

Posters

Influence of social context on expression of aggression in the zebra finch

** Blanche, Anne-Laure, University of Arizona, Department of Ecology and Evolutionary Biology, 1041 E Lowell St, Tucson, AZ 85721; ablanche@email.arizona.edu
Kathryn Chenard, University of Arizona; kchenard@email.arizona.edu
Renée A. Duckworth, University of Arizona; rad3@email.arizona.edu

Poster Presentation

Accurately measuring and describing behavior is key to understanding bird biology and can inform management decisions. By definition, social behaviors are always expressed in the context of other individuals. However, this makes measuring them in a standardized fashion difficult because measurements outside the normal social context may not act as a true measure of behavior in natural settings. Here, we assess the importance of social context in the expression of aggression in zebra finches, a social species in which aggression is important in resource acquisition and the establishment and perpetuation of dominance hierarchies. Aggression was measured repeatedly in twenty-two individuals in a flock context and was measured once for each individual outside their normal flock in a mirror test. Birds in a flock were recorded accessing a treat feeder, and the number of aggressive interactions as well as their dominance position were assessed. Preliminary results indicate that aggression and dominance are highly repeatable in the flock context and are positively correlated with one another. During the mirror test, aggressive response to the individuals' own reflection in a mirror was scored to assess an individual's reaction to an unfamiliar but equally-matched bird. The flock measures will be compared to measures of aggression from a mirror test. Given that many studies measure aggression by using the solo mirror test, it is important to determine whether it correlates with the variation in aggression expressed in more naturally occurring flock contexts.

Environmental Predictors of Bird Abundance and Richness

** Boehme, Cameron S., Arizona State University, College of Integrative Sciences and Arts, 7271 E Sonoran Arroyo Mall Suite 233, Mesa, Arizona 85212; cboehme@asu.edu
Fabio Suzart de Albuquerque, Arizona State University, College of Integrative Sciences and Arts, 7271 E Sonoran Arroyo Mall Suite 233, Mesa, Arizona 85212;
Fabio.Albuquerque@asu.edu

Poster Presentation

Previous studies conducted in the Phoenix metropolitan area have documented declines of abundance and richness of birds in riparian habitats. Herein, we investigated environmental predictors that contribute to bird abundance and richness in the Phoenix metropolitan area. Specifically, we documented, for the first time, (1) how species richness and abundance vary across years annually throughout the urban area, and (2) what environmental variables account for the variation seen in annual bird abundance and richness. We used bird census surveys collected over a 16-year period throughout the Phoenix urban area from 2000 to 2016 and

conducted general linear model tests to determine significance of each environmental variable to richness and abundance. Our results showed that winter precipitation, seasonality indicators, and soil characteristics are the largest drivers of abundance and richness of birds throughout the Phoenix metropolitan area over a 16-year period. The results of this study are necessary to better understand the composition of future bird communities as climate continues to change.

Abundance and distribution of Sonora mud turtles along the Upper Gila River in New Mexico

** Duran, Jonathan, University of New Mexico, Department of Biology, Albuquerque, NM 87131, Castetter Hall. jduran63@unm.edu

J. Tom Giermakowski, University of New Mexico, Museum of Southwestern Biology, Division of Amphibians and Reptiles, CERIA 83, Albuquerque, New Mexico; email: tomas@unm.edu

Poster Presentation

The Sonora mud turtle, *Kinosternon sonoriense*, is a secretive and poorly studied species with a relatively limited geographic range. It is found in The United States in Arizona and southwestern New Mexico as well as the Mexican states of Sonora and Chihuahua. While there are several records from Hidalgo county in New Mexico, its distribution in Grant and Catron counties are less well known. We documented the occurrence and abundance of Sonora mud turtles along the upper branches of the Gila River in New Mexico during the summer of 2018. We chose five survey sites based on historical records. We trapped turtles using baited hoop traps as well as by hand. Turtles were weighed, measured and sexed. We photographed individuals using a digital camera and took blood samples. Our results indicate that the abundance of Sonora mud turtles within the region can vary dramatically with approximately 95% of turtles being captured at one locality. Results from our study show significant sexual dimorphism, with females being both larger and heavier than males. Furthermore, three of five survey sites show a high abundance of invasive crayfish (*Orconectes virilis*), which other studies have found to prey on juvenile turtles. Future population studies should seek to determine basic life history parameters which vary inraspecifically for the species. In addition, in order to develop a thorough status assessment for Sonora mud turtles in New Mexico, we recommend widespread standardized sampling.

