

Botany and butterflies: how to improve the population of butterflies using flower preferences

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Poster Presentation

Wildlife pollinators, such as butterflies, are imperative to the survival of our environment. Because pollinator count across the board are in decline and it is important to understand their distribution patterns and vegetation preferences. We investigated late summer and autumn butterfly occurrences in the Albuquerque stretch of the Rio Grande Valley (NM) and their habitat preferences with particular focus on Valle de Oro National Wildlife Refuge. Valle de Oro is a four year old urban US Fish and Wildlife Service, National Wildlife Refuge south of Metropolitan Albuquerque. During our research period, we monitored three sites throughout the Rio Grande Valley, including Valle de Oro and captured butterflies with butterfly nets. Once captured, we photographed the tops and the undersides of each type of butterfly and then released them. Using data collected by Bosque Ecosystem Monitoring Program (BEMP) botanists, we analyzed the relationship between certain vegetation and butterfly population. The butterflies preferred alfalfa the most, which of our three sites was only found at the Valle De Oro site (where we also found the majority of the butterflies). Therefore, we suggest that Valle De Oro might consider keeping a portion of their current alfalfa crop while they transition to a greater population of native plants. At other sites along the Rio Grande, we recommend resource managers make an effort to include more native flowering plants to replace some of the exotic invasive species, such as kochia and tumbleweed.

Mountain lion (*Puma concolor*) resource selection, kill rates and competition with black bears (*Ursus americanus*) in the Jemez Mountains, New Mexico

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Poster Presentation

Predators are often managed to prevent losses among domestic livestock, improve game populations, and prevent threats to humans. Recently, many landscape-scale forest restoration projects have been initiated across the Southwest to reestablish historic forest structure, biodiversity and fire regimes primarily in response to the increased occurrence of catastrophic wildfires. However, stand replacing fires and restoration activities can alter habitat conditions for mountain lions and their prey. As part of a large-scale study to assess the impacts of wildfire and forest restoration treatments on large mammals, we captured 12 (7 male, 5 Female) adult mountain lions and fitted each with both GPS Iridium and VHF collars across

the Jemez Mountains in northcentral New Mexico. The objective of this study is to assess mountain lion resource use and behavioral patterns in the presence of a large-scale forest restoration effort. More specifically, we will 1) determine kill rates and prey composition for lions, 2) use mountain lion GPS data to develop a predation risk map based on lion habitat use patterns, then use kill site data to validate the predation risk model and, 3) determine rates of kleptoparasitism by black bears on mountain lion kills. Kleptoparasitism rates will be compared between areas of low, moderate, and high bear density using data collected from the Jemez Mountains in addition to two other sites in New Mexico. Previous studies have suggested a negative relationship between these two large predators. More specifically, how a dominant competitor affects the foraging of a top predator. However the degree at which black bears influence the predation rates of lions is still uncertain.

Tracking big feet: detecting New Mexico meadow jumping mice with track plates

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Poster Presentation

The New Mexico meadow jumping mouse (*Zapus hudsonius luteus*), an Endangered subspecies found in the southwestern US, uses riparian areas with tall, dense herbaceous vegetation as habitat. To detect the presence of this species and better understand life history and habitat use, we developed and tested a new track plate method. New Mexico meadow jumping mice have unique feet and toes that are readily distinguishable from deer mice, voles, and small mammals within their geographic range. We created a reference guide for rodent tracks that confirms the unique footprints of the jumping mouse and tested this method against detection with live traps. In only 1 of 14 comparisons of trapping with track plating did results differ (Spearman's $\rho = 0.87$, $P < 0.001$). At 6 sites, jumping mice were not detected using either method, at 7 sites jumping mice were detected by both methods, and at 1 site we live trapped jumping mice but did not detect them with track plates. Based on our success with this technique, we developed a 13-minute video (<https://www.youtube.com/watch?v=i2x0Ydc1XVM>) that shows how to assemble, deploy, and interpret results of track plates. Although trapping is effective when specific information is needed (e.g., genetic material, sex ratio), track plates benefit by reducing risk of injury or mortality to animals, reducing fatigue to field crews, and lowering costs of operation.

