Thesis Defense

"Optic Nerve of Zebrafish (Danio rerio) as a Model for Aging Studies in Humans"

Name: Pedro Gonzalez Jr.

Major Advisor: Dr. Dana M. García

Committee Members: Dr. Shannon Weigum, Dr. Joseph Koke

Monday, November 7, 2016, 3:00 PM, Norris Conference Room

The optic nerve is the cranial nerve that sends messages from the eyes to the brain and is part of the central nervous system (CNS). Astrocytes help maintain neuronal health within the CNS. In humans, senescence of astrocytes is thought to be a factor in aging related diseases. Astrocytes uniquely express glial fibrillary acidic protein (GFAP), a type of intermediate filament. High levels of expression of GFAP are one indicator of reactive astrocytosis. Since increased expression of GFAP is a characteristic response to injury or disease, we hypothesize that increased expression of GFAP in the optic nerve of zebrafish correlates with aging of zebrafish We also investigated p16-ARC, a protein that has been associated with aging-related diseases. Lastly, studies on the changes in the optic nerve of human cadavers in which measurements of the optic nerve were done revealed that there was an increase in the diameter with increasing age. We performed similar measurements on the optic nerve of the zebrafish. If all three of these indicators for aging and senescence are observed, then zebrafish may be a tenable animal model for understanding aging in humans. The fish were raised in aquaria located in Room 272 of the Supple Science Building or purchased from ZIRC to ensure the exact age of the fish. Fish were euthanized, fixed and dissected. The tissue was be frozen, embedded and sectioned into 20 mm thick sections using a cryotome and then adhered to gelatin-coated coverslips. Antibodies for immunolabeling Gfap were anti-GFAP (zrf-1) raised in mouse (1:200 dilution) as the primary antibody and goat anti-mouse Alexa Fluor 488 (1:300 dilution) as the secondary antibody. The same protocol was used for immunolabeling p16-ARC, but with the addition of anti-p16 antibody and the appropriate secondary antibody. Tissue sections were observed and positive and negative control images were acquired using an Olympus FV1000 confocal laser-scanning microscope. Intensity of labeling was quantified by measuring the pixel intensity using ImageJ software. Optic nerve diameters were measured from images obtained from 6 (n = 5), 9 (n = 5) and 12 (n = 3) month old fish. Outliers were removed. Data were analyzed using ANOVA and post-hoc t-tests. Contrary to expectations, GFAP labeling was observed in zebrafish as young as 3 months old. Intensity and extent of labeling increased as fish aged. Labeling of p16-ARC was observed in 9 and 12 month old fish, but not in 3 and 6 month old fish. The diameter of the optic nerve increased significantly as the fish aged. Overall, our study may support zebrafish as a model organism for better understanding aging in humans.

Bio: Pedro Gonzalez, Jr. obtained a BS in Biology (2014) from St. Mary's University in San Antonio, Texas. Upon deciding that he wanted to complete a Master's degree, he entered the MS Biology program in Fall 2014 and joined Dr. García's lab where he became interested in Neurobiology. Pedro aims to pursue a career in the medical field as a PA and return to his hometown (Harlingen, TX) to serve patients in the underserved region of the Rio Grande Valley.

Thesis Defense

"Mechanisms of Escherichia coli and Vibrio cholerae fitness when grown in co-culture"

Name: Candace Longoria

Major Advisor: Dr. Robert JC McLean

Committee Members: Dr. Karl Klose, Dr. Kavita Kakirde

Thursday, November 3, 2016, 9:30 AM, Norris Room

Vibrio cholerae is a gram negative bacillus that possesses a single flagellum and is commonly known to have two toxigenic strains: serogroups O1 and O139; both are causes of epidemics. V. cholerae normally lives in brackish aquatic environments that have varying conditions that include temperature, salinity, and pH. Escherichia coli is normally found in the intestinal tract and E. coli K-12 is a commensal non-virulent strain used in many laboratory settings. E. coli and V. cholerae were observed in planktonic and biofilm mixed cultures and V. cholerae was seen to have a reduced fitness in the biofilm environment. To test which E. coli genes are essential for growth with V. cholerae, we used the E. coli KEIO knockout collection of specific K-12 genes and tested the ability of various knockouts to grow with V. cholerae. Once the initial screening was complete we saw the deletion of peptidase activity, most so with pepA-, had visible changes in fitness and growth in both planktonic and biofilm mixed culture. We also used various pepA- strains and plasmids with altered DNA-binding and peptidase activity and observed the growth in mixed culture over a forty-eight hour period. Based on our data, biofilm mixed culture and the lack of peptidase activity may affect the growth and fitness of both E. coli and V. cholerae

Bio: Candace Longoria spent two years at the University of North Texas on a FOCUS scholarship before transferring to the University of Texas at Austin and graduating with her BS in Biology with a focus in Evolution, Ecology, and Behavior and a Minor in Chemistry. After a year in the real world, she entered the MS Biology program in the Fall of 2014 in hopes of providing a better future for her dog, Pig

Thesis Defense

Range expansion of an exotic Asian snail (Melanoides tuberculata) into Central Texas rivers, and the parasitological consequences thereof

Name: Stephen Harding

Major Advisor: David Huffman

Committee Members: David Rodriguez and Jake Jackson (BIO-WEST)

Wednesday, 11/02/2016, 11:00 a.m., FAB130

The invasive gastropod Melanoides tuberculata (family: Thiaridae) has been established in Texas since the 1960's. After being restricted to thermally stable spring runs for decades, these snails have recently exhibited unprecedented range expansions into the surface-fed Guadalupe and lower San Marcos Rivers in Central Texas. The mechanisms driving this expansion are not yet understood but parasitic consequences of this phenomenon are such that the invasive Asiatic trematodes Centrocestus formosanus, Haplorchis pumilio, and Philophthalmus gralli are likely to follow their snail hosts into novel habitats from which they were previously excluded. Morphometric methodologies are utilized to qualitatively and quantitatively partition variation observed within and among Texas snail populations. Additionally, geometric estimates are used to further partition subtle variation in conch morphology. Snails exhibiting unique combinations of phenotypic traits were subject to molecular analyses using primers targeting the mitochondrial 16s rRNA gene. Genetic analyses revealed cryptic variation and diversity within and among Texas snail populations. Local snail invasions are placed into a global context by establishing phylogenetic relationships with other thiarid snails using 16s rRNA data published in GenBank. This molecular perspective can now serve as a platform for futures studies investigating habitat & thermal preferenda and further studies of the genetic diversity of local M. tuberculata.

Bio: Stephen Forrest Harding graduated from Texas State University – San Marcos with a BS in Aquatic Biology in 2014. He entered the MS Aquatic Resources program under the tutelage of Dr. David Huffman in the spring of 2015. When he is not in the lab he is usually fishing, but can also be found spending time with his fiancée Hope and their two dogs and three kitties.

Thesis Defense

Gender Differences in Student Attitudes Towards Science in Secondary Classrooms with Resident Scientists in Texas

Name: Lisa Maria Hanson

Major Advisor: Dr. Julie F. Westerlund, Ph.D

Committee Members: Dr. Paula Williamson, Ph.D. and Dr. Hong-Gu Kang, Ph.D

Wednesday, November 2, 2016, 10:30 AM, Norris Conference Room

The purpose of this two-year study was to examine secondary school students' attitudes about science in four different categories before and after being with PhD graduate students, resident scientists, in their classrooms every week. The study was based upon a National Science Foundation (NSF) program called Project Flowing Waters, a five-year NSF Graduate STEM Fellows in K-12 Education (GK-12) program. The program funded 26 doctoral students, known as NSF GK-12 fellows, who served as bi-weekly resident scientists in science classrooms in local schools. A newly developed science attitude survey, My Attitude Toward Science Scale (MATS) was used to survey student [n=1111 students] attitudes (Westerlund & Hillman, 2012). Student attitudes were surveyed in four categories (a) the subject of science, (b) the desire to become a scientist, (c) the value of science to the society, and (d) the students' perceptions of scientists. Matched pre and post student attitude surveys were obtained. Seventeen resident scientist/teacher partnerships were analyzed, involving 1111 students, in the 2011/12 and 2012/13 school years using a quantitative design. A control population of students that did not have resident scientists were surveyed in the 2015/16 school. Both pre and post surveys were administered at the beginning and again at the end of the school year. Results indicated significant gender differences in attitude changes in some but not all of the four categories.

Bio: Lisa Maria Hanson graduated from Southwestern Adventist University with a BS in Biology and Business and a MS in Science Education from Touro College. She served as an Educational Coordinator in New York City where her passion for STEM education emerged to encourage more women and minorities in STEM careers. Currently, she is an Anatomy and Physiology Instructor at Coastal Bend Community College. Her passion is to establish a STEM summer camp organization in her home country of Jamaica that will encourage young girls to pursue STEM careers.

Thesis Defense

MOVEMENT BEHAVIOR OF UNIONID MUSSELS IN CENTRAL TEXAS

Name: Bianca Alexandra Hernández

Major Advisor: Astrid N. Schwalb, Ph.D

Committee Members: Dr. Thomas B. Hardy, Clint Robertson, and Dr. David Rodriguez

Tuesday, November 1, 2016, 9:00 AM, FAB Conference Room 130

Freshwater mussels are one of the most imperiled groups of aquatic organisms. Burrowing and horizontal movement of freshwater mussels are behaviors integral to their ecology, yet mussel behavior is still relatively understudied. Thus, more insight into mussel behavior is needed to establish effective survey protocols and to inform the development of long-term conservation strategies. My objectives were to 1) examine and compare burrowing depth in the field among species and sites in the Guadalupe and San Antonio Rivers; 2) examine the effect of (a) differences in species, (b) decreases in temperature and (c) different substrates on burrowing behavior in experimental studies; and 3) examine the effect of dewatering on movement behavior. Seasonal differences were found at two sites in the San Marcos and Guadalupe River, with more mussels burrowing deeper in winter. In contrast, this was not observed at a predominately sandy site in the San Antonio River, where mussels were burrowed significantly deeper compared to the other gravel/cobble dominated sites, independent of season. Lab experiments showed that differences in substrate affected burrowing behavior, and mussels responded to temperature changes. Burrowing depth was significantly deeper in sand compared to gravel. Further, when temperature was decreased from above 20°C to 15°C, 9% of the mussels stopped burrowing in sand but 58% stopped in gravel. Significant differences between species were only found in lab experiments with sand, in which Amblema plicata burrowed significantly deeper than Quadrula aurea. Horizontal movement rates differed significantly when comparing dewatering rates. At the fastest dewatering rate, 100% of the mussels became stranded, whereas 20 to 30% became stranded during slow and moderate dewatering rates. Thus, mussels in Central Texas may not have the ability to respond fast enough when water levels change rapidly, e.g., due to operations of dams. Our results also suggest that surveys may need to follow different guidelines depending on local conditions.