Spatial Ecology of an Isolated Edge Population: The Endemic White-bellied Vole (*Microtus longicaudus leucophaeus*) in Southern Arizona

** Dutt, Neil, MS student, University of Arizona, School of Natural Resources and the Environment, 1064 E Lowell St, Tucson, AZ 85721; ndutt@email.arizona.edu

Dr. John Koprowski, Director and Professor, University of Arizona, School of Natural Resources and the Environment, 1064 E Lowell St, Tucson, AZ 85721; Squirrel1@email.arizona.edu

Poster Presentation

The Madrean Sky Island Complex is a collection of mountain islands in the American Southwest, separated by seas of desert and grasslands, representing a confluence of many

different ecosystems. This region is the terminus for multiple species' distributions. The populations existing on the periphery of their species distributions are known as edge populations. Edge populations often exhibit unique and varied behavioral and physiological adaptations. Such populations can provide insight into how a species may react to shifting habitats due to large disturbances, climate change, and direct anthropogenic modifications. Mount Graham white-bellied voles (*Microtus longicaudus leucophaeus*) are endemic to the Pinaleño Mountains in southeast Arizona and represent the southernmost population of long-tailed voles. Basic ecological data are lacking for this enigmatic species. We will radio collar up to 30 individuals, targeting an approximate 1:1 sex ratio. We will pair telemetry with vegetation surveys to assess spatial ecology and behavior to better understand the ecology, social dynamics, and resource selection of this species. We aim to provide conservation directives for the isolated edge population of white-bellied voles. Populations, such as these, are at risk more than ever of being lost, understanding how this population reacts to the multitude of threats it faces, we can better inform future management and conservation actions for similarly imperilled species.

Innovative food web approaches to detect invasive species' effects on aridland streams.

**Hamilton, Gregor, University of New Mexico, Biology Department, 219 Yale Blvd NE, Albuquerque, NM 87106; ghamilton@unm.edu
Dr. Thomas Turner, University of New Mexico, Biology Department, 219 Yale Blvd NE, Albuquerque, NM 87106; turnert@unm.edu

Poster Presentation

The extent of invasive species' effects may vary depending on the ecology of the species and on the season. Therefore, studying if, how, and when an invasive species is detrimental is important for making appropriate conservation decisions. Food web studies often explore direct interactions of an invasive species and the food web it invades, such as competition among invasive fish and native fish. While invasive fish can lengthen food webs, invasive omnivores (e.g. crayfish) potentially simplify the number of food web connections by inserting themselves into multiple trophic positions. Moreover, the effects that omnivorous aquatic invasive species have on spatial subsidies – the lateral transport of energy – to riparian food webs involve teasing apart complex interactions and are poorly understood. I will explore these interactions by addressing three specific questions in my dissertation: **1)** How do omnivorous invasive species affect spatial subsidies from the aquatic to the riparian food web? **2)** Are current analyses appropriate for stable isotope data? **3)** What are the effects of an omnivorous invasive species on the magnitude of food web processes?

Carnivore Activity in Riparian Forests of Southeastern Arizona

**Herzog, Cheyenne. J., College of Integrative Sciences and Arts, Arizona State University, Polytechnic Campus, 7001 E Williams Field Rd. Mesa, AZ 85212; Cherzog1@asu.edu.
Heather L. Bateman, College of Integrative Sciences and Arts, Arizona State University, Polytechnic Campus, 7001 E Williams Field Rd. Mesa, AZ 85212;
Heather.L.Bateman@asu.edu

Poster Presentation

Understanding species occurrence in areas dominated by non-native vegetation is important when determining if management actions should be implemented. Saltcedar (*Tamarix* spp.) is one of the most prevalent non-native trees in riparian areas in the southwest United States and can alter habitat structure. Little is known about how medium and large carnivores use stands of saltcedar. The San Pedro watershed in southeastern Arizona is recognized internationally as a hotspot for mammal species. It is home to at least three riparian forest types: non-native saltcedar, native mesquite (*Prosopis* spp.) bosque, and a mixture of native cottonwood (*Populus*) and willow (*Salix*) woodlands. Our goals are to determine relative abundance and occupancy of carnivores across forest types to explore use or avoidance of non-native stands. We sampled mammals along approximately 16 river miles since 2017, using 18 trail cameras (six per forest type) spaced 1 km apart. We summarized environmental variables around the camera sites to relate them to species occupancy. We observed 14 carnivores over 7692 trap nights, with an average of 43.5 independent detections (captures of a species >1 hour apart) per 100 trap nights in saltcedar, 24.8 in cottonwood/willow, and 43.0 in mesquite. Most observed carnivore species was bobcat, followed by coyote. Other carnivores observed include mountain lion and black bear. We found a trend of species diversity being lowest in saltcedar compared to the native habitats. Results from this study could allow us to make recommendations on managing riparian areas, especially in relation to saltcedar vegetation.

