Proposal Defense

Characterization of chromatin-remodeling factors in plant immunity

April Bonnard

Major Advisor: Dr. Hong-Gu Kang

Committee Members: Dr. Nihal Dharmasiri & Dr. Suni Dharmasiri

Tuesday, December 8, 2015, 2:00PM, Norris Room, Supple Building

Abstract: 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 then 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 thaliana. It is speculated that MORC1 is a putative chromatin-remodeling factor as it has been shown to exhibit ATPase and endonuclease activity and that a subpopulation localizes to the nucleus after pathogen infection. In this research, we aim to characterize the interaction of MORC1 with several other chromatin-remodeling factors, including ACT1, ARP4, SWC2, SWC5, SWC6, SUF3, PIE1, RVB1, and YAF9, which together comprise many of the components of the SWR1-like complex in Arabidopsis to better understand the role of MORC1 as well as the link between chromatin-remodeling and plant immunity.

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.

Proposal Defense

AN ANALYSIS OF THE EFFECTS OF SUSPENDED SEDIMENT AND PHOTOSYNTHETICALLY ACTIVE RADIATION (PAR) ON THE VEGETATIVE GROWTH OF TEXAS WILD RICE (ZIZANIA TEXANA)

Michele Crawford-Reynolds

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

Committee Members: Dr. Paula Williamson, Department of Biology, Texas State University

Dr. Weston Nowlin, Department of Biology, Texas State University

Dr. David Lemke, Department of Biology, Texas State University

Dr. Tina Cade, Department of Agriculture, Texas State University

Dr. Robert Doyle, Department of Biology, Baylor University

Thursday, December 3, 2015, 9:00 AM, Freeman Aquatic Building, Room 130

Texas wild rice (TWR), Zizania texana, is a submerged macrophyte with a single known population existing in the upper reaches of the San Marcos River. Historically, this rare aquatic grass was in greater abundance than is observed today. First listed as a federally endangered species by the U.S. Fish and Wildlife Service in 1978 priority has since then been placed on the recovery and sustainability of TWR. Anthropogenic factors have been suggested to continue to present challenges for the re-introduction and maintenance of TWR. Previous research has focused on habitat suitability preferences for TWR with research still lacking in understanding all the factors that may limit its potential to recover to historical levels. Suspended sediment induced turbidity due to contact recreational use of the river is one such anthropogenic factor suggested to be problematic. Turbidity has been correlated with causing a decrease in the availability of photosynthetically active radiation (PAR) in aquatic systems. The goal of this study is to evaluate the impact suspended sediment induced turbidity and subsequent reduction in PAR has on the vegetative growth and biomass productivity of TWR. The experimental design will involve both in situ and ex situ observations, seasonal aspects (temporal) and recreational use (low and high). Identifying the impact recreational induced turbidity has on the vegetative growth of TWR may provide additional information useful in future conservation and restoration effort.

Michele Crawford-Reynolds graduated from University of The Incarnate Word in 1991 earning a bachelor's in biology. She later earned a master's degree from UIW in biology ('93) and in education from Sul Ross University ('98). She has taught at a community college in the biology department since 1995. She has two children, a daughter majoring in biology at Texas A&M University in College Station and a son majoring in psychology attending Austin Community College.