Bio: Bianca Alexandra Hernández graduated from St. Edward's University with a BA in International Relations in 2008. She interned for Congressman Lloyd Doggett, Austin and taught abroad in Andalucía, Spain before entering the MS Aquatic Resources program (Schwalb Stream Ecology Lab) in the Spring of 2015. She is a proud dog-mother of two: Bruce and Boris.

Thesis Defense

FISH COMMUNITY AND HABITAT ASSESSMENTS WITHIN AN URBANIZED SPRING COMPLEX

OF THE EDWARDS PLATEAU

Name: Cory Scanes

Major Advisor: Dr. Timothy Bonner

Committee Members: Dr. Caitlin Gabor and Dr. Kenneth Ostrand

Friday, November 4, 2016; 10:30 am. FAB 104

Abstract: Spring complexes within the arid region of the Edwards Plateau are diversity hotspots and evolutionary refugia for numerous aquatic fauna. Within the last 100 years, anthropogenic modifications and uses of spring complexes are associated with imperilment of aquatic fauna. Purposes of this study were to quantify current community structure and habitat associations and to assess biotic integrity of the fish community within the Comal springs complex, the greatest discharge spring within the Edwards Plateau region of central Texas and located within the urban landscape. Fishes and habitats were quantified among wadeable and non-wadeable areas and among six reaches of the Comal springs complex seasonally for one year. Twenty-five species and 23,318 fishes were observed. Spring-associated fish richness was six, comprising 77% of the total catch per unit area. Compared to reference conditions and to historical records, species occurrences and relative abundances suggest that the Comal spring complex has high biotic integrity despite extremely low flow conditions and rotenone treatment in the 1950s and habitat modifications (e.g., low head dams, land use conversion, bank stabilization) and high recreation use since the 1950s. However, the fish community was not homogenous among all reaches. Within two reaches of high recreational use (i.e., New Channel and Lower River), spring-associated fish richness and relative abundances were lower than other four reaches but still maintained high relative abundances of the federally-listed Fountain Darter. Fish-habitat associations were similar to reported habitat associations for most fishes. A notable exception was observed for the Fountain Darter, which had a more ubiquitous distribution and was not strongly associated with vegetation. Into the future, observations quantified in this study can be used as a baseline to monitor and assess threats to the Comal spring complex.

Bio: Cory Scanes graduated from Texas State University with a BS in Biology in 2014. He entered the MS Aquatic Resources program in the Fall of 2014 studying community ecology of fishes under Dr. Timothy Bonner. He is currently a senior research associate at the Environmental Institute of Houston at the University of Houston-Clear Lake.

Thesis Defense

Dispersal of Zebra Mussels, Dreissena polymorpha, Downstream of an Invaded Reservoir

Name: Jenae Olson

Major Advisor: Dr. Astrid N. Schwalb

Committee Members: Dr. Todd Swannack, Dr. Robert McMahon, Dr. Weston H. Nowlin

Friday, November 4, 2016; 9:30 am. FAB Conference Room 130

Abstract: Zebra mussels recently invaded Central Texas and more information is needed to predict their spread in this region and inform management decisions. Therefore, I examined riverine zebra mussel dispersal, settlement, and growth downstream of Lake Belton, TX, invaded by zebra mussels in 2013. Veliger samples and settlement of juveniles on artificial substrate was monitored at a site in the lake and six sites in the Leon and Little Rivers, 0.4 to 54.7 river kilometers (rkm) downstream of the lake outlet. Veliger declined downstream from highest concentrations from sites closest to the lake outlet (0.4 and 2.5 rkm) and were found up to 13 rkm downstream. This decline was represented best with a logarithmic decline in May, Aug, Oct 2015 (R^2 = 0.75 to 0.94), and with an inverse power relationship in June and September 2015 (R^2 = 0.53 to 0.73). No clear pattern was found in April 2016 (R^2=0.32, p = 0.06). In contrast, maximum juvenile settlement (437 ± 75 m-2) occurred 2.5 rkm downstream in August 2016, but not immediately downstream of the lake. Differences in settlement rates between sites could not be explained by differences in physico-chemical parameters such as temperature or turbidity as they did not differ significantly between sites. No mussels were found at 27 and 55 rkm downstream on artificial or natural substrata between May through December of 2015, but juvenile mussels were found there in April 2016. This suggests that zebra mussels were dispersal limited in 2015, and were able to disperse farther in 2016 probably facilitated by high discharge.

Bio: Jenae Olson graduated from Minnesota State University, Moorhead with a BS in Biology with an Emphasis in Ecology in May, 2014. She entered the MS Aquatic Resources program in the Spring of 2015 and joined the Schwalb Stream Ecology lab to work on mussel dispersal. Her interest include aquatic ecology/ecosystems and outreach programs.

Thesis Defense

HABITAT AVAILABILITY ASSESSMENT FOR THE GULF COAST KANGAROO RAT (DIPODOMYS COMPACTUS) IN SOUTH-CENTRAL TEXAS

Laura M. Bliss

Major Advisor: Dr. Joseph Veech

Committee Members: Dr. Thomas R. Simpson, Dr. Ivan Castro-Arellano

Monday, October 10, 10 AM, Supple 257

As the human population increases worldwide, urbanization, habitat destruction, and habitat modification also increase. Recently the urbanization rate in Central Texas has become one of the highest in the nation. The consequential loss of natural habitat could jeopardize native wildlife species that are already somewhat limited in their distribution. Based on specialized life-history traits that limit large-scale mobility, kangaroo rats (Dipodomys spp.) have been found to be especially sensitive to urbanization-induced habitat modification and fragmentation. Dipodomys compactus is one of five kangaroo rat species found in Texas; this species has narrow, specific habitat requirements. Using a geographic information system (GIS)-based habitat suitability model, I determined that due to isolation among suitable habitat patches, actual D. compactus range in south-central Texas is highly fragmented, and the particular population in south-central Texas may be more isolated than currently thought. The assessment strategy of GIS habitat mapping can be broadly applied to other vulnerable species with similarly narrow habitat parameters to predict current and future management requirements.

Laura Bliss was born in Houston, Texas and earned an Ecology and Evolutionary Biology B.Sc. and a Chemistry B.A. from the University of California, Santa Cruz in August 2010. Upon graduation, she worked as an ESL teacher in Beijing, China for three years. In the fall of 2013, Laura returned to the United States to complete a seabird research apprenticeship program at Friday Harbor Labs, Washington. Laura entered the Wildlife Ecology M.Sc. program at Texas State University in Fall 2014 and began working with Dr. Joseph Veech. Presently, she works concurrently as a NOAA NWFSC Hammond Research Station Fisheries Biologist and the Outreach Coordinator for a student sustainability organization at the University of Texas at Austin. She and her husband, David Dickey, have a 19-year-old cat of whom they are very proud.

Dissertation Proposal Defense

Plant effects on the dynamics of Frankia populations in soil

Seifeddine Ben Tekaya

Major Advisor: Dittmar Hahn

Committee Members: David Rodriguez, Robert McLean, Jeffrey O. Dawson (UIUC), Mark Paschke (CSU)

Friday, October 7, 2016, 9:00am, Supple 257

Frankiae are slow growing actinobacteria that are able to form root nodules with some woody non-leguminous plants. Studies on the ecology of these bacteria are hampered by difficulties to isolate them into pure cultures which was a prerequisite for quantitative analyses in the past. We have therefore focused on the development of molecular approaches that allow us to retrieve quantitative data from environmental samples unbiased by the limitations of culturability. A first objective of the current study was to develop qPCR based methods to distinguish groups within the genus and quantify their populations in soil. Additional attempts were made to distinguish and quantify typical, nitrogen-fixing frankiae from atypical, generally non-nitrogen fixing frankiae. Both SybrGreen- and Taqman-based qPCR methods were subsequently evaluated for the quantification of these populations in different soils. These methods are then used to study long term effects of agricultural management practices on abundance and diversity of frankiae. Data from these analyses are contrasted with Illumina sequencing data. Both qPCR and Illumina sequencing methods are also applied in analyses of microcosm experiments aiming to investigate the effects of plants species on indigenous and introduced populations of Frankia and relate abundance/diversity to root nodule populations.

Bio: Seif was born in Carthage, Tunisia, in May 13th, 1984. He completed a BS degree in Biological Sciences at the University of Tunis el Manar in 2007, and earned an MS degree in microbiology from the same university with a research thesis that focused on the diversity of ascomycetes in high saline lakes in 2009. In 2014, he joined the PhD program in Aquatic Resources at Texas State University.

Thesis Defense

SEASONAL AND LONGITUDINAL INVESTIGATION ON THE IMPACTS OF RECREATIONAL ACTIVITIES ON AQUATIC MACROINVERTEBRATES COMMUNITY WITHIN THE SAN MARCOS RIVER

Name: Ovie Agare

Major Advisor: Dr. Thom Hardy

Committee Members: Dr. Weston Nowlin and Dr. Benjamin Schwartz

Thursday, October 13, 2016; 8:00 am. FAB Conference Room 130

Abstract: In the San Marcos River, recreational activities are most pronounced between April and October. Given the continued urbanization and increasing population in San Marcos there is need for a quantitative study on the possible effect of elevated recreational activities on the aquatic macroinvertebrates within the river. Currently, no study has quantified both patterns in macroinvertebrate drift and benthic community structure simultaneously in the San Marcos River. Information on drift patterns and benthic macroinvertebrate habitat relationships is necessary to understand mechanisms for species persistence within the San Marcos River. In this study, I examined the seasonal and longitudinal patterns of benthic macroinvertebrate community composition at three different sites within the San Marcos River. I also examined the seasonal and longitudinal response of the drifting aquatic macroinvertebrates to changes in their habitat as a result of high recreational activities in the San Marcos River. Tubing and swimming accounted for most of the recreation activity (>90%). Across all seasons, Site 1 had the highest drift densities compared to Site 2 and Site 3. CCA result explained 15.3% of the variability in the San Marcos River benthic macroinvertebrate community among vegetation habitats and 23.9% among open substrate habitats. Study results indicated that drift may be dependent on the benthic abundance. Macroinvertebrate drift densities followed the typical circadian pattern observed in other river systems and result indicated no increase in macroinvertebrate drift density during the day when recreation is occurring. Conclusively, Study results indicated that macroinvertebrates at Site 1 and 2 were not impacted by recreation and turbidity. However, Site 3, based on the CCA results indicate that substrate and turbidity are factors influencing the macroinvertebrate community.

