



Student Presentation Abstract Book

20th Anniversary Ecological Integration Symposium

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Room 410, Friday 5th April 11:15AM

Community organization of a snake guild in a shortleaf pine forests

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Land-use practices such as intensive silviculture and fire suppression are especially common in shortleaf pine forests of eastern Texas, where high demands for timber, large-scale fluctuations in land ownership, and increased urbanization are continually altering forest management practices and disturbance regimes. These practices have contributed to the significant loss of the shortleaf pine ecosystems that were once widespread throughout the pinewoods region. Similar to longleaf pine systems of the southeast, fire-climax shortleaf forests are characterized by a well-developed herbaceous understory and are known to support a high diversity of plant and animal species. Here we present the preliminary results from a mark-recapture study investigating community organization of a snake guild in an intensively managed shortleaf pine forest. Ten traditional box traps equipped with drift fences were deployed at the Temple Foundation's Boggy Slough Conservation Area from May-July 2018. 390 trap nights resulted in 79 individual captures represented by 14 snake species. We modeled the relationships between habitat variables, prey abundances, and snake abundances across the selected sites to identify ecological patterns within this system. Our results show that the variation in snake abundances across sites is partially explained by habitat and prey availability gradients.

Room 404, Thursday 4th April 9:45AM

Water and nutrient acquisition strategies in the tropical forests of Quintana Roo, Mexico

Rachel E. Adams and Jason B. West

In the karst landscape of Quintana Roo, Mexico, plant access to water and nutrients is limited by heterogeneous conduits within the limestone bedrock. This fine-scale variability can lead to substantial differences in water and nutrient uptake that cannot be easily separated by traits or species groups. We therefore assessed resource acquisition of co-occurring trees at sites in Quintana Roo to uncover relationships between species, size, and site characteristics such as depth-to-groundwater and bedrock thickness. Within random plots, species, diameter at breast height, and height were measured and noted for all trees. Stem and leaf samples were collected from each individual and analyzed for oxygen and hydrogen as well as carbon and nitrogen stable isotopes, respectively. Because each site had a cave, we assessed bedrock characteristics and collected groundwater samples. Results show significant variability in leaf carbon and nitrogen as well as stem water stable isotopes among sites and species. There was a relationship between leaf carbon and tree size. As trees became larger $\delta^{13}\text{C}$ increased until a size threshold then $\delta^{13}\text{C}$ decreased, showing that large trees were not as water stressed compared to medium sized trees. This is supported by a positive correlation between deep water use and tree size. Sites with shallower depth-to-groundwater or larger bedrock conduits allow for easier deep water access, creating a division between shallow-rooted and deep-rooted species in terms of water and nutrient relations. This demonstrates that local site characteristics within the karst landscape helps to understand the multiple resource acquisition strategies by co-occurring trees.

Room 404, Thursday 4th April 11:15AM

The adverse effects of phenylpyrazole fipronil on juvenile white shrimp *Litopenaeus setiferus*

Ali Abdulameer Al-Badran

The effects of chemical pesticide on non-target organism remain substantial despite efforts to improve pesticide formulations and application devices. Furthermore, majority of toxicity studies have focused on a limited number of model species, neglecting ecologically or economically important organisms. In this study, we evaluated the adverse effects of phenylpyrazole fipronil on white shrimp *Litopenaeus setiferus*, one of the most commercially important species in the United States. White shrimp were exposed to six different nominal concentrations of fipronil (0.0, 0.005, 0.01, 0.1, 1.0, and 3.0 µg/L). During the experiment, which lasted 45 days, multiple endpoints such as survivorship, growth, inter-moult intervals, behavioral changes, and body chemical composition were measured. Survivorship over 45 days of shrimp in higher concentrations of fipronil was significantly lower compared with control: 25% in 1.0 µg/L treatment and 0.0% in 3.0 µg/L treatment. Growth of white shrimp was affected by fipronil exposure under all concentrations, and the percent weight gain declined significantly from 51.62% ± 2.29 in the control to -2.56% in the 1.0 µg/L treatment. Inter-moult intervals were shorter in the control (13.64 ± 1.98 day) compared with other treatments. The inter-moult intervals ranged between 14.75 ± 3.10 day in the 0.005 µg/L treatment and 20.0 ± 4.24 day in the 3.0 µg/L treatment. Changes in swimming and feeding behavior of shrimp were observed under all concentrations compared with shrimp in the control. Change in body color was also observed among shrimp in higher concentrations of fipronil (1.0 µg/L and 3.0 µg/L). The analysis of whole body chemical composition at the end of the experiment showed that lipid content in shrimp decreased significantly while ash content increased with increased concentration of fipronil. We conclude that fipronil adversely affected white shrimp under the concentrations observed in the environment or even below the chronic level of the U.S. EPA benchmark. We suggest monitoring of fipronil use is needed in coastal areas.

Room 410, Thursday 4th April 10:45AM

Characteristics of male lance-tailed manakin social networks and their impact on future social status

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Social interactions can be important for information transfer between group members, especially for young individuals. Early social experience has been demonstrated to affect social rise as an adult later in life in male long-tailed manakins (*Chiroxiphia linearis*). In the closely related lance-tailed manakin (*Chiroxiphia lanceolata*), males frequently perform displays similar to courtship displays without females present. These interactions may be important for forming future partnerships and learning complex displays, but this hypothesis remains to be tested. The goals of this project were to 1) quantify how males differ in their social interactions, and 2) determine how these differences in young males relate to future social status. We quantified male interactions from videos at nine known display sites (N = 63 males and 566 interactions) during the beginning of the 2013 breeding season (Feb-Mar). We used social network metrics and GLMMs to quantify differences in social interactions based on display sites, plumage, and social status. We used social status at last sighting from 2014-2017 was used to determine if previous social interactions could predict later rise in social status. We found that individual social interactions varied based on plumage, social status, and display site. Additionally, we found that two social network metrics explained later rise in social status. These results indicate that early social interactions are important for yet another species in the genus *Chiroxiphia*; supporting the theory that early experiences are essential for understanding social behaviors.

Room 404, Friday 5th April 9:30AM

Using Data Surveillance to Understand the Rising Prevalence of Tick-borne infections (genus *Rickettsia*) in the United States, 2010 – 2016

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Spotted fever group (SFG) rickettsia are intracellular bacteria that cause Rocky Mountain Spotted Fever (RMSF), *Rickettsia parkeri* rickettsiosis, Pacific Coast tick fever, and rickettsialpox. SFG rickettsioses are notifiable conditions in the United States caused by the highly pathogenic *Rickettsia rickettsii*, and by less pathogenic species *Rickettsia parkeri*, *Rickettsia philipii*, and *Rickettsia akari*. We summarized surveillance data from 2010 to 2016 for SFG rickettsioses. There were 24,824 cases of SFR with 95% (N=23,604) reported as probable and 5% (N=1220) as confirmed. The average national incidence was 11.22 cases per million person-years (PY). The highest statewide incidence between 2010 and 2016 was in Arkansas with 220.87 per million PY, while the lowest incidence (besides Hawaii and Alaska where SFR is not notifiable) occurred in Washington with 0.29 per million PY. Cases of SFG rickettsiosis were reported more frequently among males by gender, white by race, and non-Hispanic by ethnicity. When comparing these results to a study from 2000-2007, the average national incidences increased from 7.0 to 11.22 cases per million PY. The increase in reported incidences of SFG rickettsioses likely resulted from increased reporting of tick-borne diseases, including those caused by less pathogenic species. Thousands of cases of SFG rickettsiosis occur every year, but it is uncertain how many of those cases are RMSF and how many developed from more moderate spotted fevers. Improvement of the ability to differentiate between spotted fever group rickettsia species is urgently needed.

Room 404, Thursday 4th April 10:30AM

Consumer-driven depletion of the Northern Diamondback Terrapin in Chesapeake Bay

Raven Blakeway

Marine populations have been heavily depleted prior to establishment of annual landings reports, generating long-term data gaps about the extent of human influences on marine resources. Study of the role of consumers is necessary to improve understanding of serial depletion due to local demands inasmuch as consumer-demand drives targeted-fishery harvests. The Diamondback Terrapin (*Malaclemys terrapin*) was a popular food item that rose to gastronomical fame in the Chesapeake Bay from the 1870's to 1910's. We quantitatively analyzed the terrapin fishery using data from historical fishery reports, contemporary newspapers, and restaurant menus to show that inflation-adjusted prices experienced a four-to-five-fold increase over 40 years. Market declines had been attributed to the Volstead Act (1920); however, we observed a closer relationship to the Food and Fuel Control Act (1917). We provide an example of an estuarine species that experienced one of the most rapid and greatest increases in prices, followed by commercial extirpation in less than 40 years. Although a fisheries fate cannot be predicted strictly using historical data, interpreting the historical decline of a commercially viable species provides a better understanding of the potential consumer impact to these populations and may aid in developing efficient response strategies to future harvest pressures.

Room 401, Friday 5th April 11:15AM

Widespread convergence in stream fishes

Luke Bower

Convergent evolution can arise when taxa from divergent lineages undergo adaptive change in response to similar selective pressures, with the degree and amount of convergence depending on available genotypic and phenotypic variation and the strength of selection. Here we test the prevalence and degree of convergence in functional traits of stream fishes at the microhabitat scale across five zoogeographic regions. This study revealed high prevalence of convergence of functional traits among fish species occupying similar microhabitats of low-gradient streams. The prevalence of convergent suites of functional traits implies that adaptation to similar environmental conditions resulted in repeated patterns of evolution along multiple niche dimensions. Fishes occupying areas of high water velocity or little structural complexity generally occupied a restricted morphological space and exhibited the highest degrees of convergence. This suggests high water velocity and habitat structural complexity combine to exert strong selection on trait distributions in stream fish assemblages. Environmental factors at the microhabitat scale appear to constrain functional diversity of stream fishes, resulting in widespread species convergence and assemblage functional structures among streams with similar features. Key words: convergent evolution, environmental filtering, functional trait, intercontinental comparison, microhabitat, natural selection

Room 410, Thursday 4th April 10:00AM

Functional connectivity comparisons and considerations for the African elephant

Erin Buchholtz

Ecological connectivity methods abound. They have great potential for conservation applications as fragmentation and habitat loss occur. However, different approaches to connectivity modeling may perform better for different species based on variation in ecological traits and movement processes. Two main methods, cost distance and circuit theory, diverge in assuming movements are based either on perfect knowledge or random walk through the landscape, respectively. It has not been tested which of these is more applicable to a species with complex and long-term spatial memory, the African elephant. We will compare these two common connectivity modelling approaches for elephants based on telemetry data from Botswana. We will calculate a resistance surface from a step selection function and model connectivity based on a set of short-term and seasonal movement paths. We will then measure the ability of each connectivity method to capture elephant movement. Given elephants' spatial memory capability, we predict that cost distance will best capture movement patterns. Alternatively, we predict that circuit theory may best capture elephant movement patterns due to the complex nature of elephant behavior and the limitations of remotely sensed variables to predict this complexity. As connectivity methods become increasingly prevalent, understanding their relative applicability and assumptions will allow for the best possible results.

Room 401, Friday 5th April 9:00AM

Lakes, Plankton, and Climate Change: A modeling story told in pictures.

Sierra E. Cagle

In 1986 The Plankton Ecology Group (PEG) published a seminal paper in which they summarized the mechanisms underlying phyto- and zooplankton succession in limnetic systems using a conceptual model. The verbal model, as the authors called it, was created by comparing dynamics of multiple factors across many lakes, leading to deduction of important processes. In the research presented here we convert components of the conceptual model into a numerical model, allowing direct analysis of mechanisms driving plankton dynamics. Additionally, by shifting temperature and light parameters we investigate how variation in latitudinal location and climate change may influence plankton dynamics.

Room 410, Thursday 4th April 9:15AM

One squirrel? Eight squirrel? Orange squirrel? Gray squirrel?: Biogeography of the variegated squirrel

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Central America is a region filled with an incredible amount of species within its small area. Unfortunately, many species in this region, including many mammals, have little known about them or their relationship to Central America's constant geologic upheaval. One such species is the variegated squirrel (*Sciurus variegatoides*), which exhibits multiple, distinct pelage patterns across its range from southern Mexico to central Panama. Hypotheses for the variable pelage of *S. variegatoides* include possible adaptations to primary habitat and/or consequences of the variable climatic ranges seen in the region. Despite this, no study has investigated this variation or these hypotheses. Given this, we undertook an assessment of this species using phylogenetic analyses, morphology, and examinations of niche divergence. Mitochondrial genomes were collected from museum specimens, and cranial shape differences between subspecies and localities were assessed using two-dimensional geometric morphometrics. Molecular and morphological data posit that there is miniscule variation among subspecies, contrary to what is suggested by the intriguing pelage patterns. Similarly, analyses of niche divergences show overlap in bioclimatic space among all subspecies, suggesting no differentiation. Understanding the evolutionary patterns in this species will add to the current, sparse literature of Central American mammal evolution and increase our understanding of the biogeographic patterns affecting species in this region.

Room 401, Thursday 4th April 11:15AM

Mg/Ca Ratios of Echinoderm Ossicles in Pennsylvanian Coal Balls: Implications for Reconstructing Mg/Ca Ratios of Pennsylvanian Seawater

Michelle Chrpa

The informally named Dalton coal is an organic-rich shale deposit at the top of the Wolf Mountain Shale assigned to the base of the Stanton major cycle near the top of the Missourian (Late Pennsylvanian). Coal balls from the Dalton coal are carbonate concretions that preserve permineralized plant matter and marine invertebrate hash. The exquisite preservation of ephemeral plant organs and large amounts of void space in coal balls suggest rapid formation in uncompacted peat at the swamp surface. Early dolomite and early magnesian carbonate cements (eHMC) in coal balls suggest formation in marine swamps but could be microbial carbonates precipitated in freshwater swamps. Echinoderm ossicles in Dalton coal were likely transported to the paleomire by wave-action. Preliminary analyses suggest that echinoderm ossicles in the Dalton coal retain their original microstructure and reflect the Mg/Ca ratio of seawater when the echinoderm was alive. Comparison of the Mg/Ca ratios of eHMC in coal balls with the Mg/Ca ratios of echinoderm ossicles from the same coal balls will be used to evaluate hypotheses of coal-ball formation. Following work by Dickson, preliminary analyses suggest that ossicles in the Dalton coal which retain their original microstructure reflect Mg/Ca fluid ratios of 2.9 - 3.5. These values fall within the range reported by Dickson for contemporaneous crinoid ossicles from North America which reflect seawater Mg/Ca ratios of 2.8 - 3.6. Coal ball eHMC reflects Mg/Ca fluid ratios of 2.8 - 3.8. Overlap between these sets of Mg/Ca ratios supports a marine origin for coal balls.