The Effects of Urbanization on the Desert Spiny Lizard (*Sceloporus magister*)

**Johnson, Samantha, University of Arizona, School of Natural Resources and the Environment, Tucson, Arizona 85719; sljohnson@email.arizona.edu
Alyssa Salazar, University of Arizona, School of Natural Resources and the Environment, Tucson, Arizona 85719; alyssasalazar@email.arizona.edu
Luiza Samora, University of Arizona, School of Natural Resources and the Environment, Tucson, Arizona 85719; luizasamora@email.arizona.edu
Brieanna Whitehair, University of Arizona, School of Natural Resources and the Environment, Tucson, Arizona 85719; bwhitehair@email.arizona.edu
Matt Goode, University of Arizona, School of Natural Resources and the Environment, Tucson, Arizona 85719; mgoode@ag.arizona.edu

Poster Presentation

Urban development disrupts wildlife species by limiting their natural habitats that they currently or once inhabited. It is important to understand how urbanization disrupts a natural habitat and affects different wildlife species. Identifying these disruptions allows for strides to be made towards creating buildings and areas that may preserve wildlife within the area. In our study, we focused on the population of Desert Spiny Lizards (*Sceloporus magister*) at the University of Arizona campus and Rio Vista Natural Resources Park. We captured these lizards using a noose attached to a long, telescope fishing pole. We weighed and measured, determined sex, and obtained temperature and humidity data on all lizards captured. We implanted microchips (PIT-tags) under the skin of lizards to allow for individual identification. We attached radio transmitters to the backs of selected lizards and radio tracked a total of 7 lizards on the UA

Campus and 5 in Rio Vista, from August to October of 2018. We recorded UTM coordinates using a handheld GPS receiver each time we located a lizard. We used their location data to determine activity patterns and home range characteristics. This led the team to mapping the lizard's movements. Our results indicated that lizards on the UA Campus were more frequently on trees, while in Rio Vista, they were more frequently on the ground in dirt. Our behavioral data indicated that on the UA Campus lizards were more frequently found motionless under the shade. In Rio Vista, the lizards were most commonly observed basking. In addition, when looking into our temperature data and the number of lizards seen each month, we saw a correlation. The correlation predicts that a higher average temperature within a month compromises a higher number of lizards seen, in both UA Campus and Rio Vista. We plan to continue this study throughout the winter season and the following year to obtain more data on the urban ecology of *S. magister*.

Preliminary Assessment of Ornate Box Turtle Occupancy in Roosevelt County, New Mexico

** Kreikemeier, Alissa A., Eastern New Mexico University, Department of Biology, 1500 South Avenue K, Portales, New Mexico 88130; alissa.kreikemeier@enmu.edu
Thanchira Suriyamongkol, Eastern New Mexico University, Department of Biology, 1500 South Avenue K, Portales, New Mexico 88130; Thanchira.suriyamongkol@enmu.edu
Vinicius Ortega-Berno, Eastern New Mexico University, Department of Biology, 1500 South Avenue K, Portales, New Mexico 88130; vinicius.ortegaberno@enmu.edu
Ivana Mali, Eastern New Mexico University, Department of Biology, 1500 South Avenue K, Portales, New Mexico 88130; ivana.mali@enmu.edu

Poster Presentation

Ornate box turtle (*Terrapene ornata*) is a terrestrial grassland species, considered near threatened by the International Union for Conservation of Nature. In New Mexico, box turtles are widespread throughout most of the state. Although widespread, little is known about the species-habitat relationships, especially in the eastern portion of the state. In 2018, we conducted visual-encounter surveys in Roosevelt County, New Mexico, to determine occupancy of *T. ornata*. From August through October, we conducted spatially replicated surveys across 34 sites, each consisting of 1x1 mile surface area. The effort at each site varied from 4 to 9 1-mi spatial replicates, with a total walk effort of 209 miles. When *T. ornata* was encountered, we recorded standard body measurements and marked adults by shell-notching. We encountered a total of 54 *T. ornata*. Thirty-one turtles were encountered on transect lines while 23 were encountered outside of the study sites (i.e., on the road). We detected 0 to 7 turtles per survey site. *Terrapene ornata* occupied 12 of 34 sites, with naïve occupancy of 35%. Given that naïve occupancy likely does not represent the true occupancy, our next step is to develop an occupancy model which explicitly accounts for imperfect detection. Environmental data (i.e., humidity) and vegetation height will be used as detection probability covariates. Land cover, soil type, and proximity to roads will be used as ecological factors influencing box turtle occurrence. This model will provide a better understanding of species distribution and species habitat requirements.