Bio: Ovie Agare graduated from the University of Lagos with a BS in Surveying and Geoinformatics in 2008. His interest for life within rivers in his homeland and a quest to find ways to improve the quality of water at home made him pursue a MS in Aquatic Resources. He joined the MS Aquatic Biology program at Texas State University in the Fall of 2013 and has since worked with Dr. Thom Hardy at the Meadows Center for Water and the Environment.

Thesis Defense

Soil and vegetative associations of heteromyid rodents in central and South Texas with comments on trapping techniques

Michelle E. Adcock

Major Advisor: Dr. Thomas R. Simpson

Committee Members: Dr. M. Clay Green, Dr. Richard W. Manning, and Dr. Joseph A. Veech

Tuesday, July 12, 2016; 1:00 PM; Norris Room; Jerome and Catherine Supple Science

Heteromyid rodents occur in arid and semiarid lands in western North America. Members of this family often form assemblages that are found in habitats with sandy soils and vegetation that offers both open areas and dense shrub cover. In this study I investigated the soil and vegetative associations for heteromyid communities at the landscape and microhabitat scales in Central and South Texas. I utilized capture success as a proxy for abundance. As a minor objective, I investigated the capture success of Dipodomys compactus/ordii, the most trap-shy heteromyid species included in this study. I trapped for heteromyids for three seasons on two study sites (Guadalupe County and Jim Hogg County) and assessed microhabitat parameters, including herbaceous cover of grasses and forbs, bare ground, leaf litter, and densiometer readings within each treatment. Treatments were defined as a combination of both land cover and soil type. For the landscape level analyses, capture success was significantly different per treatment for each species on both study sites. Heteromyid species either: 1) selected for a treatment, 2) avoided a treatment, or 3) occurred as expected within a treatment based upon the overall availability of the particular land cover category and soil type. Selection for or avoidance of certain land cover and soil types on the landscape scale could suggest habitat partitioning by heteromyid species. For the microhabitat analyses, herbaceous cover and bare ground were significant for the capture success of C. hispidus on the Jim Hogg County study site, with a positive trend observed for herbaceous cover ($\beta = 0.1259$, $R2 = 0.1516$, $P = 0.0276$), and a negative trend observed for bare ground ($\beta = -0.2156$, $R2 = 0.2477$, $P = 0.0038$). Microhabitat parameters were not important predictors of capture success on the Guadalupe County study site, perhaps because of a homogeneous landscape, when compared with the Jim Hogg County study site, which offers more heterogeneity for heteromyid species. For the paired trap study, extra-large folding H.B. Sherman traps had the highest probability of capture success for D. compactus/ordii.

Michelle Adcock was born in Staunton, VA and earned her B.S. from the University of Tennessee-Chattanooga in 2005 with a major in environmental science and a concentration in biology. Upon graduation, she worked as an educational outreach coordinator at a rescue, rehabilitation, and release marine aquarium for two years. Concurrent with and after this position, she worked as a wildlife and wetland consultant in Florida for seven years. She entered the M.S. program in Wildlife Ecology at Texas State University in fall 2012 working with Dr. Thomas R. Simpson. She and her husband, Zach Adcock, are proud parents to their son, Davis.

Thesis Defense

Distribution of phosphorous, forms of phosphorous and physical composition of sediments in four central Texas reservoirs.

Wayne Waring

Major Advisor: Dr. Alan Groeger

Committee Members: Dr. Alan Groeger, Dr. Vicente Lopes, Dr. Julie Westerlund

Thursday, July 7, 3:00 PM, FAB 130

Phosphorous (P) is a limiting nutrient in many aquatic ecosystems. Generally, most of the P in a reservoir is delivered in the inflowing river(s) as suspended particulates, and eventually settles to the bottom sediments. The P is then alternately sequestered and released through nutrient cycling processes. The purpose of the present study is to evaluate the P content and gross physical composition of sediments in four Texas reservoirs; including one small run-of-the river reservoir (L. Dunlap), and three, large deep-storage reservoirs (L. Amistad, L. Buchanan, and Canyon L.). Surface sediment samples were collected from 31 sites in the four reservoirs and analyzed for total phosphorous (TP), P fractionation and sediment composition including organic matter, calcium carbonate and non-carbonate clastics. Overall, the HCl-P fraction, which is mostly Ca-bound P, was the best predictor of TP among the P fractions. In L. Amistad, clastics content was the physical parameter with the greatest positive relationship to TP. The reservoir also showed distinct differences in the two contributing arms. P was higher in the Rio Grande arm compared to the Devils River arm, as was the clastics content of the sediments. TP in L. Buchanan showed a clear longitudinal increase between the headwaters and the dam. Ca-bound P was the greatest P fraction in all reservoirs except for L. Dunlap, which had a larger proportion of NaOH-P (iron-bound, redox sensitive P). In both Canyon L. and L. Dunlap, OM was the physical fraction with the strongest relationship to TP. L. Dunlap appears to be functioning differently from the other reservoirs regarding phosphorous dynamics. One speculative possibility is that shorter WRT and fewer periods of strong stratification result in limited release of iron-bound phosphorous under anoxic conditions, thereby providing greater retention of iron-bound phosphorous. Information from this study may prove useful in understanding these differences.

Bio: Wayne Waring is originally from Austin, Texas and a resident of San Marcos, TX for the past 12 years. He attended Texas State University in San Marcos, TX for his B.S in Aquatic Biology. Wayne began the Masters of Science in Aquatic Biology in the Aquatic Resources program at Texas State University in the Fall semester, 2010. While at Texas State, he received the Outstanding Academic Achievement Award in 2013, 2014 and 2015; and the Outstanding Science Education Award in 2015.

Thesis Defense

ANALYSIS OF KILL SITE PARAMETERS TO BETTER UNDERSTAND HUNTING BEHAVIORS OF MOUTAIN LOINS (PUMA CONCOLOR)

Name: Kendall Jacquelle AuBuchon

Major Advisor: Dr. Thomas (Randy) Simpson

Committee Members: Dr. Mark Elbroch and Dr. Butch Weckerly

July 1, 2016; 2:00 PM; Norris Room; Jerome and Catherine Supple Science

The understanding of activity patterns and hunting behaviors can provide insight into life history and predator-prey dynamics. The mountain lion, Puma concolor, occupies the largest geographical range of any terrestrial mammal in the western hemisphere. Mountain lions live in a variety of habitats including mixed forests, high elevation plateaus, shrub communities, open steppe, valley bottoms with steep slopes, and riparian habitats. Previous research has shown their activity patterns occur primarily during the nocturnal and crepuscular periods. The primary prey of mountain lions are mule deer and elk, but they also rely on smaller prey such as American beaver and North American porcupine among others. I investigated characteristics of mountain lion kills in response to diel cycle and lunar illumination. Data were collected between March 4, 2011 to April 27, 2015 on a total of 1,234 predation events from 25 different mountain lions fitted with Global Positioning System (GPS) collars in Colorado and Wyoming. My three objectives were: to provide descriptive characteristics on mountain lion kill sites, evaluate selectivity of kills made across the diel cycle and over varying degrees of lunar illumination, and to assess whether there are seasonal differences in the proportion of kills made across the diel cycle, and across the lunar illumination categories. I constructed 95% Bonferroni adjusted confidence intervals and Manly's alpha selectivity index scores to assess selectivity or avoidance of specific categories. I used R to run chi-square tests and found that there was a significant difference between lunar illumination categories and during the summer season. The greatest proportion of kills occurred during periods with greatest lunar illumination (>90 %). There was a significant difference in prey selection at the lowest level (<10%) of lunar illumination. Diel cycle also had significant effects on mountain lion kills. Understanding mountain lion hunting behaviors will aid in management of this predator as well as management of its prey populations. In an era of technological advances and urban growth and development, these management practices will allow us the knowledge and tools to successfully cohabitate with this iconic species.

Kendall AuBuchon grew up in Austin, TX and attended high school at McCallum Fine Arts Academy. In spring 2013 she graduated from Texas State University where she received a BS in Wildlife Biology. She worked with Dr. Noland Martin for undergraduate research investigating mechanisms of hybridization in Iris nelsonii. During her undergraduate degree she accepted an internship position working as a field technician in Colorado where she met Dr. Mark Elbroch, who was conducting his own research at the time. She began her MS in Wildlife Ecology at Texas State University in fall 2013 working with Dr. Randy Simpson. She and Dr. Mark Elbroch began collaborating for her MS where she worked on a large dataset investigating different parameters of kill site data from Mountain lions in Colorado and Wyoming.

Thesis Defense

Characterization of IBR5-ROP GTPase (ROP2/ROP6) Interaction in Plant Auxin Response

Elia Lopez

Major Advisor: Dr. Nihal Dharmasiri

Committee Members: Dr. Rachell Booth, Dr. Dana Garcia and Dr. Hong-Gu Kang

Friday, July 1, 2016; 10:00 AM; Norris Room, Supple Science Building

The quintessential phytohormone auxin regulates many aspects of growth and development throughout the plant life cycle. Diverse auxin responses occur via multiple distinct and overlapping signaling pathways. It is well documented that auxin exerts control over gene expression by binding its nuclear co-receptors TIR1/AFB family F-box proteins and AUX/IAA transcriptional repressor proteins, thereby promoting polyubiquitination and subsequent degradation of AUX/IAAs and relieving transcriptional repression of auxin-responsive genes. More recently, auxin has also been shown to rapidly activate Rho of plant (ROP) GTPases at the plasma membrane, leading to a variety of cellular responses. The auxin signaling mutant ibr5-1 exhibits reduced auxin-responsive gene expression without accumulation of AUX/IAA repressor proteins, suggesting the dual-specificity protein phosphatase encoded by the gene IBR5 independently regulates the processes of AUX/IAA degradation and auxin-induced gene expression. In a previous screen for IBR5 interactors, a small GTPase was identified, prompting the question of whether IBR5 interacts with the ROP GTPases ROP2 and ROP6, which have been shown to be involved in auxin signaling pathways in the cytoplasm. In vitro interaction assays indicated IBR5 interacts with ROP2 and ROP6, and these interactions were confirmed by co-immunoprecipitation in Arabidopsis thaliana. To assess genetic interaction, ibr5-1 rop6-2 double null mutant was generated. In root growth assays for auxin inhibition of primary root elongation or induction of lateral root formation, the double mutant exhibited auxin resistance similar to the ibr5-1 parent line. Taken together, the results suggest the dual-specificity phosphatase IBR5 physically interacts with the Rho-like GTPases ROP2 and ROP6, and these proteins may function in a common auxin signaling pathway.