Room 401, Thursday 4th April 11:00AM

Stable isotope signals as proxy for mobility amongst ancient Canary aboriginals: creating a strontium and oxygen baseline for Gran Canaria

Paloma Cuello del Pozo

Archaeology has become increasingly interdisciplinary thanks to the technological advancements in recent decades. Geochemical methods have been established in anthropology to help shed light on past human activity. For example, the application of stable isotope analyses of oxygen ($\delta^{18}\text{O}$) and strontium ($^{87}\text{Sr}/^{86}\text{Sr}$) is a popular technique used to assess paleomobility, which is the focus of our study. First, we want to know if this method could detect foreign individuals from past Canary native populations, and second, if it could help understand intra- or inter- insular mobility. In order to evaluate the technique's viability, we must delineate isotopic baselines, also known as an isoscape. We have analyzed $\delta^{18}\text{O}$ and bioavailable $^{87}\text{Sr}/^{86}\text{Sr}$ from modern organic material from Gran Canaria Island, an exploration that had already begun as a Master's thesis in Lanzarote Island. Hence, we are continuing the development of an isoscape for the Canary Islands that can be consulted during future archaeological research. We sampled local vegetation, modern snail shells, and dentition from road-kill rabbits and lizards, sheep/goat teeth found during survey, and fresh water. The information gathered contributes to the background data necessary to include in a Ph.D. dissertation that focuses on lifeways and movements of ancient Canary aboriginals.

Room 410, Friday 5th April 9:00AM

Soil characteristics and microbial responses to different fire intensities in a woody encroached arid savanna

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Southern Great Plains savannas are experiencing a compositional shift to greater dominance by resprouting woody shrubs. Recent experiments have recognized prescribed fire, conducted in extreme hot and dry conditions, as a potentially effective method to control undesirable woody plants. Quantitative changes in soil characteristics, particularly the microbial community, under different fire intensities are lacking in this region. In conjunction with a larger study examining the physiological responses of resprouting shrubs and grasses to varying fire intensities, we are investigating the effects of fire intensity on the soil physical, chemical, and biological properties in a semiarid savanna in west central Texas. Our experiment included control, low intensity fire, and high intensity fire plots (10 x 10 m). Low intensity plots had a continuous coverage of hay additions (60 kg). High intensity plots had hay additions as well as juniper cutting additions (200 kg). Soil samples (N = 36) at a depth of 15 cm were collected before and immediately after the late summer prescribed burns. We measured the moisture content, relative water infiltration rate, aggregate stability, texture, bulk density, pH, total organic carbon (TOC), and nitrogen (N). Amplicon sequencing and chloroform fumigation will be used to determine the composition and biomass of the soil microbial community, respectively. To assess the short- and long-term fire effects on the biotic and abiotic soil properties, data collection will continue 4, 8, and 12 months after the fires. We hypothesize that while high fire intensity may improve soil structure, the microbial biomass and diversity could decrease. Results from this study will give rangeland managers a better idea of how prescribed fires alter soil characteristics and microbial

communities. These results will provide valuable insights into potential belowground consequences of using savanna restoration strategies promoting extreme, high intensity fires as a means of managing woody encroachment.

Room 404, Friday 5th April 10:30AM

Taxonomy and diversity of little-known South African grasshopper genus *Eremidium* (Orthoptera: Lentulidae)

Carla Deloera

South Africa is home to many unique habitats that harbor numerous endemic species. Our project focuses on studying grasshopper diversity in two parallel chains of habitat islands in the most ancient continent. The first is a thousand-mile arc of high mountain habitats in the far south consisting of a great mountain massif whose eastern edge has eroded into a line of high precipices and isolated rock fragments, thereby forming a line of alpine islands. The second is a string of mountain forests constituting perhaps the most complex archipelago in the world, stretching from the tip of the continent four thousand miles to the horn of Africa. The preliminary study of the flightless grasshoppers inhabiting these regions indicates that there is previously unknown and enormous species diversity awaiting discovery. The overall goal of this project is to understand the total diversity of grasshoppers in the family Lentulidae in this amazing and complex landscape and the diversification processes shaping this diversity. However, because the species of *Eremidium* are externally quite similar, there is no reliable identification key available. Previous taxonomic work contains insufficient information for identification, and therefore, there is an urgent need to revisit the taxonomy of this group. In this study, we present an overview of taxonomy of this interesting grasshopper genus and an identification key to species.

Room 410, Thursday 4th April 11:00AM

Effects of floral neighborhoods on visitation and pollination outcomes among co-occurring *Cola* spp. at different relative abundances

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Tropical forests are notable for their species-rich tree genera, yet how so many similar species co-occur, despite the potential for reproductive interference, is still little understood. Flowering density and frequency can influence pollinator-mediated interactions. Due to their lower numbers, rarer congeners may face greater challenges when competing for pollination services, leading to poorer pollination outcomes. We studied the pollination ecology of a group of seven co-flowering monoecious *Cola* spp. found at differing abundances in the Afrotropical understory. We modeled both pollinator visits and pollination success of an individual tree at a particular sampling date as functions of the density of: flowering conspecifics, congeners weighted by pollinator niche similarity, and all species, at both local and 25ha plot scales. Our models also accounted for a tree's floral surface area, and sexual morphology at sampling time. All species had actinomorphic flowers visited by diverse insects, though flies, ants and beetles dominated. Visitation increased with conspecific flowering density in the plot, while pollination outcomes showed a hump-shaped relationship; neither were related to the density or composition of the local flowering neighborhood. Visits, but not pollination success, decreased with a tree's surface area. The presence of male flowers did not affect visitation but was consistently important for pollination success, suggesting pollen transfer within trees contributed to high pollen tube counts. Rarer species were as successful as their more abundant congeners, suggesting species differences interact with flowering density to mediate pollination outcomes.

Room 404, Friday 5th April 11:15AM

Correlates of snake entanglement in erosion control blankets

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In road construction projects across the United States, erosion control methods (e.g., erosion control blankets [ECBs]), are mandated to stimulate seedbed regeneration and prevent soil loss. Anecdotal reports have suggested that snakes are vulnerable to entanglement in ECBs. We conducted a literature review, field surveys, and an entanglement experiment to examine what factors increase a snake's risk of ECB entanglement. Our literature review produced reports of 175 reptiles entangled in mesh products, 89.1% of which were snakes, with 43.6% of snake entanglements occurring in erosion control products. During our field surveys, we found ten entangled snakes (n = 2 alive; n = 8 dead). From our experiment, we found that ECBs that contain fixed-intersection, small-diameter mesh comprised of polypropylene were significantly more likely to entangle snakes compared to ECBs with larger diameter polypropylene mesh or ECBs that have woven mesh made of natural fibers. Snake body size was also associated with entanglement; for every 1 mm increase in body circumference, the probability of entanglement increased 4%. These results can help construct a predictive framework to determine those species and individuals that are most vulnerable to entanglement.

Room 410, Friday 5th April 10:15AM

Comparing behavioral, morphological, and molecular reaction norms of locust phase polyphenism

Bert Foquet

Locusts are grasshoppers (Acrididae) that form large migratory swarms and show an extreme form of density-dependent phenotypic plasticity. Typically, locusts exist in one of two extreme phases (solitary and gregarious), which manifest under low and high population density, respectively. They differ in several traits, including behavior, morphology, nymphal coloration, physiology and reproduction. Moreover, there are clear molecular differences between both phases in two well-studied locust species. The genus *Schistocerca* contains three swarming locust species and more than 40 non-swarming sedentary species, and its phylogeny is now well understood. In this study, we focus on the Central American locust (*S. piceifrons*) and three closely related non-swarming grasshoppers: *S. americana*, *S. serialis cubense*, and *S. nitens*. Together, they are predicted to form a spectrum in the degree of density-dependent phenotypic plasticity. We quantified density-dependent reaction norms in all four species by rearing them in isolated and crowded conditions at a behavioural, morphological and molecular level. Using our data, we establish that the spectrum of density-dependent phenotypic plasticity in this clade does not only extend to the behavioral level, but also to the molecular level. Further, our transcriptome analysis points towards clear similarities and differences in gene expression patterns among these four species, as well as genes specifically linked to certain locust characteristics. Finally, we compare and contrast our results in *S. piceifrons* to what is known from other locust species.

Room 401, Thursday 4th April 9:45AM

Trust and Emotions as the Main Drivers of Support for Large Carnivores Recovery in the Absence of Real Threats

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Once existed throughout much of the developed world, large carnivores are recolonizing parts of their historic range, including the Midwest region of the United States. Understanding public support for recovery of large carnivores has implications for acceptance of the species and development of management plans that set policy governing human-predator interactions. We investigated the socio-psychological determinants of support for recovery of black bears (*Ursus americanus*), cougars (*Puma concolor*), and gray wolves (*Canis lupus*) using a model whereby support for recovery was hypothesized to be a function of emotions toward large carnivores, perceived risks from large carnivores, and trust in management agency. We used a case study of the Illinois, USA, public to test our model. The results of structural equation modeling showed that trust in management agency and emotions toward large carnivores had strong relationships with support for recovery, whereas perceived risk was weakly related. Results of multi-group analysis revealed minimal differences in the path coefficients of the hypothesized model across black bears, cougars and gray wolves, which implied that respondents' support for recovery was shaped by similar psychological processes for different large carnivores. Our results suggested that, in the absence of established populations (i.e., limited potential for interaction), individuals relied more on their trust in management agency and emotions toward the species rather than perceived risk in expressing support for large carnivore recovery. We provide specific recommendations for management agencies to utilize public trust and emotions to facilitate large carnivore recovery; however, we caution that circumstances may change upon establishment of breeding populations.

Keywords: Large carnivore recovery; Conservation Psychology; Perception of risk; Emotions; Social trust

Room 410, Thursday 4th April 9:30AM

Texas High Plains Beef Cattle Production in Future Climates: An Assessment of Impacts and Adaptations

Paul Goetze

The area over the Ogallala Aquifer in Texas is at high risk through the remainder of the 21st Century. Under most climate change scenarios, a warming and drying trend is projected along with accelerated drawdown of the aquifer itself. To better understand the regional impacts, this study looks at projections for rangeland and beef cattle operations in 49 west Texas counties and how they will be impacted under various climate scenarios both physically and economically. With their vulnerability assessed, several adaptations are compared and analyzed for their suitability to maintain beef operation viability.

Room 404, Thursday 4th April 9:15AM

Linking cotton fleahopper spring emergence to local environmental conditions

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The cotton fleahopper (CFH), *Pseudatomoscelis seriatus* (Reuter), is an economically important cotton pest that feeds on developing squares and terminals. The CFH overwinters as diapausing eggs in host plants such as woolly croton, *Croton spp.*, and emerges in the spring once eggs have been exposed to sufficient temperatures and moisture to terminate diapause. We documented diapausing egg densities and environmental conditions in three croton fields in the Brazos River Bottom, and examined the temporal emergence patterns of CFH nymphs across each site in Spring 2018. Although egg densities varied among fields, temporal patterns of nymph emergence were similar across all three sites. Importantly, the temporal patterns of emergence revealed that CFH adults emerging from overwintered eggs could directly infest cotton when it is most susceptible to CFH feeding damage, rather than first undergoing reproduction on alternative hosts. The next phase of this study is to integrate the spring emergence data with local environmental conditions to develop a model to predict spring emergence patterns of CFH from diapausing eggs in croton. Data collection will continue for at least two additional years to expand the current data set and validate the accuracy of the model.

Room 401, Thursday 4th April 10:30AM

The influence of golden-fronted woodpeckers as ecosystem engineers on the local avian community

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Ecosystem engineers mechanically change their environment and have a direct impact on local species. Woodpeckers serve this role as their cavities provide crucial nesting sites for secondary cavity-nesting birds and the foraging holes they create encourage insects to colonize, providing forage for other insectivorous birds. The goal of this project was to determine if the presence of an active woodpecker nest would influence local avian species richness and abundance, and if the effect of the woodpecker was impacted by the type of vegetation present: sparsely or densely forested. A suite of behavioral cues was used for the golden-fronted woodpecker (GFWP) to identify active nest sites (N = 36) within vegetation types. Avian species richness and abundance were significantly higher around GFWPs when compared to control points. However, the impact of an active GFWP was greater on avian abundance in the sparse versus dense vegetation types. The impact of the GFWP on species richness was not influenced by vegetation type. These results indicate that not only is the GFWP influencing the local avian community, but that the extent of its influence may be determined by vegetation type.

Room 404, Thursday 4th April 10:00AM

Thermal preference in the smoothskin octopus (*Muusoctopus leioderma*)

Maureen Hayden

The smoothskin octopus (*Muusoctopus leioderma*), typically a deep water species found between 90-500 m, has recently been found at depths of 13 m (Hochberg, 1998; Kore et al., in review). Collections of a deep water octopus in Burrows Bay, Washington have raised questions about the known distribution of this species. Temperature at the collection location (13°C) is warmer than temperatures at the upper portion of their known depth range (8°C). I hypothesized that *M. leioderma* is a recent immigrant to shallow water. Therefore, I predicted that *M. leioderma* would prefer temperatures cooler than 13°C, consistent with acclimation to deeper depths. Total movement was quantified at temperatures between 4 and 13°C in a shallow, temperature controlled enclosure. Oxygen consumption of octopuses was also measured by open respirometry system at temperatures between 8°C and 13°C and movement rate changed as a function of temperature more than metabolic rate as a function of temperature suggesting behavioral avoidance of these temperatures. Temperature preference of 15 *Muusoctopus leioderma* was determined using a thermal gradient. Results from the temperature preference trials demonstrated that *M. leioderma* preferred temperatures cooler than the collection location. These data are consistent with the hypothesis that the Burrows Bay population of *M. leioderma* may be recent immigrants to shallow water.

