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2013 Oklahoma Research Day

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19. Zoology

University of Central Oklahoma

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Abstracts from the 2013 Oklahoma Research Day

Held at the University of Central Oklahoma

05. Mathematics and Science

19. Zoology

05.19.01 Mesocarnivore mammals in the Mountain Pine Ridge of Belize: Report from a camera trap survey in 2010

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Northeastern State University

We present results of a camera-trap survey of mammals in the mesocarnivore guild in the Mountain Pine Ridge area of the Maya Mountains in the Cayo District of Belize, Central America. This is largely a tropical pine savanna habitat managed for commercial timber production. Our research purpose is to determine which mammalian mesocarnivore species use managed tropical pine forest as habitat. Mesocarnivores receive less attention in tropical forests than do large felids such as jaguar (*Panthera onca*) and puma (*Puma concolor*) but may be of at least comparable ecological significance if their relative abundance is high. Little information is available on relative abundance of mesocarnivores in tropical pine forests. We present the first comprehensive camera-trap survey of mesocarnivores in a commercially logged tropical pine forest. We placed camera traps at 15 sites approximately three km apart in a loose grid covering ~40000 hectares. Camera traps consisted of pairs of motion-activated digital cameras on opposite sides of logging roads. We examined images of 1520 mammals taken between 18 January 2010 and 11 January 2011. The mammal fauna recognizable in the images encompassed 7 orders, 13 families, 21+ genera and 23+ species. Large carnivores included jaguar and puma. Potential mammalian prey for mesocarnivores included several species of rodents and marsupials. The most commonly photographed mammal was the grey fox (*Urocyon cinereoargenteus*), at 78% of the mammal total. We exa

05.19.02 Effects of Blood Sampling on Nestling Scissor-tailed Flycatchers (*Tyrannus forficatus*)

Michael Husak, Diane Landoll,

Cameron University

Increases in the ease and efficiency of genetic work in birds using minimally invasive techniques, such as small blood samples, has opened the potential to ask a broad range of questions. Blood sampling among adult and nestling birds has increased dramatically over the last 20 years. While sampling protocols are well researched and monitored, there remain questions regarding the effects of blood sampling on survival and development in nestlings, especially in systems in which depredation rates are high. We compared survival and rates of development in nestling Scissor-tailed Flycatchers (*Tyrannus forficatus*) in southwestern Oklahoma. From 2008 through 2012 we collected 25- μ l blood samples from a total of 291 nestlings from 80 nests while addressing patterns of extra-pair paternity. Obtaining blood samples from nestlings did not significantly affect rates of predation, abandonment, or development compared to control nests which were monitored in the same manner, but from which blood was not collected.

05.19.03 Strength of the Femur and Humeri of Oklahoma Turtles (Order Testudines) Indicated from Structural Analysis of the Bisected Bones

Jessica Steudeman,

East Central University

Upper long bones of turtles were examined to determine comparative strength to withstand stresses placed on the limbs by added weight of the shell (carapace and plastron) to organism mass. Femora and humeri were extracted from 59 turtles collected within Oklahoma. Extracted bones were measured for: total bone length, short diameter, long diameter, short anterior bone collar, short posterior bone collar, long ventral bone collar, and long dorsal bone collar. Measurements were used to calculate the short and long KR values, short and long K values, and the R/t value for each bone collar. KR is radius of the marrow cavity. K is ratio of outer bone collar diameter compared to inner marrow cavity diameter. R/t is ratio of total radius compared to the thickness of the bone collar. Data was used to determine variation in strength within different turtle species and other vertebrates. Differences in K and R/t values were found between terrestrial turtles and aquatic turtles as well as other vertebrates. Significant differences occurred in thickness of opposing sides of the bone collar. Differences reflect stress points on limbs as it is held in a horizontal position for walking. Dorsal and anterior aspects of the bones require more strength, and therefore have thicker bone collars, while the ventral and posterior aspects require less strength and more flexibility. Data suggests shell weight causes remodeling of bone collars to carry increased mass induced by the shell while on land.

05.19.04 A Morphometric Investigation of Possible Hybridization in Sympatric Regions between *Terrapene carolina triunguis* and *Terrapene ornata ornata*

Timothy Steudeman, Kenneth Andrews,

East Central University

The box turtles *Terrapene carolina triunguis* and *Terrapene ornata ornata* are sympatric in regions of Oklahoma. It has been proposed by multiple authors that these two species interbreed. Morphometric measurements were extracted from six hundred and ninety-five box turtles in field and museum collections to determine if interbreeding exist between these two sympatric species. The shell measurements extracted were: Length of Plastron, Humeral, Internal Seam, height of the shell, and length and widths of cervical 1, 2, 3, anterior lobe, posterior lobe, and carapace. Measurements were analyzed to determine a possible hybridization between the species *Terrapene c. triunguis* and *Terrapene ornata*. Statistical analysis software was used to determine correlations between specimens of a known species and those of possible hybridization. Baseline statistics were utilized to determine variation within these structures and T tests will be performed on the averages to determine if there are any significant differences between the average meristic values of the structures. Once these variances are determined, then Discriminant Function Analysis (DFA), Principal Components Analysis (PCA), and Cluster Analysis (CA) will be used to determine if these variations have hybrid specimens with intermediate values. Preliminary analysis suggests that cervical length would be of use in determining interbreeding.

