Dissertation Proposal Defense

Characterization of chromatin dynamics under biotic stress in Arabidopsis

Name: Yogendra Bordiya

Major Advisor: Dr. Hong-Gu Kang

Committee Members: Dr. Nihal Dharmasiri,Texas State University, Dr. Sunethra Dharmasiri,Texas State University, Dr. Daniel F. Klessig, Cornell University, Dr. Ping He, Texas A&M University

Friday, January 16, 2015, 10:00 AM, Supple 257-A

A genetic screen for components involved in resistance (R) protein-mediated immunity in Arabidopsis led to isolation of crt1 (compromised recognition of TCV). CRT1/MORC1 was shown to be a MORC ATPase that physically interacts with multiple immune components. While MORC1 is mainly located in endosome-like vesicles in the cytoplasm, a subpopulation resides in the nucleus, which increases after infection. The combined findings that MORC1 i) is an endonuclease, ii) is localized to heterochromatin, and iii) is implicated in epigenetic regulation, including suppression of heterochromatic transposable elements (TEs), suggest that MORC1 has an important nuclear function(s). To gain insight into the role of MORC1 in the nucleus, genome accessibility in response to Pseudomonas syringae pv. tomato (Pst) in Arabidopsis and its MORC1-associated mutants were assessed. DNase-seq, a genome-wide inspection of DNase I hypersensitive site (DHS), identified 29,450 DHS in twelve different combinations of genotypes and treatments including Pst infection. Characterization of the DHS differentially present among these different combinations revealed that genomic regions associated with signal transduction and (a)biotic stress are over-represented, under pathogen challenge. TEs were also significantly over-represented in Pst infection-induced- and MORC1 mutant-associated differential DHS (dDHS). Interestingly, these TE-associated dDHS were primarily in heterochromatic region for the MORC1 mutants but genome-wide for Pst infection-induced dDHS. Interestingly, chromatin immunoprecipitation of MORC1 showed that, while MORC1 indeed interacted with these heterochromatic TE-associated dDHS, it interacted with Pst infection-induced TE-associated dDHS that are located in well-characterized defense marker genes including PR-1 during pathogen infection. These results suggest that infection drives dynamic changes in the genome and that MORC1 plays important roles in modulating accessibility to these genomic regions.

Yogendra received his bachelor's degree in Agriculture from University of Agricultural Sciences, Bangalore, India in 2009 and master's in Crop Science and Biotechnology in 2012 from Seoul National University, Seoul, South Korea. In 2012 Fall, Yogendra entered into Ph.D. program at Texas State University.

Thesis Defense

DEVELOPMENT OF 2-D AND 3-D PAPER-BASED MICROFLUIDIC DEVICES FOR THE DETECTION OF CRYPTOSPORIDIUM AND GIARDIA

Shalini Madadi

Major Advisor: Dr. Shannon Weigum

Committee Members: Dr. Rohde, Dr. McLean

Monday, December 8, 2014 10:00 AM - Norris Conference Room

In developing countries, morbidity due to infectious diseases such as diarrheal illness can cause major deterioration of physical and cognitive impairment in young children under the age of five and individuals with poor immune system. In such regions, proper diagnosis and treatment can help in changing the mortality and morbidity rates. Current tests used to detect diarrhea-causing pathogens are often expensive, time consuming, require a well-maintained centralized laboratory with continuous power supply, highly skilled laboratory personnel and good bio-safety practices, which are often limited in resource poor settings in both developed and developing countries. Real-time PCR, immunoassays (ELISA, or EIAs, lateral-flow test strips), microscopy, and flow cytometry are few examples of traditional tests available. The goal of this project was to develop a paper-based microfluidic device for detection of Cryptosporidium and Giardia, two protozoan pathogens that cause persistent to chronic diarrhea worldwide that is inexpensive and easy to use. Toward this goal, we have designed and optimized a wax-printing technique to create microfluidic channels in paper that direct fluid flow via capillary action in defined patterns for colorimetric immunoassay detection of individual and multi-plexed pathogens. Initial results suggest that a minimum printed width of 300 µm is necessary to form an impermeable barrier in chromatography paper when heated at 95oC for 10 min, while a minimum channel width of 1500 µm is necessary to wick fluids through the microfluidic channels. Next, we performed a concentration series of immunolabeled Cryptosporidium oocysts and Giardia cysts to determine the lowest detectable number of oocysts in an enzyme-based colorimetric assay. Our results indicate that as few as 250 oocysts are detectable for Cryptosporidium and 2000 cysts for Giardia. We further fabricated 3- dimensional (3-D) paper-based devices with a size-selective filter that excludes the use of cumbersome pre-labeling protocol and expensive equipment to remove unbound-free antibodies by retaining enzyme-bound pathogens and measuring the amount of enzyme that reaches the bottom layer. Tests for size-selective membrane and 3-D retention assay using in-line filter holder proved that cellulose acetate membrane with 1.2 µm pore size had shown to retain Cryptosporidium oocysts of size 4-6 µm. Follow-up assays for detection of cryptosporidium in paper devices using enzyme retention assay showed potential for further improvement in development of paper-based microfluidic devices. This research supports the use of paper-based microfluidic assays for colorimetric detection of infectious pathogens with high sensitivity that use low cost materials and simple fabrication techniques

Bio: Shalini Madadi was born and raised in Hyderabad, India where she pursued her bachelor's degree in biotechnology in 2010. Coming from a developing country, she has seen the poverty and limited access to health care resources in remote areas where infectious diseases are prevalent, which inspired her to pursue a degree in master's under the supervision of Dr. Weigum. Her research aims towards

developing inexpensive and easy-to-use diagnostics that can identify infectious diseases, such as pathogens causing diarrhea, using simple colorimetric assays.

Thesis Defense

EFFECTS OF LANDSCAPE CHARACTERISTICS ON NESTING ECOLOGY OF CAVITY-NESTING BIRDS

Sara E. Harrod

Major Advisor: Dr. Clay Green

Committee Members: Dr. Floyd "Butch" Weckerly, Dr. Thomas "Randy" Simpson

Friday, November 21, 2014 - 3:30 PM, SUPP 153A

I studied the effects of landscape characteristics on nesting success and nest site selection of native cavity-nesting birds utilizing nest boxes at the Freeman Center, San Marcos, Texas from 2013 to 2014. Nest checks were conducted twice weekly from February to July of each year. Landscape analyses were conducted using ArcGIS and FRAGSTATS and habitat measurements were collected on site to examine the landscape characteristics surrounding each box. I used the Mayfield Method to estimate nest success of each nesting pair. For each year, Principal Components Analyses (PCA) were conducted to assess characteristics of each nest box, and Canonical Correspondence Analyses (CCA) were conducted to assess relationships between habitat features surrounding nest sites and species nesting success. Four species utilized the nest boxes in 2013, followed by six in 2014. In 2013, Eastern Bluebirds (Sialia sialis) (15% occupancy) and Ash-throated Flycatchers (Myiarchus cinerascens) (5% occupancy) were most successful in grassland and shrubland habitats, respectively. Bewick's Wrens (Thryomanes bewickii) (77.5% occupancy) were generalists; their nesting success showed no association for any habitat variable. Sites of Black-crested Titmice (Baeolophus atricristatus) (12.5% occupancy) nests were associated with areas of little herbaceous or woody vegetative cover while no difference in landscape characteristics were found between successful and failed nests. In 2014, bluebird (20% occupancy) success and failure were associated with large grassland patches. Flycatcher (11.7% occupancy) success was not associated with any measured habitat variables, while failure occurred in sites with large shrubland patches. Titmouse (38.3% occupancy) success and failure were not correlated with any measured habitat variables, while wren (71.7% occupancy) success was most likely to occur in sites with large woodland patches. To maximize nesting success, wildlife managers utilizing nest boxes to manage for a given species should consider not only habitat types but patch characteristics such as density and area when considering where to erect nest boxes.

Bio: Sara Harrod was born in Wichita Falls, Texas, on October 05, 1989. Her interest in wildlife began at a young age and led to a passion for bird-watching. After graduating from high school, she attended Texas A&M in College Station, Texas, and began her undergraduate work. She received a Bachelor of Science in Zoology in May of 2012. The following fall, she began her work on her Master's at Texas State University. In the future Sara hopes to study the effects of anthropogenic activity on passerines and the conservation of at-risk populations.

Thesis Defense

RELATIONSHIP BETWEEN BASE FLOW MAGNITUDE AND SPRING FISH COMMUNITIES

Cody A. Craig

Major Advisor: Dr. Timothy H. Bonner

Committee Members: Dr. Christopher Taylor (UTPA), Dr. Floyd Weckerly (TxState)

Friday, November 21, 2014 - 10:00 AM, FAB 130

Base flow is the portion of stream flow attributed to groundwater, and few studies quantify the pure effects of base flow reductions on stream fish communities. Spring complexes within the karst terrains of the Edwards Plateau Region of central Texas offer a unique opportunity to test hypothesized relationships between base flow and stream fish communities. Spring complexes are numerous within the Edwards Plateau, providing multiple independent observations, stable hydrographs dominated by base flow conditions, similar groundwater sources, and support endemic fishes that are associated with the spring complexes (i.e., spring-associated fishes). Primary objectives of this study were to assess spring-associated fish richness, relative abundances, and densities across a gradient of base flow magnitudes with predictions that metrics of spring-associated fish communities would linearly decrease with reductions in base flow. To control potential confounding variables, additional objectives were to test for the presence and strength of parapatry that is hypothesized to exist between spring-associated fishes and riverine-associated fishes (i.e., fishes with distributions not typically associated with spring complexes). Patterns in richness, relative abundances, and densities indicated parapatric distribution between spring-associated and riverine-associated fishes. Strength of parapatry depended upon base flow magnitude. Correspondingly, differences in spring-associated fish richness, relative abundances, and densities along a base flow gradient were detected, but only densities were linearly related to base flow. Richness and relative abundances of spring-associated fishes were non-linearly related to base flow, suggesting that spring complexes have a level of buffering capacity against base flow reductions. The relationship between spring-associated fish communities and base flow gradient was used to support the reported parapatry between spring-associated fishes and riverine-associated fishes with in the area and to highlight the conservation value of spring complexes to regional fauna. Predictive models generated in this study can be used to evaluate spring-associated fish community integrity within the Edwards Plateau Region and to predict future changes in Edward Plateau spring complexes related to increases in groundwater extraction.