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Room 404, Thursday 4th April 10:45AM

The effect of cheliped function on male mating success in the Louisiana crayfish, *Procambarus clarkii*

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The Louisiana crayfish, *Procambarus clarkii*, is a large-bodied crayfish that is native to northeastern Mexico and the south-central United States, with a breeding season ranging June through November in warmer climates, including a second mating in the spring. This system combined with the r-selected characteristics of this species allows it to produce a massive amount of offspring, increasing its potential to become invasive. Despite the extensive research on the invasive potential of this organism, the behavioral aspects of the mating system have been mostly neglected. Previous research showed that females preferred males of larger body size, with little evaluation of other physical characteristics. We investigated how chelae presence, function, and size, affect female choice when evaluating potential mates. These traits were chosen to act as a proxy for various naturally occurring physical states. For example, chelae presence was used to evaluate the situation in which an individual lost a chelae as a result of predation or interspecific interaction. Females were given a choice between two different males, in two different mate choice experiments. We will present the importance of these traits in male mating success.

Room 401, Thursday 4th April 10:45AM

Heuristics and Fire: Decision-Making Processes and Prescribed Fire Implementation in the Southern Great Plains

Kelly Hoffman, Lars Coleman, Will McDaniel, Patrick Bixler, Morgan Russell and Urs Kreuter

The Southern Great Plains (SGP) of Texas and Oklahoma, once predominately grassland biome, have undergone a slow conversion to a grassland-savanna matrix due to woody encroachment following European expansion. The suppression of fire in this once fire-driven ecosystem is partly to blame. Prescribed fire is a powerful management tool capable of mimicking historical fire regimes and maintaining the integrity of these rangelands. Despite the extensive history of prescribed fire use in the SGP, consistent usage of the tool on a landscape-scale is impeded by a variety of policy, legal, and sociocultural factors. While significant research has been conducted into the policy and legal impediments to more widespread prescribed fire use, the sociocultural barriers represent an understudied area of research. Barriers and opportunities are shaped by both macro institutional and policy variables down to micro-level individual decision-making processes. Based on a mixed-mode web-based and mail survey, this research explores key variables that shape an individual's decision to use prescribed fire as a land management tool. The results indicate bifurcated modes of cognition that influence decision-makers' choices regarding fire. On the one hand, the choice to implement prescribed fire is a conscious, analytical decision-making process. On the other hand, rather than solely utilizing analytical calculations, our findings suggest that the decision to use prescribed fire is influenced by affective reasoning and heuristics that are more intuitive than analytical. The results have implications for the ways that policy incentives are framed as well as the information communication strategies for advancing prescribed fire.

Room 401, Thursday 4th April 9:30AM

Snake vertebral ecometrics: towards a better understanding of community assembly through time.

John J. Jacisin III

Anthropogenic environmental change threatens to overwhelm the ability of ecosystems and species to sustain historical function. Integrative science merging the fields of paleontology, Earth sciences, and conservation biology is imperative to securing the future of Earth's organisms, resources, and natural systems. Ecometrics – the community-level study of functional traits exhibiting quantifiable relationships with environmental gradients or climate – synthesizes modern, historical, and paleontological data across space and time for a plethora of organisms. Snakes are good candidates to expand ecometric research as ectotherms that have shown significant reactions to changes in the environment. Snakes use their vertebrae to locomote and interact with the environment, making vertebral shape a good element to investigate trait-environment relationships through deep time. We used geometric morphometrics to quantify anterior shape of middle trunk vertebrae with 23 homologous landmarks. We used generalized procrustes superimposition and a PCA to extract shape scores for 118 extant snake species from the continental United States and Canada. We tested differences between vertebral shape and ecological categories (fossorial, semifossorial, arboreal, semiarboreal, aquatic, semiaquatic, or terrestrial) and found several relationships between different shapes for at least one ecological category ($P < 0.01$). Relative neural spine height (PC1; $R^2 = 0.35$), vertebral height-to-width ratio (PC2; $R^2 = 0.22$), relative neural canal size (PC3; $R^2 = 0.13$), relative prezygapophyseal facet length (PC5; $R^2 = 0.21$), and relative parapophysis length (PC6; $R^2 = 0.22$) explain ~86% of the shape variance and separate by ecological category. Our ecometric analysis suggests that relative neural spine height and relative neural canal size, vertebral height-to-width ratio, and relative parapophysis length can be used as proxies for ecological province and temperature-related bioclimatic variables. These newly described ecometrics contribute to the toolbox of paleontological proxies to help interpret past climates and environments and assess community assembly through time.

Room 401, Friday 5th April 9:30AM**Exploring utilities of spectral diversity for representing plant diversity and its spatial pattern**

Xavier Jaime

Patterns of spatial heterogeneity in vegetation are important in pyric-herbivory studies, potentially influencing the patterns of burn, vegetation regrowth, livestock use, and subsequent burns, but have rarely been explored. In this study, we explore the utilities of spectral diversity for representing the herbaceous plant diversity and its spatial pattern. Airborne hyperspectral imageries with 120 bands (381.9nm to 998.6nm; 5.2nm bandwidth) and 0.5 m resolution were acquired on two research ranches (~5000 acres each) in the Edwards Plateau of Texas. Herbaceous plant composition and cover were sampled in randomly located 1mX1m quadrats stratified by representative soil types and vegetation classes, areas dominated by bare ground/rock, grasses, small shrubs, and large shrubs. We examined the relationship between spectral diversity, in Shannon's diversity and evenness indices calculated based on the spectral data, and the field data-based herbaceous plant richness, Shannon's diversity and evenness indices at the sample locations. Our preliminary results showed there was a significant correlation between the spectral- and field-based Shannon's indices ($r=0.2484$, $p=0.0176$). When examined for different vegetation classes, the correlation between the spectral- and field-based Shannon's indices was statistically significant only in the areas dominated by grasses ($r=0.3808$, $p=0.0456$). It was possible that the spectral information related to the bare ground or woody vegetation introduced noise for the relationship. There was also a significant correlation between spectral-based Shannon's index and herbaceous plant richness ($r=0.3012$, $p=0.0037$). We are currently exploring subsets of the bands and their transformations that may be more relevant to the herbaceous vegetation and its diversity, as well as other variables representing spectral diversity. Findings of these explorations can potentially help develop spectral diversity measures that can meaningfully represent the herbaceous plant diversity and its spatial patterns.

Room 404, Thursday 4th April 9:30AM**Host-mediated microbiome engineering drought tolerance in the wheat rhizosphere**

Michael Jochum

The goal of this research was to alleviate drought stress in grasses using the concept of host-mediated microbiome engineering in the rhizosphere. After six rounds of artificial selection on a root rhizosphere microbiome based on the host phenotype, we were able to sub select a microbial community that contributed a 5-day net increase in drought avoidance in wheat seedlings. The engineered rhizobiome demonstrated statistically significant increases root system architecture phenotypes, when compared to the control. The engineered microbiome also demonstrated statistically significant increases in total plant biomass and rhizosphere water retention. 16S rRNA amplicon NGS of rounds 0, 3, and 6 revealed taxonomic increases in the relative abundance of proteobacteria and betaproteobacteria at the phylum and class levels. There were also significant decreases in alpha diversity, and divergence in beta diversity between round 0 and round 6. Functional metagenome inferences revealed increases in level 2 KEGG orthologs associated with cell motility, cellular processes and signaling, signal transduction, and metabolism. Based on these results, we hypothesize that the engineered microbiome is directly or indirectly producing signals that alter root system architecture for increased water uptake via surface area exploration, while also producing biofilm that adds the humectant properties of the rhizosphere, therein increasing water retention and preventing root desiccation. Overall, findings from this study improve our understanding of the ecological and evolutionary implications of plant-microbe interactions in a water deficient environment.

Room 401, Friday 5th April 11:00AM

Signatures of introgression across natural swordtail hybrid zones (Teleostei: *Xiphophorus*)

Gastón I. Jofre-Rodríguez, Molly Schumer, Peter Andolfatto, Gil G. Rosenthal

When two species get in secondary contact and hybridize, the recombinant nature of their genome changes over time, and hybrid genotypes become balanced by selection and dispersal from parental populations. The recombining genotypes that are under selection can leave signatures that can be identified using geographic cline analysis. This analysis plots the change of allele frequencies for each locus from one parental species to another, and provides the center and width of the cline. Comparing the centers and the widths of multiple loci, with the null expectation of no selection, through the geographic gradient, allows the detection of outlier loci. Outlier loci putatively involved in reproductive isolation will have reduced cline widths, and outlier loci with high rate of introgression will have increased widths and can have different cline centers. I will use natural *Xiphophorus malinche*-*Xiphophorus birchmanni* hybrid populations as a model. This *Xiphophorus* hybrid system has been extensively used to study of the ecological and evolutionary consequences of hybridization. The central hypothesis of my research is that selection creates a detectable signature on different regions of the genome that can be detected using geographic cline analysis.

Room 410, Friday 5th April 11:00AM

Evidence of extrinsic postzygotic isolation in a North American songbird

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Migratory divides are hybrid zones between closely related species that breed adjacent to one another but show different migratory phenotypes, with parental forms using different migratory routes that often lead around geographical barriers. It has long been hypothesized that hybrid offspring in divides will exhibit intermediate behaviors that force them to migrate across these barriers. Work on the Swainson's thrush has already shown that hybrids take intermediate routes; we test a second hypothesis here, that these intermediate hybrid routes are inferior to migratory routes of parental forms. We combine ecological niche modelling with empirical tracking data and a connectivity analysis in this study. We found lower habitat suitability of localities in the intermediate range compared to both parental ranges. In addition, intermediate routes show high values of resistance, suggesting that these routes are inferior. Combined our study provides evidence for migratory behavior acting as an extrinsic postzygotic barrier to gene flow and a strong example for the important role migration plays in the process of speciation.

Room 410, Friday 5th April 10:30AM

Weak trophic level-body size relationship of fishes depends on their functional traits

Friedrich Keppeler

Carnivorous are typically larger than their prey, and consequently, trophic level (TL) should increase with body size. While such relationship has helped in developing predictions of food web structure and dynamics in mesocosms and simple communities, a TL-body size relationship may not exist for all kinds of communities or evolutionary lineages. Moreover, functional traits associated with species' TL and prey selectivity are usually ignored. Herein, we explored the relationship between TL and size, and how this relationship may change according to seven functional traits (relative gut length, body depth, body width, mouth width, mouth orientation, tooth shape and gill rakers) measured from hundreds of estuarine and freshwater fishes. A general positive relationship between TL and body size was not observed, and this result was consistent when using either biomass or standard length as proxy for fish size, and either mean TL or individual TL as response variable. Trophic Level varied consistently with size for one third of the species, from which only 40% had positive relationships. Body depth, tooth shape and mouth width were all associated with the TL-body size relationship. Overall, predators with conical or triangular-serrated teeth, large mouth, and elongated or fusiform bodies tend to have positive TL-body size relationships, while herbivores with uni or multicuspid teeth, deep bodies and small-medium mouths are inclined to negative relationships. Given the high diversity of life history strategies, trophic ecology, and adaptations observed in fishes, our results suggest prudence when defining a species TL based on a single trait (i.e., size).

Room 404, Friday 5th April 11:00AM

The effect of Pesticides on Honey Bee (*Apis Mellifera*) Queen Reproductive Physiology

Omar Khan

Honey bees (*Apis mellifera*) are integral to continued food security in the U.S., as they pollinate approximately 1/3 of U.S. food crops and contribute \$17 billion annually to the agro-economy through pollination service fees. Every spring, over 70% of all bee colonies in the U.S. are taken to California to pollinate the almond crop. As these colonies are at high concentrations, this creates a reservoir for pests and pathogens, in addition to high pesticide exposure risk from pollinating the almond bloom. Honey bee colonies are plagued with varroa mite (*Varroa destructor*) infestations that can eventually cause colony mortality. This leads beekeepers to take extreme measures in order to treat varroa mite infestations. Since beeswax is highly lipophilic, any miticides introduced to bee colonies remain in the wax matrix for long periods of time. Previous work shows that when queens are exposed during development to field relevant levels of fluvalinate (active ingredient in Apistan®), coumaphos (active ingredient in Checkmite+®), and amitraz (active ingredient in Apivar®), all ubiquitous miticides found in the beeswax matrix, queen behavior and physiology is negatively impacted. This can also be true when queens are exposed to chlorothalonil and chlorpyrifos, common pesticides used in almond orchards. Our preliminary results suggest that queens reared in pesticide-contaminated environments may have fewer ovarioles than counterpart queens reared in pesticide-free environments. If beekeepers are inadvertently hurting their own queens, then the beekeeping industry must know in order to produce high quality queens which lead high quality honey bee colonies.

Room 410, Friday 5th April 9:15AM

Sugar is an ant's best friend? : Testing food web theory predictions in invasive Ants

MacKenzie Kjeldgaard

The tawny crazy ant (*Nylanderia fulva*) is a major invasive pest that can reach densities of nearly one million ants per hectare. We used stable isotope analysis, attraction of ants to baits, and pitfall sampling to investigate tawny crazy ant trophic position, abundance, and competitive interactions over six months in varying Texas habitats. We predicted that tawny crazy ant colonies occupying a low trophic position (i.e., herbivore) would consequently have higher colony densities and be more competitively dominant than those occupying a higher trophic position (i.e., predator). We found that tawny crazy ant trophic position varied significantly across the seasons and by site. Counter to our expectations, tawny crazy ant density was positively correlated with trophic position. Tawny crazy ant density was highest when colonies fed on a more predaceous diet compared with colonies that fed on a more herbivorous diet. Colony density was also positively correlated with dominance at baits, so tawny crazy ants were more abundant and more dominant in sites where they fed as predators compared with sites where they fed as herbivores. Understanding the effects of diet on invasions are essential to inform future control and indicate which habitats may be more susceptible or resistant to invasion.

