  
**Wyoming Game and Fish Department, 1212 S. Adams St., Laramie, WY, 82070**

#### ***What Does the Frog Say: Developing Tools to Monitor Distributions of Amphibians Using Acoustic Recording Equipment and Detection Software***

To aid managers in monitoring distributions of amphibians across broad regions, the Wyoming Game and Fish Department and the Bureau of Land Management are developing methods for monitoring amphibians using automated acoustic surveys. These survey methods allows for acoustics at target locations to be recorded using automated recording devices; and then subsequently, recordings can be examined for vocalizations of target species using automated software. To develop methods for automated acoustic surveys, we tested various strategies for deploying automated recorders, tested 3 acoustic recognition programs for accuracy in detecting target vocalizations and user-friendliness, and began training software to recognize vocalizations (recognizers). Of the 3 software programs we tested, Arbimon II performed slightly better (average F-score across 3 species = 0.78) than both MonitoR (F-score = 0.68) and Kaleidoscope (F-score = 0.73) in correctly identifying vocalizations, and was also the most user-friendly of the programs we tested. We continue building recognizers in Arbimon II that accurately identify vocalizations from several amphibians that inhabit Wyoming and Colorado.

## **Morning Session – Regular Session Talks**

**10:30 AM**

In order of delivery

**Lauren Livo**

**1835 S. Van Gordon St, Lakewood, CO 80228**

### ***Possibilities for Documenting New County and State Herpetofaunal Records***

State and county borders typically do not reflect biologically meaningful boundaries. However, herpetofaunal distributions often are described, in part, by these artificial borders. Within Colorado, recent range extensions of reptiles and amphibians have added to both county level species lists as well as to the state species list. Numerous county level gaps remain in the reported distributions for several species. In addition, evaluation of herpetofaunal records from adjacent states indicate the possibility that additional species might occur in Colorado. This talk will emphasize possibilities for field work that could yield new county or state distribution records and summarize how to document these observations.

**Ryan Pioreschi and Will Keeley**

**City of Boulder Open Space and Mountain Parks**

### ***Restoration efforts on City of Boulder Open Space and Mountain Parks lands to improve habitat conditions for Northern Leopard Frogs (*Lithobates pipiens*)***

Restoration efforts began in 2012 to increase suitable habitat for all native amphibians, with a focus on increasing and maintaining breeding habitat for northern leopard frogs, a Tier 1 species of greatest conservation need whose populations are rapidly declining in the western United States. OSMP staff accomplished restoration goals by removing non-native cattail (*Typha* sp.), planting native species, and controlling non-native American bullfrogs (*Lithobates catesbeiana*). In 2019, 40 OSMP staff spent over 450 hours conducting restoration activities to

remove 54 tons of cattail. Since 2012, we have observed increases in the number of northern leopard frog breeding sites, maintained breeding at sites that were experiencing cattail encroachment, and reduced bullfrog occupancy at sites that support northern leopard frogs. Restoration techniques and several case studies will be presented.

**John Giordanengo and Claudia Strijek**

**AloTerra Restoration Services, 320 E. Vine Drive, Suite 213, Fort Collins, CO 80524**

### ***Design Challenges to Restoring Northern Leopard Frog Habitat at Lindsay Pond—A Boulder, CO Population Destroyed by the 2013 Floods.***

Prior to the 2013 flood, Lindsay Pond was a 0.4 acre inline stock pond located on Bull Gulch, a foothills drainage on Boulder Open Space and Mountain Parks (OSMP) property. During typical years, ponded water could reach four feet deep. During the 2013 flood event, sediment and debris flows filled Lindsay Pond, destroying a population of Northern Leopard Frogs (*Lithobates pipiens*), a tier 2 Species of Greatest Conservation Need in Colorado (CPW 2015). The flood also resulted in a channel headcut immediately downstream of the area formerly occupied by Lindsay Pond, threatening the stability of the pond area. AloTerra and Tailwater are working with the City of Boulder (OSMP) to design habitat restoration measures for this population, including grading, hydrology, revegetation, water quality, sediment management, and channel stability. Design constraints include the structure and diversity of vegetation cover for breeding conditions and forage, predation by non-native American Bullfrog (*Lithobates catesbeianus*), appropriate hydrology during breeding season and metamorphosis stages (March – July), chytrid fungus (*Batrachochytrium dendrobatidis*), and winter hydrology. This presentation will provide a design approach to address known constraints, including appropriate revegetation hydroseres for *L. pipiens*, a hydrology schedule to favor *L. pipiens* while discouraging *L. catesbeianus*, bioengineering approaches for

headcut stabilization, and construction management approaches for reducing the introduction of chytrid fungus.