Mohave fringe-toed lizard (*Uma scoparia*) distribution in Arizona

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Poster Presentation

Due to their ecological adaptations and the threat of human development within their distribution reducing their habitat, all Fringe-toed Lizards (*Uma sp.*) are listed as Species of Greatest Conservation Need (SGCN) in the Arizona State Wildlife Action Plans (SWAP). Because these

lizards are habitat specific they are extremely sensitive to landscape disturbance. In addition, much of their known range is being considered for utility-scale solar energy developments. Our objectives were to conduct surveys for Mohave fringe-toed lizards (MFTL; *Uma scoparia*) on public lands managed by the Bureau of Land Management (BLM) in Arizona, create a distribution map of MFTLs in Arizona, determine the ideal conditions to conduct surveys, and provide recommendations for monitoring MFTLs in Arizona. Surveys were conducted in western Arizona in La Paz and Mohave counties in locations where suitable habitat for MFTLs occurred. A total of 96 surveys were conducted that resulted in 170 individual MFTL observations. Effort focused on the periphery of sand dune habitats. We mapped locations along with MFTL Heritage Data Management System (HDMS) records in Arizona to create a revised distribution map which extends the known range for MFTL in Arizona by nearly 20 km to the east and 20 km to the south from previously known records. An activity budget was created by evaluating temperature, activity type and temporal data. We created guidelines for biologists to survey in the times that yield the highest detection probabilities and gave recommendations for the continued study of MFTLs in Arizona.

Hantavirus prevalence in two rodent communities in eastern New Mexico

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Poster Presentation

Certain hantaviruses are zoonotic that, when contracted by humans, can cause the often fatal hantavirus cardiopulmonary syndrome (HCPS). Several rodent reservoir species serve as biological vectors. In northwest New Mexico in 1993, the initial outbreak of HCPS occurred and was caused by Sin Nombre virus (SNV). Since then, studies of prevalence and distribution of hantaviruses in rodent populations have been conducted in northwest New Mexico, Texas and Arizona, but little is known about its occurrence in eastern New Mexico. In 2015, Eastern New Mexico University students trapped small mammals on the university Natural History Preserve in Portales and the Bottomless Lakes State Park in Roswell. Blood samples were collected and tested for antibodies to hantaviruses via enzyme-linked immunosorbent assay (ELISA). Of the 103 blood samples across eight rodent species, five species tested positive, with an overall prevalence of ~8%. Southern plains woodrats (*Neotoma micropus*) had the highest prevalence of ~40%. Previous studies have mainly examined prevalence of SNV in its primary reservoir, the deer mouse (*Peromyscus maniculatus*). This study provides a preliminary assessment of eastern New Mexico small mammal community members and the prevalence of hantavirus antibodies in each representative species. This research continues at various sites in Roosevelt County, in order to further observe the possible impact of rodent assemblages on hantavirus prevalence. By analyzing the possible hantavirus dependence on rodent community dynamics, we may hone predictive tools concerning this dangerous zoonosis.

Pilot project to enhance vampire bat bite surveillance in Arizona

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Poster Presentation

The distribution of the common vampire bat (*Desmodus rotundus*) is from the tropics of southern Mexico, Central America, and South America. The common vampire bat feeds on the blood of wildlife and livestock. Although, fossil records of vampire bats have been reported in Florida and the states bordering Mexico, including Texas, It has not been found in the United States for the past 10,000 years (Johnson, N, Arechiga-Ceballos, N., & Aguilar-Setien, A. 2014). Vampire bats are known to be vectors of rabies and prone to bite animals and livestock for its feed. More recently, vampire bats with rabies have been documented within 31 miles of the Texas border. (Johnson, N, Arechiga-Ceballos, N., & Aguilar-Setien, 2014) The concern is potential movement of vampire bats to areas within the United States as a result of rising global temperatures and climate change. The damage vampire bat can cause is transmission of rabies to cattle, damaged hides, weight loss, decreased milk production and death. The USDA, Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) focuses in preventing the spread of rabies with the national rabies management program. In order to achieve this goal, a pilot project has been developed where vampire bats are being surveillance at targeted livestock facilities in Texas, Arizona and New Mexico. The vampire bats' response to the changing climate should also give us hints about how the ranges of these bats might be altered. Our objective is to have a count of minimum of 100 head of livestock in detection of vampire bat bites. I am tasked with monitoring two dairy and one cattle yards in Yuma, Arizona, and while there have been no detection of bats, baseline is being established.