Room 410, Thursday 4th April 9:45AM

Influence of Juniper shrubs on infiltration in a Texas rangeland undergoing woody encroachment

Pedro A. M. Leite, Kevin McInnes and Bradford P. Wilcox

It is commonly acknowledged that woody plant encroachment on rangelands reduces groundwater recharge and streamflow. However, despite widespread woody encroachment in the Edwards Plateau of Texas, baseflow has increased for many of its watersheds. This unexpected trend has been attributed mainly to reduced runoff due to an improvement in rangeland conditions in the past decades. However, it might also be related to woody plants increasing infiltration, an aspect that has been little investigated. In this study, we contrasted saturated hydraulic conductivity (Kfs) – a metric that allows infiltration comparisons across different soils conditions – between areas of juniper canopy and intercanopy. Single ring infiltration experiments following the Beerkan procedure were performed to estimate Kfs under the canopy of junipers of different sizes, ranging from small saplings to mature trees. We found that infiltration was significantly higher under all canopies and that after reaching a certain size (approximately 1.5 m) there is no further improvement of Kfs, which is around one order of magnitude higher than Kfs on intercanopy. We also found that intercanopy soils surrounding larger trees (>3m tall) had 2-3 times higher Kfs than other intercanopy soils. Additionally, Brilliant Blue dye tracer was added to some of the infiltration tests, and by excavating soil pits we found the dye stained areas twice as deep under juniper than on intercanopy soils – an indication of higher preferential flow near shrubs. Overall, our results show that juniper shrubs of all sizes are hotspots of much higher infiltrability, which suggests that they are likely contributing to a reduction in surface runoff and the consequent increase of baseflow observed in many of the region's watersheds.

Room 401, Thursday 4th April 10:00AM

Constance Lin

Carrion decomposition is a fundamental step in nutrient recycling in which organic matter and minerals are redistributed into the food web. This complex process involves a wide diversity of interacting organisms that transforms the carrion from a fresh corpse to dry remains through a succession of distinct stages. Each stage of decomposition is associated with a particular arthropod community that colonizes, reproduces and feeds on the carrion, facilitating its transition from one stage to the next. Some species in these arthropod communities, especially flies and beetles, have been particularly well studied in a forensic context as they are critical in the estimation of post-mortem intervals (PMI). Ants, however, have been documented as carrion visitors in many studies, but their effect on carrion-feeding insects and the rate of decomposition is vastly understudied. We quantified the effects of Red Imported Fire Ants (*Solenopsis invicta*) and other ants on the colonization and abundance of carrion-feeding insects and on the decomposition rate of rat carcasses. We found that ants significantly altered the colonization and abundance of carrion-feeding insects. Overall, fly abundance was lower when ants were present and decomposition rate was accelerated. Our study suggests that ants recruit to carcasses in high densities and could significantly influence carrion decomposition by feeding and excluding other members of the necrophagous insect community as well as by altering the carcass and the surrounding microhabitat.

Room 404, Friday 5th April 10:15AM

Drew Little

Schistocerca piceifrons is a significant agricultural pest. Spanning from Peru to Mexico these locusts move in swarms, consuming entire crops in their path. As locusts, *Schistocerca piceifrons* undergoes density-dependent polyphenism, changing morphologically and behaviorally between a gregarious and solitary phase depending on population density. In the gregarious phase, locusts show dark coloration, are attracted to one another, and participate in swarming behavior. In the Solitary phase, the locusts are light in coloration and avoid one another and do not swarm. To be able to determine if density dependent polyphenism affects the locust *Schistocerca piceifrons* and to quantitatively determine behavior a logistic regression model was created to predict the behavior of locusts using individuals reared in crowded and isolated conditions. The model quantitatively showed that there were two clear phases and that our species was a true locust and accurately predicted which phase individuals were based on video assay. Using the model, a time course was generated to determine how long individuals must be in low density or high density to change to gregarious or solitary phase. Gregarization was found to occur in two hours; however, the change in behavior was incomplete suggesting that the density was not high enough to induce a complete change. The transition from gregarious to solitary was found to occur much slower than gregarization. Based on the results of the time course and incomplete gregarization a density course was generated to determine at what density individuals must be exposed to crowded conditions before they become gregarious. These individuals were found to become fully gregarious at a higher density than was used in the time course and was found in other species.

Room 410, Friday 5th April 9:45AM

Environmental conditions influencing spatial variability in predation risk to juvenile sharks in two Texas estuaries

Amanda J. Lofthus, Jeffrey R. Wozniak and Philip Matich

Estuarine nursery habitats provide refuge for juvenile organisms to grow and develop, and are typically characterized by lower predation risk than surrounding habitats. Juvenile bull sharks (*Carcharhinus leucas*) utilize estuarine environments as nursery habitats, and likely select specific estuarine habitats characterized by lower predation risk. This study investigated how abiotic factors (salinity, dissolved oxygen, water depth, temperature, and distance to nearest tidal inlet) along a freshwater – marine gradient influenced predation risk in two Texas estuaries: San Antonio Bay and Sabine Lake. Predation risk was classified as the presence of sharks greater than 1.6 meters in total length, and drumline sampling was used to assess the occurrence of predatory sharks in both estuaries. San Antonio Bay and Sabine Lake are structurally different, and differences in CPUE of large sharks varied between the two. Preliminary analyses indicate that predation risk is correlated with salinity and distance to the Gulf of Mexico in San Antonio Bay, but this same pattern is not seen in Sabine Lake. Understanding the effects of changing environmental conditions on predation risk will allow us to better understand bull shark nursery dynamics along the Texas coast, and identify important nursery habitats for this estuarine predator.

Room 401, Friday 5th April 10:45AM

Fish functional diversity changes along the longitudinal gradient of a species-rich tropical river

Edwin O. Lopez-Delgado, Kirk Winemiller and Francisco Villa-Navarro

Evaluation of different facets of biodiversity is critical to disentangle fish community assembly and to improve conservation planning. In the present study, we used a functional diversity approach to elucidate changes in functional diversity patterns and to identify mechanisms underlying community structure along a longitudinal gradient of a free-flowing tropical river. Fish assemblages were surveyed during the low-water period at 34 sites distributed from the source to the mouth of the Bitá River in the Colombian Llanos region. 132 species (2,219 organisms) were measured to calculate functional α and β diversity metrics. Functional richness was low along the entire basin and within river sections. In contrast, functional β diversity was high, with higher values of functional nestedness than functional turnover. Functional diversity metrics were not significantly different among the river sections. In addition, results from null models showed that 65% of the observed values were not different from random expectations. These findings suggest a combined effect of environmental filtering and stochastic dynamics along the longitudinal fluvial gradient.

Room 401, Thursday 4th April 9:15AM

Does wealth affect the quality of your drinking water? The relationship between gross domestic product (GDP) per capita and sampling effort in Brazil

Adriana Mendez-Jimenez

Toxic cyanobacterial blooms (CyanoHABs) are a growing water quality and public health risk in inland waters. In the USA, reports of CyanoHABs have increased in recent years, affecting 43 states, while globally they have expanded to at least 103 countries. Since they are recurrent, people are constantly exposed to cyanotoxins via drinking water. Chronic exposure to low levels of cyanotoxins is associated with neurological impairments, gastrointestinal and respiratory problems, as well as kidney and liver malfunctioning. In South America, knowledge about the diversity and distribution of cyanobacteria is increasing but remains limited. However, non-biological variables that could be causing differential exposure to cyanotoxins in humans are yet to be addressed. Understanding CyanoHAB's occurrence and frequency requires monitoring, which financial resources could curtail. Low wealth may also reduce the quality of drinking water available to the inhabitants of poorer regions. The objective of this research is to assess the impact of wealth on monitoring efforts at state and regional levels, and their implications to public health. I examine whether gross domestic product (GDP) per capita impacts the enforcement of water quality regulations, particularly sampling effort in Brazilian municipalities from 2007 to 2013. Brazil is the one country in the region with encompassing CyanoHABs legislation and monitoring schemes to help prevent exposure to cyanotoxins. However in Brazil, access to environmental resources and services has been differential, due to disparate wealth between the northern and southern states. Preliminary results suggest that sampling effort increases with GDP per capita.

Keywords: CyanoHABs, GDP per capita, water quality, legislation, public health

Room 401, Friday 5th April 9:15AM

Designing Power Grids to Mimic Food Webs

Varuneswara Panyam

The recent evolution of power systems has been marked by capacity addition and an increase in renewable energy integration. This evolution has resulted in bi-directional pathways with two-way exchanges between the grid and consumers that is beginning to resemble the cyclic organization of food webs. However, extreme events continue to affect power systems. Inherently robust and cyclic ecological networks present a rich source of robust design guidelines for modern power grids. Structural similarities between biological ecosystems and power grid networks support the application of ecological properties and analysis techniques to power grid design. A comparison between power systems and average ecosystem performance in terms of ecological metrics, substantiates the use of the ecological robustness and cyclicity as design principles to quantify network robustness and the effectiveness of two-way connections between the grid and consumers respectively. Preliminary results obtained for a set of 5 power grid networks show a positive correlation between increased structural cycling, ecological robustness in grids and reliability improvements measured by the North American Electric Reliability Corporation (NERC) standards N-X contingency analyses. These results suggest that the ecological metrics: robustness and cyclicity can play a collective role in quantifying and improving the robustness and sustainability of power grids.

Room 410, Friday 5th April 9:30AM

Preliminary Results from a Translocation of Dunes Sagebrush Lizards (*Sceloporus arenicolus*) in West Texas

Mickey Parker

The Dunes Sagebrush Lizard (*Sceloporus arenicolus*) is a habitat specialist that is restricted to the shinnery oak sand dune blowout formations in the Mescalero Sands of southeastern New Mexico and the Monahans Sandhills of west Texas. The species' high level of habitat specificity, coupled with its reluctance to cross roads, makes it unlikely that it can colonize new habitat or repopulate areas that have experienced local extinctions. In 2016, we began a project examining translocation as a conservation strategy for the lizard. Prior to this study, Dunes Sagebrush Lizards had not been detected in Crane County, TX since 1970. During the breeding season (April-June), we collected 36 adults from nearby populations and translocated them to a site in Crane County with suitable habitat that is contiguous with the historical locality. We used a soft-release strategy, keeping the translocated individuals in six temporary enclosures constructed from Animex® wildlife fencing. After an acclimation period, we removed the enclosures and monitored the translocated population using a trapping grid of 519 pitfall traps. In 2017, we conducted another round of translocation at the site with 34 adults and 6 hatchlings. Gravid females successfully laid clutches in both years. Monitoring in 2018 revealed that the lizards are persisting in small numbers and potentially reproducing at the site. We will continue monitoring the incipient population over the next year to examine growth, survival, reproduction, and dispersal. Here we will present findings to date and discuss factors that will likely affect the dynamics of the incipient population.

Room 410, Thursday 4th April 10:30AM

Who's adapted to the elephant? A critical analysis of gender and human-elephant interactions during firewood harvest

Lauren Redmore, Amanda Stronza, Graham McCulloch, Anna Songhurst and Lee Fitzgerald

In rural parts of the world where people and elephants share space, the potential for interactions between the two species can alter decisions made by both people and elephants. The panhandle of the Okavango River in northern Botswana exemplifies the challenges of coexistence in social-ecological systems as 18,000 elephants live amongst 16,000 people in remote mixed-use agro-pastoral savannahs. Households depend almost exclusively on firewood for energy and harvesting firewood in an elephant dominated landscape puts men and women at risk to unwanted interactions with elephants. Little is known about how men and women make firewood harvest decisions when there is a significant threat of elephants. Our research used interdisciplinary methods to examine how men and women harvest firewood in order to minimize their risk to elephants. We conducted 9 months of ethnographic research in the village of Mokgacha. We used participant observation and collected firewood 55 times total with 14 diverse households, recording times harvested, weights and origin of felling of firewood, and the firewood harvest experience. We surveyed men and women to understand how elephants influence firewood harvest decisions. We found that both men and women harvest elephant-felled firewood, but men are less likely to adopt risk-minimizing techniques during harvest, potentially putting them at greater threat to unwanted interactions. Understanding gender dynamics through adaptations to elephants provides key information for exploring human resiliency in an elephant-dominated landscape.

Room 404, Friday 5th April 10:45AM

The Conservation Action for *Xenomys nelsoni* (Magdalena Wood Rat)

Aaron Rose

The evolutionary importance of gene flow between divergent populations is increasingly apparent in the speciation biology literature. Such gene flow can result from anthropogenic disturbance to communication systems responsible for reproductive isolation between sympatric species. In aquatic environments, chemical signaling is particularly susceptible to disturbance, as pollutants may affect the production and/or reception of signaling molecules in a variety of ways.

Swordtail fish (genus *Xiphophorus*) have long served as a model in mate choice research, and the *X. birchmanni*-*X. malinche* hybrid zone in the rural Sierra Madre Oriental of central Mexico has developed as a model for behavioral ecology and evolutionary genetics. Species specific pheromones are integral to species recognition and mate choice in these fishes, but previous work shows that anthropogenic pollutants (specifically humic acid) can interfere with chemical communication and thus promote hybridization.

One such pollutant present in and around *X. birchmanni*-*X. malinche* hybrid zones is calcium hydroxide (pickling lime, $\text{Ca}(\text{OH})_2$) which is used to poison streams. While illegal, this environmentally-risky fishing method remains widely used, and the downstream effects on freshwater ecology are not well understood. To investigate the effects of non-lethal concentrations of $\text{Ca}(\text{OH})_2$ on mating preference in the olfactory modality, control and $\text{Ca}(\text{OH})_2$ exposed female *X. birchmanni* were assayed for preference for pheromone cues of conspecific males versus those of the hybridizing sister species *X. malinche*. Surprisingly, $\text{Ca}(\text{OH})_2$ exposure reversed preferences for species-typical signals, with exposed females preferring heterospecific male signals, a scenario which should facilitate genetic exchange between species.