Bio: Cody Craig was raised in Longview, TX. He attended Texas Tech University for his B.S. in Wildlife Fisheries Management. Continuing his undergraduate research, he joined the graduate program at Texas State for a M.S. in Aquatic Biology. After graduation, he would like to continue his educational pursuit with a Ph.D. with an ultimate goal of continuing research in the field of aquatic ecology.

Thesis Defense

OCCURRENCE AND AMOUNT OF MICROPLASTICS INGESTED BY FISHES IN WATERSHEDS OF THE GULF OF MEXICO

Melissa B. Phillips

Major Advisor: Dr. Timothy H. Bonner (Biology)

Committee Members: Dr. Gwendolyn Hustvedt (Fashion Merchandising), Dr. Joseph A Veech (Biology)

Thursday, November 20, 2014 - 10:00am, FAB 130

Occurrence and types of microplastics in the digestive system of freshwater fishes could be an emerging environmental crisis because of the proliferation of plastic pollution in aquatic environments. Recent studies report increasing amounts of microplastics in marine systems and in the gut tracts of marine fishes. To date, only one study has reported percent occurrence of microplastics (12%) in the digestive system of freshwater fishes. Purposes of this study were to quantify occurrences and types of microplastics ingested by fishes within the western freshwater drainages of the Gulf Mexico and an estuary of the Gulf of Mexico. My study objectives were (1) to enumerate and identify microplastics from fishes taken from 10 sites and nine freshwater drainages of Texas and harbor, bay, and gulf sites within or near the Laguna Madre of southeast Texas, (2) to compare percent occurrence of microplastics among habitat and trophic guilds of fishes, and (3) to compare percent occurrence of microplastics between urbanized and non-urbanized streams and thus test the hypothesis that fishes from urbanized streams will have greater percent occurrence of microplastics than fishes from non-urbanized streams. Among 535 fishes examined in this study, percent occurrence of microplastics was 8% in freshwater fishes and 10% in marine fishes. Plastic types included polyester, polystyrene, polypropylene, acrylate, and nylon. Percent occurrence of microplastics ingested by fishes in non-urbanized streams (5%) was less than that of one urbanized streams (Neches River; 29%). Percent occurrence by habitat (i.e., benthic, pelagic) and trophic guilds (herbivore/omnivore, invertivore, carnivore) were similar. Percent occurrences of microplastics reported herein are similar for freshwater fishes and towards the lower end of the range of microplastic ingestion in marine fishes (range: 8 - 33%). Occurrences of microplastics in the fishes pose several environmental concerns. For fish health, microplastics absorb toxins and can be passed through the digestive system, into the circulatory system, and accumulate in tissue. Long-term effects are unknown for the fish or the effects on human consumers.

Bio: Melissa Phillips was raised in London, England. She attended the University of Leeds for her B.A. in Sociology. After raising enough funds to she took a one way flight to Honduras where she certified as a Divemaster and dived her way around Central and South America. Upon returning to London she worked in Marine Conservation and web development. She enrolled in the MS-Sustainability Studies program to further a career in marine conservation, specifically to reduce the amount of plastic pollution in our marine environments.

Dissertation Defense

Freshwater turtles as a renewable resource: using red-eared slider (Trachemys scripta elegans) as a model species

Ivana Mali

Major Advisor: Dr. Michael R.J. Forstner

Committee Members: Dr. Thomas R. Simpson, Dr. Floyd W. Weckerly, Dr. Scott K. Davis, Dr. Hsiao-Hsuan Wang

Thursday, November 20, 2014 - 2:00 pm LBJ 3-9.1

Freshwater turtles have a long history of being utilized by humans. For centuries, turtles have been used as a protein resource and in traditional medicine, playing an important role in cultures across the globe. Wild turtle harvests have historically and currently been unsustainable. While some regulatory regimes have been implemented in different regions, many taxa remain unprotected and there is a need for improvement. The objective of this work was to assess the problem of unsustainable wild freshwater turtle harvest and commercial trade in the United States of America (US), focusing first on the entire southeast region and specifically on the Texas harvest paradigm. I also evaluated solutions, such as commercial turtle farming as an alternative to wild population harvest. The results provide evidence of large, unsustainable exports of freshwater turtles continuing out of the US, despite recently implemented restrictions on turtle harvest in several states of the Southeast US. Moreover, I provide evidence of the negative consequences from non-uniform harvest regimes across the Southeast US. Turtle harvest regulations in Texas are based on assumptions regarding the overland movement patterns of adult red-eared slider (Trachemys scripta elegans) on the landscape. To test these assumptions, I developed a novel method to monitor movements, achieving a higher resolution than what has been previously reported and allowed me to evaluate the source-sink harvest paradigm applied to Texas freshwater turtle populations. The results illustrate flaws in the current management regulations, but also provide direction for future studies to help improve management. Finally, by modeling biological data alongside economic information on farming red-eared sliders in Louisiana, I demonstrated the economic challenges of farming red-eared sliders for meat markets. While it gives a perspective of how the future market may develop, it highlights some of the difficulties to achieving sustainability with the commercial trade of turtles for meat.

Bio: Ivana Mali was born in Novi Sad, Serbia on February 25 1983 to Ljiljana and Petar Mali. She obtained her Bachelors of Science in Biology at Henderson State University in May 2008. She enrolled at Texas State University in 2008 and earned her Masters of Science in Wildlife Ecology in August 2010. She entered the Aquatic Resources doctoral program in 2010 focusing on chelonian population sustainability. She has been a Flowing Waters teaching fellow (2011-2013) and is the current president of the Texas Herpetological Society. Her research topics include freshwater turtle reproductive ecology, testing field sampling assumptions and biases, movement ecology, but also global freshwater turtle sustainability under anthropogenic pressures such as road mortality and commercial harvest.

Dissertation Proposal Defense

Biodiversity Research using Hierarchical Models in a Bayesian Framework

Katherine Bell

Major Advisor: Dr. Chris Nice

Committee Members: Dr. James Fordyce, Dr. Darrin Hulsey, Dr. Noland Martin, and Dr. James Ott

November 13, 2014 - 9:00 am, LBJ Student Center 3-9.1

Biological systems are structurally complex, but hierarchical modeling allows these multiple levels of structure to be examined simultaneously. The research I propose explores the use of hierarchical models in three different biodiversity research projects: 1.) I will investigate the population genomics and genomic architecture of jaw morphology in a trophically polymorphic species of cichlid. Here a hierarchical approach will be used to model uncertainty, which results from next generation sequencing techniques, and to test for associations between phenotype and genotype. 2.) Next, I will examine the response of British butterflies to climate change. For this question a hierarchical model will enable the simultaneous estimation of both species- and community-level responses to climate change. 3.) The third project explores the fitness surface of chemical sequestration using the pipevine swallowtail butterfly as a model system. This project will include lab and field studies which will provide data used to develop a hierarchical model that accounts for costs and benefits in fitness to both predators and prey.

Bio: Katherine was born in Dorset, England. She received a BSc HONS in Zoology from Queen Mary, University of London in 2009. In 2010 she enrolled at Texas State University and joined the Population and Conservation Biology program, as a part of Chris Nice's lab. Upon completion of her Masters in 2012 she joined the PhD program in Aquatic Resources at Texas State University and continued her work with Chris and the Nice lab group.

Thesis Defense

DIETARY ANALYSIS OF OVERWINTERING POPULATIONS OF BRAZILIAN FREE-TAILED BATS (TADARIDA BRASILIENSIS) IN

CENTRAL TEXAS, UNITED STATES

Lynsey Ramirez

Major Advisor: Dr. Thomas R. Simpson

Committee Members: Dr. Clay Green, Dr. Chris Nice

Monday, November 10, 2014 - 9:00 am, Norris Conference Room

Brazilian free-tailed bats (Tadarida brasiliensis) overwinter in south and central Mexico and migrate north each spring to form large breeding colonies in northern Mexico and the southwestern United States; however, there are recent observations of increasing populations of free-tailed bats overwintering in central Texas. It is possible that climate change has led to warmer winters in northern sections of their range with increased insect productivity forming a sustainable food resource for the bats. Dietary analysis using the dissecting microscope methodology show their summer prey includes adults of several Lepidopteran species in the family Noctuidaie and species of beetles in the order Coleoptera. In this study I used traditional methodology of dissecting guano pellets to identify insect fragments through the use of various keys, guides and experienced entomologists, and gather information on the dietary habits of overwintering free-tails. Pellets were collected from roosting sites at three different locations across central Texas: the Chiroptorium, Old Tunnel, and D'hanis Bridge, and then dissected in the lab. Orders of the insects and in some cases, families, were identified which determined a glimpse of what free-tailed bat colonies are eating to survive winter months in central Texas. Diptera, Hemerobiidae, and Lepidoptera composed the greatest percent composition of diet with significant differences between sites based on a particular food category. Differences could be due to diverse vegetation and habitats at each sampling site. Winter diets will begin to be established and understanding the factors that control migratory dynamics and alterations expected with continuing climate changes can be gained.