Candid carnivores and other mammal communities in saltcedar and native riparian forests

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Poster Presentation

Nonnative *Tamarix* spp. is one of the most prevalent trees in riparian habitats in the Southwest and can affect habitat quality and wildlife. Aside from avian and some herpetofauna communities, less is known about meso and large carnivore habitat associations with monotypic stands of *Tamarix*. The purpose of this study was to measure the abundance and richness of mammals across three riparian forest types using camera traps. We hypothesized that mammal abundances would be lower in *Tamarix* stands compared to two native forest types. We sampled mammal communities in a monotypic *Tamarix* stand and in stands with dominant native vegetation (*Populus*, *Salix*, and *Prosopis* spp.), along the San Pedro and Gila Rivers in Arizona. We used a total of 12 camera traps, placing 4 in each forest type. Abundance was measured as the number of pictures of animals per trap night per habitat. We recorded 13 species of mammals over 71 trap nights and the most common species was *Pecari tajacu*. Carnivores included *Lynx rufus*, *Canis latrans*, and *Urocyon cinereoargenteus*. We recorded *Puma concolor* only in the *Populus*

stand and *Ursus Americana* was observed in the *Prosopis* stand. Preliminary findings show no difference in abundance of mammal communities across the three sampled habitats. Additional trap nights will be collected during 2017 to determine how *Tamarix* habitat compares to native riparian habitats.

Ectoparasitic mite loads: which whiptail species carries more mites?

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Poster Presentation

Tiger Whiptails (*Aspidoscelis tigris*) reproduce sexually and Sonoran Whiptails (*Aspidoscelis sonorae*) are parthenogenic. Both carry ectoparasites and reside in riparian habitats. Do whiptails that reside in salt cedar habitat have more mites than those that live in native vegetation? Does mite load vary between mites on sexual and parthenogenic species? Our objectives were to compare mite loads between two whiptail species; Tiger whiptails and Sonoran whiptails. The second objective was to compare ectoparasitic mite loads in 3 different habitats; salt cedar (*Tamarix*), mesquite (*Prosopis*) and cottonwood (*Populus*). We hypothesized that native vegetation, specifically cottonwood and mesquite would have higher mite loads than lizards in salt cedar habitats because the whiptails, mites, and salt cedar did not co-evolve together. We hypothesized that the Sonoran whiptail would have the highest mite load because of the lack of genetic variation in parthenogenic species. The study was conducted by taking pictures of the ventral side of whiptail lizards and counting the scales with mites present. The mite load was calculated by dividing the number of scales with mites present by the total number of scales. As predicted Sonoran whiptails had a higher mite loads than tiger whiptails and native vegetation had dramatically higher mite loads compared to salt cedar.

Assessing the response of lesser prairie-chickens to prescribed fire in the shinnery oak prairie ecoregion of eastern New Mexico

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Poster Presentation

Lesser prairie-chickens (*Tympanuchus pallidicinctus*) (LEPCs) have experienced severe declines in population and range over the last two centuries. Current conservation efforts are focused on conserving habitat and working with private landowners to engage in land management practices that benefit LEPCs. While prescribed burning is used for other prairie grouse in North America, no study has yet directly evaluated the effects of prescribed fire on LEPCs in New Mexico. The objectives of our study were to 1) determine the extent to which recently burned [early March] areas are utilized by LEPCs and 2) the

effects of spring burns on plant and insect community composition, structure, and recovery. In 2016, prescribed burns were completed on approximately 5000 acres of LEPC inhabited shinnery oak prairie. Following the prescribed fires, we captured individual LEPCs at established lek sites and placed PTT transmitters on 10 females and 8 males as well as VHF necklace collars on 21 males. We anticipate discussing preliminary results regarding space use of LEPCs relative to recently burned areas and the response of insect communities to prescribed fire during the 2016 field season. Results of this study will help guide resource managers on the response of plant and animal communities in the shinnery oak prairie to spring prescribed fires.