Room 410, Thursday 4th April 11:15AM

Vertebrate Scavenger Access to Mass Mortality Events Impact on Associated Arthropod Community Structure

Samantha Sawyer

Mass mortality events (MMEs) are defined as a significant number of individuals dying within a given location in a small period of time (e.g., 17-yr-cicada, beached whales). Magnitude and frequency of these events have been increasing across taxonomic groups globally, causing high interest in recent years. However, the impact of MMEs on the environment are relatively unknown. Carrion insects contribute significantly to the nutrient recycling process with insects serving a major function. However, vertebrate scavengers function with these events are often times overlooked. With vertebrate scavengers and necrophagous insects competing for a food source, it is important to determine how the presence of these vertebrates alter the overall arthropod community associated with the process of recycling MMEs. Five independent mock mass mortality events utilizing donated feral swine (*Sus scrofa* L.) were created at Mississippi State University, starting summer 2016. Carrion biomass varied between 25 kg and 726 kg having both fenced and open treatments of each biomass. Sticky traps were placed 30 cm above the ground at each mock MME and were replaced as needed. Traps were sent to the Forensic Laboratory for Investigative Entomological Sciences (FLIES Facility) at Texas A&M University for arthropod identification to the family level. Multivariate analyses were used to determine differences between arthropod community composition with scavenger access and non-access treatments of varying biomasses. Highlighting the importance of scavengers and arthropods role in the decomposition of carrion after MMEs.

Room 401, Friday 5th April 10:15AM

Limb morphology of large mammal communities as an environmental predictor

Rachel Short

Conservation paleobiology uses the fossil record to increase the long-term understanding of biotic responses to environmental change and to inform ongoing conservation efforts of extant taxa. Ecometric analyses quantify assemblage-level functional trait responses to environmental change and can be used to estimate paleoclimates from fossils preserved in a community or assemblage from a past location and time. We provide ecometric models of Artiodactyla that can be used to improve our understanding of the relationship between morphology and environment through time using gear ratios calculated from linear measurements of calcanea and radioulnae. Artiodactyla has a nearly global distribution and taxa frequently overlap geographically to create a myriad of unique communities that are impacted by environmental change. Using community lists at 50km equidistant points, communities were sampled for mean and standard deviation of gear ratio as well as temperature, precipitation, and vegetation cover. A maximum likelihood approach was used to discern trait-environment relationships and to produce paleoenvironmental estimations. Finally, anomalies were calculated between the actual values and the estimated values. For precipitation, anomalies produced by the calcaneum ranged between -6.30 and 2.60 (mean = -0.26) whereas anomalies produced by the radioulna ranged between -6.77 and 3.24 (mean = -0.14). This suggests that community morphologies of calcanea and radioulnae can be used to estimate paleoprecipitation of paleontological communities. An understanding of past community morphology and responses to environmental changes will enable better predictions of responses to expected future changes.

Room 401, Friday 5th April 9:45AM

Unintended morphological effects of captivity in Mexican wolves (*Canis lupus baileyi*)

Leila Siciliano-Martina

A primary goal of the modern zoo is to promote in situ and ex situ conservation, including, in some cases, the reintroduction of captive species into the wild. Reintroductions represent a massive investment of time and resources; however, most do not succeed. When examining the causes of these failures, morphological differentiation is often overlooked. Changes to the cranial morphology of captive animals has been well-documented, including changes related to jaw strength and bite force, features of particular importance for subsistence in the wild. To assess the morphological variation occurring in captivity and its potential impact on reintroduction successes, I examined the cranial shape of captive, wild, and reintroduced Mexican wolves (*Canis lupus baileyi*) using 2D geometric morphometric techniques. Multivariate analyses of variation and principal component analyses indicate that captive lineages exploit a unique region of morphospace uninhabited by wild wolves. This trend is also apparent among reintroduced animals, suggesting that these changes are not due merely to phenotypic plasticity. The observed changes appear to occur within cranial regions commonly associated with jaw strength and bite force, which could have large implications for the diet and survival of reintroduced individuals. Zoos can act as genetic reservoirs for rare and endangered species; however, changes among captive populations could hinder their contribution to conservation. Habitat losses have placed an increasing burden on zoos, where additional captive generations may be required before considering a reintroduction, potentially leading to an accumulation of changes. Such results may have implications for captive species management and conservation practices.

Room 401, Friday 5th April 10:30AM

Population genomic insights into *Spodoptera frugiperda* migration and host strain hybridization

Ashley Tessnow, Tyler Raszick, Gregory Sword

The fall armyworm (*Spodoptera frugiperda*) is a major pest of corn, cotton, and sorghum in the United States, Mexico, Puerto Rico, South America, and more recently Africa. One of the major factors contributing to this insect's pest status is its high mobility, reportedly traveling up to 1600km in a single generation. Since *S. frugiperda* does not undergo diapause, in the United States this pest is only reported to overwinter in south Texas and south Florida, dispersing north into Canada from these overwintering sites each year. Interestingly, there is no evidence of a return migration in this species. As a result, this species is thought to exhibit a pied piper migration, with migrants traveling north in the spring, reproducing, and dying off in the winter rather than returning to their overwintering site. The objective of our study was to use spatiotemporal population genomics to implicitly test hypotheses related to the population structure and migratory patterns of fall armyworm populations originating at the Texas overwintering site. To do this, we collected moths from five locations and three time points across the Texas migratory route, and used ddRADseq to identify SNP markers. We then calculated pairwise F_{st} s to determine patterns of differentiation between each of our sampled populations. Understanding the migratory pattern of *S. frugiperda* can help us to enhance our pest management strategies and better control this pest throughout the season.

Room 404, Thursday 4th April 11:00AM

Improving Gene Editing Techniques with CRISPR Cas9 in the Yellow Fever Mosquito, *Aedes aegypti* (Diptera: Culicidae)

Benjamin Thomas, Justin Overcash, Zach N. Adelman

Millions of people yearly are infected with dengue or Zika viruses transmitted from the blood-feeding mosquito *Aedes aegypti*, primarily in tropical and subtropical regions. The use of CRISPR/Cas9 shows promise in developing control methods such as gene drive in *Aedes aegypti*. CRISPR/Cas9 can generate a double-stranded break (DSB) at a highly specific site in the mosquito DNA. To repair this DSB, different DNA repair pathways compete with each other followed repair which can result in an indel or in some cases genomic rearrangements. Classical non-homologous end joining (NHEJ) appears to be the dominant repair pathway in repairing DSBs in mosquitoes and is considered to be error prone while homology-directed repair (HDR) occurs less frequently and is thought to be more conservative (error free). Further information about the frequency of error prone and non-error prone DNA repair could improve usage of CRISPR/Cas9 in gene drive research where error free DSB repair is needed. In this study, plasmids were generated to quantify the amount of error prone and non-error prone DNA repair. The plasmids were made in a series of steps followed by sequencing to ensure the expected product formed. The resulting plasmids were then transfected into *Aedes aegypti*, embryonic cells and a dual luciferase assay was conducted to quantify luminescence, a proxy for DSB repair. More data providing insight for the mechanism of DSB repair in *Aedes aegypti* will be needed as it could serve to be useful in improving current gene editing and drive technologies. Keywords: *Aedes aegypti*, NHEJ, DNA repair

Room 404, Friday 5th April 9:45AM

The effects of pesticides on honey bee (*Apis mellifera*) queen mating frequency

Charlie Webb

Honey bees (*Apis mellifera*) are the key insect pollinator for 1/3 of human consumed food, making them important to U.S. and worldwide agroecosystems. Honey bees are declining for many different reasons, but the two honey bee health factors we were interested in examining are pesticides and queen quality. This work specifically examines the interaction and implications of pesticide exposure to immature queens. Some pesticides commonly found in U.S. colonies were purposely introduced by beekeepers in an effort to control the honey bee parasite, varroa mites (*Varroa destructor*). We were particularly interested in discovering if these pesticides affected our queens. We hypothesized that queens reared in beeswax containing field relevant levels of beekeeper-applied pesticides would be less reproductively fit than their pesticide-free reared queen counterparts. We contaminated the queen-rearing environment and then allowed the queens to develop under normal conditions after emergence from their beeswax pupal cells. After queens mated with area drones, we sacrificed them and took samples of their progeny in order to discover how many drones each queen had mated with. This measurement is known as queen mating frequency and is commonly used as a proxy measurement of queen reproductive quality and potential. Our findings show that queens reared in pesticide-laden environments had different mating frequencies than queens reared in pesticide-free environments. This study adds insight regarding pesticide and honey bee queen interactions and has large implications. Our work suggests beekeepers should moderate their pesticide use, as these pesticides have unintended consequences on the colony.

Room 410, Friday 5th April 10:45AM

Fecundity Compensation: Possible in the Sugarcane Aphid?

Crys Wright

The sugarcane aphid, *Melanaphis sacchari*, (SCA) (Hemiptera: Aphididae) is an economically important pest of grain sorghum, *Sorghum bicolor*, in southern United States. This aphid reproduces parthenogenetically, and under favorable conditions, its populations can exceed a thousand individuals per leaf. While some studies have assessed the effects of natural enemies (predators, pathogens, parasites, and parasitoids) on SCA populations, no study has measured SCA defenses. Fecundity compensation (i.e., a rapid increase in reproduction in response to natural enemies) is a defense mechanism that has been studied in few aphid species. If this were to occur in SCA, which is parasitized by *Aphelinus nigritus* Howard (Hymenoptera: Aphelinidae) and *Lysiphlebus testaceipes* (Hymenoptera: Braconidae) in Texas, the suitability of parasitoids for aphid biological control might be hindered. This study assessed the likelihood of fecundity compensation in SCA by testing its response to mechanical wounding simulating parasitoid oviposition.

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Poster #39

Silvicultural systems in southern bottomland hardwoods: a review of avifauna community response to forestry management practices

Crystal Alexander¹, Connor S. Adams¹, Kathryn R. Kidd¹, and Christopher Schalk¹

¹*Arthur Temple College of Forestry & Agriculture, Stephen F. Austin State University, Nacogdoches, TX 75962*

Bottomland hardwood ecosystems in the southeastern U.S. are regulated by naturally occurring disturbances. These disturbances drive ecological processes determining forest structure, composition, and function. Over the past century, changes in anthropogenic land-use and unsustainable forestry practices have altered natural disturbance regimes, resulting in the degradation and loss of bottomland hardwood forests. Despite recent ecologically-driven silviculture, these forests and their wildlife face continuing threats. Forest-dwelling birds are one species group that has experienced continual population declines and are needing effective forestry guidelines for conservation. Prior to guideline development, an analysis of forestry effects on avian communities and responses is needed. Therefore, we conducted a comprehensive review of 48 peer-reviewed publications on studies conducted in bottomland hardwood forests in the southern U.S. Specifically, these studies evaluated avian communities' response to forest canopy gaps created from natural and anthropogenic disturbances. Our results show that the most positive forest management practice for avifaunal communities was the implementation of uneven-aged systems, particularly through patch clearcuts. However, we also discovered numerous knowledge gaps in the literature, such as the lack of research on avian responses at multiple spatial and temporal scales. Future studies should focus on response differences in respect to the dynamic processes of succession, seasonal use by birds with varied life histories, and the role of behavioral ecology and habitat use of avifauna within canopy gaps. Directing future studies to fill these knowledge gaps is critical to the development of effective bottomland hardwood forest management aimed at conservation of forest-dwelling birds.

Poster #18

Divergence times among hybridizing gamefowl

James Alfieri

Hybridization between species has been observed for centuries and across the tree of life, despite many genetic and environmental barriers preventing it. Interestingly, birds are especially capable of producing fertile hybrid offspring. To explore what factors govern hybrid fertility, I collected data from historical natural hybrid and artificial cross accounts in the literature and performed a meta-analysis. Preliminary data suggests that hybrid fertility depends on phylogenetic distance of the mating pair. Specifically, I found that crosses producing fertile offspring were composed of mating pairs having diverged a maximum of 6.85 MYA, versus non-fertile offspring having parents that diverged 17.05 MYA. Additionally, results are in accordance with Haldane's rule. These results indicate the presence of a sex-linked genetic incompatibility that may explain why certain hybrids are successful.

Poster #1

Effects of Climate Change on *Anaplasma phagocytophilum* infection risk in Minnesota and Wisconsin from 2005 to 2015

Adam Baker

The human incidence rate of anaplasmosis has been increasing in recent years within the United States, especially in Minnesota and Wisconsin. Some researchers have demonstrated that climate affects the distribution of tick-borne diseases. Thus, we aimed to identify the relationship between climate factors and *Anaplasma phagocytophilum* infections in Minnesota and Wisconsin from 2005 to 2015. We analyzed an extensive set of incidence cases collected by the Wisconsin Department of Health Services and the Minnesota Department of Health, as well as climate data from the National Oceanic and Atmospheric Administration using multiple linear regression models. We expected that the anaplasmosis infection rate would be correlated with some climate factors.

Poster #33

Early generation hybrid evolution in swordtails

Richard Bovio

Hybridization is a common phenomenon that serves as an important evolutionary mechanism by which diversity can arise. When two genetically divergent species hybridize, the resulting admixture generates novel genotypic and phenotypic combinations that selection can act upon. We study two freshwater species of fish, *Xiphophorus birchmanni* and *X. malinche*, that form natural hybrid zones to uncover the genotypic and phenotypic evolution of hybrid populations. *Xiphophorus malinche* are found at high elevations while *X. birchmanni* are found at lower elevations – at intermediate elevations, hybrids form. To explore the effects of selection on early generation hybrid populations, we've seeded replicated mesocosm stock tanks at high, intermediate, and low elevations with F1's. Each treatment will experience divergent natural selection with respect to temperature. Meanwhile, sexual selection via mate choice may facilitate or impede the evolutionary trajectory of different thermal regimes. Twice a year we genotype and phenotype these experimental hybrid populations. Our current dataset includes a fraction of the first two to three generations and we can already begin to see trends that align with theoretical expectations (i.e. a greater proportion of the genome is skewed towards *X. malinche* ancestry at high elevations and towards *X. birchmanni* at low elevations). The next step to this project is to construct pedigrees from each replicate and correlate genotype and phenotype with mating success.

Poster #9

Spatial and temporal variation in benthic macroinvertebrate assemblage structure in salinized reaches of the Pecos River

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In the Permian Basin region of Texas, salinization has occurred in the Pecos River as natural saline inputs have been exacerbated by flow-regime change and other anthropogenic impacts. Recent studies have shown that fish diversity has declined with salinization in the Pecos River, but impacts on benthic macroinvertebrate assemblages have not been examined in recent decades as salinization has intensified. In this study, we deployed Hester-Dendy multi-plate samplers for 6-8 weeks in summer and fall 2017 to assess the structure of colonizing benthic macroinvertebrate assemblages at three sites in the lower Pecos River (two in the salinized Permian Basin region, one in the Edwards Plateau region). Invertebrate biomass and taxonomic richness was lowest in the salinized Permian Basin sites, with assemblages dominated by dipteran taxa. As specific conductance decreased and habitat heterogeneity increased in the Edwards Plateau reach, more diverse benthic macroinvertebrate assemblages colonized the samplers. Additionally, diversity of benthic macroinvertebrates and biomass increased from summer to fall. Results of this work add to our understanding of how river salinization affects ecological communities. Because river salinization is a common issue in dryland regions, and it is expected to increase with climate change, such information is important for conservation and management.