Bio: Lynsey Martinez Ramirez was born in Alamogordo, New Mexico on August 13, 1987 to Jose and Patricia Martinez and raised in San Antonio, Texas. She graduated with a B.S. in Biology at the University of Texas at San Antonio May of 2010 and enrolled at Texas State University-San Marcos to pursue a Master's of Science degree in Wildlife Ecology. Lynsey was married in 2011 and had two baby girls in 2012 and 2013. During the course of her graduate career, she was actively involved with Hermandad de Sigma Iota Alpha, Incorporada and earned a hunting scholarship with Conservation Leaders for Tomorrow. She was also an Instructor's Assistant for Freshman Biology (non-majors) and a member of TriBeta National Biological Honor Society and the Texas Academy of Science. Lynsey hopes to use her degree to pursue work in conservation biology and restoration projects.

Thesis Defense

EXAMINATION OF A DNA APTAMER (TLS11a) AS A CANCER-SPECIFIC TARGETING AGENT WITHIN CULTURED MEAR LIVER CANCER CELLS

Melissa D. Sutton

Major Advisor: Dr. Shannon Weigum

Committee Members: Dr. Tania Betancourt, Dr. Dana García

Friday, November 7, 2014 - 10:00 am, RFM 4233

Hepatocellular carcinoma (HCC) is one of the leading causes of cancer-related death worldwide, particularly in regions where chronic Hepatitis B and C infections are common. Early detection of HCC remains challenging due to the lack of existing biomarkers with adequate sensitivity and specificity for screening high-risk patients. Nanoparticle assemblies that incorporate high-affinity aptamers which specifically bind malignant hepatocellular carcinoma cells could be useful for targeted drug delivery or enhancing contrast with existing ablation therapies. The in vitro interactions of a tumor-specific aptamer, TLS11a, were characterized in a hepatoma cell line via live-cell fluorescence imaging, SDS-PAGE and Western blotting techniques. Cell surface binding of the aptamer-AlexaFluor®546 conjugate was found to occur within 20 minutes of initial exposure, followed by internalization and localization to late endosomes or lysosomes using a pH-sensitive LysoSensor™ Green dye and confocal microscopy. In an effort to characterize the TLS11a target protein, the TLS11a/AlexaFluor-546 conjugated aptamer was used in place of primary antibody in a conventional Western blot following electrophoresis and transfer of proteins extracted from various cellular components. Prominent bands appeared just over 21 kilodaltons (kDa) in the cell surface protein fraction, the cytosolic hydrophilic protein fraction and in whole cell lysates; no TLS11a-bound protein bands were apparent in the hydrophobic membrane fraction. Aptamer-functionalized polymer nanoparticles containing poly(lactic-co-glycolic acid) (PLGA) and poly(lactide)-b-poly(ethylene glycol) (PLA-PEG) were then prepared by nanoprecipitation and passively loaded with the chemotherapeutic agent, doxorubicin, yielding spherical nanoparticles approximately 50 nm in diameter. Targeted drug delivery and cytotoxicity was assessed using live/dead fluorescent dyes and a MTT colorimetric viability assay with elevated levels of cell death found in cultures treated with either the aptamer-coated and uncoated polymer nanoparticles. Identification and characterization of the cell surface protein epitope(s) recognized by the TLS11a aptamer are ongoing along with nanoparticle optimization, but these preliminary studies support continued investigation of this aptamer and functionalized nanoparticle conjugates for targeted labeling and drug delivery within malignant hepatocellular carcinomas.

Bio: Melissa Sutton was raised in Virginia Beach, Va. and moved to Texas in 2008. She briefly attended Austin Community College where she received her A.S. in Chemistry, before transferring to Texas State for her B.S. in Microbiology. Continuing her undergraduate research, she joined the graduate program at Texas State for a M.S. in Biology. After graduation, she would like to have a career in industry, either working in a lab or a research facility.

Thesis Defense

Effects of diel cycle and turbidity on antipredator response to multiple cues of predators by Eurycea nana and Eurycea sosorum.

Kristina Zabierek

Major Advisor: Dr. Caitlin Gabor

Committee Members: Dr. Jim Ott, Dr. Kristen Epp

Friday, October 31, 2014 - 1:30 pm, SUPP 153-A

Predation is an influential force in many ecological communities. Prey often exhibit antipredator behaviors which minimize risk of predation. However, antipredator behavior may be costly by reducing time spent foraging or mating. I wanted to determine whether Eurycea nana, the San Marcos salamander, is able to minimize costs of antipredator behavior by responding to chemical cues of predators based on the diel cycle of the predator. I studied response of salamanders to a diurnal predator, green sunfish (Lepomis cyanellus) and a nocturnal predator, red-swamp crayfish (Procambarus clarkii) during the daytime and nighttime to determine if salamanders were able to respond in a risk-sensitive manner. I found that salamanders exhibited increased antipredator behavior in response to green sunfish, but not to crayfish. I also found that diel cycle did not affect antipredator behavior, suggesting they do not respond in a threat sensitive manner based on the foraging cycle of their predator. Anthropogenic influences can have effects on predator-prey interactions. Increased turbidity is a growing problem for aquatic systems and can affect the ability of prey to respond to predators. I studied the effect of turbidity on antipredator behavior in Eurycea sosorum, the Barton Springs salamander, by comparing their response to cues from green sunfish predators, Lepomis cyanellus, and green-throat darter non-predators, Etheostoma lepidum. I wanted to determine whether multimodal cues are important in predator detection, therefore cue treatments included a fully crossed design including both chemical and visual cues of the predator and non-predator across two vision levels; clear (0 NTU) and low turbidity (~20 NTU). I found that E. sosorum significantly increased antipredator behavior to predator chemical cues compared to non-predator chemical cues but did not respond to visual cues. This suggests multimodal cue use is not a major factor in predator detection. We also found that E. sosorum had decreased antipredator behavior in turbid conditions compared to clear conditions. This has significant conservation implications for the already endangered salamander.

Bio: Kristina was raised in Brooklyn, New York and received her B.A. in Biology at CUNY Queens College in 2012. During her time there she worked in a research laboratory studying costs of pesticide resistance in the Colorado potato beetle. She spent a summer on a farm in Ithaca, NY studying organic farming methods to attract natural predators of the Colorado potato beetle. Interested in conservation, Kristina also had an internship with the NYC Parks Department monitoring piping plovers. Always being interested in amphibian biology, Kristina joined the Population & Conservation Biology under Dr. Gabor in 2013. During her graduate education Kristina participated in projects examining anthropogenic effects on stress hormones (CORT) in Eurycea nana and Eurycea tonkawae. After completion of her M.S. degree, Kristina plans to dedicate herself to pursuing knowledge about insect-amphibian interactions and to conservation education.

Thesis Defense

The impact of human disturbance on the foraging ecology of Green Herons (Butorides virescens)

Amanda A. Moore

Major Advisor: Dr. M. Clay Green

Committee Members: Dr. David Huffman, Dr. Thomas “Randy” Simpson

Friday, October 31, 2014 - 10:00 am, RFM 4233

As the trend towards urbanization continues, natural areas can become highly urbanized and recreational use of these natural areas may also increase. Waterbirds use areas that are generally subject to elevated levels of human disturbance and consequently are often considered highly susceptible to disturbance. In 2013 and 2014, I assessed the effects of human recreational disturbance on Green Herons (Butorides virescens) through the use of focal observations. I collected behavioral data over 154 observations along the headwaters of the San Marcos River located in Central Texas; the river varies in its degree of human recreational activity and thereby disturbance varied across sites. I built 15 linear regression models to assess the potential influence of human disturbance as well as potential influence of habitat differences between study sites on each of the response variables (4 foraging behaviors and foraging efficiency). Using AIC model selection, I found that differences in habitat provided the best explanation for the observed variation in 4 of the 5 response variables measured. These results suggest that Green Heron foraging behavior is not significantly affected by human recreational disturbance but influenced more by differences in habitat. It is possible that the birds are habituated to disturbance and tolerant of humans at certain locations and perhaps only modify their foraging technique in order to maximize their foraging efficiency to suit their locale. These finding are noteworthy in that it is important to be able to distinguish cases where human disturbance impacts a species from cases where it does not in an ongoing effort to strike a balance between the needs of waterbird species and human recreational use of aquatic systems.

Bio: Amanda Moore was raised in Bloomingdale, Illinois and moved to Texas in 2001. She received a B.A. in Arts & Technology from U.T. Dallas in 2005. After graduation, Amanda worked out in the “real world” for about 5 years before deciding to change paths and move to San Marcos to join the Texas State Wildlife Ecology graduate program. She hopes her next “real world” career involves conservation, fieldwork, and birds.

Thesis Defense

Floral Scent Production in the Carrion Flower Genus Stapelia (Apocynaceae)

Johann Souss

Major Advisor: Dr. David Lemke

Committee Members: Dr. Michael A. Huston, Dr. Garland Upchurch

Thursday, October 30, 2014 - 1:00 pm, Norris Conference Room

Floral scent plays an important role in the reproductive biology of many flowering plants, often serving as a pollinator attractant. In a majority of species, floral scent is a diffuse product of the epidermis, especially that of the corolla. In some groups, however, the production and emission of the volatile substances responsible for fragrance is localized to specialized glands, temed osmophores. This study examined the composition of floral fragrance in the genus Stapelia, a group of succulent perennial herbs native to the drier regions of South Africa. Volatile compounds produced by flowers were collected using headspace-solid phase microextraction. Component separation and identification were achieved using gas chromatography-mass spectrometry. A diversity of organic compounds was found among members of the genus, including various terpenoids, organic acids, sulfur compounds, and nitrogenous compounds. Among the most common compounds identified were dimethyl disulfide, dimethyl trisulfide, hexanal, and trimethylamine. Although osmophores were originally described from the petals of other members of the milkweed family, this study has demonstrated, using a combination of vital staining, histological examination, and gas chromatography, that among Stapelia species the production of volatile compounds appears to be a function of the corona, the often elaborate set of appendages situated between the corolla and androecium.