**Andrew C. Gygli and Wendy Estes-Zumpf**  
**Wyoming Game and Fish Department, 1212 S. Adams St.,**  
**Laramie, WY, 82070**

***The extent and potential effects of a damaging non-native amphibian (American bullfrog, *Lithobates catesbeianus*) outbreak in northeast Wyoming.***

The American bullfrog (*Lithobates catesbeianus*) is a robust and prolific amphibian native to the eastern United States. They were introduced globally via use as bait, the pet trade, and as a food source. In the western United States and Canada, bullfrogs are invasive, damaging animals. Bullfrogs are highly adaptable, voracious, and prolific and that can quickly overtake wetland systems. They outcompete or devour native animals and can transmit diseases like *Batrachochytrium dendrobatidis* (Bd) to native amphibians. Many taxa are prey for bullfrogs including birds, fish, mammals, amphibians, reptiles, arthropods, and mollusks. Bullfrogs are nonnative to Wyoming, except possibly in and around Cheyenne and Torrington. In 2018, Wyoming Game and Fish confirmed bullfrogs in Kleenburn Ponds near Sheridan. In summer 2019, we conducted public outreach and survey campaigns to determine the extent of the bullfrog invasion. We conducted aural and visual surveys during the mid-summer breeding season across northeast Wyoming. We only located bullfrogs in and around Sheridan, and removed at least 2,000 bullfrogs from all life stages. To determine predation impacts, we extracted and analyzed stomach contents from 69 adults. We recovered snakes, amphibians, mammals, mollusks, crayfish, and arthropods from orders including hemiptera, lepidoptera, orthoptera, odonata, hymenoptera, and coleoptera. The Bighorn Range is just upstream and harbors unique glacial relict wood frogs which could be lost if bullfrogs are established. Continued public education and concerted bullfrog detection, suppression, and removal efforts are critical

to prevent the irreversible loss of unique biodiversity that neighboring states are experiencing due to nonnative bullfrogs.

**Lunch**  
**12:00 PM**

On your own and at your own expense

**CO PARC Herp Quiz**  
**1:30 PM**

Hunter Johnson, CO PARC Steering Committee

**Plenary Speaker – Tim Trout**  
**“Komodo Dragons: A 20-year Retrospective”**  
**2:00 PM**

Tim Trout, Reptile Keeper, Denver Zoo

Having worked with Komodo Dragons for twenty years in a zoo setting and participating in field work with their wild counterparts, I have gained much admiration and fondness for this taxa. From the early days of keeping and breeding them to growing knowledge of their biology from ongoing field work, we are still learning much about the Earth's largest lizard. Denver Zoo has unique philosophies and husbandry practices that over the past 25 years have proven to be both innovative and successful in routine maintenance, reproduction and medical care. I will discuss care throughout their life cycle--from incubation to geriatric care--and share the strategies that have lead to their successful management at Denver Zoo.

**Colorado Parks & Wildlife Update**  
**2:45 PM**

Tina Jackson, Species Conservation Coordinator  
Harry Crockett, Native Aquatic Species  
Coordinator

## Regular Oral Presentations

3:00 PM

In order of delivery

**Ann-Elizabeth Nash**

**University of Northern Colorado, Greeley, CO 80639**

### ***Social Structure of the Spiny-Tailed Iguana, *Ctenosaura similis****

Social structures of reptile groups are poorly known, yet may influence mate choice, foraging, nesting sites, predator avoidance, and disease transmission. To address this dearth of information, I examined personality, network position, and genetic relatedness of a group of free-ranging Spiny-tailed Iguanas (*Ctenosaura similis*). These social (but non-cooperative) animals form stable aggregations (>6 years), developing relationships through repeated, non-random interactions. During four field seasons, ~28 lizards wore physical proximity tags, recording associations when lizards were  $\leq 6$  meters apart. Networks were analyzed for individual and group measures. Lizard personalities were assayed via flight initiation distance, arena tests, and observed conspecific aggression. Genetic relatedness of each group was determined. There is strong support for existence of distinct personalities and behavioral syndromes. Social network measures indicate varying social connections among individuals but which are stable during each season. Network analysis demonstrates high group density, with strongly connected modules within the group. Personalities and positions are duplicated in the group, potentially offering insurance against ecological changes, climactic events, and conspecific loss. Targeted removal may not deteriorate the social structure, making the possibility of control where *C. similis* is invasive challenging. This is the first large-scale study to look at personality and social network structure in an egg-laying, Neotropical lizard that exhibits facultative group formation. Results demonstrate a level of complexity hypothesized as an important step in the evolution

of more multifaceted sociality. An IUCN “species of least concern”, this proxy may reveal social structure characteristics needed to support self-perpetuating populations of endangered iguanas.