Bio: Elia Lopez graduated from Texas State University in 2013, earning a B.S. in Biology with a minor in Geography. In 2014, she joined the M.S. program in Biology at Texas State University where she is studying plant hormone signaling pathways. During her time in the graduate program, she became a South Texas Doctoral Bridge Program Scholar and received an award for Best Poster at the 20th Annual Department of Biology Colloquium. In the Fall, she will begin pursuing a PhD at the University of Texas Graduate School of Biomedical Sciences (MD Anderson Cancer Center/UT Health Science Center at Houston).

Thesis Defense

THE PREVALENCE OF LEPTOSPIRA IN SMALL MAMMALS ON FIVE PUERTO RICAN CATTLE FARMS

Name: Kathryn Michelle Benavidez

Major Advisor: Dr. Iván Castro-Arellano

Committee Members: Dr. Dittmar Hahn, Dr. David Rodriguez, and Dr. Joseph Veech

July 1, 2016; 9:00 AM; Room 153; Jerome and Catherine Supple Science

Leptospirosis is thought to be the most widespread zoonotic disease in the world. For this study 124 mice (Mus musculus), 99 rats (Rattus rattus and R. norvegicus), and 89 small Asian mongooses (Herpestes auropunctatus) from five farms in Puerto Rico were tested for renal carriage of Leptospira and approximately 38% of the sampled individuals were positive. I evinced a heterogeneous distribution of Leptospira prevalence among the sites with a farm in Lajas having the highest prevalence at 52%. Among tested species, mice had the highest prevalence of Leptospira at 59% and mongooses had the lowest at 13%. Comparative sequence analysis of the LipL32 gene revealed the presence of two species of Leptospira: Leptospira borgpetersenii and Leptospira interrogans. These two Leptospira species were equally distributed at all farms except for a farm at San Sebastián where 100% of the samples sequenced were of the species L. borgpetersenii. Significant associations of Leptospira prevalence with landscape features were observed at a farm in Naguabo, where more positive samples were located near all the tested landscape features and at a farm in Sabana Grande where more positive samples were found near a human dwelling. These results show that rural areas of Puerto Rico are in need of management and longitudinal surveillance of Leptospira in order to prevent continued infection of Leptospirosis by focal susceptible species (i.e. humans and cattle).

Michelle Benavidez was raised in South Texas and attended high school at Skidmore-Tynan ISD. In Spring 2014 she graduated as a McNair Scholar from St. Edward's University in Austin, TX where she received a BS in Environmental Science and Policy with a concentration in Biology and a minor in Sociology. For her undergraduate research she worked with Dr. Peter Beck to investigate the effects of border fence construction on ocelot conservation efforts in Texas. She began her MS in Wildlife Ecology at Texas State University in Fall 2014 working with Dr. Iván Castro-Arellano to investigate the role of the small mammals in disease transmission on the island of Puerto Rico. Fall 2016, she will begin a PhD program at Indiana University in Bloomington where she will join Dr. Michael Wasserman's Primate Environmental Endocrinology Lab in the Anthropology Department.

Thesis Defense

Fitness of Escherichia coli when in Mixed Culture with Enterococcus faecalis

Avry Stolzman

Major Advisor: Dr. Robert JC McLean

Committee Members: Dr. Kavita Kakirde and Dr. Kelli Palmer (UT Dallas)

Thursday, June 30, 2016; 1:00 PM; Norris Room, Supple Building

Escherichia coli (E. coli) coexists with many different species, such as Enterococcus faecalis (E. faecalis), in the gastrointestinal tract of many animals Under normal circumstances, the two bacteria live alongside each other and a multitude of other microorganisms without causing infection. However, there are occasional instances when an imbalance occurs and certain flora are able to outcompete the rest. These superior bacteria express specific traits that allow them to increase colonization and infect the host organism. There is currently little known about the mechanism of how E. coli is able coexist. Using the Keio collection of E. coli, we identified that the gene yliK in E. coli, commonly known as methylmalonoyl CoA mutase, that is essential for its growth when in mixed culture with E. faecalis. Methylmalonoyl CoA mutase is part of a four gene operon encoding for enzymes that convert succinate into propionate. The E. coli mutant pure culture exhibited increased fitness with the addition of propionate. The E. faecalis, although at a much lower cell density, also exhibited increased fitness with the addition of propionate. The E. coli mutant/E. faecalis mixed culture showed to have increased fitness when grown together as when compared to the fitness of the two bacteria in pure culture. The E. coli mutant/E. faecalis mixed culture also showed an increase in fitness with the addition of propionate. These results suggest that E. coli and E. faecalis increase the other's fitness, and that this elevated fitness is enhanced when propionate is added to the environment.

Bio: Avry Stolzman is a hill country native, growing up in Johnson City, Texas. She graduated from Tarleton State University in 2013 with a B.S. in Biology. She began her M.S. in 2014 studying the relationship between Escherichia coli and Enterococcus faecalis in mixed culture. She will be attending Ross University School of Veterinary Medicine in September of 2016.

Thesis Defense

Salmonellae in the intestine of H. plecostomus in the San Marcos River

Name: Anna Y. Gates

Major Advisor: Dr. Dittmar Hahn

Committee Members: Dr. Robert McLean and Dr. Thom Hardy

Thursday, June 30, 2016, 9:00 am, Supple 153

Heavy rainfall events have been associated with outbreaks of many waterborne diseases including salmonellosis. Salmonellosis is caused by members of the genus Salmonella that can enter water systems through sewage contamination, runoff after heavy rainfalls, or flow-through channels through manure fields after heavy rains or flooding. Currently, salmonellae are not closely monitored in regards to water quality. In this study, Hypostomus plecostomus, an invasive, algae consuming fish, was sampled from the San Marcos River (San Marcos, TX), the intestines analyzed for the presence of salmonellae by quantitative real-time polymerase chain reaction (qPCR) after semi-selective enrichment, and results related to precipitation and other ecological factors affecting the river area. Salmonellae were detected in the intestines of H. plecostomus in 40-100% of the fish following most precipitation events, but were not consistently detected in environmental samples (i.e. water and sediments). Other ecological factors affecting the river do not appear to play a significant role in the prevalence of salmonellae in the intestines of H. plecostomus. This leads us to believe that H. plecostomus is ingesting salmonellae through their food sources and that the amount of salmonellae present in those food sources may be increasing after large rainfall events, but may not be dependent on these events. Further studies included characterization of Salmonella isolates from positive samples by repetitive polymerase chain reaction (rep-PCR). Unique isolates were then serotyped using Multilocus Sequence Typing (MLST). Several sampled H. plecostomus were observed to be infected by multiple serotypes of Salmonella, whereas other positive fish were observed to be infected by one serotype only. Some serotypes were observed to be common across multiple sampling dates, which leads us to believe that there may be a common environmental serotype residing in the intestines of infected H. plecostomus. Furthermore, detection of multiple serotypes in the intestines of H. plecostomus was an unexpected observation.

Anna Gates received her Bachelor's degree from the University of Houston – Downtown in microbiology in 2012, where she participated in undergraduate research studying dental biofilms and stress on B cell lymphocytes. She started the Master's degree program and joined Dr. Hahn's lab in 2014, studying microbial ecology and the prevalence of salmonellae. She will be joining Michigan State University to pursue a Doctor of Veterinary Medicine degree in August 2016.

Thesis Defense

Histone variant H2A.Z substitution mediated by the SWR1-like complex is a novel transcriptional regulatory mechanism controlling defense genes and immunity in plants

April Bonnard

Major Advisor: Dr. Hong-Gu Kang

Committee Members: Dr. Nihal Dharmasiri and Dr. Sunethra Dharmasiri

Friday, June 24, 2016; 2:00 PM; Norris Room, Supple Building

Plants have evolved a complex immune system against various pathogens, part of which involves the function of resistance (R) proteins in detecting the presence of secreted effector molecules from pathogens. This detection leads to a robust immune response by implementing large-scale modifications in chromatin accessibility, thus leading to transcriptional reprogramming. MORC1 is a protein that interacts with several of these R proteins and is required to maintain optimum levels of immunity in Arabidopsis. MORC1 is also a putative chromatin-remodeling factor as it has been shown to exhibit ATPase and endonuclease activity and that its subpopulation localizes to the nucleus after pathogen infection. In this research, I aim to characterize the interaction of MORC1 with the components of the SWR1-like complex, including ACT1, ARP4, SWC2, SWC5, SWC6, SUF3, PIE1, RVB1, and YAF9 in Arabidopsis. The SWR1-like complex replaces histone H2A with its variant H2A.Z. This replacement has been speculated to be involved in transcription regulation as it occurs in the promoter and/or genic region of actively transcribed genes. Interestingly, a wide range of mutations in these SWR1-like components led to altered resistance to the bacterial pathogen Pseudomonas syringae, suggesting that the SWR1-like complex functions in plant immunity. To further gain insight into the molecular mechanism of this H2A.Z replacement in defense signaling, I performed chromatin immunoprecipitation with H2A.Z and found that pathogen infection leads to the association of H2A.Z with defense genes including PR-5. Furthermore, an Arabidopsis mutant line lacking three genes encoding H2A.Z showed compromised transcriptional induction of defense genes in response to pathogen infection. Together, my results establish that the histone replacement with H2A.Z by the SWR1-like complex modulates the transcription of defense genes and thereby affects immunity in plants. A potential model how this histone replacement can be implicated in transcriptional memories in which a prior stress exposure often leads to more prompt transcriptional induction to similar stress will be discussed.

Bio: April Bonnard graduated from Texas State University in 2014 earning a B.S. in Biology with a minor in Biochemistry. She is now pursuing her M.S. in Biology at Texas State University where she is studying the relationship between chromatin-remodeling and plant immunity. During her time in the M.S. program, she became a member of the Alpha Chi National College Honor Society and participated in the 20th Annual Department of Biology Colloquium, where she received an award for the best talk at the M.S. level.