Bio: Johann Souss received his B.S. in zoology from University of Florida in 2008. Upon completing his undergraduate degree he worked as a resident naturalist in Costa Rica. He joined the Texas State biology graduate program in 2010. He moved to Oregon in 2012, where he spent most of his time exploring his interests in coffee and hospitality. Johann will be departing for Tanzania in February 2015 to work on sustainable agriculture and environmental education projects as a Peace Corps Volunteer.

Thesis Defense

Examining the effects of urbanization on the occurrence of mammal species in natural areas of the eastern Edwards Plateau

Matt Haverland

Major Advisor: Dr. Joe Veech

Committee Members: Dr. Butch Weckerly, Dr. Jennifer Jensen (Geography)

Thursday, October 30, 2014 - 10:30 am, Norris Conference Room

Central Texas is experiencing urbanization at an unprecedented rate. This anthropogenic conversion of land is due in part to a rapidly growing population in the Austin and San Antonio metro areas and the development of infrastructure and resources needed to support that growth. Urban parks, greenspaces, and preserves can mitigate the impact of land development by serving as habitat for local wildlife populations. To maximize the potential of this habitat, we must assess how urbanization influences species across a landscape. Mesocarnivores act as top-tier predators in an ecosystem almost completely devoid of large predators and thus they could influence abundance of other species. I surveyed 72 sites (point locations) across nine different study areas throughout the eastern Edwards Plateau ecoregion of central Texas for fourteen survey occasions during 2013. Using occupancy modeling, I examined the influence of ten different urban covariates on mesocarnivore occurrence. Generalist species, such as raccoons and opossums, had an increased probability of occurrence at sites with higher urban influence and were most likely to occur in smaller more urban study areas. Ringtails and grey foxes appeared to be unaffected by urbanization and were equally likely to occur across all sites. Results for other species, such as the coyote and skunk, were inconclusive. Most species had very low probability of detection with only the raccoon and fox having a probability greater than 0.1. Knowledge of the effect of urbanization on wildlife could assist us in evaluating current preserves as well as devising strategies to conserve species in any planned future preserves.

Bio: Matthew Haverland was raised in College Station, Texas and received his B.S. in Marine Fisheries at Texas A&M University-Galveston in 2007. During his time in Galveston, he worked as a student research assistant for the NOAA Fisheries Ecology Lab aiding biologists in studies on benthic marsh communities in Texas and Louisiana. After graduation, Matt joined the NOAA Fisheries Service as a temporary fisheries observer collecting data on bluefin tuna spawning in the Gulf of Mexico and later joined the Pelagic Observer Program as a full time fisheries observer where he worked for several years. After a renewed interest in terrestrial biology, Matt joined the Texas State Wildlife Ecology graduate program in 2012. During his graduate education, Matt has participated in several ecological studies including work as a seasonal field technician conducting bobwhite quail surveys. After completion of his M.S. degree, Matt plans to seek employment as an ecologist examining vertebrate communities and ways to mitigate the impact of human development.

Dissertation Proposal Defense

Probiotic regulation of fat-storage via Angiopoietin-like 4 (ANGPTL4)

Priscilla Pham

Major Advisor: Dr. Bob McLean

Committee Members: Dr. Dana García, Dr. Shannon Weigum, Dr. Dhiraj Vattem,

Dr. Jennifer Spinler, Dr. Vatsala Maitin

October 17, 2014 - 11:00 am, SUPP 153-A

Gut bacteria have been shown to influence diet-related obesity, mediated in part via ANGPTL4, a circulating lipoprotein lipase inhibitor that modulates fat-storage in the adipose tissue. Modulating the gut microbiota to exert stimulatory activity towards ANGPTL4 may thus serve a protective function against diet-related obesity. I have screened several commonly used probiotic strains for enterocytic ANGPTL4-modulation in vitro and observed significant increases in ANGPTL4 protein levels in response to secreted factors from Bifidobacterium longum. An initial characterization of these bioactive factors indicated them to be secreted B. longum proteins. The objective of the proposed study is to further elucidate the mechanism of ANGPTL4-regulation by B. longum and its impact on fat storage, and investigate if dietary enrichment of Bifidobacterium in the gut can enhance ANGPTL4 in human subjects.

Bio: Priscilla Pham is from Houston, Texas and received her BS in Human Nutrition and Foods from Prairie View A&M University. In 2010, she entered the Master's in Human Nutrition Program at Texas State University and began her research in the Molecular and Cellular Nutrition Laboratory under Dr. Vatsala Maitin. As a PhD student, she is continuing her research work under the advisement of Dr. Bob McLean.

Thesis Defense

Species traits versus environmental properties as factors influencing species abundance

Stephanie Miller

Major Advisor: Dr. Joe Veech

Committee Members: Dr. Jim Ott, Dr. Ivan Castro-Arellano

Tuesday, October 21, 2014 - 12:30 pm, SUPP 257-A

A longstanding goal in ecological research is to explain the abundance of a species found in a particular place and time. To do so, researchers identify factors that influence species abundance and attempt to describe their relationships quantitatively. The main objective of my study was to compare the relative effects of intrinsic species traits (morphological, physiological, behavioral and life history attributes) and extrinsic environmental properties (climatic, biotic and geographic aspects) on species abundance. From a literature search, 915 independent abundance observations were compiled for 83 species from 170 survey locations distributed throughout the western United States. Besides abundance information, data on species traits associated with body size, reproductive capacity, diet, and geographic range were acquired along with properties of each survey location including climatic, spatial, and biotic (number of other rodent species and individuals) variables. To make the comparison, four composite variables (an intrinsic ecological variable, intrinsic geographic variable, extrinsic abiotic variable and extrinsic biotic variable) were created using Principal Components Analysis (PCA), and a fifth variable that was the distance between each species location (occurrence in a particular survey) and the center of that species geographic range was also included. Model comparison and model-averaging procedures were then conducted using all 31 possible linear regression models of the five predictor variables with standardized abundance (corrected for extraneous design variables) as the response variable. For the dataset consisting of all species, the intrinsic ecological variable was found to have the greatest influence on abundance ($N=915$, $\beta eco = 0.116$, $SE= 0.042$). For datasets limited to certain genera (Dipodomys, Neotoma, Perognathus, and Peromyscus), different variables were identified as most influential. These results indicate that environmental properties and species traits can influence abundance independently and in combination with one another. Moreover, there is no single combination of extrinsic and intrinsic variables that most influences abundance in all genera. Nonetheless, the distinction between intrinsic and extrinsic variables is a useful dichotomy in studying the factors affecting species abundance.

Bio: Stephanie received her Bachelors of Science from the University of Florida in 2010, with a major in Zoology and a minor in Wildlife Ecology and Conservation. During her undergraduate career she worked in a physiology lab studying the response of snake kidneys to salinity changes and an animal behavior lab that studied the effects of predation on cichlid parenting structure. Upon completing her undergraduate degree, Stephanie acquired a field technician position working for a Clemson University Ph.D. student examining the habitat use of coyotes and raccoons on Yawkey Wildlife Preserve. Now after completing her Masters at Texas State University in Population and Conservation Biology, she plans to continue her education studying topics at the intersection of community ecology, species distribution, and biodiversity conservation.

Dissertation Proposal Defense

Personality, predation, and competition in a changing environment

Chelsea Blake

Major Advisor: Caitlin Gabor , Biology Department, Texas State University

Committee Members: Dr. Andrea Aspbury, Biology Department, Texas State University, Dr. Alison Bell, University of Illinois-Champagne-Urbana, Dr. Brian Langerhans, North Carolina State University, Dr. Chris Nice, Biology Department, Texas State University

Sept 4, 2014 - 12:00 noon, HPB 145

In order to explore the effects of anthropogenic environmental change on the behavioral ecology of native species, I propose four studies which will examine a range of predatory and competitive relationships. I present a study examining how personality of native prey individuals influences their behavior and survival of several different predator species, including native, novel, and invasive predators. In a second study, I will examine the relationship of behavioral traits to body shape traits associated with predator escape ability, and plasticity of behavior in response to morphological changes. I will also explore how personality of prey may relate to predator recognition in response to a novel predator. In the final study I will explore how environmental changes like rising turbidity can interact with competitive and predatory relationships among native species. The goal of the experiments presented is to add to our understanding of how behavior interplays with anthropogenic changes to shape outcomes for native species in shifting ecological landscapes.

Bio: Chelsea Blake grew up in the heart of the Midwest. Chelsea double majored in Art and Biology at Earlham, a Quaker liberal arts college in Indiana. After gaining teaching, field work, and research experience in Maryland, Oregon, Georgia, and South Carolina, she moved to Texas in 2011 and entered the Aquatic Resources PhD program at Texas State. She received a National Science Foundation Graduate Research Fellowship in 2013 to support her dissertation work. She lives in Austin with a houseful of pets, roommates, and her husband. She legally married her partner (and best field assistant) while in New York this summer.