Poster #16

A Spatial and Temporal Analysis of Texas Bays and Marine Species

Fiala Bumpers

Temporal and spatial analysis of marine species distributions within the Gulf of Mexico is important in recognizing trends as to how their population dynamics change. Recognizing these trends can help fisheries and bay managers take precautionary action to better manage species important to a system and prevent biodiversity loss. This paper explores (1) the spatial variability between the Upper and Lower Laguna Madre bay systems and its effects on seagrass species distribution; (2) how the abundance of fish and invertebrate species across all Texas bays are changing over time and space. Species observation data collected by TPWD for 10 bays in the Gulf of Mexico; over 35 years (between 1982-2016); across three sampling methods (gillnet, bag seine, and bay trawl); for over 1200 species of fish, invertebrates, and vegetation were analyzed in the R Studio Programming environment. SOMs were created to determine differences in environmental variables between the Upper and Lower Laguna Madre. Linear regression and related analysis were performed on the fish and invertebrate species observance data to determine their changes across bays (space) and over time. The findings for this study will allow for more accurate species distribution trends to be recognized than previous studies, and allow for the exploration of the use of SOM tools in marine species distribution analyses.

Poster #7

Spot-on: Using melanistic spots to identify individual Shoal Chub (*Macrhybopsis hyostoma*, Gilbert, 1884)

Chase A. Corrington and Joshua S. Perkin

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Documenting dispersal and conducting mark-recapture analyses for diminutive fishes is difficult because of constraints imposed by small body size and consequently limited availability of internal or external tags. One possible solution for tracking small-bodied fishes is to use natural markers such as spots composed of melanophores. These natural markers can be combined with computer-assisted photo identification methods to identify individuals. The Shoal Chub (*Macrhybopsis hyostoma*) in particular possesses unique constellations of lateral spots that may allow for individual identification, which might represent an improved approach to documenting dispersal and marking small fishes in large river systems. In this study we assessed the utility of natural markers for identifying individual Shoal Chub, first using preserved specimens and then using live individuals tagged with passive integrated transponder (PIT) tags. Preliminary results suggest individual Shoal Chub can be identified from photographs, and computer-assisted programs such as I³S Spot hold promise for rapid identification of large numbers of individuals. Our work provides a methodology for identifying and validating natural markers and has implications for the ecology and conservation of diminutive fishes across a range of waterbodies.

Key words: native fish conservation; species distribution modeling; computer-assisted photo identification; landscape ecology; natural fish markings

Poster #10

Revisiting the coastal marsh grass assemblages of Anahuac National Wildlife Refuge: an investigation of changes in marsh structure

Danielle DeChellis

Coastal marshes provide many ecosystem services, but they are increasingly threatened by anthropogenic activities and climate change. The flood damage caused by unprecedented rainfall during Hurricane Harvey is a possible example of the consequences of removing wetlands. Similar scenarios may become more common as coastal populations expand while sea levels and hurricane events increase. This study assessed the East Texas Chenier Plain at Anahuac National Wildlife Refuge to highlight species composition changes in marsh grass assemblages since the Johnson study in 2010. Species composition data of fifteen plots distributed across Anahuac NWR was collected and analyzed using a cluster analysis that organized the plots into assemblages. Four marsh grass assemblages could be identified from the 2018 data and the corresponding 2010 data. Seven plots were classified in the same assemblage in both studies and eight plots were assigned to different assemblages in this study. In plots with large shifts in species composition, knowledge of species' tolerance ranges was applied to suggest how marsh zones have evolved. Potential effects of elevation, salinity, inundation frequency, and management practices on the Anahuac marsh community were identified and applied to the results as well. Changes in vegetation diversity between the studies were most likely caused by unpredictable inundation periods characteristic of microtidal systems like Galveston Bay and which determine salinity. Marsh structure is defined by many interacting ecological variables occurring over gradients and their inclusion in future comprehensive studies of Galveston Bay is necessary to draw more accurate conclusions on the drivers behind changes.

Poster #30

Determinants of *Tubastraea coccinea* invasion and likelihood of further invasion in the northern Gulf of Mexico

Zakary C. Derouen and Miranda R. Peterson

Invasive species have large economic and ecological impacts, including agriculture losses, native species replacement, ecological function modification, and altered community structure. Despite this, invasive marine species are relatively understudied. The orange cup coral, *Tubastraea coccinea*, is the first scleractinia to invade the Western Atlantic. The coral is shown to have negative effects on native reef corals and has been spreading to natural reefs within the Gulf of Mexico (GoM). Our objective is to document the recent range expansion of *T. coccinea* throughout the GoM, compare the current range with a previous study, identify the factors for its distribution, and project the potential range of invasion. To accomplish our objectives, we will obtain occurrence records and associated environmental data to develop a species distribution model. Considering the threat that *T. coccinea* presents to native reefs within the GoM, it is important to be able to track and predict its distribution, as well as identify potential factors facilitating its invasion.

Poster #2

Prolonged inundation affects water-use strategies in bottomland oaks

Ajinkya G. Deshpande, Luiza M.T. Aparecido, Georgianne W. Moore

Columbia bottomland hardwoods is a network of riparian forests in the floodplain created by three major rivers in south-central Texas. Larger streams further divide into bayous, which flood to form sloughs, inundating large swaths of forests for prolonged periods. Plants in such habitats are known to cope with this hydrological heterogeneity. However, response of tree water-use to flooding early in the growing season and transitioning to water deficits in the later stages is still largely unestablished since different sequences of inundation and drought can affect plant survival and growth differently. The aim of this study was to 1) Assess how inundation affects tree water use. 2) Investigate changes in seasonal water use among upland and inundated trees as wetter conditions gradually diminish. 3) Understand how inundation affects tree water-use in response to changes in atmospheric dryness (vapor pressure deficit). We measured sap flux density continuously in 5 seasonally-inundated trees and 5 upland trees (all *Quercus sp.*). The upland trees had consistently higher sap flux rates ($1790 \text{ kg m}^{-2} \text{ day}^{-1} \text{ tree}^{-1}$) throughout the growing season as compared to inundated trees ($744 \text{ kg m}^{-2} \text{ day}^{-1} \text{ tree}^{-1}$). However, a larger proportion of this water uptake occurred in the spring (March 7-May 31, 2018). During spring, rates averaged $2114 \text{ kg m}^{-2} \text{ day}^{-1} \text{ tree}^{-1}$ in upland trees and $837 \text{ kg m}^{-2} \text{ day}^{-1} \text{ tree}^{-1}$ in inundated trees. As wet conditions diminished over the summer (May 31-July 16, 2018), sap flux rates dropped more sharply in upland trees ($1086 \text{ kg m}^{-2} \text{ day}^{-1} \text{ tree}^{-1}$) as compared to inundated trees ($542 \text{ kg m}^{-2} \text{ day}^{-1} \text{ tree}^{-1}$). Response of water-use was much strongly correlated to VPD during spring ($R^2 = 0.49$ for upland and $R^2 = 0.63$ for inundated) than summer ($R^2 = 0.14$ for upland and $R^2 = 0.17$ for inundated). Inundated trees show suppressed water uptake despite having higher water availability indicating flood stress possibly resulting in stomatal closure. However, much higher overall sap flow during spring inundation as compared to dry summer conditions indicates lower physiological flexibility. Thus, although the trees are wetland-adapted, the period and timing of inundation critically affects the water-use strategies of trees that are seasonally flooded.

Poster #6
Blake Elkins

The sugarcane aphid (*Melanaphis sacchari* Zehntner) continues to be a major pest of sorghum throughout the United States. A diverse array of insect natural enemies have been reported to respond to the sugarcane aphid in sorghum and represents the potential for biological control of this pest. Insect natural enemies, aphids, and plant damage were surveyed during the field season at several locations from the south to the south central part of the great plains. Differences in the abundance of several taxonomic groups of insect natural enemies were analyzed. Further work will elucidate potential environmental and landscape factors that influence natural enemy communities of the sugarcane aphid in sorghum. This analysis represents a preliminary evaluation of natural enemy communities and will continue for multiple years.

Poster #14

Integrating multiple genomic datasets to understand stress adaptation in the serpentine endemic *Caulanthus amplexicaulis*

Elyssa Garza

Serpentine soils are characterized by limiting nutrients (e.g. Ca, N, P, K), low water retention, and high levels of toxic heavy metals. The diploid jewelflower, *Caulanthus amplexicaulis* var. *barbarae* (*Cab*), is endemic to these soils and has developed strategies to overcome these stressful conditions and sustain a small population in serpentine-containing areas. To understand the changes accrued in the stressed *Caulanthus* genome over time, the *Cab* genome was compared to its granite-living sister variety, *Caulanthus amplexicaulis* var. *amplexicaulis* (*Caa*). We have assembled, analyzed, and annotated both *Cab* and *Caa* genomes (~372 Mb size; 14 chromosomes). Genomic datasets from Recombinant Inbred Lines (RILs) and parental plants will be combined using several bioinformatic tools to construct a high-resolution linkage map of the *Caulanthus* genome. This map will serve as a reference to incorporate RNA-Seq expression data and QTL phenotypic data, which will allow the identification of candidate genes involved in serpentine endemism and tolerance.

Poster #4

Correlating Body Condition and Habitat Management of Wintering Duck Populations in Texas Wetlands

Allison Guggenheimer

Texas is a critical stopover and wintering location for waterfowl. Poor body condition on wintering grounds can have long-term impacts on populations via survival and later breeding success. My study seeks to understand the trends and factors affecting body condition in green-winged teal (*Anas carolinensis*), blue-winged teal (*Anas discors*), northern pintail (*Anas acuta*), gadwall (*Anas strepera*), and northern shoveler (*Anas clypeata*). I hypothesize that (1) ducks at highly managed native wetland habitats will be in the best body condition; (2) body condition trends throughout the winter (November-January) will be species, sex, and age-dependent, but will generally be stable until the spring equinox in March when mass will increase for migration; and (3) ducks collected after extreme weather events will be in poorer body condition than those collected after a milder season. Using over 1000 bodies salvaged from hunters from 2017-2019 I am analyzing morphometric measurements, mass, gizzard fat, corticosterone (the primary avian stress hormone), and stable isotopes to form a picture of body condition and diet shifts. This information compared to habitat variables and management techniques where birds were collected will have the potential to impact land management practices on waterfowl wintering grounds, providing benefits to both land managers and waterfowl populations. Physiological condition can provide an early signal of long-term population trends, thus, this research could shed light on hidden threats to waterfowl.

Poster #15

Analysis of genetic diversity in pataxte (*Theobroma bicolor* Humb & Bonpl) and cacao (*T. cacao* L.) from the Mexican southern states of Tabasco and Chiapas

Hernandez-Montes F. S., De La Rosa-Reyna X. F., Rodriguez-Castillejos G.C., Castañon-Najera G. and Ruiz-Salazar R.

Cacao (*T. cacao* L.) is one of the most important crops worldwide and in Mexico where it is originated. However, there is another native species grown locally in the southern states of Tabasco and Chiapas, the pataxte (*Theobroma bicolor* Humb & Bonpl). Phenotypically cacao and pataxte are very similar and they share the same geographical origin but little is known about their genetic relationship. The objective of this research was to conduct an analysis of genetic diversity among native species of cacao and pataxte in south Mexico. We collected 46 accessions, which included four cacao genetic groups (Calabacillo, Guayaquil, Criollo rojo and Criollo blanco) and one pataxte. DNA purification was performed in order to amplify two microsatellite markers, MTcCIR11 and MTcCIR12 previously reported in genetic diversity studies of cacao. For the diversity analyses we calculated the diversity indexes such as the number of alleles by population, effective number of alleles (n_e), observed and expected heterozygosity, Hardy-Weinberg equilibrium and inbreeding coefficient. The allelic range observed in MTcCIR11 was 121-313 bp and in MTcCIR12 was 190- 232 bp. For each marker we found five alleles with an effective number of alleles by genetic group of Calabacillo=1.78, Guayaquil=2.63, Pataxte=2.69, Criollo Rojo=1.5 and Criollo Blanco=4. Observed heterozygosity was lower than the expected with exception of criollo groups. In the AMOVA test we found a variance of 5% between populations and 67% among individuals from different populations. Our partial results point that the highest n_e is found within the criollo species of cacao.

Poster #17

Advertisement Calls for Eleven Anuran Species from the Bolivian Gran Chaco

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Anuran advertisement calls play a vital role in sexual selection and species recognition. Male anurans produce species-specific calls that serve to attract females for mating opportunities. These calls are also an important character to help define taxonomic entities. Here we describe the advertisement calls of eleven anuran species from the Gran Chaco ecoregion of Bolivia. We then compare the calls of the Bolivian Chaco species to calls of conspecifics in other regions of South America to explore geographic variation in call parameters. Call recordings were collected in the field using SM2 song meters deployed at seven different ponds from January-October 2011 and analyzed using Kaleidoscope and Raven Pro 1.5. Call parameters measured included call duration, dominant frequency, number of notes per call, number of pulses per note, and pulse rate. To our knowledge, the calls of two species, *Phyllomedusa sauvagii* and *Pleurodema guayanae*, are described here for the first time. The calls of the other nine species, *Rhinella major*, *Rhinella schneideri*, *Ceratophrys cranwelli*, *Scinax nasicus*, *Leptodactylus bufonius*, *Physalaemus albonotatus*, *Physalaemus biligonigerus*, *Odontophrynus americanus*, and *Dermatonotus muelleri*, have been previously described from other localities. The results showed that call parameters of the Bolivian Chaco frogs overlapped in the range of the call parameters of conspecifics from other localities. Results from this study provide the first descriptions of call parameters for these species in this region. These results provide characters that can be used in future studies that use an integrative approach to understanding evolutionary relationships and their classification.