Machining a Solution to Data Heavy Rangeland Research: Case study with Camera-trap photo processing

Brandon K. Mayer, University of Arizona, School of Natural Resources and the Environment;
brandkmayer@gmail.com

George Ruyle, University of Arizona, School of Natural Resources and the Environment

Poster Presentation

Time-lapse cameras are increasingly being used to assess wildlife and livestock interactions on rangelands. The use of camera-traps is an inexpensive, unobtrusive, and relatively real-time method to estimate various metrics of range use, but extracting information has proven to be costly and time consuming to process collected data. Researchers and managers are in need of new methods for streamlining the digestion of these large datasets. One such problem appears in the quantitative processing of photos from time-lapse camera traps used to estimate frequency of site use by grazing species. Time-lapse cameras collect hundreds of thousands of photos that need to be individually sorted and classified by human observers. Processing time can exhaust months to years of effort, distract from data analysis, and limit the prospective scope of the research. We are testing the use of machine learning techniques via neural networks such as ResNet-18 architecture to automate photo processing and data extraction. Through the use of deep learning, large datasets of thousands of photos can be processed in a matter of days rather than months, greatly reducing the time invested by hired personnel while matching accuracy. Machine learning methods have the potential to provide detailed and current results allowing resource managers to make up-to-date decisions regarding the proper management of rangelands given prevailing conditions. By negating the burden of photo processing time, resource managers can tackle increasingly complex problems across various environments and land ownerships.

Understanding climate impact on select New Mexican birds through bird banding and community science data

** Moore, Catie M., Bosque School, 4000 Bosque School Rd NW, Albuquerque, NM 87120;
catie.moore@bosquestudents.org

**Hayley A. Neil, Bosque School, 4000 Bosque School Rd NW, Albuquerque, NM 87120;
hayley.neil@bosquestudents.org

Poster Presentation

Climate change has begun to affect both the living conditions and the migration patterns of birds. Change in temperatures can cause later departures in the spring and fall, which can in turn affect the species and ecosystem that have grown to depend on these migrations. In order to explore the effects of changing weather on New Mexico's migratory birds, we compiled data from the Los Alamos and Coyote Springs IBP-MAPS Program Stations Map sites which detailed the number of birds from each species caught each year from 1995 to as late as 2012. From there we chose the top three most common birds from each site and compared their fluctuation in number to our weather data, collected from sources such as Kirtland Air Force Base. We also collected our own data regarding bird observation via Feederwatch, which we used as a comparison to IBP-MAPS

data. The feeder was set up at the north end of Bosque School, in Albuquerque, NM, and observed twice a week for 1-2 hours. Our preliminary analysis shows that students using community/citizen science monitoring techniques such as Feederwatch is complementary to more formal studies such as IBP-MAPS to understand bird migratory response to climate change.

Mapping the spread and effect of chytrid in efforts to protect endangered species of amphibians

** Nelson, Alyssa, Bosque School, 4000 Bosque School Rd NW Albuquerque, NM 87120, alyssa.nelson@bosquestudents.org

Poster Presentation

Chytrid (*Batrachochytrium dendrobatidis*) is a fungus that is a contributing cause to native amphibian population decline in the United States at a concerning rate. The dramatic decline of native amphibians is concerning in and of itself, but particularly as an impeding factor in attempts to reintroduce endangered species. This includes the Boreal toad (*Anaxyrus boreas boreas*), a New Mexico listed endangered amphibian whose population has severely plummeted in its once native Southern Rocky Mountain habitat due to disease and habitat loss. The effort to map out what areas chytrid is affecting includes many different organizations as a large area of the United States needs to be surveyed. Across several areas of concern within New Mexico we ethically caught amphibians. Each captured animal was swabbed for the presence of chytrid and promptly released. Collected swab samples were tested in the lab for the presence of chytrid. This information is then interpreted to conceptualize where the fungus exists, and what areas are unfit to release endangered amphibians such as the boreal toad.