Thesis Defense

The effect of indole production on the growth of Escherichia coli when co-cultured with Enterococcus faecalis

Shelly L. Pringle

Major Advisor: Dr. Robert JC McLean

Committee Members: Dr. Gary Aron, Department of Biology, Dr. Dittmar Hahn, Department of Biology, Dr. William Coons, Department of Biology, Victoria College

July 11, 2014 - 2:00 pm, SUPP 257-A

In nature, bacteria live in dynamic communities surrounded by a vast number of other bacterial species. Recent studies indicate that one mechanism by which Escherichia coli thrives within such a multitude is via production of the molecule indole. Evidence indicates that indole thwarts the quorum sensing system of acyl-homoserine lactone (AHL) producing bacteria such as Pseudomonas aeruginosa, Chromobacterium violaceum, and Pseudomonas aureofaciens. Impeding the signaling system of these bacteria ultimately leads to a lowering of toxic secretions such as pyocyanin and proteases. The aim of this research was to determine if the production of indole by E. coli increases its competitive fitness with Enterococcus faecalis. E. faecalis is a Gram positive, non-AHL producing bacteria which is found alongside E. coli as normal flora in the human intestine, as well as in a number of mixed culture infections. E. faecalis has increasingly become a concern as it is now a leading cause of hospital-acquired infection and has developed resistance to “last-line” antibiotics such as Vancomycin. Colony counts and turbidity of ΔtnaA (the E. coli mutant incapable of degrading tryptophan and thus deficient in indole production) were measured in mixed culture with E. faecalis. Indole was then reintroduced at physiologically relevant concentrations. Contrary to previous research, in competition with E. faecalis the population size of E. coli is inhibited and indole has a further inhibitory effect.

Shelly Pringle attended the University of Texas where she received a Bachelor of Arts in Biology in 2003. Upon receiving her degree she worked as a high school science teacher, teaching Biology, Chemistry, and Integrated Physics and Chemistry. In the fall of 2012, Shelly was admitted to Texas State University–San Marcos to pursue a Master of Science in Biology.

Thesis Defense

Seasonal diets of the collared peccary (Pecari tajacu) In the Llano uplift ecological region of Texas

Meredith Hominick

Major Advisor: Dr. Thomas R. Simpson

Committee Members: Dr. M. Clay Green, Department of Biology, Dr. James F. Gallagher, Department of Biology

July 07, 2014 –1:00 pm, SUPP 153-A

I investigated the seasonal diets of the collared peccary (Pecari tajacu) at Mason Mountain Wildlife Management Area from June 2013 to April 2014 using microhistological analysis of fecal material. Eighty fecal samples were collected from summer 2013 to spring 2014. I identified and quantified 36 plant species consumed by the collared peccary. Prickly pear was consumed in all seasons with seasonal use of forbs, grasses and mast. Annually, the bulk of the diet was comprised of browse (including prickly pear) 37.1%, forbs 32.8%, mast 22.4% and grasses 7.8%. Primary browse species included prickly pear (Opuntia spp.) and live oak/blackjack/post oak (Quercus spp.). Forbs, especially silver bladderpod (Lesquerella argyraea) and prickly fanpetals (Sida spinosa), were highly utilized as well. Vegetational surveys were conducted using the Daubenmire method to sample herbaceous species and line intercept method to sample woody species. Results of log-likelihood chi-square tests with Bonferroni corrected confidence intervals established that there were statistically significant differences between plant use and availability ($P<0.001$). Additionally, Manly's alpha preference indices indicated that collared peccaries foraged selectively on silver bladderpod in spring. Prickly pear was a selected food plant in the summer. Peccaries selectively foraged on live oak/blackjack/post oak and prickly pear in the fall and selected prickly fanpetals during winter.

Meredith received a B.S. in Biology and a minor in Environmental Science from University of the Incarnate Word in 2012. She began her studies at Texas State in the fall of 2012, and completed internships with Texas Parks and Wildlife Department as well as Bayou Land Conservancy.

Thesis Defense

Detection of Borrelia burgdorferi sensu lato Infection in Rodents From Disturbed and Sylvan Assemblages Across Texas

Troy J. Maikis

Major Advisor: Dr. Iván Castro-Arellano, Department of Biology, Texas State University

Committee Members: Dr.Thomas R. Simpson, Department of Biology, Texas State University, Dr. Maria Esteve-Gassent, Department of Veterinary Pathobiology, Texas A&M University

July 3, 11:00 Norris Room, Supple Science Building

Lyme disease, caused by the bacterium Borrelia burgdorferi, affects tens of thousands of Americans each year. Most of the research in the United States is conducted in the northeastern portion of the country. Texas represents an under-studied area with low incidences of annual human infection. Studying the bacterium in an area of low incidence could answer questions about why it has a greater prevalence in other parts of its range. The present study investigated tick loads on rodents and Borrelia prevalence in disturbed and sylvan habitats at five sites in Texas across three seasons. At four of the sites investigated, rare and relatively large bodied species that were only captured in sylvan habitats had higher tick load than the rest of the species collected at the site. Borrelia prevalence was found to vary seasonally, with larger numbers of infected individuals being captured in the fall. Future studies are needed to determine if the results described herein represent a consistent pattern, but this work represents a positive step toward investigating LD in the southern portion of its range.

Bio: In 2006, Troy Maikis graduated with a B.S. in Ecology and Evolutionary Biology from The University of Arizona. After receiving his degree, Troy went on to work all across the western U.S. for multiple government agencies, non-profits, and private contracting firms. In the fall of 2012, he began his M.S. research at Texas State University. Following the first presentation of a portion of his M.S. research, Troy was awarded the William B. Davis award by the Texas Society of Mammalogists.

Thesis Defense

Reliability Analysis of Rainwater Harvesting in Three Texas Cities

Name: Dustin Lawrence

Major Advisor: Dr. Vicente L. Lopes, Dept. of Biology

Committee Members: Dr. Walter Rast, Dept. of Biology, Dr. Ronald R. Hagelman, Dept. of Geography

July 2, 2014 10:00am FAB 130

Population growth and a prolonged drought have raised concerns about the sustainability of water resources in Texas. Recent state legislation has made financial assistance available towards the development of water supplies. The purpose of this research is to inform decision makers at state and local levels, as well as property owners about the amount of water that can be supplied by rainwater harvesting systems in Texas so that it may be included in any future planning. Reliability of a rainwater tank is a concern as people want to know to what degree a source of water can be depended on. Performance analyses were conducted on 3 cities under different climate conditions and multiple scenarios to demonstrate the importance of optimizing rainwater tank design. This was accomplished using a daily water balance model and running simulations on a range of tank sizes appropriate for rainwater harvesting at the household level. Reliability curves were produced and reflect percentage of days in a year that water can be supplied by a tank. Operational thresholds were reached in all scenarios and mark the point at which reliability increases by only 2% or less with an increase in tank size. Maximum thresholds were also reached in some scenarios and indicate a tank size that provides the maximum achievable reliability. Additional simulations considered several average years of rainfall for each city under a single scenario to determine an average ideal tank size. A payback period analysis was conducted on these tank sizes to determine the amount of time it would take to recoup the cost of installing a rainwater harvesting system.

Bio: Dustin Lawrence was raised in New Braunfels, Texas. After serving for 4 years in the United States Army, he received a B.S. in Geography with a minor in Biology from Texas State University in 2010. He was accepted into the Aquatic Resources program at Texas State University as a Master's Candidate in 2011. While working towards his graduate degree, he taught 2 semesters of biology labs, interned with the Texas Commission on Environmental Quality, and started a family. He currently works full-time as a laboratory technician for New Braunfels Utilities conducting various tests to maintain water quality standards.

Thesis Defense

Validating environmental flow recommendations: drifting coarse particulate matter, invertebrates, and larval fishes

Christopher R. Vaughn

Major Advisor: Dr. Timothy H. Bonner, Department of Biology

Committee Members: Dr. Floyd W. Weckerly, Department of Biology, Dr. Archis Grubh, Texas Parks & Wildlife

July 3, 2014 – 1:00 PM, Freeman Aquatic Building (FAB) 130

Water quantity management in Texas and elsewhere is currently managed under the theory of the Natural Flow Paradigm, which states that sound ecological riverine environments are dependent upon the dynamic character of flow. Water quantity recommendations and standards prescribe a multi-tier flow regime, consisting of subsistence, base, and high-flow pulses, with magnitudes of each based on long-term averages of site-specific hydrographs. The next step in water quantity management is to validate that the recommended flow regimes are sufficient to maintain a sound ecological environment, although validation methodologies are rarely incorporated into water quantity management plans. Purposes of this study were to develop methodologies for validating flow recommendation and standards that are transferable and replicable and to quantify the value of flow tiers relating to organic drift. Objectives of this study were to assess drift biomass of coarse particulate matter (CPM) and drift rates of invertebrates and larval fishes related to flow tiers (i.e., subsistence, base, two per season high flow pulse, one per season high flow pulse, and one per year high flow pulse) across four sites and two rivers (i.e., San Antonio and Guadalupe rivers). A priori predictions were that CPM, invertebrates, and larval fishes were in greater biomass or densities at higher flow tiers, though at some point flows would be sufficiently high and induce a washout effect. Findings were generally inconsistent with the predications. Biomass of CPM did not differ among flows ranging from subsistence to two per season high flow pulse events, and densities of macroinvertebrate did not differ among flows ranging between base and one per season events. However, densities of fluvial specialist Neoperla (Order Pelcoptera) were positively correlated with flow as a continuous variable rather than a categorical variable. Densities of larval fishes were greatest at subsistence, base, and two per season high flow pulses and decreased at 1 per season flow pulses. It is uncertain if a washout effect occurred or if survival of larval fishes was decreased at a higher flow pulses. With a validation methodology in place, replications from other sites and river basins can be added to the existing model to improve statistical power and inference, along with other flow-dependent variables, in order to fully assess the value of multi-tier flow regimes.