05.19.05 Responses to Femoral Gland Secretions in Primarily Visually Signaling Collared Lizards

Abigail McGee, Anthony Lunsford, Troy Baird,

University of Central Oklahoma

Although they have highly developed visual signaling, male collared lizards (*Crotaphytus collaris*) produce secretions from femoral glands, and occasionally lick the substrate, apparently to sample the secretions. We conducted laboratory experiments to address whether *C. collaris* differentiates femoral gland secretions from control substances (odiferous, neutral), and the extent to which males and females differentiate secretions from different male donors. We recorded the number of licks on his own secretions, secretions from the subject male, secretions from a rival male, cologne, and water, each applied to one of four dishes positioned equidistant from a central release box in random locations. Females were presented with secretions from the male owner of the territory that overlapped her, secretions from a male whose territory was distant from her home range, cologne, and water. Thus far, results show that both sexes tended to respond more to the odiferous control and femoral gland secretions. Males licked secretions from rival males more, whereas females licked the odiferous control and familiar male secretions more. Results suggest that collared lizards respond to secretions and a scented control, suggesting that chemical cues may function in intra- and intersexual signaling, in addition to this species' highly developed visual communication.

05.19.06 Migratory Connectivity in Yellow Rails and Le Conte's Sparrows
Chris Butler,

University of Central Oklahoma

The objective of this project was to determine the breeding grounds of two poorly-studied bird species: Yellow Rail (*Coturnicops noveboracensis*) and Le Conte's Sparrow (*Ammodramus leconteii*). Both species were banded at Red Slough Wildlife Management Area in McCurtain County, Oklahoma during November through March. Yellow Rails were banded from 2008 – 2013, while Le Conte's Sparrows were banded from 2010 – 2013. Preliminary deuterium analyses on feathers collected from Yellow Rails suggests that Yellow Rails wintering in Oklahoma are breeding primarily in the western half of their range. Preliminary deuterium analyses on feathers collected on Le Conte's Sparrows likewise suggest that they are breeding in the western half of their range. However, the deuterium values obtained for Le Conte's Sparrows show less variation than feathers collected from Yellow Rails. This suggests that Le Conte's Sparrows have relatively strong migratory connectivity while Yellow Rails have moderate connectivity.

05.19.07 The Effect of Habitat Area on Species Richness: Aquatic Macroinvertebrate Assemblages in the Peloncillo Mountains

Jeremy Massengill, Paul Stone,

University of Central Oklahoma

Aquatic habitats exist along a size gradient ranging from small temporary pools to large intermittent tanks. These habitats are characterized by stochastic events, environmental factors, and biotic interactions. We conducted research in the Peloncillo Mountains, Hidalgo Co., New Mexico. The Peloncillo Mountains are characterized by an intertwining network of canyons, seasonal monsoons and periodic drought. Aquatic macroinvertebrate assemblages occur in aquatic habitats along a size gradient and are potentially impacted by environmental and biological factors associated with these habitats. A focused effort at data collection of aquatic macroinvertebrate assemblages in pools and tanks that vary in size may clarify unknown aspects of this study area. This will allow testing of the theory of island biogeography which predicts species richness should be highest in large aquatic habitats and lowest in small aquatic habitats. Using collection data from May 2012, five randomly selected ephemeral pools and five randomly selected intermittent tanks, from three distinct drainages, were compared to see if species richness varied along the size gradient. Species richness was not higher in larger intermittent tanks compared to smaller ephemeral pools. Also, the linear regression of pool size vs. species richness was not significant in the positive direction. This is different from what is predicted by the theory of island biogeography and we will address possible reasons for this outcome.

05.19.08 Deuterium Stable Isotope Analysis on Wintering Black Rails of Texas

Jeffrey Tibbits, Charles Brower, Chris Butler, Jeffrey Kelly, Jennifer Wilson,

University of Central Oklahoma

The Black Rail (*Laterallus jamaicensis*) is the smallest of the North American rails and one of the most secretive species on the continent. Birds breeding along the Gulf Coast and along the southeastern Atlantic coast are presumed to be year-round residents, but nothing is known about where interior birds winter. To date, 556 Black Rails have been banded but there has only been a single recovery. Another approach to studying bird movements is to use stable isotope analysis. Isotopic ratios vary spatially, and the tissues in an organism reflect these local isotopic ratios. Since Black Rails molt rectrices (tail feathers) shortly after breeding, the isotopic ratios in these metabolically inert feathers should reflect the isotopic ratios of the breeding grounds. The goal of this project was to determine the relative proportion of inland to coastal Black Rails wintering in Texas. Nine Black Rails were banded at San Bernard NWR between November 2009 and April 2010. A single rectrix (tail feather) was removed from each individual and subjected to a deuterium stable analysis. Three of the nine birds had deuterium values consistent with coastal Texas, indicating that they were residents. The remaining six birds had deuterium values consistent with inland North America, indicating that they were non-residents. The results of this study suggest that many of the Black Rails wintering along the Texas coast breed in the interior of North America.