Red Eared Slider and Painted Turtle diets using stable isotopes in Albuquerque New Mexico

** Newell, Anya S., Bosque School Wildlife Seminar, 4000 Bosque School RD NW, Albuquerque, NM 87120; anya.newell@bosquestudents.org

**Issa S Wilks, Bosque School Wildlife Seminar, 4000 Bosque School RD NW, Albuquerque, NM 87120; issa.wilks@bosquestudents.org

Poster Presentation

Painted Turtle (*Chrysemys picta*) is native to New Mexico, and the Red Eared Slider (*Trachemys scripta*) is an exotic invasive species to the Albuquerque area. Both of these species are omnivorous, but it is unknown what their dietary overlap is, and how that affects the turtles populations and if the two species are competing for the same dietary resources. To test dietary overlap we collected nail samples from the Red Eared Slider and the Painted Turtle and analyzed their stable isotope signatures in order to determine where they fall on a dietary scale that considers how carnivorous an animal has been through looking at nitrogen levels, and the types of plants they have consumed through analyzing carbon scales. The goal of this study is to

compare the diets of the Red Ear Slider and the Painted Turtle in order to determine if the exotic Red Ear Slider is competing for the food source of the Native Painted Turtles.

Comparing herpetofauna across urban and non-urban habitats in central Arizona

** Nordheim, Caitlin L., The University of Tampa; Caitlin.nordheim@spartans.ut.edu.
Dr. Heather L. Bateman, Central Arizona Phoenix LTER and Arizona State University;
Heather.L.Bateman@asu.edu.

Poster Presentation

Urbanization is rapidly increasing, and it is important to understand how urbanization impacts ecosystems, specifically amphibians and reptiles in riparian forests. Using visual encounter surveys in riparian forests along the Salt River, San Pedro River, and Gila River in central Arizona and GIS software, we compared (1) community diversity and richness between urban and non-urban areas (2) abundance and (3) occupancy of different lizard species in urban and non-urban riparian areas. Diversity did not differ between urban and non-urban sites, but the non-urban sites had a higher species richness. Urban areas support more lizards associated with open areas, so we can predict that these lizards will persist as urbanization grows. Non-urban areas support more lizards associated with trees, so these species may decline as urbanization continues.

Growth Rate Estimates for the Rio Grande Cooter on the Black River, New Mexico

** Ortega-Berno, Vinicius, Eastern New Mexico University, Department of Biology, 1500 S Avenue K, Roosevelt Hall 215, Portales, New Mexico, 88130.

Vinicius.OrtegaBerno@enmu.edu

Thanchira Suriyamongkol, Eastern New Mexico University, Department of Biology, 1500 S Avenue K, Roosevelt Hall 215, Portales, New Mexico, 88130.

Thanchira.Suriyamongkol@enmu.edu

Andrew W. Letter, Eastern New Mexico University, Department of Biology, 1500 S Avenue K, Roosevelt Hall 215, Portales, New Mexico, 88130. Letter.Andrew.W@gmail.com

Korry J. Waldon, Eastern New Mexico University, Department of Biology, 1500 S Avenue K, Roosevelt Hall 215, Portales, New Mexico, 88130. Korry.Waldon@enmu.edu

Ivana Mali, Eastern New Mexico University, Department of Biology, 1500 S Avenue K, Roosevelt Hall 213, Portales, New Mexico, 88130. Ivana.Mali@enmu.edu

Poster Presentation

The Rio Grande Cooter, *Pseudemys gorzugi*, is a relatively large riverine turtle native to New Mexico, Texas, and Mexico. As one of the least studied freshwater turtle species in the U.S., very little is known about this species demography. We conducted a capture-mark-recapture study of *P. gorzugi* from 2016 to 2018 on the Black River, New Mexico. We recaptured 118 individuals between the years, of which 25 were females, 36 were males and 57 were juveniles. Here, we report the somatic growth rates and length-at-age estimates for the species. We analyzed plastron length of female and male datasets including juveniles in both groups with the

assumption that juvenile females and males have similar growth rates. We estimated growth curves using the non-linear Von Bertalanffy equation and used FiSAT II to estimate the equation growth parameters k and a . As expected, there was a significant negative relationship between mean body size and growth rates. Growth constant (k) estimates ranged from 0.060 to 0.102 for females and 0.100 to 0.105 for males, depending on the estimation method used. Estimated age at sexual maturity is ~15 years for females while longevity was estimated at ~50 years for females and ~38 years for males. Our results demonstrate the importance of continuous multi-year studies on long-lived species in order to provide demographic data and implement sound management practices.