Poster #22

Characterization of the Sugarcane Aphid Microbiota

Jocelyn Holt

The sugarcane aphid (*Melanaphis sacchari* (Zehntner), SCA) was first reported on sugarcane in the continental USA in Florida in 1977 and in Louisiana in 1999. In 2013 SCA abruptly became a serious pest of sorghum and is currently a sorghum pest in twenty-two states across the continental USA. We assessed whether changes in microbiota composition may explain the SCA outbreak in USA sorghum. Samples were collected from Louisiana before the 2013 pest outbreak and from four states (Alabama, Florida, Louisiana, Texas) after 2014. We characterized the SCA bacterial microbiota on sugarcane and grain sorghum, using taxon-specific PCR primers and a metabarcoding approach. All SCA harbored the obligate symbiont *Buchnera aphidicola*. Interestingly, none of the facultative bacteria typically associated with aphids (e.g., *Arsenophonus*, *Hamiltonella*, *Regiella*) were present in either the PCR screens or metabarcoding data. However, metabarcoding detected bacteria not previously identified in aphids (e.g., *Arcobacter*, *Bifidobacterium*, *Citrobacter*, etc.). Lastly, we found microbial host-associated differentiation in aphids that seems to correspond to the genetically distinct aphid lineages that prefer to feed on grain sorghum (MLL-F) and sugarcane (MLL-D).

Poster #23

Caudates as prey: Predator diversity and size-relationship patterns

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Predators play important roles in ecological communities that can affect both their structure and function. Salamanders are prey to a variety of predators that differ in their foraging tactics (e.g. specialists vs. generalists), morphology, behavior, and ecology. Salamanders are an ideal group to explore and quantify patterns that may affect the evolution and persistence of defensive strategies. Here we examined patterns of predator diversity and body-size relationships of salamander species and its predators. We compiled observations predator-prey interactions using natural history notes from Herpetological Review (1975-2018) and Herpetology Notes (2008-2017). Our database contains 156 salamander predator-prey interactions comprised of 68 salamander species that were preyed upon by 88 predator species from 30 orders. Snakes were the most frequently reported predators (35% of predations reported), followed by salamander predators (24% of predations reported), and birds (16% of predations reported). Exploring the body-size relationship of the salamander prey, and both snake and salamander predators were consistently eating salamander prey that were smaller than themselves. This pattern is likely attributed to the fact that both types of predators are gape-limited, and are unable to eat prey that attain a certain size refuge. These patterns can serve to help generate hypotheses on the defensive strategies of salamanders.

Poster #24

Preliminary Investigation of Toll-Like Receptor 1B in Chihuahuan Desert Ecoregion Species of Interest

Katrina D. Keith, Gary Voelker and Ricardo Canales

Toll-like receptors (TLRs) are an important structure that acts as a functional bridge between the innate and active immune system responses. Our study focuses on 6 of the toll-like receptors found in birds. We are investigating the genetic diversity of the critical immune structures, in species considered to be “species of interest” by Texas and Mexico. These species migrate to isolated “sky islands” in the mountains of the Chihuahuan Desert Ecoregion. Our goal is to assess if the functional diversity of these populations is different between populations, show and spatial variation in parasite-mediated selection and malarial infection (*Plasmodium*, *Haemoproteus*, and *Leucocytozoon*). Our preliminary results after the first of two field seasons will report on a narrower dataset: TLR1B in the Painted Bunting (*Passerina ciris*).

Poster #36

Preliminary Analysis of Predation by Arthropods on Cordaites in Carboniferous Coal Balls

Scott Lakeram

Pennsylvanian coal balls contain rich fossil assemblages of plant debris and invertebrate material. They are our primary resource for understanding paleoecological interactions during the Pennsylvanian. Arthropod coprolites containing cordaite-pollen often occur in the reproductive cones of *Cordaite* (an extinct relative of conifers) preserved within coal balls. Little work has been done within the literature to identify the spatial relationship between coprolites and plant debris. Using an established collection of coal ball thin sections from the Cliff Land coal bed in Iowa, 50 Cordaitian reproductive cones were analysed using light microscopy for pollen and vegetation filled coprolites within the cone and around the peat matrix. Pollen filled coal balls were primarily found within reproductive cones. A small percentage of vegetation filled coprolites were found within reproductive cones with a majority being found within the peat matrix. Predation of pollen in cones are occurring in one of two places, during maturity in the canopy by palynivores or in fallen material on the swamp floor by detritivores. Ongoing spatial analysis will examine coprolite content and proximity in coal ball peels, SEM imaging will be used to analyze pollen spores within coprolites to confirm that they are of Cordaitian origin. To date a high proportion of pollen filled coprolites have been found primarily occurring in Cordaitian reproductive cones indicating one of the earliest evidences of palynivory.

Poster #32

Everything's sweeter in Texas? A chemical and palynological analysis of honey in Texas

Pierre Lau

Honey bees use nectar as their main source of energy to fuel colony growth and development. Nectar is consumed throughout the year and stored as honey for the winter to suffice a colony's heavy bias towards carbohydrate consumption. Understanding the floral resources collected by colonies in a region will likely aid in the identification and promotion of certain plant species to enhance honey bee colony health in those landscapes. The goal of this study is to identify the floral sources foraged by honey bees throughout the ten unique ecoregions in state of Texas. With the help of the Texas Beekeepers Association, we conducted a palynological analysis of 116 honey samples provided by participating beekeepers whose colonies were located throughout Texas. The pollen in each honey sample was extracted, acetolyzed, identified, and classified in frequency categories depending on each taxon's relative abundance. Key characteristics associated with adulterated honey were also analyzed with Nuclear Magnetic Resonance (NMR) spectroscopy. We found at least 130 unique pollen types in honey including *Triadaca*, *Mimosa*, *Ulmus*, *Prosopis*, and *Rhus*. There were no significant differences in honey pollen diversity in each of our Texas ecoregions. Our chemical analysis detected approximately 9% of our honey to be adulteration. This information suggests that beekeeper management practices may have a significant impact on the honey bees produce. This study will help us better understand honey bee nectar foraging preferences and serves as a foundation for future studies focused on honey bee nutrition and floral preferences in Texas.

Poster #26

Biomedical Engineering

Kenith Meissner

The current market does not contain a low-cost machine capable of building optical surface mounted devices (SMDs). This project attempts to design a machine capable of handling optical parts which are highly sensitive components that rely on accurate placement. The machine will be a mixture of existing technology and specifically designed parts. This machine was designed around a Computer Numeric Control (CNC) machine frame (OpenBuilds). A controller conducts all actions performed by the machine. These actions include motion along x-, y-, and z-axes along with rotational motion. There is also a dual-camera subsystem which helps the user to determine ideal optical part placement. The machine is reprogrammable by using opensource software. Overall, it will provide optical SMD design capability to a larger population by decreasing the cost of such a machine. These capabilities can be used to create boards for applications in biomedical imaging, prism systems for lasers and optical interferometry, to name a few (G&H).

Poster #13

Fish taxonomic and functional diversity in an East Texas urban stream

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Urbanization is one of the leading threats to freshwater biodiversity, and urban areas continue to expand globally. Here we examined taxonomic diversity, functional diversity, and the functional trait–environment of stream fish assemblages in La Nana Creek, an East Texas urban stream. First, we compared the taxonomic diversity of fish assemblages using historical data (surveys conducted in 1950 and 1990) and contemporary surveys (2017-2019) using relative species richness and relative abundance. Then, we used contemporary data to examine changes in species richness and functional diversity along an urbanization gradient, from less urbanized (upstream) to more urbanized (downstream). Traits linked to feeding, locomotion and habitat use were measured in fishes from these sites. Relationships between functional traits and environmental variables were also measured and examined via multivariate ordination analysis. Compared to historical surveys, we observed an increase in species richness in surveys from 2017-2019. Some non-native species were also observed in contemporary surveys. Surveys conducted along the main stream of La Nana Creek during 2017-18 suggested an increase of species richness along the gradient with sites in middle and lower reaches containing more diverse assemblages. Functional diversity of assemblages also increased with species richness along the gradient, and traits related to swimming, habitat preference, and food resource use were associated with local variables including substratum type and depth. Our results suggest that contemporary resurveys are an important tool for examining how freshwater taxa are responding to recent environmental change.

Key words: Fish assemblages, Functional diversity, Land use, Lotic systems, Texas, Trophic ecology

Poster #35

Leaf destruction by *Melampus coffeus* in basin and fringe mangrove swamps, Barnes sound, Key Largo, Florida

Samuel H. Neely and Anne Raymond

We studied the ichnological signal of crab herbivory (*Aratus pisonii*) and snail detritivory (*Melampus coffeus*) in two sites within a mangrove swamp at Barnes Sound, Key Largo, Florida: a basin site, which is inundated and has thick leaf mats (19-37 stacked leaves); and a fringe site, where the peat surface is generally exposed and has thin leaf mats (0-4 stacked leaves). We hypothesize that most leaves in the surface litter reflect both herbivory by *A. pisonii* and detritivory by *M. coffeus*; however, detritivory by *M. coffeus* may obscure the ichnological signal of *A. pisonii*. From each site, 25 leaves were targeted to analyze leaf selection and feeding behaviors of *M. coffeus*. The abundance of snails, leaf surface preference, and percentage of consumed leaf were recorded. The abundance of snails per leaf surface from each swamp was non-significant. Snail consumption was higher on fringe than basin leaves (30% to 23%). Snails preferred to feed on lower leaf surfaces in fringe mangroves ($p=0.045$). Snails in basin mangroves portray a strong preference to consume lower surfaces of leaves ($p=0.014$). *M. coffeus* are pulmonates that retreat from the leaf mat when the peat surface is flooded; inundation could shield the leaf mat from detritivory, which could explain thicker leaf mats in basin mangroves than in fringe. A higher frequency of consumption on the lower leaf surface by *M. coffeus* may indicate they prefer leaves that have been scraped by crabs; this would obscure the ichnological signal of crab herbivory; thus, it would be underreported.

Poster #5

Old-growth grasslands and savannas worldwide are more species-rich than their secondary counterparts

Ashish N. Nerlekar and Joseph W. Veldman

The concept of “old growth”, long applied to forests, now also encompasses ancient grassland ecosystems, including savannas and open-canopy woodlands. Most old-growth grasslands are composed of plant species that evolved to tolerate frequent fires and megafaunal herbivory. Because these frequent aboveground disturbances, which are critical to grassland biodiversity, limit tree cover, many old-growth grasslands are misinterpreted as early successional or secondary vegetation. Complicating matters, true secondary grasslands – which form on land recovering from tillage agriculture and afforestation – can appear superficially similar to old-growth grasslands. The old-growth grassland concept predicts that herbaceous plant species-richness should be greater in ancient grasslands compared to these recently formed secondary grasslands. We tested this hypothesis at the global scale in a meta-analysis (based on log-response ratio) of 26 studies and found that richness of old-growth grasslands was two-fold greater than secondary grasslands (mean effect-size= -0.48, $p < 0.001$). Although we expected richness to increase with secondary grassland age, the time since abandonment was uncorrelated with the recovery of plant diversity ($r^2 = 0.02$, $p = 0.184$). Our results confirm that the distinction between old-growth grasslands and secondary grasslands is an important predictor of herbaceous plant species richness and highlights the slow recovery time of grassland plant diversity after destruction by intensive soil disturbance or fire exclusion.

Poster #40

Population genetics of wild and cultured populations of the African bonytongue, *Heterotis niloticus* in Nigeria

Tofunmi E. Oladimeji, Michael O. Awodiran, Kirk Winemiller and Luis A. Hurtado

Heterotis niloticus constitutes an important freshwater, commercial and subsistence fishery in Nigeria and other African countries. This fish attains very large size, being heavily targeted by fishermen. However, recent studies have reported that *H. niloticus* may be seriously endangered in many Nigerian waters. Despite its importance, there are no studies on the genetic structure of this fish in Nigeria. In this study, we characterized genetic diversity and structure for *H. niloticus*, using microsatellite markers, in four major rivers and two aquaculture farms in Nigeria. These results provide information that would enhance making informed decisions about conservation and management strategies of the populations of this species and improve aquacultural plans in Nigeria.

Poster #3

Cattle Grazing Impacts on Small Mammal Populations in South Texas

Alexis Pence

Texas A&M Department of Wildlife and Fisheries Sciences

Livestock grazing is known to affect ecosystems and alter wildlife composition. Small mammals are one taxa that respond quickly to environmental change and are known to be indicator species for ecosystem quality. The goal of our project was to determine how various cattle grazing regimes affect small mammal communities in southern Texas rangeland that is dominated by Tamaulipan Thornscrub and Coastal Sand Plain. We conducted a mark-recapture study of small mammals over four consecutive years (2014-2018), cattle were deferred during Year 1, whereas cattle were grazed following 4 different grazing treatments Years 2–4. Throughout February and March, Sherman traps were arranged into grids at several locations across the East Foundation's San Antonio Viejo Ranch. Substantial changes in the small mammal populations due to overgrazing could have cascading effects on the ecosystem since they are an important food source for larger, carnivorous animals and can be a sign of declining rangeland health. Understanding how grazing pressure affects the small mammal community will allow landowners and managers to successfully manage their rangelands. Our findings suggest that following years of grazing, abundance and overall species compositions differs with varying levels of grazing pressure. These baseline data will be useful for further studies aiming to understand the community impacts on small mammal populations of various grazing regimes.

Poster #29

Seasonal variation in trophic structure of amphibians and snakes of a Ramsar site in southern Brazil: an isotopic approach

Marluci Muller Rebelato, Rodrigo Ferreira Bastos, Alexandre Miranda Garcia, Kirk Winemiller, Laura Verrastro and Alexando Marques Tozetti

Wetlands are highly productive systems that support great biodiversity worldwide. The Taim Ecological Station is considered an important Ramsar site for aquatic biodiversity in south Brazil, but knowledge on food web structure in the is very scarce. Hydrology in Taim wetlands is regulated by seasonal rainfall, resulting in remarkable periods of dry summer and wet winter. Because hydrology is a major factor regulating food web interactions, we investigated potential variation in the trophic ecology of amphibians and snakes with seasonality. We sampled carbon and nitrogen stable isotopes for amphibians and snakes, and for available sources, which included suspended particulate organic matter, filamentous algae, aquatic macrophytes, and grasses from terrestrial habitats. We used stable isotope analysis to estimate the trophic position of consumers, and we assessed whether niche width of consumers varied between seasons using standard ellipse area analysis. We also used mixing models to investigate the potential contribution of sources supporting the consumers between seasons. All consumers showed higher trophic position during the dry season, indicating that both amphibians and snakes feed on higher trophic level sources in the wet season. Isotopic niche area was smaller in the dry season, suggesting that available sources are less diverse during the dry season. Regardless of the season, seston and filamentous algae were the most important sources for amphibians. For snakes, the most important sources were seston and aquatic macrophytes. Terrestrial grasses contributed more to snakes than to amphibians, as expected due to differences in habitat used.