Comparing demography, nesting ecology, and movement patterns of sympatric scaled and Gambel's quail populations in response to climate in the Chihuahuan Desert

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Poster Presentation

Due to habitat loss, degradation, and droughts, quail populations in New Mexico and in the Southwest have declined since the 1960s. In order to investigate the role of climate on quail populations, sympatrically occurring scaled and Gambel's quail are being studied on the White Sands Missile Range. White Sands Missile Range offers a unique opportunity to study the effects of climate on habitat selection and demography without the confounding effects of cattle grazing. Hypothesized to be affected by the duration and timing of seasonal rainfall patterns, it is hoped that this study will fill information gaps needed to help manage these quail species through future periods of prolonged drought and predicted changes in climate. Last spring, quail were trapped and tracked using VHF transmitters in order to study nest success, nest site selection, brood success, and brood habitat selection. We anticipate discussing preliminary results regarding nest and brood success, along with overall survival, and movement patterns between the two species, as well as future data collection and analysis regarding resource selection for nest and brood sites. By learning more about scaled and Gambel's quail, we hope to fill in current gaps in our baseline understanding of their ecology and demography to assist in more informed management actions for these game birds.

Variation in body size, body condition, and population structure of western river cooter from New Mexico and Texas

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Poster Presentation

Western River Cooter, *Pseudemys gorzugi*, is one of the least studied species of freshwater turtles in North America. In the US, species occur only in New Mexico and Texas and their range is restricted to the Pecos and lower Rio Grande Basin. Western River Cooter is listed as a state threatened species in New Mexico and near threatened by the International Union for Conservation of Nature (IUCN). Given their conservation status, it is important to monitor populations of Western River Cooter across their range. In this study, we compared population demographics and body condition indices between two distinct regions of *P. gorzugi* distribution: Black River in New Mexico and Devils River in Texas. In New Mexico, we collected 155 turtles during 2016 field season, while in Texas, we collected 168 turtles during 2015/2016 field seasons. Our analyses show that there are fundamental differences in demographic parameters between New Mexico and Texas populations. While Texas population consists of larger turtles and adults only, New Mexico population contains turtles of all age classes. Texas females had greater body condition than New Mexico females, while body conditions in males did not differ. Additionally, in Texas, females had greater body condition than males, while in New Mexico there was no difference between the males and females. Our research will help further the understanding of *P. gorzugi* ecology and create opportunities for future studies, such as resource availability and food habits.

Linking perennial surface water and aquatic food subsidies to terrestrial species in arid environments

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Poster Presentation

Severe drought driven by climate change and water use by humans is causing formerly perennial streams to flow intermittently, presenting a level of disturbance not documented historically. The loss of aquatic prey during drought could negatively impact riparian and terrestrial species, including lizards. Because lizards play important roles in riparian food webs (e.g. predators, nutrient cycling), it is crucial to understand the cascading effects of stream drying on lizard communities. In my proposed research, I hypothesize that perennial streams provide aquatic subsidies to terrestrial species, which reduces competition and opens niches for riparian lizards. I predict that (*P1*) lizard communities near perennial water will be more diverse than communities that do not have access to water, (*P2*) individuals within a species will grow larger and faster with access to perennial water than those without, and (*P3*) lizards along perennial reaches will consume easy-to-catch emerging adults of aquatic insects in addition to more scarce terrestrial prey. The Chiricahua Mountain range of southeastern Arizona is exceptionally suited to gain insights on the cascading effects of drought and stream drying on riparian lizard communities because of the diversity of lizard species and the many perennial and ephemeral streams with similar microhabitats for lizards. This study will provide insights into food webs in riparian ecosystems and a greater understanding of how terrestrial and aquatic systems are linked via cross-system subsidies. This research will be especially relevant for predicting what may happen to riparian communities when streams dry in response to drought and water withdrawals.