Christopher Vaughn is from Arlington, Texas. He attended Texas A&M University where he received a Bachelor of Science in Wildlife and Fisheries Sciences with an emphasis in Fisheries Ecology and Conservation in December 2011. Immediately upon graduation, Christopher came to Texas State University to earn his Masters of Science degree in Aquatic Resources. His primary area of research is in instream flow, water quantity management, and the effects that deviant flows have on instream biota, in particular, drifting organics.

Thesis Defense

Atmospheric Carbon Dioxide and its Relation to Carbon Cycle Perturbations during Ocean Anoxic Event 1d: A High Resolution Record from Dispersed Plant Cuticle

Name: Jon D. Richey

Major Advisor: Dr. Garland R. Upchurch

Committee Members: Dr. David E. Lemke, Dept. of Biology, Dr. Noland H. Martin, Dept. of Biology, Dr. Marina B. Suarez, Dept. of Geological Sciences, University of Texas – San Antonio

July 3, 2014 10:00am Supple 153-A

Past geological greenhouse intervals are associated with Ocean Anoxic Events (OAEs), which result from an increase in marine primary productivity and/or an increase in the preservation of organic matter. The end point is widespread black shale deposition combined with a long-term atmospheric positive δ13C excursion from an increase in the burial of 12C. Some OAEs show a negative δ13C excursion preceding the positive excursion, indicating a perturbation in the global carbon cycle prior to the initiation of these events.The Rose Creek Pit (RCP) locality, southeastern Nebraska, is currently the only known terrestrial section that preserves OAE1d (Cretaceous, Albian-Cenomanian Boundary) and has abundant plant organics. These features allow for a combined analysis of carbon isotopes and stomatal index (SI) to determine changes in the cycling between carbon pools and their relation to inferred paleo-CO2. To do this, RCP SI data were calculated from the cuticle of Pandemophyllum kvacekii (an extinct laurel) and related taxa, and fitted to δ13C curves derived from fossil gymnosperm charcoal and lignitized wood, as well as other published δ13C profiles from RCP and nearby sediment cores. Absolute values of CO2 were estimated using three published transfer functions based on species of extant Lauraceae. SI indicates changes in CO2 coincident with changes in δ13C. Near the bottom of RCP, pCO2 was relatively low (330−615ppm). At the same level, this study records a negative δ13C shift of ~2.8−2.96‰ compared to pre-excursion samples collected near RCP, similar to that of other RCP δ13C curves (~2.14−2.4‰). All RCP δ13C curves show that the negative excursion lasts through ~3.3m of the section. During this negative excursion, pCO2 increases from the pre-excursion values to a high of ~380−800ppm. After the negative excursion, all RCP δ13C curves and pCO2 values show a slow return to pre-excursion values. Despite the finer sampling intervals of this study compared to other RCP δ13C curves, δ13C curves from fossil gymnosperm charcoal and lignitized wood do not record the positive excursion recorded in carbonate δ13C curves during OAE1d. This study confirms that δ13C of fossil wood, whether coalified or charcoalified, and SI from dispersed cuticle can reliably capture carbon cycle perturbations and changes in atmospheric CO2 around OAEs.

Bio: Jon D. Richey was raised in Tyler, TX. After a long break from higher education, he received a B.S. in Biology from Texas State University – San Marcos in 2011, and entered into the Master's program in Biology that same year. Jon received a National Science Foundation Graduate Research Fellowship in 2013 and a Texas State Thesis Support Fellowship in 2014. He will enter the Ph.D. program in Earth and Planetary Sciences at the University of California – Davis Fall 2014.

Thesis Defense

Variation in rumen-reticulum fill in white-tailed deer (Odocoileus virginianus)

Meredith R. E. Aiken

Major Advisor: Floyd W. Weckerly

Committee Members: Dr. Thomas R. Simpson, Department of Biology, Dr. M. Clay Green, Department of Biology

June 24, 2014 – 11:00 AM, Supple 153

Understanding variation in rumen-reticulum fill allows us to predict how ruminants will accommodate fluctuations in food supplies and animal production demands. Studies suggest rumen-reticulum fill increases with lower quality diets (low crude protein-CP, high acid detergent fiber-ADF) and browse diets compared to pelleted diets. Rumen-reticulum fill presumably fluctuates with the demands of antler growth and access to females during the mating season, in male white-tailed deer, and during late gestation and lactation in females. Previous research has mainly examined the relationship between rumen-reticulum fill and body mass; however, multiple factor may be influencing rumen-reticulum fill. Herein, I examined the influences of nutrition (ADF and CP), diet type (pelleted or browse), reproductive demands (males in rut vs. males outside of rut, lactating vs. non-lactating) as well as body mass, rump fat, age, and sex on wet and dry rumen-reticulum fill. I collected white-tailed deer (122 males, 152 females) from Kerr Wildlife Management Area, Texas (pen-raised, free ranging) and a private ranch in south Texas. I built models and used Akaike Information Criteria to select competing models to understand which hypotheses explained rumen-reticulum fill dynamics. The only prediction that was not falsified was that lactating females had greater fill. In regards to nutrition, wet fill decreased, as ADF increased. This is likely because of chemostatic factors that regulate food intake and diet quality when dietary fiber is 'low'. Deer consuming a pelleted diet had greater wet and dry rumen-reticulum fill than deer consuming a browse diet. My findings indicate that scaling relationships between body mass and rumen-reticulum fill were allometric. Additionally, rumen-reticulum fill is influenced by a wide variety of factors.

Meredith received a B.S. in Wildlife and Fisheries Science from Texas A&M University in 2009. She began her studies at Texas State in the fall of 2012, and was recently awarded the Leadership Scholarship from the Max McGraw Wildlife Foundation and Wildlife Management Institute.

Thesis Defense

Current velocity and flow mediated diets of larval fishes

David S. Ruppel

Major Advisor: Dr. Timothy H. Bonner

Committee Members: Dr. Floyd W. Weckerly, Department of Biology, Dr. Alan W. Groeger, Department of Biology

June 12, 2014 – 12:30 PM, FAB 130

Purposes of this study were to test two theories relating to food consumption of larval stream fishes. Flow-pulse feeding theory states that larval fish food consumption will be greater following nutrient-rich flow pulses. Drift-feeding theory states that larval fishes enter the drift at night to consume food items under the protection of darkness. Objectives of this study were to quantify gut fullness and occurrence and abundances of food items consumed among larval fishes taken during subsistence flow, base flow, and several high flow pulse tiers (e.g., one per season, one per year) and between larval fishes taken during the day in slackwater habitats and larval fishes taken during the night in swift water habitats. During one year period of observation among four sites and two rivers, mesolarval of obligate riverine taxa (i.e., Cyprinidae, Catostomidae, Percidae) had greater gut fullness within 28 d following a 1 per season flow event than those taken within 28 d following subsistence flow, base flow, 2 per season flow event. Greater gut fullness during a 1 per season flow event was attributed to greater numbers of copepods and organic detritus consumed. However, gut fullness and occurrences and abundances of food items consumed by metalarvae were independent of flow. Among mesolarvae and metalarvae collectively and among taxa, gut fullness was greater during the day for fishes taken in slackwater habitat than those taken at night from swift water habitats. Larval fishes within lowland rivers of western gulf slope drainages of Texas conformed only partially to larval fish feeding theories. Drift-feeding theory likely is not a mechanism to explain larval drift at night, and the value of flow pulses to larval fish feeding and subsequent recruitment was not consistent among larval life stages. Nevertheless, this study documents for the first time larval fish food consumption in lowland rivers and establishes a process to quantify the value of flow tiers relevant to the stream fish community.

David received a B.S. in Zoology from Northern Michigan University in May 2012. David began his studies at Texas State University in Summer 2012 and was recently awarded the Certificate of Excellence in Spring 2014. David currently serves as President of the Aquatic Biology Society and is a member of the Texas Chapter of the American Fisheries Society.

Thesis Defense

INVASIVE HETEROPHYID TREMATODES AND THEIR NATIVE AQUATIC HOSTS IN TEXAS

Daniel C. Huston

Major Advisor: Dr. David G. Huffman

Committee Members:

Dr. Ivan Castro-Arellano, Department

Dr. Kenneth G. Ostrand, U.S. Fish and Wildlife Service

May 8, 2014 – 1:00 PM, Supple 116

Centrocestus formosanus and Haplorchis pumilio are invasive Heterophyid trematodes which have been introduced to Texas via introductions of their first intermediate snail hosts. Second intermediate hosts for both of these trematodes include multiple species of freshwater fishes, which become infected when exposed to free-swimming trematode cercariae. Centrocestus formosanus cercariae encyst in the gills of their fish hosts, whereas H. pumilio cercariae penetrate the epidermis and encyst in the head and tissues of the fin insertions. Though mortalities in fish hosts have been attributed to these trematodes in artificially confined systems such as fish culture, there are no reported fish kills attributed to these trematodes in the wild. We speculate that many fish species restricted to stable spring-fed systems would experience increasing parasite burdens of these trematodes over time. High metacercarial intensities in the gills could lead to reduced respiratory efficiency, while high metacercarial intensities in the fin insertions could reduce swimming performance. In order to test this hypothesis and estimate the impact of these parasites, we developed a methodology for the artificial infection and swimming endurance testing of small fish hosting various intensities of trematode metacercariae. We found we were able to induce a wide range of metacercarial intensities in our fish using wild caught Melanoides tuberculata infected with either C. formosanus or H. pumilio, and that we could test the swimming endurance of these fish with a specially constructed swim tunnel. This methodology has laid the groundwork for the development of a mathematical model of the impact of these parasites at various metacercarial intensities. In addition, we utilized artificial infection methods to examine host specificity for C. formosanus. Though C. formosanus has previously been reported to infect frogs and toads in Asia, the potential for Texas amphibians to become infected has been ignored. We exposed adult San Marcos salamanders (Eurycea nana) and larval leopard frogs (Lithobates berlandieri) to the cercariae of C. formosanus. We found that while the neotenic E. nana was refractory to infection, L. berlandieri tadpoles were susceptible. We believe that the active respiratory rhythm of the tadpoles when compared to the passive respiratory system of the salamander may account for this observation. Lastly, we examined host breadth and built a preliminary second intermediate host list for H. pumilio in Texas. Haplorchis pumilio has been known to occur in Texas for over a decade, and has been reported infecting snails in multiple spring-fed systems throughout the state. However, no second intermediate fish hosts have been reported hosting H. pumilio metacercariae in Texas, or the U.S.A. We examined the federally listed fountain darter (Etheostoma fonticola), Devils River minnow (Dionda diaboli), Pecos gambusia (Gambusia nobilis), Comanche Springs pupfish (Cyprinodon elegans); Texas protected Rio Grande darter (Etheostoma grahami) as well as the largemouth bass (Micropterus salmoides). With the exception of C. elegans, all species examined were positive for H. pumilio. We conclude that H. pumilio is likely present

in many systems where their snail hosts have become established, and these finding present concern for human and wildlife health.

Daniel Huston was born in Corpus Christi, TX. Daniel Received a B.S. in wildlife biology from Texas State University in 2011, and began an M.S. in biology in 2012. He has worked for the U.S. Fish and Wildlife Service throughout his graduate career, and enjoys topics pertaining to invertebrate biology.

Dissertation Defense

Wetlands, birds, and changing landscapes: examining avian communities at multiple spatial extents

Suzanne Whitney

Major Advisor: Dr. Joseph Veech

Committee Members:

Dr. Floyd Weckerly, Department of Biology

Dr. Weston Knowlin, Department of Biology

Dr. Erica Fleishman, University of California - Davis

Dr. Curt Flather, USDA – Forest Service, Fort Collins, CO

May 9, 2014 – 9:00 AM, SUPPLE 116

Destruction and impairment of wetlands has been extensive throughout the conterminous United States, resulting in the loss of both crucial ecosystem functions and productive habitat for a wide variety of organisms. Over the last few decades, efforts to protect, restore, and create wetlands have led to increases in wetland area and improvements to wetland quality in many locations. However, wetlands are difficult to create or restore, and whether these initiatives will lead to wetland function that approaches historical levels remains unclear. My research focuses on how the diverse bird communities that rely on wetlands might be affected by changes to their primary habitat and the surrounding landscape. I utilized data from the North American Breeding Bird Survey (BBS) and the National Land Cover Database (NLCD) to develop a set of spatially-explicit abundance models for each of 24 species of wetland-breeding birds. Independent variables in these models included combinations of three different aquatic habitats as well as other land cover types that could potentially influence species abundance. I compared the models in an information-theoretic framework to determine which cover types most influenced species abundance. All species were positively associated with one or more types of aquatic cover, and when considered in the broad spatial context of entire landscapes, other cover types likely affect abundances of many species as well. I also used data from the BBS and the NLCD to develop an inventory describing the characteristics of wetland bird communities and the composition of the landscape (including how these factors have changed over time) within several Bird Conservation Regions. The data included in this inventory indicate that wetlands and the bird communities associated with these systems have continued to experience substantial regional changes in recent years. Further, a review of previously published studies on avian use of anthropogenic wetlands suggests that while created and restored wetlands do support substantial bird communities, these assemblages are typically dissimilar from those at natural wetlands.

Suzanne graduated from California Lutheran University with a B.S. in Biology in 2004 and received her M.S. in Environmental Studies from the College of Charleston in 2008. She taught environmental education and worked on various ecological research projects in Oregon, California, Massachusetts, Puerto Rico, Mississippi, and South Carolina before moving to Texas. Suzanne entered the Aquatic Resources Ph.D. program at Texas State University in the fall of 2009 and has been supported as an

Instructional Assistant for Organismal Biology and as a National Science Foundation GK-12 fellow with Project Flowing Waters.

Dissertation proposal Defense

Role of IBR5 in modulating SCF ubiquitin ligase mediated protein degradation in plant hormone response

Thilanka Jayaweera

Major Advisor:

Dr. Nihal Dharmasiri, Department of Biology, Texas State University.

Committee Members:

Dr. HongGu Kang, Department of Biology, Texas State University

Dr. Sunethra Dharmasiri, Department of Biology, Texas State University

Dr. Alan Lloyd, MCDB, University of Texas at Austin

Dr. William Gray, Department of Biology, University of Minnesota

May 9, 2014 – 2:00 pm Supple 153

The SCF (Skp1, Cullin, F-box) ubiquitin ligase dependent protein degradation is a common mechanism that regulates protein abundance of both plants and animals. This mechanism is involved in many cellular processes such as cell cycle, signaling cascades, and developmental processes. Several plant hormone signaling pathways such as auxin, gibberellic acid, ethylene, and jasmonic acid use the SCF dependent ubiquitin-proteasome pathway to regulate gene expression. In auxin signaling, auxin promotes the interaction between Aux/IAAs and SCFTIR1/AFBs and thereby enhances the ubiquitination and degradation of Aux/IAA repressors through 26S proteasome. The degradation of Aux/IAAs relieves the repression on ARFs leading to the modulation of gene transcription. Dual specificity phosphatase, IBR5 was identified as a protein involved in auxin signaling. Unlike in many other auxin insensitive mutants, Aux/IAA proteins are not stabilized, but rather degrade faster in ibr5-1 compared to the wild type suggesting that IBR5 negatively regulates Aux/IAA degradation. Also, the loss of ABP1 auxin receptor function leads to rapid Aux/IAA degradation similar to ibr5-1, suggesting that ABP1 and IBR5 function in a common signaling pathway to regulate SCFTIR1/AFBs dependent Aux/IAA degradation. Overall goal of this study is to understand the molecular mechanism by which IBR5 regulates SCF ubiquitin ligase mediated protein degradation. Three ibr5 mutant alleles, ibr5-1, ibr5-4 and ibr5-5 as well as alternatively spliced IBR5.1 and IBR5.3 will be used to further understand the function of IBR5 in the above process. Also, experiments will be carried out to understand the interaction between ABP1 and IBR5, hypothesizing that IBR5 links ABP1 and TIR1/AFBs dependent auxin signaling pathways.

Thilanka Jayaweera was raised in Kandy, Sri Lanka and received his BS degree in Molecular Biology and Biotechnology from University of Peradeniya, Sri Lanka in May 2009. Then he entered the graduate College of Texas State University and earned his MS degree in Biology in fall, 2011. Thilanka entered the aquatic biology PhD program in spring 2012 to continue his research focused on auxin signaling in plants development. During his stay at Texas State he won several awards including Biology colloquium award, Colene Drace Cell Biology award, Graduate college scholarship and Dorothy Coker Research Fellowship.

Thesis Defense

Factors Affecting Phosphorus Uptake in Karstic Rivers of the Edwards Plateau, Central Texas

Aaron P. Swink

Major Advisor:

Dr. Weston Nowlin

Committee Members:

Dr. Benjamin Schwartz, Department of Biology

Dr. Alan Groeger, Department of Biology

April 23, 2013 – 1:00 PM, FAB 130

Phosphorus (P) is a limiting nutrient for microbial primary producers in many aquatic systems and thus an overabundance of it via urban and agricultural runoff has led to eutrophication of waterways across the globe. There are a variety of ways to study nutrient dynamics, but nutrient spiraling theory is often used as a measure of efficiency and limitation in lotic ecosystems. However, the consistency, accuracy, and utility of the traditional metrics are questionable, especially as the discharge and hydrologic complexity of a stream or river increases. Thus, there is a relative dearth of knowledge on nutrient uptake in larger rivers, especially in spring-fed rivers. Recent improvements in methodology (i.e., pulsed tracer addition experiments) have allowed nutrient uptake length measurements to be performed in larger rivers in which it was cost-prohibitive to perform more traditional uptake methods (i.e., short-term steady state injection or isotope additions). The purpose of this study was to quantify P uptake and examine the factors that influence P uptake in relatively larger discharge riverine ecosystems, specifically, in karstic, spring-fed rivers of the Edwards Plateau, in central Texas. We utilized a pulsed tracer addition method to measure P uptake in 7 rivers and coupled these estimates with measurements of a diversity of in-stream and reach-level variables which are likely to exhibit influences on P uptake and retention in lotic ecosystems. We found that levels of chlorophyll-a and particulate P in benthic biofilms were significant predictors of uptake rates. In general, there was a high degree of covariance between benthic chlorophyll-a, benthic particulate P, water column SRP and dissolved mineral load indicating that biological and physicochemical factors are highly interrelated and work in concert to affect P cycling in these systems. Our results indicate that P uptake rates for the rivers in this study are rapid when compared to similarly sized non-karst rivers due to (1) the low availability of dissolved phosphate in the river, (2) abundance of algae-dominated biofilms, and (3) interaction with dissolved minerals (especially Ca2+), presumably resulting in precipitation of insoluble mineral forms of P. We have also shown that pulsed tracer additions can be a simple and effective tool for studying nutrient dynamics in streams and rivers.