Poster #20

Population diversity and genetic structure of blackfin tuna (*Thunnus atlanticus*)

Rios-Rodriguez J. R., Nuñez Mata Y. M., Rodriguez Castillejos G. C., De La Rosa Reyna X. F. and Martinez Montoya H.

Blackfin tuna is the smallest member within the *Thunnus* genus; the species inhabits the warm waters of the Western Atlantic, from Massachusetts to the shore of Rio de Janeiro in Brazil. Unlike other tuna species, genetic diversity and genetic stocks existent in blackfin tuna are poorly known. The main objective of this study was to calculate the genetic diversity and genetic structure of blackfin tuna within its geographical range. In total we used 108 mitochondrial COI sequences, including 107 previously reported in several databases (BOLDsystems and NCBI) and one additional sequence from an individual collected in Matamoros, Mexico. The genetic analysis was performed with a 540 bp fragment. Haplotypes were analyzed using a Median Joining Network method. In total we observed 20 haplotypes clustered in two main clades with 17 and 3 haplotypes. We observed a nucleotide diversity of $\pi=0.95$, 22 segregating sites and ten parsimony informative sites. For AMOVA we tested two structures, one between haplotype groups (haplotype A and B) and between geographical site (North Atlantic, Gulf of Mexico, Caribbean sea, Central Atlantic, Atlantic and South Atlantic). The highest variance was observed among haplotypes with 69.09% and 39.9% explained within haplotypes ($F_{ST}=0.60$; $p=0.000$). In the analysis by geographic origin, 82.83% of variance was explained within populations and 17.16% among populations ($F_{ST}=0.17$; $p=0.008$). Our preliminary results, revealed two main clades, including North Atlantic, Gulf of Mexico, Caribbean Sea, South Atlantic and Atlantic in clade A and the Caribbean Sea, Center Atlantic and Gulf of Mexico in clade B.

Poster #37

Sex differences in pollen consumption among blow flies (Diptera: Calliphoridae)

Stephanie Rodriguez

Hymenoptera are known to be some of the main pollinators in our ecosystems. However, a recent study showed that blow flies (Diptera: Calliphoridae) are underappreciated as pollinators. Previous research done by former students in our laboratory showed that blowflies collected around rural areas in College Station, TX, consume pollen. The same research group found that there are differences in pollen consumption depending on the sex of blow flies, but they did so using cohorts of five specimens per sample. Therefore, one thing that was not answered was whether the difference in pollen consumption depending on the sex was consistent on an individual basis. To answer this question, blow flies were caught in different locations near pollinating flowers in College Station, TX. They were labeled according to location and date and were then identified down to species and sex. Then, individual flies were processed by dissecting their gut. The gut contents were then processed by performing pollen acetolysis and then each sample was placed on a slide. The number of pollen grains were then counted and the different pollen was identified to the lowest taxonomic level possible. Our research will continue to inform us about whether there is a difference of pollen consumption among the different sexes in blow flies on an individual basis. This will improve our knowledge on the role that blow flies play in providing pollination services in our ecosystems.

Poster #11

Evolution of sensory receptor organization in weakly electric fishes

David Saenz

The design of animal sensory systems involves trade-offs between different selective forces such as optimal foraging, communication with conspecifics, and predator avoidance. This on-going study investigates the distribution of electroreceptor pores along the body of electric fishes. The objective is to determine whether the distribution and density of electroreceptors differs non-randomly among gymnotiform genera and whether these differences are consistent with specific ecological factors such as habitat type and diet. Gymnotiform fishes display strong evidence of phylogenetic niche conservatism (Crampton 2011; unpublished data) and likely diversified quite rapidly, so it is possible that the distribution of electroreceptor pores remains uniform throughout the phylogeny. However, they occur in a wide variety of aquatic habitat types and have different trophic strategies. For example, though most feed on macroinvertebrates, some feed in fast-flowing rivers while others feed in lentic environments. Therefore, we might expect to see patterns in the distribution of electroreceptor pores that reflect specializations in foraging strategies and diet for each habitat type. Comparative studies in elasmobranchs support this hypothesis (Raschi 1986; Yopak 2007; Kajiura et al. 2010; Kempster et al. 2012). To test this, scanning electron microscopy is used to image the epidermal surface of sister taxa collected from different habitat types. Pores are counted using ImageJ cell counter and an ANOVA is used to compare mean pore counts for different body sections. Diet and habitat data are supplemented with data collected from scientific literature. Fish specimens are acquired from various museum collections.

Poster #12

Assessing the functional role of skinks (*Scincella lateralis*) in forest food webs

Dylan W. Thompson, Connor S. Adams, Daniel Saenz, Christopher M. Schalk

A species relative abundance and associated biomass affects its functional role of energy transfer up to higher trophic levels. For example, lungless salamanders (Family Plethodontidae) account for a substantial portion of the total biomass within forested ecosystems of the northeastern United States. As prey items, they represent a vast storage of obtainable energy that otherwise would be unavailable for relocation within these food webs. Conversely, the Piney Woods ecoregion of Texas is characterized by a lower abundance and diversity of salamanders. As a result, salamanders in the Piney Woods contribute a smaller proportion of biomass in this ecosystem. However, small ground-dwelling lizards of the family Scincidae are generally found in high abundances in east Texas pine forests, and consequently may represent a large amount of total biomass that contributes to the transfer of energy and nutrients to higher trophic levels. This project will investigate whether forest-dwelling skinks, specifically the little brown skink (*Scincella lateralis*), occupy a similar role in food webs than that of the Plethodontids of the northeast. We will use total removal plots to assess skink abundance and biomass as well as measure the environmental variables correlated with their occupancy. We will also use a bomb calorimeter to determine the caloric value of collected individuals to understand the amount of energy they represent in the food web. We will compare our results with associated studies of plethodontid salamanders to determine whether these taxa occupy similar functional roles in their respective forest ecosystems.

Poster #8

Niche segregation among sunfishes (*Lepomis* spp.) in an East Texas urban stream

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Closely related species can strongly influence each other's diet and habitat use, either directly by aggression or indirectly by the exploitation of shared resources. Species in the *Lepomis* clade (sunfishes) converge on general body shape but diverge in morphological traits associated with their trophic ecology. This divergence in their trophic functional traits allows different species to exploit a wide variety prey items including aquatic immature insects, terrestrial insects, microcrustacea, crayfish, and small fish. In this study, we investigated the trophic niche segregation of seven species of *Lepomis* in an urban stream in East Texas. We measured morphological traits associated with feeding habits and habitat use to make inferences about their niche overlap and resource utilization. Most *Lepomis* species exhibited sexual dimorphism in body size, with males being larger than females. However, *L. gulosus* and *L. macrochirus* exhibited the opposite pattern where females were larger than males. *Lepomis macrochirus*, *L. megalotis*, *L. miniatus*, *L. auritus*, and *L. microlophus* formed a cluster in the functional trait space defined by deeper bodies, small eyes, smaller mouths, and larger guts. These species are also known for their invertivorous dietary habits. A second cluster was formed by *L. gulosus*, a species with slightly elongated bodies, large eyes, and large mouths, and known for its piscivorous habits. A third cluster was formed by *L. cyanellus*, a species slightly similar to *L. gulosus* in functional traits but with a much larger mouth which allows to exploit a greater variety of prey including small fish and invertebrates. Our results suggest that coexistence of *Lepomis* species in this urban stream is maintained not only by partitioning of trophic resources, but also by habitat use. Future research based on dietary analysis will elucidate of how trophic resource utilization varies among coexisting species.

Key words: ecomorphology, niche overlap, sunfishes, stream, Texas

Poster #28

The Conservation Action for *Xenomys nelsoni* (Magdalena Wood Rat)

Lois-Anna Voelkel

Xenomys nelsoni (Magdalena Woodrat) is currently classified as Endangered A2c under the 2018 International Union of Conservation Nature (IUCN) Red List; needs proper reassessing and a conservation plan to fulfill the objectives of the newly formed Small Mammal Specialist Group (SMSG) of Mexico. Of the 263 small mammal species (Rodentia and Eulipotyphla) that are found in Mexico, 63 are considered endangered according to the parameters of the Red List. This species is an endemic species in the tropical dry forest, currently threatened by habitat destruction (Arroyo-Cabrales et al. 2017) with a 50% reduction in population size. The collaboration of Texas A&M SMSG and the SMSG of Mexico at the Mexican Small Mammal Assessment, Prioritization, and Conservation Planning Workshop, has created guidelines to propose and develop restoration efforts protect populations of both *X. nelsoni* and other species that co-occur within the area of distribution. Through this research, there will be a more comprehensive determination of the status of this species, ideas regarding the planning and managing of a captive breeding program, and the development of public awareness and efforts for habitat protection (Lacher et al. 2018).

Poster #25

Neuromolecular underpinnings of social competence and cognition in dynamic communities of a highly social cichlid fish

Kelly Wallace

Individual variation in “cognitive style” (how an individual approaches a cognitive task) can be predicted by more general consistent behaviors such as aggression, neophobia, and sociability. Social competence, the ability to make context-appropriate behavioral decisions, thus should be impacted by cognitive style and general behavioral tendencies. But how exactly does the social environment influence this interconnected web of social competence, cognitive style and behavioral tendencies? What hormonal and neural mechanisms underly these social decisions? We investigate these questions by manipulating naturalistic communities of the cichlid fish *Astatotilapia burtoni*, a model system in social neuroscience, to quantify the behavioral styles and space use patterns of socially dominant and subordinate males. We assess individuals’ cognitive performance and style by testing them in a spatial maze, followed by a reversal, a novel object recognition task, and a social competence task (males only). This test suite is repeated after an experimental perturbation that allows some subordinate males to ascend in social status. Throughout, we estimate circulating glucocorticoid and androgen levels. We then use quantitative real-time PCR of the immediate-early genes *egr-1* and *cfos* to determine to which extent the neural activity patterns in core nodes of the vertebrate social decision-making network (SDMN) correlate with behavior, cognitive style and performance, and social competence. Finally, we also measure pathways associated with stress reactivity and social behavior. Taken together, this experimental design provides a uniquely comprehensive investigation of the cognitive, behavioral, and mechanistic underpinnings of decision-making in a complex and dynamic social community.

Poster #27

Flight Initiation Distance in Fox Squirrels (*Sciurus niger*) Varies with Threat Assessment in Urban and Rural Environments.

Krista Ward

Stephen F. Austin State University, Behavioral Ecology

Due to increasing urbanization, natural predators of Eastern Fox Squirrels have decreased in urban environments which may affect squirrel behavior. We hypothesize that squirrels in urban environments will have shorter flight initiation distances compared to squirrels in rural environments. We also hypothesized that squirrels will have a shorter flight initiation distances when observer approach speed is slow. We observed and recorded flight initiation distances by approaching squirrels between two types of environments: rural (n=30) and urban (n=30). Observers approached the squirrels at one of two speeds: fast (1.2 m/s, n=30) or slow (0.6 m/s, n=30). Both hypotheses were supported by our analyses. Flight initiation distances were significantly shorter in urban environments ($p > 0.0001$) and when observer approach speed was slow ($p = 0.0108$). These results suggest that human influences are decreasing anti-predator behaviors of squirrels which could lead to loss of important behavioral traits that squirrels in natural environments require for survival.

Poster #19

Distribution and biodiversity of head morphology in Horned Lizards

James West

Horned lizards of genus *Phrynosoma* share similar body form but display disparity in size, tail length, and most notably in horn morphology and head shape. Many studies have demonstrated that strong associations exist between species morphology and local habitat characteristics. Morphological traits in *Phrynosoma* such as head size and limb length have been correlated with precipitation, temperature, and elevation. Reduction in horn size has also been suggested to co-occur with life history traits like viviparity. Understanding the extent to which climate and environment relate to variation and distribution of head morphology can provide insight into how species may respond to future climate change. Previous research on *Phrynosoma* head morphology has not looked at shape and variance across the genus (17 species) as a whole. I will quantify morphological shape and variation of the skull and horns among species of *Phrynosoma*. 3D models of horned lizard specimens will be constructed from micro-CT imaging at Friday Harbor Laboratories, University of Washington. A Procrustes analysis will be conducted over 3D models to characterize head shape and variation across the genus. Phylogenetic, environmental and life history analyses will be performed to tease apart correlations with morphology. I predict to find that morphological head and horn traits in *Phrynosoma* are correlated with climatic variables.

Poster #31

Evolutionary journey from the seashore to the world's highest coastal range

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Ligia is an oniscidean isopod genus that comprises > 30 nominal species, most of which live in supralittoral coastal habitats. Few lineages, however, have colonized terrestrial habitats. Phylogeographic studies have uncovered high levels of cryptic allopatric diversity in coastal species, which is explained by the fragmented nature of the rocky supralittoral habitat they occupy, and the limited dispersal potential of these isopods (they are direct developers). Detailed studies of terrestrial isopods have not been conducted to date; thus, it is unclear whether they also show high levels of allopatric differentiation. In this study, we examined phylogeographic patterns of *Ligia* isopods in the world's highest coastal range, Sierra Nevada of Santa Marta, Colombia, South America, where they occur at altitudes between 800m and 2,200m. We sequenced DNA fragments of the 12S rRNA and 16S rRNA mitochondrial genes for individuals collected in localities within this range and conducted Bayesian and Maximum Likelihood phylogenetic analyses. We found that high levels of allopatric divergence also occur in this terrestrial lineage and the phylogeographic patterns shed light on the progression of colonization with regard to altitude.