Washes as movement corridors in semi-arid Sonora, Mexico

Ragan, Kinley A., Arizona State University, School of Life Sciences, 427 East Tyler Mall #320, Tempe, AZ, 85281; karagan@asu.edu

Sharon J. Hall, Arizona State University, School of Life Sciences, 427 East Tyler Mall #320, Tempe, AZ, 85281; sharonjhall@asu.edu

Jan Schipper, Arizona Center for Nature Conservation, Department of Field Conservation, 455 North Galvin Parkway, Phoenix, AZ, 85008; jschipper@phoenixzoo.org

Poster Presentation

Urban development, livestock grazing, climate change, and global dryland expansion continue to impact the integrity and configuration of riparian corridors worldwide. Roads bisecting riparian areas are especially problematic for wildlife, but this threat can be mitigated for some species with carefully designed structures that allow safe passage. In Sonora, Mexico, federal Highway 2 crosses numerous riparian areas that connect essential habitat within the Madrean Archipelago biodiversity hotspot. Recently, the expansion and redesign of this highway has created the opportunity for the implementation of road crossing mitigation measures, with the goal of reducing wildlife mortality and increasing connectivity. Riparian areas are known to facilitate the movement of mammals, but less is known about the use of different types of riparian habitats by mammals in dryland systems. In this study, we are using camera traps to explore mammal activity in ephemeral, intermittent, and perennial stream habitats that cross Highway 2. The cameras will be present for six months to monitor species richness, presence, and activity periods near the road. To quantify the differences between ephemeral and intermittent washes, we will also collect vegetation data (e.g., percentage cover and vegetation type) and other environmental variables (e.g., ground moisture and topographic differences). We expect species richness, abundance, and activity to be highest in intermittent washes with the highest canopy cover. Understanding how wash type impacts mammal corridor movement will facilitate identification of suitable locations for roadway mitigation in Sonora and other semi-arid environments.

Occupancy of American Bullfrog (*Lithobates catesbeianus*) and ecosystem impacts

** Samaniego, Lauren, New Mexico State University, Department of Fish, Wildlife and Conservation Ecology, 2980 Espina, 132 Knox Hall, Las Cruces, New Mexico 88003; La_sam23@nmsu.edu

Wiebke J. Boeing, New Mexico State University, Department of Fish, Wildlife and Conservation Ecology, 2980 Espina, 132 Knox Hall, Las Cruces, New Mexico 88003; wboeing@nmsu.edu

Poster Presentation

American Bullfrogs (*Lithobates catesbeianus*) are one of the worst invasive species and cause substantial ecological damage through competition, predation, and transmission of pathogens resulting in declines and extirpation of native taxa. Bullfrogs have an opportunistic diet and have been documented preying on frogs (including cannibalism), lizards, snakes, fish, birds, and mammals. In the southwest United States, there is concern for the effect bullfrogs have on native species like the federally threatened Chiricahua Leopard frog (*Lithobates chiricahuensis*), Northern Mexican garter snake (*Thamnophis eques megalops*) and the federally endangered Gila chub (*Gila intermedia*) and New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus*). The proposed research will (1) identify bottom-up and top-down factors that predict bullfrog presence, and (2) analyze impacts of bullfrogs on native species. We will survey water bodies in the Gila National Forest and Wilderness for bullfrog occupancy. We will investigate bullfrog impacts by analyzing diet composition of post-metamorphic individuals. We will provide data for species that are most influenced by bullfrogs. We will identify modes of bullfrog impacts (competition, predation). Analysis might reveal low native richness in systems where bullfrogs are a predatory species. We expect enhanced deterioration of ecological integrity in systems with an additional predatory species, like Large Mouth Bass (*Micropterus salmoides*) and a mitigation effect in systems with alternative alien invasive prey species, like Northern Crayfish (*Orconectes virilis*). This study will provide insight on bullfrog feeding strategy and the biotic and abiotic factors that may facilitate the higher occurrence of invasive bullfrogs in New Mexico.