Shrimp vs sardine: bait preference of western river cooters

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Poster Presentation

The western river cooter, *Pseudemys gorzugi*, is a turtle species occurring in parts of Texas, New Mexico, and Mexico. *Pseudemys gorzugi* is listed as near threatened by the IUCN and state threatened by the NMDGF. More research is needed to expand available information on this species. Understanding bait preference of *P. gorzugi* is important for maximizing capture rates in future studies. Our study examined preferences between sardine and shrimp bait. During 2016 field season, 50 baited hoopnet traps were set for six days at 4 different locations along the Black River near Carlsbad, NM. We alternated the traps between shrimp and sardine bait and checked the traps once a day. We measured, marked, and released all captures and recorded information on both the trap location and bait. We conducted chi square analyses to test overall bait preference as well as preferences among different sex/age classes. We collected 181 western river cooters, with 40 of these being recaptures. Overall, 77 turtles were caught with sardine and 104 with shrimp bait, showing significant overall preference for shrimp ($P = 0.04$). Although each group preferred shrimp bait, statistically there were no significant preferences among males ($P = 0.24$), females ($P = 0.76$), juveniles ($P = 0.62$), or hatchlings ($P = 0.08$). Our results suggest that shrimp could be used to help maximize capture rates of *P. gorzugi*.

Methods for comparing genetic relationships of *Erethizon dorsatum* (North American porcupine) in a section of the Rio Grande Valley in Albuquerque, New Mexico

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Poster Presentation

Porcupines are prevalent throughout the Rio Grande's associated riparian forest (bosque). Their population and movements have been tracked by the Bosque Ecosystem Monitoring Program (BEMP) and Bosque School wildlife classes for several years. Quill and hair samples have been collected from most specimens captured in the past, as well as those currently being studied. Although BEMP researchers have estimated population size, a comprehensive study of genetic relatedness of porcupines in the bosque has never been conducted. Using quill samples collected by students and faculty from Bosque School over the last thirteen years, we used a modified CTAB protocol to extract DNA from the base of the quills, PCR to amplify the mitochondrial D-loop and microsatellite regions, and gel electrophoresis to confirm the DNA's size and viability. We are currently working on mitochondrial D-loop sequencing and microsatellite analysis. We will analyze over ten microsatellite loci to construct a multi-sequence alignment and infer a phylogenetic tree of the relatedness of porcupines in the Rio Grande bosque. We plan to have our project completed in early 2017.

Herpetofauna and riparian habitats at the confluence of the Gila and San Pedro Rivers

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Poster Presentation

More than half of all amphibian and reptile species located within the Mojave, Chihuahuan, and Sonoran Deserts utilize riparian or wetland habitats. Increased human land-use and climate change intensify the competition between human and ecological uses for water. As a result, altered stream flows and groundwater levels could cause a shift in riparian plant composition. Our ongoing research focuses on how native and non-native riparian habitats provision herpetofauna wildlife and how these communities vary as habitats change from native cottonwood-willow (*Populus-Salix*) (CW) to more xeric habitats like mesquite (*Prosopis*) (MQ) and non-native *Tamarix* (SC). We installed 18 drift-fence trap arrays during April and May 2016 with six arrays established in each riparian forest type: CW, MQ, and SC (n=18). From the total 288 trap days, we found herpetofauna abundance was about four times greater in CW and MQ woodlands compared to non-native SC and species richness was greatest in MQ sites. Habitat measurements were collected at arrays from June to August 2016. All three habitat types had high percentage canopy cover, >80%, however some aspects of habitat structure varied among habitat types. Woody plant richness seemed to be highest at MQ sites and bare ground and woody debris cover was highest in SC stands. Similar community data collected by the Bureau of Reclamation about ten years ago are being compared to our data. Initial analyses show that the Sonoran Spotted Whiptail (*Aspidoscelis sonora*) was the most commonly captured animal during both the Bureau of Reclamation and our project.