05.19.09 Determining the breeding grounds of Henslow's Sparrows using stable isotope analysis

Katrina Hucks, Chris Butler,

University of Central Oklahoma

Henslow's Sparrows (*Ammodramus henslowii*) are a declining grassland bird species. Although the decline in this species is presumably due to habitat loss, it is unclear whether this decline is being driven by habitat loss on the wintering grounds, breeding grounds or in both areas. It is important to determine whether wintering birds bred in a wide geographic area or a relatively narrow zone in order to manage for this species. Our goal was to determine the breeding location of Henslow's Sparrows wintering along the Gulf coast. During 14 – 21 December 2012, we searched for Henslow's Sparrows in Louisiana, Mississippi, and Florida. Birds were flushed using a rope-dragging technique and were caught in hand-held nets. A partial secondary feather was taken from each sparrow for a deuterium stable isotope analysis and the bird was then released. We were unsuccessful at banding Henslow's Sparrows at two locations in southeastern Louisiana, but banded five Henslow's Sparrows at Mississippi Sandhill Crane National Wildlife Refuge in Gautier, Mississippi as well as a single bird at Kissimmee Prairie Preserve State Park, FL. The feathers are currently being prepared for a deuterium stable isotope analysis.

05.19.10 Mapping the Winter Distribution of the Eastern Whip-poor-will

Britney Temple, Chris Butler,

University of Central Oklahoma

The Eastern Whip-poor-will, (*Antrastomus vociferus*), is declining at a rate of 2.6% annually. The objective of this study is to model the winter distribution of the Eastern Whip-poor-will and examine how the range may shift under different climate change scenarios. We obtained the locality data from ORNIS and Christmas Bird Counts, for the months December, January, and February. Twenty ecogeographical variables were obtained from WorldClim. Maxent was used to model the distribution of this species. The models show that the winter range is far smaller than the breeding range, with the greatest concentration of highly suitable habitat during winter is in Florida. This suggests that habitat destruction in Florida may have a disproportionate effect on the population of Eastern Whip-poor-wills. In addition, the models suggest that climate change may negatively impact this species.

05.19.11 Modeling the Hybrid Zone for Black-chinned and Ruby-throated Hummingbirds

Lindsay Jones, Chris Butler, Daniel Whalen,

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Black-chinned Hummingbirds (*Archilochus alexandri*) and Ruby-throated Hummingbirds (*A. colubris*) hybridize in Oklahoma and Texas. The extent of the hybrid zone has not previously been described and the goal of our study was to describe the spatial extent of the hybrid zone and project how the zone may change under different climate change scenarios. Locality data for breeding Black-chinned Hummingbirds and Ruby-throated Hummingbirds was obtained from ORNIS, while locality data for hybrids was obtained from a literature review. Bioclimatic variables for the model were obtained from WorldClim. We used Maxent to model the extent of the hybrid zone. The hybrid zone is currently restricted to the southern Great Plains. Under all three climate change scenarios considered, the hybrid zone remained centered in the southern Great Plains, with a moderate northward shift. These results suggest that, although climate change may affect the distribution of each hummingbird species, the zone of overlap is expected to remain largely static.

05.19.12 Biodiversity studies of bees: A perspective from species-level systematics

Victor Gonzalez, Michael Engel,

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Despite more than 250 years of biodiversity research and the enormous societal relevance of bees, a significant amount of work remains to be done to fully understand their evolutionary history and diversity, as well as to achieve actual conservation and sustainability goals. Even in areas where the bee fauna has been relatively well extensively studied such as North America, biological information is still limited to a few common species, others are known from a single sex, many are new to science, and traditional identification guides are often outdated or nonexistent. Furthermore, the species status of the vast majority has never been tested since they were proposed by earlier scientists based upon obsolete unspecified or non-existent species concepts and limited morphological knowledge due to the scientific equipment available at the time. This means that not only have we entered the 21st century with old, untested hypotheses, but also that potentially useful morphological characters remain to be explored and analyzed. We highlight the urgent societal need for species-level systematic work, particularly emphasized by the recent concerns about population declines of both managed and unmanaged bees, and the urge to assess the status of pollinators and pollination services. We also draw attention to the wealth of exciting research and collaboration opportunities that can be developed today while addressing such a need.