Turtle Population at Bosque del Apache Wildlife Refuge

** Smith, Amanda M., University of New Mexico, Bosque Ecosystem Monitoring Program, 1 University of New Mexico, Albuquerque, NM 87131; asmith1994@unm.edu
Jessica M. Harwood, University of New Mexico, Bosque Ecosystem Monitoring Program, 1 University of New Mexico, Albuquerque, NM 87131; jharwood3@unm.edu

Poster Presentation

Living in a desert with drought can put a strain on aquatic turtles. Not much is known about the population of aquatic turtles at the Bosque del Apache National Wildlife Refuge in southern New Mexico. The refuge is home to the Big Bend slider (*Trachemys gaigeae*) which is a vulnerable native species. This Big Bend slider is closely related to the exotic red-eared slider (*Trachemys scripta elegans*) and the two can interbreed. The goal of this study was to get a better understanding of the aquatic turtle population on the wildlife refuge, as well as to collect genetic samples from Big Bend sliders to ensure that there was no interbreeding occurring with red-eared sliders. For 4 consecutive days, we used 14 hoop nets in wetlands and ditches to capture turtles. All turtles were processed, marked, and released. Skin samples were taken from the hind foot of Big Bend sliders, and nail clippings were taken from each turtle to better understand their diet through isotopic analysis. A total of 53 turtles were captured throughout the study, including 2

Big Bend sliders, 1 spiny softshell (*Apalone spinifera*), and 50 painted turtles (*Chrysemys picta*). Using Schnabel's Method, we estimated that there are 254 painted turtles residing in one pond. Painted turtles seem to be thriving on the refuge, and no invasive turtle species were found during this study. This research is ongoing, and we are waiting for the isotope and genetic results.

Identifying cryptic species of eastern tarsiers on North Sulawesi, Indonesia

**Sumampow, Thalita C. Pingkan, Northern Arizona University, School of Forestry, 200 E Pine Knoll Dr, Flagstaff, AZ 86011; tcs277@nau.edu

Paul Beier, Northern Arizona University, School of Forestry, 200 E Pine Knoll Dr, Flagstaff, AZ 86011; Paul.Beier@nau.edu

Faith M. Walker, Northern Arizona University, School of Forestry, 200 E Pine Knoll Dr, Flagstaff, AZ 86011; Faith.Walker@nau.edu

Myron Shekelle, Western Washington University, Department of Anthropology, 516 High Street, Bellingham, WA 98225; Myron.Shekelle@wwu.edu

Poster Presentation

In 2004, evidence of Sulawesi's formation by volcanic and tectonic activity, temporary fragmentation during glacial periods, and biogeographic and genetic relationships among species of *Macaca* and *Bufo* gave rise to the hybrid biogeography hypothesis. The hypothesis identified 16 likely regions of endemism and predicted that each would harbor a distinct tarsier species. Since then, 11 tarsier species have been named, potentially leaving 5 to be described. We collected data on genetics that could test the hypothesis of cryptic species on three of these biogeographic provinces, namely the volcanic islands of Bunaken, Manadotua, and Mantehage (North Sulawesi, Indonesia) on May-August 2018. We recorded tarsier duet calls and used these calls to follow tarsiers to their sleeping sites where we captured them, collected saliva by buccal swab, took small ear biopsies, and promptly released them. We sequenced individuals at 6 nuclear genes (ABCA1, ADORA3, AXIN1, RAG, TTR, and SRY) and 1 mitochondrial gene (Cytb). By comparing our sequences to existing genotypes at 14 mainland sites, we constructed a multilocus species tree to see the relatedness between populations. Our preliminary data show that the island populations are genetically identical yet distinct from the ones on mainland. For the next step, we will build a time-calibrated multilocus Bayesian species tree to have some insight on the divergence mechanism between populations. Our results will advance the understanding of Sulawesi biogeography, inform tarsier conservation, and contribute to Indonesian awareness of biodiversity.

The effect of PCR replication on species richness estimates using environmental DNA and 16S rRNA vertebrate metabarcoding

**Turner-Rathbone, Courtney S., Department of Biology and Chemistry, Embry-Riddle Aeronautical University, 3700 Willow Creek Rd, Prescott, AZ 86301; turnerrc@my.erau.edu

Hillary L. Eaton, Department of Biology and Chemistry, Embry-Riddle Aeronautical University, 3700 Willow Creek Rd., Prescott, AZ 86301; eatonh@erau.edu

Matthew J. Valente, Department of Biology and Chemistry, Embry-Riddle Aeronautical University, 3700 Willow Creek Rd., Prescott, AZ 86301; valentm9@erau.edu
Catherine E. Benson, Department of Biology and Chemistry, Embry-Riddle Aeronautical University, 3700 Willow Creek Rd., Prescott, AZ 86301; bensonc5@erau.edu