Thesis Defense

Effects of red imported fire ants (Solenopsis invicta) on juvenile Houston toads (Bufo houstonensis) in coastal prairie grassland

Name: Madeleine Marsh

Major Advisor: Dr. Michael Forstner

Committee Members: Dr. Thomas Simpson and Dr. Clay Green

Wednesday, June 22, 2016, 10:00 am, Supple Norris Room

The Houston toad (Bufo houstonensis) was first described in 1953 in Houston, Texas, but has since been extirpated from the area. Houston toad populations have been in a nearly continuous decline across their known distribution since discovery, primarily due to multiple stressors, including red imported fire ants (Solenopsis invicta; hereafter referred to as RIFA). In spite of the uncertainty of historical presence, the 1984 Recovery Plan attempted to reintroduce the Houston Toad into coastal prairie habitats. Although originally thought unsuccessful, the Recovery Plan site proved to be suitable habitat, even if only as dispersal habitat. In 2015, on Attwater Prairie Chicken National Wildlife Refuge (APCNWR), a total of forty-eight exclosures were placed in four prairie locations (12 exclosures per site) two of which were treated for RIFA and two prairie locations were used as untreated controls. Morphometric data (snout-urostyle length, head-width, and weight) were collected for all toadlets were detected on a weekly basis, slowing to bi-weekly after six weeks. A mixed-effects for repeated measures model was used in R to evaluate growth rates between treatment and control areas, which showed no difference in growth between treatments ($f = 1.747$, $df = 42.7, 45$, $p = 0.09$) or density ($t = -1.095$, $df = 140.61$, $p > 0.1$). Program MARK was used to estimate survivorship and detection between treatments using a Cormack-Jolly Seiber (CJS) model. The model chosen, using ΔAICc, assumed that detection and survivorship changed through time but not between treatments. Because there was no difference in growth or survivorship, we fail to reject our null hypothesis that RIFA has a negative impact on the survival and growth of juvenile Houston Toads. A trend seen in the data comparing the exclosures in the open prairie to those within the drip line showed higher survival within the drip line, but much faster growth in the open prairie. This supports that connectivity of habitats is vital for the survival of juvenile Houston toads. However, because it has been shown that Houston toads are able to persist on the RIFA controlled prairies of APCNWR, the area of suitable Houston toad habitat can now be more explicitly delineated to include native grasslands, particularly for dispersal habitat. These landscape-connecting habitats are one of the most critical and least understood ecological aspects for Houston toad management. The results from this study also clearly assist with assessing new sites for reintroduction through propagation and population restoration efforts.

Thesis Defense

Site factors influencing drought-related tree mortality in Central Texas

Name: Beth Crouchet

Major Advisor: Dr. Susan Schwinning

Committee Members: Dr. Benjamin Schwartz and Dr. Jennifer Jensen

Wednesday, June 15, 2016, 1:00 pm, Supple 153

Climate models predict an increase in the frequency of severe weather events, including prolonged drought conditions coupled with exceptionally high temperatures. These so called “global-change-type” drought events have been linked to numerous forest dieback events worldwide. Texas experienced such an event in 2011, which reportedly killed 6% of all trees in the state. The purpose of my research was to identify site factors that modified local rates of tree mortality. In 2014, I censused 64 plots across the state, of which 40 were included in the final analysis focusing on Central Texas. Over 6000 trees were included, mostly in the genera Juniperus (n=3487), Quercus (n=1054), Ilex (n=745), Ulmus (n=347) and Diospyros (n=308). Each tree above 10 cm circumference was identified to the species level, its basal circumference was measured and its health status recorded in seven categories between dead with no sign of re-sprouting to < 25% crown die-back. For each plot I also collected site variables describing community composition, elevation, slope, aspect, solar insolation, water storage capacity, soil texture and depth, as well as climate factors, including annual precipitation from 2008 to 2011 and daily temperatures in 2011. I used binary logistic regression in a multivariate model selection analysis to determine which factors were significantly correlated with crown dieback and tree mortality. The number of days in which trees were exposed to temperatures over 35 or 38°C in 2011 had a significantly positive effect on mortality in three out of nine tree species. Heat exposure had independent effects on crown dieback and on the odds of resprouting. Precipitation in 2011 had significant effects in eight out of nine species, but they were positive for some species and negative for others. Topographic effects (e.g., slope and aspect) were significant for four out of nine species. Collective stand density was not as good a predictor of mortality than species-specific densities. For example, the mortality odds of Juniperus ashei on the Edwards Plateau was more closely related to intraspecific density. Although J. ashei was by far the most common species, Quercus fusiformis was not negatively affected by J. ashei density, but instead by its own intraspecific density and the density of Diospyros texana. Modeling approaches that focus on purely abiotic factors such as climate, topography and soil are incomplete, because they omit the influence of species interactions in diverse communities. My study exposed some of the complexities associated with linking climate events to vegetation changes, in particular, the effects of landscape variation and vegetation composition on tree mortality.

Bio: Beth Crouchet was born in Austin, Texas and earned a B.S. degree in Environmental Science from Concordia University in 2010. She has recently completed the Capital Area Master Naturalist Program where she volunteers as an environmental educator around the Austin area. She is the mother of two boys, ages 11 and 14.

Thesis Defense

The Genomic Architecture of Reproductive Isolation in a Louisiana Iris Hybrid Zone

Cheng-Jung (Joy) Sung

Major Advisor: Dr. Noland Martin

Committee Members: Dr. Chris Nice and Dr. James Ott

Tuesday, May 31,2016, 10:00am, Supple Science Building, Room 153

Speciation is a consequence of multiple sequentially-acting pre-zygotic and post-zygotic reproductive isolating barriers that evolve over time. To examine the genomic architecture of reproductive isolation and adaptive introgression, hybrid zones can be used to identify genomic regions that are resistant - or more susceptible - to gene flow in nature as well as to identify the genomic architecture of known reproductive isolating barriers. In the current study, a large Louisiana Iris hybrid zone between Iris fulva and Iris hexagona habitats was identified in Southern Louisiana. This hybrid zone is comprised of individuals with a wide variety of genetically diverse late-generation hybrids that exhibit an array of flower-color and plant-growth morphologies. The two Iris species are differentiated with respect to floral traits morphologically, which results in the attraction of different pollinators, and ecologically, which results in habitat isolation. Ecological isolation is therefore one of the most important barriers preventing gene exchange between these Iris species. In this defense, I will describe how Bayesian Genomic Cline analyses can be used to identify loci responsible for reproductive isolation and adaptive introgression in Louisiana Iris. I also will show how Genome Wide Association Mapping can identify the genomic architecture of floral and ecological traits that differ between I. fulva and I. hexagona. I will then combine these two analytical approaches to ask the following question: “Do the genomic architectures of phenotypic traits predict patterns of gene flow in hybrid zones?” In short, the answer is “yes”. The genomic architectures of 14 traits that were examined were complex, with many loci of small effect explaining phenotypic differences observed between species. Further, these loci were significantly associated with reproductive isolation between, and adaptive introgression across species boundaries.

Bio: Cheng-Jung Sung was born and raised in Taipei, Taiwan and received her Bachelor’s degree of Science at National Taiwan University in Crop Breeding of the Department of Agronomy in Taiwan in 2011. She attended Texas State University and started her Master’s study in the Population and Conservation Biology program of the Department of Biology in 2012 and has been working with Dr. Noland Martin since then. She plans on integrating her two fields of study to pursue her PhD degree.

Dissertation Defense

Personality and predation in a changing environment

Name Chelsea Blake

Major Advisor: Dr. Caitlin Gabor

Committee Members: Dr. Chris Nice, Dr. Andrea Aspbury, Dr. Alison Bell, Dr. Brian Langerhans

Friday, 15 April 2015, 2:00pm Supple Science Building 116

The interaction between predators and prey is one of the driving forces that shape not only animal behavior, but also the evolution and ecology of organisms. However, predator-prey interactions are now taking place in an unprecedented and rapidly changing world, as humans introduce new species and alter habitat conditions. Thus examining the anthropogenic introduction of novel predators is key to the contemporary study of behavioral ecology. Further, not all individual animals behave the same way within the same species or population, thus it is important to also assess behavior at the level of the individual. Individual behavioral types, or "personalities" of animals can have far-reaching implications for their ecology. Here I have explored predator-prey interactions in the context of changing environments from the perspective of individual-level variation to provide novel insights into species interactions. I have found that the personality of prey can affect how they fare with predators, but that the effect depends on which predator species they face. Additionally, I have shown that although behavioral type is important in predator interactions, it does not affect whether prey are able to recognize a novel predator. I have also explored how physical antipredator characteristics of individuals might relate to their behavioral type. I have found that although physical traits are not necessarily inherently correlated with behavioral traits, altering the physical condition of an individual can affect their behavioral traits. Ultimately, my work contributes to the understanding of how prey personality could interact with introduced predators to either aid or hinder the survival of native species.

Bio: Chelsea was born in Evanston, IL and grew up in Indianapolis, IN. At Earlham College, a Quaker liberal arts school, Chelsea studied metal working and biology. After graduating in 2008, Chelsea spent several years working in environmental education and ecology around the nation before starting a PhD program at Texas State in 2011. In 2013, Chelsea won a National Science Foundation fellowship, which facilitated the creation of the Project SPRING science outreach program at Texas State. Chelsea's parents, sister, spouse, Augustyn Blake, and choir friends at Crystal Queer Revelation have been very supportive throughout these years.

Thesis Defense

Title: Effects of Abiotic Factors on Body Size Class Variation of Lepidoptera in Two Contrasting Ecosystems: the Chihuahuan Desert and Edwards Plateau

Name: Virginia Brown

Major Advisor: Dr. Michael Huston

Committee Members: Dr. David Huffman and Dr. Chris Nice

Wednesday, April 6, 2016, 2pm, Supple 257

The abundance and body sizes of organisms are expected to respond to environmental conditions such as temperature, precipitation, and food availability. I quantified the abundance and total mass of nocturnal lepidoptera across multiple size classes to determine whether lepidoptera of different sizes responded differently to environmental conditions. Standardized samples were collected from two contrasting ecosystems – the Chihuahuan Desert in the Big Bend region and the Edwards Plateau near San Marcos. During 2013 the Chihuahuan Desert was sampled at two sites, a mountain hillside and a mesquite flat, near Terlingua Ranch headquarters at the base of the Christmas Mountains. Synchronously two sites, an open grassland and an oak-juniper thicket, were sampled at Freeman Ranch near San Marcos, Texas. Samples were sorted to morphospecies, counted, dried and weighed. Body size classes were evaluated in terms of total number of individuals, total weight and morphospecies. Available abiotic factors were not strong predictors of body size patterns. Total abundance and weight followed seasonal precipitation patterns at both locales. Body-size classes were more strongly correlated to each other in the Chihuahuan Desert than in the Edwards Plateau, probably as a result of the contrasting seasonal precipitation patterns. Our research establishes a baseline of comparison for the Chihuahuan Desert; while demonstrating that there are complex interactions between the lepidoptera community and abiotic factors that warrant further investigation. I evaluated how the body size distribution of lepidoptera were affected by abiotic factors; average and accumulative monthly temperature, growing degree days, precipitation, and temperature at time of sampling. To determine if the response was due to phylogeny of the order, rather than environmental factors.