How video production can promote conservation

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Poster Presentation

Video is an incredibly powerful tool that can be used to promote conservation, management or awareness of environmental issues. All you need is a clip or short two minute video shared on social media to transport the public to places they never imagined existed - share the peril of species, and ignite a fire of wonder that will leave them inspired to get involved or learn more. Wildlife and fish researchers have some of the most amazing jobs, working with extraordinary species in truly unique environments. Videography is a great tool to share research or conservation actions, increase awareness of new and ongoing projects and to learn more about our natural world. Whether footage comes from Gopros in the field, a clip from your smartphone or a production with a team, we must invest our time as leaders of conservation to ensure the communities we serve understand what we do.

Movement, resource use, and reproductive success of elk in response to competition, predation risk, and landscape restoration

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Poster Presentation

Due to historical land use and fire suppression, forests in northern New Mexico are at abnormally high risk for catastrophic wildfires. In response, a coalition of agencies under a USDA Collaborative Forest Landscape Restoration Project (2010-2019) and DOI Resilient Landscapes Program (2015-2024) began restoring 210,000 ha in the Jemez Mountains to the historical fire regime via thinning and prescribed fire. As part of these restoration efforts, responses of all large, wild mammals present on the landscape are being evaluated and modeled, including Rocky Mountain elk (*Cervus canadensis*). Since 2012, >100 cow elk have been collared with VHF, store-on-board, or iridium GPS collars and their movements measured relative to their dominant natural competitors (mule deer, *Odocoileus hemionus*), predators (black bears, *Ursus americanus*, and cougars, *Puma concolor*), available forage, and landscape characteristics (topography, water sources, etc). Mule deer, black bear, and cougar movements are determined by store-on-board or iridium GPS collars. Elk forage availability and quality have been quantified across the landscape using 200 vegetation plots sampled annually and seasonally since 2013, while landscape features have been geospatially referenced via satellite and GIS layers. Starting in 2016, elk calves were captured and tagged to estimate elk reproductive success. This research will provide the basis for conservation and management of elk through this substantial landscape-scale restoration effort, and provide a holistic model for future ungulate research.

Identifying bats via environmental DNA in water

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Poster Presentation

Environmental DNA (eDNA) has become a powerful tool for studying wildlife because a sample of water or soil can be taken and screened without disturbing the target organism. This has proven especially useful in monitoring aquatic species. Using an environmental sample, such as water, to identify local bat species would require less field effort and lead to a greater understanding of the environments that bats occupy. To this end, we applied a DNA mini-barcode that identifies bat species from genetic samples to water in lab and field trials. We tested the efficacy of our assay at identifying low concentrations of bat DNA by constructing a dilution series of guano in water down to 0.628mg/L. Because DNA recovery from the environment is more difficult than laboratory tests due to low concentration and high degradation of the molecule, we modified existing protocols to ensure that the samples are collected and appropriately preserved in the field. In our dilutions we were able to accurately identify the bat species at every concentration. This work will guide our efforts to pump and filter higher volumes of water to capture more bat DNA, and to optimize our laboratory procedures to handle this challenging yet promising sample type.

Microhabitat evaluation for northern Mexican gartersnakes at Bubbling Ponds Hatchery

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Poster Presentation

The northern Mexican gartersnake (*Thamnophis eques megalops*) was listed as threatened under the Endangered Species Act in 2014. Bubbling Ponds Hatchery in Page Springs, Arizona, supports a robust population of this species; natural resource managers are interested in understanding spatial ecology of gartersnakes at this site to guide hatchery operations and to serve as a model for habitat creation and restoration. Our primary objective was to determine microhabitat characteristics selected by northern Mexican gartersnakes at the hatchery. We deployed transmitters on 42 individual snakes, tracked movements weekly, and measured vegetative, cover, and abiotic variables in 1-m-diameter plots and along four associated 2.5-m transects. From May 2015 – August 2016, we measured habitat at 510 unique snake locations and 510 paired random locations, allowing us to assess used versus available habitat. Habitat selection varied by season. During the active season (March–October), snakes selected sloped areas close to water with abundant vegetation and cover. From April to May, gestating females selected similar locations but with less dense cover. Snakes selected upland habitats during the inactive season (November–February), including rocky slopes with abundant vegetation. Conservation of this species should incorporate a landscape-level approach that includes abundant wetland edge habitat with connected upland areas.