Poster Presentation

eDNA is a relatively new but promising tool for characterizing biological communities. Currently, the two most common eDNA analyses used by biologists are qPCR and metabarcoding. While qPCR is the more established of the two, it uses primers to target a single species. On the other hand, metabarcoding targets multiple species using one primer set. This allows metabarcoding to more broadly characterize community assemblages and potentially detect rare or low-density species. As with any new technology, there are several methodological questions that need to be answered to better understand its applicability. For example, it is standard protocol that only a fraction of the total DNA extracted from a sample is used in PCR reactions. Are rare species going undetected because we use only a small fraction of DNA from each sample? To address this question, we examined whether we might find different species in one versus two PCR replicates from the same eDNA sample. Duplicate 4L water samples were collected from seven sites on Fossil Creek, AZ. Samples were filtered, DNA was extracted, PCR was performed in duplicate using primers that amplified a hypervariable region of the 16S rRNA gene that can be used to identify vertebrate species. Sequencing was performed on a Illumina MiSeq FGX Forensic Genomics System. Sequence analysis identified 14 vertebrate species, including six fish, six mammals, and two herpetofauna. The most common species were found in every PCR replicate, whereas sequences associated with rare species were often found in only one of the two PCR replicates.

Social Media Influences on Ranchers' Perceptions of and Attitudes Toward Mexican Gray Wolves

** Waters, Kaycie M., University of Arizona, Department of Agricultural Education, 1110 E. South Campus Drive, Tucson, Arizona 85719; kayciewaters@email.arizona.edu
Matthew M. Mars, University of Arizona, Department of Agricultural Education, 1110 E. South Campus Drive, Tucson, Arizona 85719; mmars@email.arizona.edu

Poster Presentation

Many socio-political issues arise when predators are reintroduced into areas that are concurrently used by ranchers. This is especially true for the endangered Mexican gray wolf in Arizona and New Mexico. While the socio-political issues are well documented, there is a gap in the literature specific to what influences the formation of ranchers' perceptions of and attitudes toward Mexican gray wolves and their reintroduction. My study aims to explore how social media and other forms of interactive communication influence ranchers' perceptions of and attitudes toward this topic. My theoretical framework draws on the three value-types of online communities identified by Seraj (2012) as the lens in which to explore this topic. These value types are: intellectual value, social value, and cultural value. I am using a qualitative, ethnographic design to discover how ranchers' perceptions and attitudes are formed in relation to the Mexican gray

wolf reintroduction. Ideas commonly used in marketing and explored in online communities can help describe the ways perceptions and attitudes are formed. Seraj's value-types may provide a key to understanding how interactive communication among ranchers influences their views of predator reintroductions. Preliminary data may be presented, but the focus will be on the theory and methods. My goal is to explore how ranchers' perceptions and attitudes are formed in order to help wildlife management professionals more effectively communicate with this important stakeholder group. An understanding of how perceptions and attitudes are formed can help wildlife management professionals find common ground to discuss predator reintroductions with ranchers.

Agave Restoration for Bats: Building Roots in a Changing Landscape

Weeks, Althea C. I., Colorado State University, Student Conservation Association, Southeast Arizona Group, Chiricahua National Monument, 12856 E Rhyolite Creek Rd, Willcox, AZ 85643, althea_weeks@partner.nps.gov.

Helen Fitting, National Parks Service, Southeast Arizona Group, Biologist, Chiricahua National Monument, 12856 E Rhyolite Creek Rd, Willcox, AZ 85643, helen_fitting@nps.gov.

Poster Presentation

With changes occurring more rapidly in the landscape of Southern Arizona due to climate change and an increased political concern over immigration, it is vital to establish habitats for species of concern, increase communications with Mexico, and adapt to industrial disturbances on the landscape. The National Parks Service has begun a long-term study project along the US-Mexican Border at Coronado National Memorial to examine the best planting practices of agave as a food source for the recently delisted lesser long-nosed bats and the Mexican long tongued bats that rely on agave nectar as an annual food source. Most of the migrating bats in Southern Arizona come up from Mexico to their post-maternity colonies in Arizona. In 2010, a border fence was constructed at Coronado National Monument that resulted in the taking of many well established agaves. Due to the then endangered status of many bats that rely on agave, funds were allocated to plant two agave for every one destroyed. This funding was enacted this year by the National Parks Service to plant 1200 agave and apply protective treatments to establish best planting techniques against invasive species, javelina predation, frost, and heat exposure. This ongoing study, led by Helen Fitting, was presented at the annual Bi-National Restoration Workshop hosted by the National Parks Service in which Mexican and American partners could gain potential planting techniques for future restoration projects on both sides of the border. This poster reviews the techniques used to protect planted agave, recommends techniques for creating international partnerships, and reviews the lessons learned from such relationships.