Aaron Swink is from Kapaa, Hawaii. He attended Texas A&M University where he received a Bachelor of Science in Bioenvironmental Science in 2009. He has since worked for invasive species eradication projects in Hawaii and has done water quality monitoring for the San Marcos Observing System (SMOS) and the San Marcos Habitat Conservation Plan (SMHCP). In 2012, he was admitted to Texas State University to pursue a Master of Science in Aquatic resources. His primary areas of research interest are in freshwater biogeochemistry and karst hydrogeology and geomorphology.

Thesis Defense

Mating behavior and the effects of turbidity on association preferences in the fountain darter, Etheostoma fonticola.

Sophia L. DeColo

Major Advisor: Dr. Caitlin R. Gabor

Committee Members:

Dr. Andrea Aspbury, Department of Biology

Dr. Kenneth Ostrand, USFWS

April 10, 2014 – 10:00 AM, Supple Norris Room

Anthropogenic activities such as industrial pollution, aquatic recreation, and increased groundwater withdrawal pose serious threats to aquatic ecosystems. Rising levels of turbidity as a result of these threats have serious consequences for aquatic organisms as turbidity degrades visual communication. The federally endangered fountain darter, Etheostoma fonticola, is endemic to the clear spring-fed headwaters of the San Marcos and Comal Rivers in central Texas. Here we tested the impact of simulated turbidity on association preferences in E. fonticola. We examined whether male and female E. fonticola exhibit preferences for larger over smaller individuals across two vision levels; clear and impaired (simulated low turbidity). We found that both female and male E. fonticola do not exhibit association preferences for larger over smaller individuals of the opposite sex or the same sex. Simulated low turbidity levels affected the total amount of time both female and male E. fonticola spent associating with individuals of the opposite sex. Reducing the amount of time spent associating with the opposite sex may reflect a reduction in the amount of time spent evaluating potential mates, thereby weakening sexual selection for traits important in mate choice. These results indicate that compromised vision hampers association preferences in E. fonticola, which may be of concern for the conservation and management of this endangered species. Additionally we investigated the mating behavior of E. fonticola. Association preferences in E. fonticola did not reveal female or male mate preferences for size in this species. However, male-male interactions may influence mating behavior in E. fonticola and larger and smaller males may experience variation in mating success regardless of female preferences for size. Here we examined whether larger and smaller male E. fonticola exhibit differences in agonistic behavior and mating success. We found that larger males exhibited higher rates of aggressive behaviors and smaller males in turn exhibited more defensive behaviors. However, differences between larger and smaller males in male-male interactions were not correlated with differences in spawning success. These results suggest that male size influences dominance relationships in E. fonticola but not mating success. Combined with the results from our previous study, body size is not an important male trait for evaluating or choosing potential mates in female E. fonticola. As changing environmental conditions and anthropogenic activities threaten this endangered species, further understanding of the mating behavior of E. fonticola may be critical for their conservation and persistence.

Sophia DeColo was born in Boston, Massachusetts. She attended Northeastern University where she received a B.S. in Biology in 2010. While at Northeastern, she conducted undergraduate research in

vertebrate paleontology and had the opportunity to work in the penguin colony at the New England Aquarium. Since then she has pursued various outlets to engage in animal husbandry and aid in conservation efforts. In 2012, Sophia entered Texas State University to pursue a Master of Science in Population and Conservation Biology.

Thesis Defense

Influence of a population irruption by Roosevelt elk on a vegetation index

Heath D. Starns

Major Advisor: Dr. Floyd W. Weckerly

Committee Members:

Dr. M. Clay Green, Department of Biology

Dr. Thomas R. Simpson, Department of Biology

April 4, 2014 – 11:00 AM, SUPP 257

Understanding the factors that influence population growth is central to the study of any species. Large herbivores can influence their food supplies through herbivory. Over 23 years just before and throughout an irruption by a Roosevelt elk population I assessed temporal and spatial patterns of the Normalized Difference Vegetation Index (NDVI). My objectives were to determine if elk herbivory was associated with NDVI and whether the plant community foraged by the irruptive population was tolerant or resistant to elk grazing. Using Landsat 5 Thematic Mapper imagery, I obtained estimates of NDVI for three areas of Redwood National and State Parks, each inhabited by distinct populations of Roosevelt elk. Each population exhibited a different pattern of growth through the time series of the study. One population underwent the irruptive growth pattern while the other two populations did not. Using piece wise regression, I detected temporal changes in NDVI for the area used by the irruptive population that suggested a decline in forage biomass during the end of the dry season but I detected no decline in NDVI at the peak of the growing season. My findings suggest that the area used by the irruptive elk population may have undergone changes in plant community composition favoring plants that were resistant to elk grazing.

Heath received a B.S. in Wildlife Ecology and Management from Texas A&M University in August 2008. After graduating, he worked as assistant manager on a wildlife-focused ranch in south Texas for three years. Heath began his studies at Texas State in the Fall of 2012, and was recently awarded the Thesis Research Support Fellowship in Spring of 2014.

Thesis Defense

OCULAR HISTOLOGY IN THREE SOUTH CENTRAL TEXAS PAEDOMORPHIC SALAMANDER SPECIES (EURYCEA SOSORUM, EURYCEA NANA AND EURYCEA RATHBUNI) AND COMPARATIVE OCULAR DEVELOPMENT OF TWO MORPHOTYPES

Ruben U. Tovar

Major Advisor: Dr. Dana García

Committee Members:

Dr. Caitlin Gabor, Department of Biology, Texas State University

Dr. Glenn Longley, Department of Biology, Texas State University

April 2, 2014 – 10 am, Supple 153

The recent focus on conserved genes expressed through development has allowed for great headway in understanding the molecular mechanisms responsible for the variation seen among organisms. Understanding the expression of these integral developmental genes has implications with respect to evolutionary processes. The south central Texas Eurycea clade presents a unique continuum of karst phenotypes, having representative species of both subterranean and above ground morphotypes. By describing the adult ocular morphology and the developmental pathways leading to it, I hope to lay the foundation for better understanding the underlying molecular mechanisms responsible for subterranean phenotypes in a karst salamander system. I am interested in exploring the evolution of developmental mechanisms that has resulted in the divergent ocular morphologies seen between the subterranean Texas blind salamander (Eurycea rathbuni) and the above ground Barton Springs salamander (Eurycea sosorum). To better understand the developmental processes of ocular reduction, a description of adult ocular histology was done first. The adult histology revealed an underdeveloped eye in the subterranean species E. rathbuni and well-developed eyes in the above ground species E. nana and E. sosorum. To understand how differences in gene expression influence the divergent outcomes of eye development between the two morphotypes, expression of genes involved in ocular development (pax6 and shh) was examined in E. rathbuni embryos and E. sosorum embryos. Pax6 and Shh are conserved across all animals and share similar expression patterns through development in species in which their expression has been examined. I found that both E. rathbuni and E. sosorum express Pax6 and Shh,butthe time course and location of Pax6 and Shh expression in the developing eye of the blind salamander differed from that in the sighted salamander. Furthermore, I observed unexpectedly that the lens, which functions in inducing development of the retina in other organisms, persists in the Texas blind salamander into the latest embryonic stages. I conclude that these salamanders present an ideal system in which to study the evolutionary and developmental mechanisms that lead to the variation in morphotypes seen in the Eurycea clade.

Ruben Tovar was born in San Antonio, Texas. He received a B.S. in Interdisciplinary Studies with a minor in Biology from the University of Texas, Arlington in 2010. His research interests lie broadly in herpetology, but his question of interest is in the subdiscipline of evolutionary developmental biology.

Dissertation Proposal

Predicting Future Range Expansion of Whooping Crane (Grus americana) Winter Habitat Using Long-Term Census and Remotely Sensed Data

Nicole A. Davis

Major Advisor: Dr. Thomas Hardy, Department of Biology, Texas State University

Committee Members:

Dr. Clay Green, Department of Biology, Texas State University

Dr. Susan Schwinning, Department of Biology, Texas State University

Dr. Jennifer Jensen, Department of Geography, Texas State University

Dr. Elizabeth Smith, International Crane Foundation

April 1, 2014 – 3:30 pm Supple 112

Individual-based models (IBMs) have been utilized to explain various ecological processes. Examples include the influence of winter range carrying capacity on migrating bird survival, habitat choice in relation to range distribution, and changes in population dynamics from habitat degradation. The aim of my dissertation is to develop a spatially-explicit individual-based model to examine how behavioral patterns in wintering whooping cranes (Grus americana) influence territorial expansion and, most importantly, if these patterns may potentially limit territorial expansion below the seemingly available habitat. Whooping cranes have remained an endangered species since 1967, with only one wild-population remaining; the Aransas-Woods Buffalo population. Current conservation strategies regarding land protection for the Aransas-Woods Buffalo population within their wintering grounds along the Texas coast are limited by the uncertainty of future distribution as the population increases. I will develop winter range habitat suitability models for subadult and adult whooping cranes for inclusion in the individual-based model. The overall goal of the final IBM is to mimic past distributions of the Aransas-Woods Buffalo population within their wintering grounds along the Texas coast. The IBM could then be used as a conservation strategy tool to aid in future protection of the endangered Aransas-Woods Buffalo whooping crane population by producing predictions of winter distribution as the population increases.

Nicole received a B.S. in Biology from the University of Texas at San Antonio in December 2007 and a M.S. in Biology from Texas A&M University-Corpus Christi in May 2011. While attending Texas A&M-Corpus Christi, she was a NOAA Environmental Cooperative Science Center fellow and received the Teresa Heinz Scholar for Environmental Research Scholarship. Nicole joined the Aquatic Resources PhD program at Texas State University-San Marcos in the spring of 2012. She has remained an intern with the International Crane Foundation since joining Texas State and recently received a research grant from the Coypu Foundation.