**Cara F. Smith and Stephen P. Mackessy**

**University of Northern Colorado, Greeley, CO 80639**

### ***The Distribution of Medically Significant Venom Toxins in the Prairie Rattlesnake (*Crotalus viridis viridis*) Throughout Colorado***

Snake venoms are complex mixtures comprised primarily of potent bioactive proteins used for prey incapacitation. Venom composition has been shown to vary geographically, taxonomically, with age, and with dietary preference. North America's most wide-ranging rattlesnake, *Crotalus viridis* (the Prairie Rattlesnake), is found from northern Mexico through the plains of the western United States to southern Canada. Coupled with its wide species range, *C. viridis* is also a habitat generalist, and inhabits areas in close proximity to humans, increasing the likelihood of human encounters and bites from this snake. *C. viridis* venom is known to induce hemorrhage and muscle degradation due to the presence of large enzymes like snake venom metalloproteases (SVMPs), snake venom serine proteases (SVSPs) and smaller nonenzymatic muscle toxins (myotoxins). Though previous research on *C. viridis* has shown geographic variation in some venom toxins, to date, no analysis has investigated broad-ranging variation in the entire venom proteome of this species. The current project investigates venom variation in the *C. viridis* throughout Colorado by determining geographic population-level patterns in abundance of major toxins using gel separation, high performance liquid chromatography, mass spectrometry and biochemical assays. The patterns observed straddle the Type 1-Type 2 venom compositional dichotomy previously characterized in rattlesnakes, as there appears to be a trade-off between dominantly enzymatic and nonenzymatic venom phenotypes. Ultimately, the patterns of venom variation in *C. viridis* can help inform snake-bite treatment in addition to

providing clues about foraging ecology and venom evolution of this wide-ranging rattlesnake.

**Katrina Cook<sup>1</sup>, Lusha Tronstad<sup>2</sup>, and Anna Chalfoun<sup>1</sup>**

**<sup>1</sup> Wyoming Cooperative Fish and Wildlife Research Unit,  
University of Wyoming, Laramie, WY 82070**

**<sup>2</sup> Wyoming Natural Diversity Database, University of Wyoming,  
Laramie, WY 82070**

### **Wood Frog Habitat Selection and Quality in the Bighorn Mountains of Wyoming**

The wood frog (*Lithobates sylvaticus*) is a glacial relict species in Wyoming, found only within the Medicine Bow National Forest and the Bighorn Mountains. The Wyoming Game and Fish Department has listed the wood frog as a Species of Greatest Conservation Need, with a Native Species Status Rank of 2 in the 2017 State Wildlife Action Plan. The ranking reflects a general lack of information about the habitat needs of wood frogs. Another critical gap in knowledge for this population is the prevalence and influence of the chytrid fungus which has contributed to global amphibian declines. We will radio-track up to 50 wood frogs in the Bighorn Mountains from breeding sites to hibernacula during the summers of 2020 and 2021 to quantify habitat preferences at multiple scales. Tracked individuals will be swabbed several times during each summer to determine their chytrid status. Macro and micro-habitat characteristics will be measured at each frog's relocation site and at random locations. We will also address the question of whether benthic macroinvertebrate communities can serve as a suitable proxy for the quality of breeding habitat of amphibians and presence of wood frogs. Aquatic macroinvertebrates will be sampled across a range of potential and known amphibian breeding ponds and compared to observed numbers of breeding amphibians. Our study will provide valuable information about the habitat needs of, and disease threats to, wood frogs in Wyoming, and the efficacy of a novel approach

to identifying suitable breeding habitat for amphibian species of concern.

**Alexa Lindauer and Jamie Voyles  
University of Nevada, Reno, NV, 89512**

### **Out of the frying pan, into the fire? The effects of hydroperiod and disease on two declining amphibian species.**

Reduced water availability during larval development may impact disease susceptibility post-metamorphosis. For species that are exposed to drying conditions and disease, such as Yosemite toads (*Anaxyrus canorus*) and Chiricahua leopard frogs (*Rana chiricahuensis*), the combination of these threats across life stages may interact to exacerbate declines. We reared Yosemite toad and Chiricahua leopard frog tadpoles under different hydroperiods and then exposed juveniles to the fungal pathogen, Bd. Although we did not find an effect of drying conditions on disease susceptibility, we did find that juvenile Yosemite toads are highly susceptible to lethal chytridiomycosis, and juvenile Chiricahua leopard frogs are not.

### **CO PARC Update**

**4:10 PM**

Summary of CO PARC Activities, CO PARC Field Trips;  
Announce 2020 Annual Meeting  
Hunter Johnson and Andrew DuBois, CO PARC Steering  
Committee

### **Dinner and Social at the Red Zone**

**540 Main Street, Longmont, CO**

**5:30 PM**

At your own expense

### **Live Auction, Herp Quiz and Photo Contest Results**

**6:30 PM**