Virginia Brown became interested in studying insects while traveling through the outback of Australia. She joined the Huston Terrestrial Ecology lab as a junior, and helped establish entomological research at the Christmas Mountains. Enjoying her undergraduate research in the Chihuahuan desert she decided to remain at Texas State University for her Masters in Biology with a focus on lepidoptera ecology.

Thesis Defense

Potential role of stygobitic species in nutrient dynamic of the Edwards Aquifer, central Texas

Lauren A. Loney

Major Advisor: Dr. Weston Nowlin

Committee Members: Dr. Floyd Weckerly, Dr. Benjamin Schwartz

Wednesday, April 6, 1:00PM, Freeman Aquatic Building 130

In aquatic ecosystems, animals can have direct and indirect impacts on the cycling of nutrients. In subterranean aquatic ecosystems with little to no direct connection to the surface, the recycling of organic matter and inorganic nutrients is likely to be particularly important in maintaining below ground communities. Although numerous studies have examined the role of consumer-driven nutrient cycling in surface aquatic ecosystems, relatively little is known about the ecology and nutrient cycling dynamics of subterranean ecosystems. In this study, I examined the nutrient recycling and body stoichiometry of the stygobiont (obligate subterranean aquatic organisms) community located at a site within the Edwards Aquifer, one of the world's most diverse aquifers. The first goal of my study was to examine the diversity and composition of stygobionts at my study sight and to gain information on which stygobiont species were numerically- and biomass-dominant in this portion of the Edwards Aquifer. The second portion of my study examined nutrient recycling (via excretion) and elemental composition of several common invertebrate stygobiont species in my study portion of the aquifer. I also compared stygobiont nutrient recycling and stoichiometry to related epigean taxa collected from the San Marcos River. Overall, I found that the stygobiont community at my study site was relatively species rich, but it numerically dominated by few taxa. I also found that stygobiont excretion varied significantly with body size and species identity, but that species origin (epigean vs stygobiont) did not have a substantial role in predicting nutrient recycling and elemental composition.

Bio: Lauren Loney is from San Marcos, Texas. She graduated from the University of Missouri in 2011 with a B.S. in Fisheries and Wildlife. Lauren began her Master's of Science in Aquatic Resources at Texas State University in the fall semester of 2012 and is currently pursuing a Juris Doctor from the University of Texas with an emphasis in water law.

Thesis Defense

Urbanization and Stress Response of Texas Eurycea Salamanders

Name: Megan J. Mondelli

Major Advisor: Caitlin R. Gabor, Department of Biology, Texas State University

Committee Members: Chris Nice, Department of Biology, Texas State University

Andrew Gluesenkamp, Texas Parks & Wildlife and Nathan Bendik, Watershed Department, City of Austin

Wednesday, April 6, 2016, 9AM, Supple 153

Amphibians worldwide are rapidly declining. Successful conservation strategies should consider the physiological response of an organism to its environment using stress hormones. Glucocorticoid (CG) hormones are a particularly useful class of biomarkers that effectively measure stress. The primary GC stress hormone in amphibians is corticosterone (CORT). Short-term increases in CORT (i.e., acute stress) are adaptive during stressful events because CORT mediate metabolic and immune function. However, chronic stress can be harmful to the overall health of an organism and can lead to dysregulation of the hypothalamic-pituitary-interrenal (HPI, for amphibians) axis leaving the organism susceptible to metabolic and immune problems. Chronic stress is also associated with suppressed reproductive hormones such as testosterone and estradiol. Anthropogenic and environmental factors such as seasonal changes, urbanization (modification, pollution) and storms have been shown to affect stress and reproductive hormones. Here, I studied how these factors affect the stress of two federally threatened species of Texas Eurycea salamanders that are fully aquatic. I conducted two projects, the first of which measured stress levels of E. tonkawae, Jollyville Plateau salamander, in urban and rural streams across seasons. I also examined the correlation between stress, sex steroids and activity levels of salamanders in urban and rural streams. My second project investigated the effects of storm water runoff on stress of E. nana, San Marcos salamander. I found that CORT in E. tonkawae is highest in summer but did not vary based on stream type. Activity in E. tonkawae varied by population; one urban stream showed a positive correlation between activity and CORT while but this was not the case in the other populations. However, urbanization did not affect activity level. Additionally, my research shows a significant effect of storm runoff water on testosterone, but not CORT in E. nana. In conclusion, my research shows that CORT changes with season and should be considered when testing other questions stress response. Additionally, it is possible that storm water does not affect the stress of salamanders, but some other factor associated with storm events might be stressing these salamanders. Further research is needed to tease out what factors maybe stressful.

Bio: Megan J. Mondelli graduated from Rowan University (New Jersey) in 2013 earning a B.S. in Biological Sciences. During her undergraduate degree in 2012, she received a National Science Foundation funded REU position to explore population distributions and prey type of Plethodontid salamanders in New Hampshire. After, graduating, she worked for Rutgers University at Haskin Shellfish Research Laboratory participating in an oyster stock assessment survey for the Delaware Bay. In 2014, Megan began pursuing a M.S. in Population and Conservation Biology at Texas State University, studying how urbanization affects the seasonal variation in hormones and behavior and how runoff from storms affects hormones of Texas Eurycea salamanders.

Thesis Defense

Patch Occupancy and Population Density of the Crevice Spiny Lizard (Sceloporus poinsettii) in the Central Mineral Region of Texas

Name: Jeffrey T. Jenkerson

Major Advisor: Thomas R. Simpson, Department of Biology, Texas State University

Committee Members: Ivan Arellano-Castro, Department of Biology, Texas State University, James F. Gallagher, Texas Parks & Wildlife

April 4, 2016, 1:00 PM, Supple 153

Herpetofaunal species within a landscape are strongly associated with the amount and availability of suitable habitat as defined by numerous characteristics of the microhabitat. I estimated occupancy and density of crevice spiny lizards (Sceloporus poinsettii) on monadnock features present on Mason Mountain Wildlife Management Area within the Llano Uplift area of the Central Mineral Region of Texas. From June to September 2015, I captured and marked 46 adult crevice spiny lizards using ®Floytag T-bar anchor tags. Average lizard density across sites was 1.41/100 m2 (SE = 0.023, n = 46). Additionally, 382 lizards were detected across 20 locally isolated granitic outcrops during abundance sight surveys. These estimates were used to evaluate the relative influences of microhabitat variables on the distribution of this rock-dwelling lizard species within the context of habitat size and a landscape level variable (burning treatment). I measured variables that are either known or suspected to influence habitat suitability, including fine-scale rock habitat (i.e. ground cover, geology, amount of refuge and vertical surface area) and the landscape context (burning treatment). Multimodel information-theoretic approach suggests that at a local rock scale, crevice spiny lizard occupancy may be more closely related to refuge quality. At a boundary habitat scale, most parsimonious models suggest that geographic aspect is most influential to occupancy. These results indicate that patterns of occurrence may be tied closely to characteristics most immediately affecting the ability to thermo-regulate and find cover. Lizard density decreased with increasing site size, indicating that habitat size may not be positively correlated with habitat suitability for the crevice spiny lizard.

Bio: Jeffrey T. Jenkerson graduated from the University of Texas at San Antonio in 2013 earning a B.S. in Biology with a concentration in Ecology. In 2014, Jeffrey began pursuing a M.S. in Wildlife Ecology at Texas State University, studying how habitat parameters affect crevice spiny lizard demography.

Thesis Defense

Inducing Biofilm Dispersion

Name: Sara Robertson

Major Advisor: Dr. McLean

Committee Members: Dr. Forstner and Dr. Rodriguez

Monday, April 4, 2016 9am Supple Norris Room

Bacterial growth on surfaces results in these organisms forming a complex surface-adherent biofilm community. Growth as biofilms results in microorganisms becoming highly resistant to most antibiotics and disinfectants. In this study I explore an alternative method for biofilm control by inducing dispersion of sessile organisms into an unattached (planktonic) growth mode using boric acid. Samples used were naturally-occurring aquatic biofilms from gravel in the San Marcos River. Biofilm concentrations and detachment due to exposure to boric acid (experimental) or water (control) was measured using dilution plating and growth on R2A agar. The study further explored the effects of dispersion by examining if a preferential release of certain bacterial taxa is induced. To determine whether boric acid induced a preferential removal of bacterial populations from aquatic biofilms, DNA was purified from biofilm samples prior to and following treatment with either boric acid or water, as well as from bacteria released through these two treatments. Using Illumina Miseq sequencing, community profiles of bacterial populations were obtained and showed the population released by boric acid treatment was similar to the original biofilm population. In contrast, the population released by water treatment showed a preferential release of microbes among taxa. Future implication for dispersion could be useful in food processing equipment, medical equip and long term goals of rejuvenation of older antibiotics.

Bio: Sara is from Georgetown TX. After high school she served 4 years active duty in the U.S. Navy and an additional 3 years as an active service reservist. After completing her active duty tour she studied wildlife and fisheries at Texas A &M and received a B.S in 2009. Sara then started her Master in the fall of 2014 and will be graduating May 2016 with a M. S. in Biology.

Thesis Defense

Social factors during foraging bouts influence sexual segregation

Leah Peterson

Major Advisor: Dr. Floyd. W. Weckerly

Committee Members: Dr. Mark A. Ricca, Dr. Tim H. Bonner

Friday, April 1, 2016, 1:00PM, Supple Science Building 257

Large ungulate spatial patterns occurring at broad scales can often be explained by fine-scale processes that function at the individual level. To better understand broad-scale sexual segregation, fine-scale processes were examined in a non-migratory population of Roosevelt elk (Cervus elaphus roosevelti) in the Redwood National and State Parks, California, USA. Throughout twenty years of observation, this population exhibited a change in sexual segregation, allowing the opportunity to assess the potential influence of two fine-scale mechanisms: the availability of forage abundance and social factors during the forage bout. Per capita forage availability was estimated for comparison between two meadow complexes (2005-2016) to determine if selectivity for one meadow complex by males (and thus sexual segregation) could be explained by the greater absolute metabolic requirements in males. To assess the influence of social factors (such as group size, group type, or proximity of conspecifics) during the foraging bouts, focal observations were collected from adult male and female elk from 2009-2016. These data were used to conduct AIC analyses to select the best fit models for predicting the distance traveled, the variance in turning angles, and the proportion of time the animal spends with its head out of the feeding position during a foraging bout. Interestingly, we found that the availability of forage biomass was likely not the driver for males and females using separate meadow complexes. This study instead found that males are more vigilant than females and are more likely to move farther and in direct paths to avoid proximity of conspecifics. Consequently, males will be more influenced by social factors while foraging than females. The asynchronous responses to social factors by males and females may explain the exclusive, male-only use of a meadow complex from which females were recently extirpated. We can therefore conclude that sexual segregation is driven, in part, by fine-scale foraging behaviors.