Sedation techniques, distribution and population of North American porcupine (*Erethizon dorsatum*) throughout the Rio Grande's bosque

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Poster Presentation

For 13 years high school students have studied North American porcupine (*Erethizon dorsatum*) along the Rio Grande's riparian forest (*bosque*) through Albuquerque, NM. I focused on documenting the success of our current practices of capture and sedation techniques and the current distribution and population of North American Porcupine in this area. We capture using Havahart cage traps and then sedate by administration of the alpha inhibitor Dexdomitor (dexmedetomidine hydrochloride) and previously Domitor (medetomidine hydrochloride). We then affix a radio collar and administer the reversal agent Antisedan (atipamezole hydrochloride). Through 52 captures and sedations we have observed no adverse effects from the drugs. Once radio collared we regularly track and record GPS locations and habitat conditions where studied animals are located. Also we have conducted population surveys and made bounded count population estimates in and around the areas used by the radio collared porcupines. Initial results suggest that the population remains stable and radio collared animals have an average home range under 6 hectares.

Pronghorn fawn survival and cause-specific mortality in a localized pronghorn population in southeast New Mexico

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Poster Presentation

Pronghorn (*Antilocapra americana*) fawn survival is often considered a significant limiting factor for native or translocated pronghorn population growth and persistence. However, pronghorn fawn survival can be highly variable due to predation, habitat quality (potential forage) issues, and weather stochasticity during the fawning period. To estimate fawn survival in a localized pronghorn population near the Fort Stanton Snowy River Cave National Conservation Area, New Mexico that was recently augmented by translocations of 75 (50 females: 25 males), 69 (33 females: 36 males), and 15 female pronghorn in 2013, 2014, and 2015, respectively, we captured 116 pronghorn fawns aged ≤ 5 days, and marked them with ear tag radio transmitters to monitor survival from 2014 to 2016. Fawns were checked twice daily until the youngest surviving fawn was 40 days old. A total of 96 mortalities were documented; 42 attributed to “definite” predation by bobcat (*Lynx rufus*), coyote (*Canis latrans*), golden eagle (*Aquila chrysaetos*) or “unknown” predator, 25 attributed to “probable” predation, 26 attributed to unknown cause of death, and 3 attributed to injury/infection. Naïve survival results for 2014, 2015 and 2016 were 0% (0/29 survived), 19.35% (6/31 survived), and 23.21% (13/56 survived), respectively. Based on preliminary data, future efforts aimed at evaluating coyote management to improve pronghorn fawn survival in this localized pronghorn population may provide valuable insight into future pronghorn translocation and subsequent management efforts.

Anuran species inventory and *Batrachochytrium dendrobatidis* (chytrid) survey along selected ponds, streams, and rivers in New Mexico

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Poster Presentation

Frogs, as water quality indicators and in the worldwide decline, are important taxa of ecological study. Chytrid (*Batrachochytrium dendrobatidis*) is a fungus that is decimating amphibian populations worldwide. There is limited knowledge whether the chytrid fungus is present in various locations in New Mexico. Knowing if chytrid is present is important for management implications regarding amphibian survival and reintroduction efforts of presently extant extirpated anuran species. I conducted over 87.5 hours of both randomized transect and selective site surveys for frogs and toads around selected ponds, streams, and rivers in New Mexico. Sites surveyed were chosen because of management questions. Some captures were spontaneous and opportunistic and others were along established transects. I actively captured frogs with dip nets and set coverboards. The species that were identified were southern leopard frog (*Lithobates pipiens*), Woodhouse Toads (*Anaxyrus woodhousii*), and the American Bullfrog (*Lithobates catesbeianus*). A total of 16 amphibians were caught and swabbed for chytrid. PCR detected no chytrid DNA from the swab samples. My work provides a an extended baseline of detected anuran species for a chytrid status to gauge the water quality and health conditions resulting from this research and previous surveys.