Bio: Leah Peterson is originally from Des Moines, IA. She attended Creighton University in Omaha, NE and achieved her B.S. in Biology in 2013. Leah began her Wildlife Ecology Master's program at Texas State in the fall of 2014 and with her M.S. degree, she hopes to pursue a career in wildlife research or consultation.

Thesis Defense

Density-Dependent not -Independent Factors Influence Roosevelt Elk Recruitment in the Bald Hills of Redwood National Park

Nicholas R. Kolbe

Major Advisor: Dr. Floyd. W. Weckerly

Committee Members: Dr. Thomas R. Simpson, Dr. Mark A. Ricca

Friday, April 1, 2016, 9:00 AM, Supple Science Building 257

Density-dependent and ---independent factors are known to influence population dynamics of large ungulates like Roosevelt elk (Cervus elaphus roosevelti). But the strength of influence of both kinds of factors depends on abundance relative to K carrying capacity. I examined the influence of density, climatic variables and prescribed fire on juvenile recruitment in an elk population in Redwood National Park, California, USA, from 2002 to 2015. In the Park prescribed fire is used to reduce conifer and redwood (Sequoia sempervirens) encroachment into meadows and is not used to manage elk habitat. Consequently, prescribed fire might have a density-independent influence on juvenile recruitment and population dynamics. Fire is also known to increase elk food supplies but whether fire might have a positive influence on recruitment depends on the population size relative to K. Between 2002 and 2015 abundance varied from 190 to 279. Using a Gompertz state-space model and expectation from the standard logistic model I estimated K to be between 275 and 340. An Akaike Information Criterion model selection analysis of 35 linear regressions estimating juvenile recruitment considered abundance, prescribed fire, and climatic influences. Population abundance alone had the strongest influence on juvenile recruitment. Our findings may be affected by the population being below K carrying capacity. Prescribed fire might not have influenced recruitment because the population was too far below K or an insufficient area was burned to substantially increase elk food supplies.

Bio: Nicholas Kolbe is from McQueeney, Texas. He graduated from Texas A&M University of Kingsville in Kingsville, TX with a B.S. in Range and Wildlife Management. Nicholas began his Masters of Science in Wildlife Ecology at Texas State University in the fall semester, 2014. While at Texas State, he has presented two papers at the Texas Chapter of the Wildlife Society annual meetings and published a manuscript in California Fish and Game. During the summer of 2015, he worked as an intern for Texas Parks and Wildlife Department at the Gus Engeling Wildlife Management Area, Tennessee Colony, TX. Nicholas has also received numerous scholarships from Texas State and non-governmental organizations.

Thesis Defense

The ecology of colonial nesting Green Herons (Butorides virescens) in Texas

Name: Nathan Trimble

Major Advisor: Dr. M. Clay Green

Committee Members: Dr. David Huffman, Dr. Floyd Weckerly

Wednesday, March 30, 2016, 2PM, Norris Room

Green Herons (Butorides virescens) are small herons found throughout the eastern United States, the west coast of the United States and throughout most of the state of Texas. While this species can be found along the Texas Coast year round, they occur in greater densities during the breeding season. Green Herons are solitary foragers and often nest singly, with a breeding pair defending a breeding territory. Green Herons sometimes form loose breeding aggregations or colonies presumably as a function of habitat availability and/or predator pressure. A colony of at least 35 breeding pairs of Green Herons annually breed along a tidal creek in Port Lavaca, Texas. This study sought to determine a relationship between nest density and nest success and to use observational data to examine factors of this poorly understood behavior in Green Herons. A secondary goal of the study was to examine juvenile dispersal by banding chicks and monitoring adults in subsequent years to test whether juveniles return to their natal colony to breed. Nearest neighbor spacing varied from < 1 m to 42.5 m apart (mean=9.57m). All nests occurred in low shrubs Marsh Elder (Iva frutescens) along the water's edge. Nesting began in early April and ceased in late July/early August. Clutch size ranged from 1-5 eggs for both years with a mean of 3.09 (SE=0.106) and 3.43 (SE=0.163) for 2014 and 2015 respectively. Nest success varied between years (2014, 53.57% nest success; 2015, 12.25% nest success); high nest mortality in 2015 was likely due to extreme weather events and human disturbance. AIC model selection favored models containing the quadratic effect of nearest neighbor estimate, Julian lay date, and year suggesting the possibility of an optimum nearest neighbor distance of around 12m for Green Herons at this location, though more years of data will be needed to reveal a strong trend given the high amount of density independent mortality in 2015. No chicks banded in 2014 were re-sighted in 2015.

Nathan Trimble grew up in Houston, TX. He received a Bachelor's of Science in Wildlife Biology from Lees-McRae College in Banner Elk, NC. Nathan got hooked studying birds in the mountains of North Carolina and joined the Wildlife Ecology program at Texas State University in fall of 2013 with a focus on avian ecology.

Thesis Defense

Using nutrients, sediment, ions, isotopes, and hydrograph separation to quantify conduit-dominated recharge processes in a Trinity Aquifer site: Cave Without a Name

Michael Markowski

Major Advisor: Dr. Benjamin Schwartz

Committee Members: Dr. Weston Nowlin, Dr. Astrid Schwalb

Wednesday, March 30, 8:30 AM, Freeman Aquatic Building 130 (FAB 130)

Cave streams provide an ideal location for sampling waters transported through a karst system because they integrate basin-wide sources ranging from fast flow in conduits to slow flow through the bedrock matrix. Although numerous studies have monitored cave streams to characterize these process, most have infrequent sampling intervals and/or a limited number of measured parameters. This study used a large dataset that includes high frequency sampling and comprehensive stormwater analyses of surface and cave stream water from five storm events between July 2014 and July 2015 at Cave Without A Name (CWAN) in central Texas. The objectives were to determine which environmental factors influence the timing and proportions of storm water and pre-event water moving through the system and to quantify relationships between discharge and sediment, nutrient, and ion concentrations within and across storm events. Results show that evapotranspiration (summed over prior 12 weeks to each storm), soil moisture (at 10-40cm), and cave-stream discharge prior to each storm affects the timing of the peak ratio of stormwater/pre-event water flow through the cave. As antecedent conditions became wetter from July 2014 to July 2015, peak stormwater arrival times dropped from days to hours. Progressively faster stormwater arrival times, heterogeneity within and across storm chemographs and sediment graphs, and water isotope data all indicate a flushing of the upper unsaturated zone during Events 1 and 2, and progressive wetting of unsaturated portions of the system from July 2014 to July 2015. Taken together, these data reveal complex hydrologic and mass transport dynamics, variable rainfall-runoff and rainfall-recharge relationships, and highlight that a single storm cannot be used to accurately describe how a karstic groundwater system responds to storm events under a wide range of hydrologic conditions. This better understanding of recharge processes at CWAN will help guide future research and surface water/groundwater management in karst regions.

Bio: Michael Markowski attended The University of Texas and received a B.S. in Hydrogeology in 2010. He spent two years at the Pickle Research Campus, where he worked with both fluvial geomorphology and glaciology teams. He plans on completing his M.S. in Aquatic Resources from Texas State University this May.

Dissertation Defense

Influence of Brain-Derived Neurotrophic Factor and Family History of Alcohol Dependence on Alcohol USE IN Healthy Social Drinkers

Shobhit Sharma

Major Advisor: Dr. Natalie Ceballos

Committee Members: Dr. Dana Garcia, Dr. Brett Ginsburg, Dr. Michelle Lane and Dr. Shannon Weigum

Monday, March 28, 12:00 Noon, Supple Science Building Norris conference room

Brain-derived neurotrophic factor (BDNF) is important for neuronal survival, differentiation and consolidation of synaptic strength. Studies have found increased alcohol use and genetic risk for alcohol dependence in individuals with the Val66Met single-nucleotide polymorphism (SNP) of the BDNF gene, a genotype associated with decreased activity-dependent release of BDNF. However, the literature remains contentious with regard to this issue. The current study was designed to address this issue with two aims. Aim 1 examined the influence of the Val66Met SNP, serum BDNF levels, and family history of alcohol dependence (FH) on alcohol use in healthy social drinkers. It was expected that the Val66Met polymorphism would be associated with higher drinking levels compared to the Val66Val genotype, and those participants with a combination of Val66Met genotype and a positive FH would exhibit the most severe alcohol use profile. Results for Aim 1 indicated no significant effects of genotype on quantity/frequency of alcohol use; however, the Val66Met group had an earlier age at first alcohol use. FH-positive participants had an earlier age at first drunken episode. There were no interactions of BDNF genotype x FH group. Correlational analyses revealed that quantity/frequency of alcohol use was positively related to perceived stress levels in the Val66Met group, such that participants with higher stress levels tended to consume more alcohol. This relationships was not present in the Val66Val group. Aim 2 examined stress-related changes in serum BDNF levels. It was expected that Val66Met and Val66Val groups would have different stress-related changes in serum BDNF levels, and that the profile of the Val66Met group would be associated with more severe alcohol use. Results of Aim 2 indicated that, across groups, serum BDNF levels decreased in response to stress, but there were no main effects or interactions of BDNF genotype or FH group. However, in the Val66Met group, stress-related BDNF change (post- minus pre-stress) was related to age at first drink, such that earlier age of alcohol use was associated with a greater stress-related decrease in serum BDNF. This relationship was not present in the Val66Val group. Taken together, the results of these two aims suggest that in healthy young social drinkers, the association between the Val66Met SNP and alcohol use may be linked to stress vulnerability and behavioral risk factors (i.e., earlier initiation of alcohol use), which are known to be associated with the development of alcohol dependence.

BIO: Shobhit Sharma received his MS in Biology from Texas State in Spring 2011. He entered Aquatic Resources Ph.D. program in Fall 2011. As an instructional assistant he has taught laboratory courses in Anatomy & Physiology and Clinical Lab Science. During his PhD he received grant from The Texas Research Society on Alcoholism (TRSA).

Thesis Defense

Grazing Influence on Selected Parameters of the Avian Community on a Texas Hill Country Ranch

Joseph A. Jandle

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

Committee Members: Dr. Michael R. J. Forstner, Department of Biology, Texas State University

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

Monday, March 28, 2016, 9:00 AM, Supple 153

Many regionally declining prairie and shrubland birds breed in the Edwards Plateau ecoregion of Central Texas. Additionally, Central Texas supports a winter resident bird community rich in ground foraging sparrow species. Livestock grazing can have species specific and mixed results for local bird communities and other wildlife. I examined the degree to which grazing influences bird foraging frequency and the overall bird community relative to herbaceous ground cover at Freeman Center, a 1,701 ha working cattle ranch in the Balcones Canyonlands subregion of the Edwards Plateau. For one year, I conducted avian surveys and herbaceous ground cover surveys on two grazed and two ungrazed pastures using twenty, 100 meter fixed radius point count sites and twenty, 100 meter transects extending from each site. I included a total of 383 line transect Daubenmire surveys, 135 point count surveys, and 184 avian walking transect surveys in various analyses. I used GLMs to analyze herbaceous ground cover surveys in grazed and ungrazed sites. I incorporated significant herbaceous predictors into GLMMs to analyze breeding and winter resident abundance, richness, diversity, and evenness. I also included site as a random factor. I built an additional GLMM to analyze avian winter ground foraging counts. I identified a total of 138 avian species from Freeman Center between January 2014 and May 2015. All breeding bird indices were significantly different between years. Breeding bird richness positively correlated with forb cover ($P = 0.003$). Breeding bird diversity was positively correlated with tallest green grass ($P = 0.016$) and forb cover ($P = 0.007$). Except foraging counts, no winter resident indices were significantly correlated with herbaceous ground cover predictors. Winter resident foraging counts were positively correlated with forb cover ($P = 0.002$). Breeding and wintering bird abundance, richness, diversity, and ground foraging counts were higher in grazed sites than ungrazed sites. Results suggest that moderate rotational grazing promotes forb production and native forbs are important for breeding and wintering birds in the Texas hill country. Future study should determine herbaceous diversity and the dominant herbaceous plants in a study area. Judgment deferred rotational grazing should be appropriate when ranch managers have the knowledge, experience, and prudence to make best-management decisions based on climate, rainfall, and sustainability. A Multi-year study is necessary to assess long-term cattle use and the affects of climate and rainfall on the health and future of ranch operations and wildlife at Freeman Center.

Bio: Joseph A. Jandle was born in San Marcos, Texas. He earned a B.S. from Texas State University in 2011 with a major in Wildlife Biology. He entered the Wildlife Ecology Master's program at Texas State University in 2014. He studies avian ecology with an emphasis on identification, vocalization, and rangeland species in Dr. Simpson's lab.

Thesis Defense

Geochemical clues to groundwater sources of the Pedernales River

Sarah J. (Saj) Zappitello

Major Advisor: Dr. Benjamin Schwartz

Committee Members: Dr. Thomas Hardy, Dr. Alan Groeger

Wednesday, March 23, 1:00PM, Freeman Aquatic Building 130

Interactions between aquifers and rivers are recognized as important components of the hydrologic system. Central Texas rivers and aquifers are especially well connected due to karstic carbonate geology where gaining and losing streams, springs, and caves are common. The Pedernales River is an important source of water for local communities, the city of Austin, and downstream water users of the Colorado River, to which it drains. The Pedernales River Basin is surrounded by rapidly developing areas with increasing water demands, but the majority of the watershed is developed only for agriculture. Identifying critical areas for water quality and quantity protection while the land is still relatively undeveloped creates an opportunity for proactive water resource protection. This study compares the geochemistry of waters from the main stem and tributaries to the Pedernales River, springs across the basin, wells screened in specific aquifers, and historic data. By conducting this study during baseflow conditions, the water sources are assumed to originate exclusively from groundwater, as opposed to runoff or soil interflow. Geospatial information was also evaluated for river gains and losses where measured, springs, and surface geology. Stable isotope ratios and principal component analysis highlight the importance of groundwater contributions to the river and indicate that evaporation is controlling the geochemical evolution of surface waters. Human impacts are also illustrated by spatial analysis of water geochemistry.

Bio: Saj Zappitello is from Dripping Springs, Texas. She graduated from the University of Texas at Austin in 2006 with a B.S. in Hydrogeology and Environmental Geology. Saj is a professional geologist and an endangered karst invertebrate specialist, and she worked in environmental consulting on karst issues in the Edwards Aquifer before starting her Masters of Science in Aquatic Resources at Texas State University in the fall semester of 2014. She is an avid cave explorer and tuba player. Saj lives in south Austin with her husband, two ferrets, and ten chickens.

Thesis Defense

Inhibition of quorum signaling in Chromobacterium violaceum in the presence of cadmium, cobalt and nickel divalent cations

Name: Starla Thornhill

Major Advisor: Dr. Robert JC McLean

Committee Members: Dr. Leticia Vega, Jacobs International (NASA JSC);

Dr. Kavita Kakirde, Texas State University

Tuesday, March 22, 2016, 11 AM, Norris Room

Bacteria are single celled organisms capable of acting as a single unit by sensing and responding to population density via a phenomenon called quorum signaling. Quorum signaling regulates a variety of phenotypes including biofilm formation and virulence factor production. In the soil bacterium Chromobacterium violaceum the virulence factor violacein results in a deep purple pigmentation and is one such regulated phenotype. Previously, a number of biological and organic molecules have been described as quorum signaling inhibitors, but to date no metal-based inhibitors have been identified. In this study, we show that quorum sensing is inhibited in C. violaceum when in the presence of sub-lethal concentrations of cadmium based salts. Cobalt and nickel salts have also been indicated as inhibitors in other gram negative species. Inhibitory effects of cadmium divalent cations on C. violaceum were shown in biofilm formation, pigmentation and virulence factor production, as well as transcript levels for genes involved in these processes. This study represents the first description of heavy metal based quorum sensing inhibition in C. violaceum.

Starla Thornhill graduated from Texas State University with a B.S. in Microbiology in May 2014. Her research interest is in bacterial growth in the microgravity environment, and she has spent time at NASA Johnson Space Center training in use of microgravity simulating bioreactors.

Dissertation Proposal Defense

The Arabidopsis Mediator Complex Subunit 9, a MORC1 interacting protein, is a positive regulator of plant immunity

Ji-Chul Nam

Major Advisor: Dr. Hong-Gu Kang, Department of Biology, Texas State University

Committee Members: Dr. Nihal Dharmasiri, Department of Biology, Texas State University

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

Dr. Walter Gassmann, Division of Plant Sciences, University of Missouri

Dr. Keiko Yoshioka, Department of Cell & Systems Biology, University of Toronto

Tuesday, March 1, 2016, 2:00 pm, 209 Undergraduate Academic Center

Arabidopsis thaliana MORC1 (Microrchidia), also known as CRT1, is an ATPase protein that is required for multiple levels of plant immunity including effector-triggered immunity (ETI), PAMP (pathogen-associated molecular pattern)-triggered immunity (PTI), basal resistance, non-host resistance, and systemic acquired resistance. Consistent with its role in ETI and PTI, MORC1 physically interacts with 11 resistance proteins and the PAMP-recognition receptor FLS2. We employed yeast two-hybrid to assess a protein-interaction profile of MORC1 and identified 14 MORC1-interacting proteins (MIPs). To characterize the role of MIPs in plant immunity, we obtained T-DNA insertion lines for some MIPs and generated combined mutants with morc1/morc2. Five out of eight mip mutants tested exhibited decreased resistance against Pseudomonas syringae, suggesting that these MIPs function in plant immunity. For instance, mip13 displayed compromised resistance to P. syringae while overexpression of MIP13 conferred enhanced antibacterial resistance. Interestingly, addition of the morc1/2 mutation restored resistance to P. syringae in mip13, suggesting a complicated interaction between MIP13 and MORC1/2 in plant immunity. MIP13 encodes MED9, a component in plant RNA polymerase II mediator complex and likely functions in the transcriptional induction of defense genes. Thus, we are currently assessing the transcriptional induction of selected defense genes in MIP13 altered backgrounds in conjunction with morc1/2 to learn how MIP13 and MORC1/2 interplay in plant defense responses.

Bio: Nam Ji-Chul was born in Seoul, South Korea. He earned a B.S. from the University of Missouri in 2010 with a major in Biological Sciences. He earned a M.S. from the University of Missouri in 2013 in Plant Sciences from Dr. Gassmann. He entered the Aquatic Resources Ph.D. program at Texas State University in 2013. He studies molecular plant immunity with an emphasis on the transcriptional control of disease resistance genes in Dr. Kang's lab.

Dissertation Proposal Defense

Natural History, Demographic Parameter Estimates, and Survey Techniques for Federally Threatened Jollyville Plateau Salamanders (Eurycea tonkawae)

Zachary C. Adcock

Major Advisor: Dr. Michael Forstner, Department of Biology, Texas State University

Committee Members: Dr. David Rodriguez, Department of Biology, Texas State University

Dr. Benjamin Schwartz, Department of Biology, Texas State University

Dr. Benjamin Pierce, Department of Biology, Southwestern University

Dr. James Nichols, U.S. Geological Survey

Tuesday, January 19, 2016, 3:00 pm Norris Room

The central Texas Eurycea salamanders are of high conservation concern because of their extreme level of endemism, small ranges, and the rapid urbanization of the greater Austin and San Antonio areas. Seven of the 13 currently recognized species are listed as either threatened or endangered by the U.S. Fish and Wildlife Service (USFWS), and three additional species are listed as threatened or endangered by the Texas Parks and Wildlife Department (TPWD). Eurycea tonkawae was federally listed as threatened in 2013, and despite the increased attention from the listing process, few publications exist that advise conservation decisions for this taxon. The USFWS relied heavily on unpublished data for the listing decision and for establishing critical habitat units. Effective design and implementation of conservation policy is not possible without adequate natural history knowledge of the target species. In this dissertation, I intend to address several issues important to the conservation of E. tonkawae, including: 1) delineating the full extent of occupied surface habitat, 2) identifying small-scale environmental variables that influence presence (microhabitat parameters), 3) describing annual ecology, 4) estimating demographic parameters (e.g., abundance, survival), and 5) investigating environmental DNA (eDNA) as a survey technique. This work will contribute to informed conservation policy and management decisions for the recovery of Eurycea tonkawae.

Bio: Zach Adcock was born in Andrews, TX and raised in Cedar Hill, TX. He earned a B.S. from the University of Tampa in 2004 with a double major in Biology and Environmental Science and a double minor in Marine Biology and Chemistry. He earned a M.S. from the University of South Florida in 2012 in Integrative Biology from Drs. Henry Mushinsky and Earl McCoy's lab. He worked as a wildlife and wetland consultant in Florida for 10 years concurrent with and in-between the two degrees. He entered the Aquatic Resources Ph.D. program at Texas State University in 2012, in Dr. Michael Forstner's lab, to continue work on the conservation of endangered and threatened wildlife. His fiancée, Michelle Curtis, is in the Wildlife Ecology program at Texas State University and they have one son, Davis, of whom they are very proud.