How rare? Limits of detection of a genetic assay for species identification from guano

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Poster Presentation

At the 49th joint annual meeting of Arizona and New Mexico chapters of The Wildlife Society we reported on the development and coverage of a genetic assay for identifying bat species across Chiroptera from guano. Here, we explore the limits of detection of the Species from Feces assay (nau.edu/batdna), which uses high-throughput amplicon sequencing to identify bat species from hundreds of fecal pellets simultaneously, for increased utility and decreased costs. In controlled tests, we determined how rare guano from a bat species can be in a pooled sample and still be detected, and examined whether read number reflects the proportion of a species' feces. We further examined the sensitivity of the assay, and new applications, by testing soil samples collected at roosts and guano fertilizer of unknown age. Finally, to illustrate effectiveness of the approach, we identified bat species that contributed to guano samples collected from across >40 subterranean roosts in the southwestern U.S. For limits of detection, we found that all bat species in mock communities were detected to a 1:192 fecal DNA dilution along with other high concentration bat species. In practice, soil and fertilizer samples readily PCR amplified bat DNA, with species-level discrimination. Bat species were also genetically detected in all mines (1-4 species each), whereas in only 58% of mines were bats visually identified. We show that the Species from Feces assay is a sensitive, powerful, and practical means to survey roosts.

Ten new locations of the endangered New Mexico meadow jumping mouse detected on tribal lands in southwestern Colorado

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Poster Presentation

We conducted live-trapping presence surveys for the federally endangered New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) in summers 2014 and 2015, and fall 2016. We focused our surveys in suitable habitat on the Southern Ute Indian Reservation in southwestern Colorado. As a result of these trapping efforts, we documented ten new localities along the Pine, Animas, Florida, Piedra, and San Juan

Rivers or their associated tributaries within the Southern Ute Indian Reservation. Identification of these new populations is significant because this subspecies was previously known from only two locations in Colorado where the subspecies was inadvertently discovered during live-trapping surveys in 2007 and 2012. In 2014, the U.S. Fish and Wildlife Service reported only 29 populations of New Mexico meadow jumping mice were known to occur within its distribution. These included the two Colorado populations, as well as 15 populations in New Mexico and 12 in Arizona. If we assume each of the 10 new locations we documented represents a population, our discoveries increase the known populations of New Mexico meadow jumping mice by 33%.

Habitat characteristics and hibernation emergence of the federally endangered New Mexico meadow jumping mouse in southwestern Colorado

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Poster Presentation

In southern Colorado, only one study of New Mexico meadow jumping mouse (*Zapus hudsonius luteus*; hereafter NMMJM) provides a general description of its habitat in this part of its distribution (Jones 1999) and until recently, only two confirmed populations of NMMJM were known to occur in Colorado since 2005 (USFWS 2014). Since 2014, ten new locations of NMMJM have been detected on tribal lands in southwestern Colorado (Zahratka et al. in review), thereby underscoring the importance of understanding the vegetation characteristics of habitat where this subspecies occurs. Therefore, to support recovery of NMMJM in Colorado, we investigated habitat associations, as well as hibernation emergence patterns of NMMJM at Sambrito Wetlands Area, one of the two previously known locations of NMMJM in Colorado. We conducted live-trapping and vegetation surveys in 2014 and 2015. The overall vegetation attributes we measured at capture locations are consistent with previous assertions that herbaceous vegetation >61 cm in height is a necessary component of suitable habitat for NMMJM. However, our vegetation data suggest that within the riparian corridor (i.e., within 5 meters of flowing water for our study), slightly taller horizontal cover about 1 meter in height is important, and standing vegetation (i.e., grasses, sedges, and rushes) may be more important to NMMJM than forbs. The earliest emergence observed was May 21 for males and June 6-11 for females, suggesting a minimum 16-day hibernation emergence lag between the sexes – a lag time slightly longer than previously recorded.