Thesis Defense

CHARACTERIZATION OF A MAJOR FACILITATOR SUPERFAMILY TRANSPORTER PROTEIN IN ARABIDOPSIS

Damian T. Raymond

Major Advisor: Dr. Nihal Dharmasiri

Committee Members: Dr. Sunethra Dharmasiri and Dr. Hong-Gu Kang

Monday, Nov 9, 2015, 8:30 am in Supple 257

The Major facilitator superfamily (MFS) transporter proteins regulate solute homeostasis across membranes in both prokaryotes and eukaryotes. Recently we isolated several mutant alleles of Arabidopsis PIC30, which encodes an MFS transporter protein that transports nitrate (NO_3^-) and synthetic auxin, picloram. Arabidopsis genome also consists of a gene, PIC30H (PIC30 homolog), which shows higher sequence homology to PIC30. In silico analysis indicate that both PIC30 and PIC30H consist of an MSF domain and a Noduline like (NOD) domain. Therefore, we hypothesized that PIC30H may function redundantly with PIC30. Using genetic and biochemical approaches we found that PIC30H localizes to plasmamembrane similar to PIC30. Nevertheless, tissue specific expression of these two genes indicates reasonable differences in spatial expression. Furthermore, overexpression of PIC30H in pic30 did not rescue the picloram resistant root growth of pic30 suggesting that these two genes may not function redundantly. Arabidopsis mutants of both PIC30 (pic30) and PIC30H (pic30HKO) were resistant NO_3^- analog ClO_3^- suggesting both PIC30 and PIC30H transport NO_3^- inwardly. Interestingly, dark-induced hypocotyl growth of pic30HKO was hypersensitive to picloram while the hypocotyls of pic30 mutant was resistant when compared with wild type suggesting that PIC30 and PIC30H may transport picloram in an opposite direction. Taken together these results indicate that while some transport functions of PIC30 and PIC30H are similar, they may also have different transporter functions despite their sequence similarity.

Bio: Damian T. Raymond graduated from University of Peradeniya – Sri Lanka in 2011 earning a B.S. in Botany with a minor in Chemistry. In 2013, he began pursuing a M.S. in Biology at Texas State University, characterizing a putative picloram transporter protein in Arabidopsis.

Thesis Defense

Rumenreticulum - Liver Masses Relationship in White-tailed deer (Odocoileus virginianus) differ between males and females

Gayatri Bhaskar

Major Advisor: Dr. Floyd. W. Weckerly

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

Wednesday, November 11th, 8:00AM, Supple Science Building 153

Relationships between organ masses probably influence energy demands in mammals. Previous studies have estimated allometric relationships between body mass and organ masses in white-tailed deer. To my knowledge, however, there has been no investigation into the relationship between rumen-reticulum organ mass and liver mass in any ungulate. Furthermore, energetically demanding life history events like lactation in females and mating in males should affect organ workloads. Understanding the co-dependent relationships of these organs could be insightful to understanding the energy conservation strategy of white-tailed deer. I examined relationships between rumen-reticulum organ and liver masses in white-tailed deer to see if relationships differed between females and males during and two months before the mating season. I collected 151 white-tailed deer (68 males and 83 females) from Kerr pens, Central Texas, and a private ranch in South Texas (SOTX). Deer from the Kerr pens were obtained during the peak of the mating season, whereas deer from SOTX were collected two months prior to the mating season. All females had also given birth to young in the previous spring or summer. There was a positive relationship between masses of the rumen-reticulum organ and liver at both study areas. However, this relationship differed between males and females. In comparison to females, males exhibited heavier livers in relation to rumen-reticulum organ masses at both study areas. These findings might be useful to understanding physiological changes during energetically demanding periods in male and female white-tailed deer.

Bio: Gayatri Bhaskar is from Bangalore, India. She attended Western Kentucky University at Bowling Green, KY for her B.S in Biology. Gayatri began the Masters of Science in Wildlife Ecology at Texas State University in spring semester, 2014. While at Texas State, she presented a paper on “Birth mass scaling in Elk (Cervus elaphus)” at the 51st Texas Chapter of the Wildlife Society annual meeting, Corpus Christi, Texas. During the summer of 2015, she worked as an intern for Texas Parks and Wildlife at Kerr Wildlife Management Area, Hunt, TX.

Thesis Defense

Urbanization and Stress Response of Texas Eurycea Salamanders

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

Nathan Bendik, Watershed Department, City of Austin

November 6, 2015, 8AM, Norris Room

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

AN EXAMINATION OF GENE FLOW AMONG DISTINCT MANAGEMENT UNITS OF THE REDDISH EGRET (Egretta rufescens)

Golya Shahrokhi

Major Advisor: Dr. M. Clay Green

Committee Members: Dr. David Rodriguez, Dr. Bart M. Ballard

Friday, October 30, 2015, 10:00 AM, Supple Building, Room 257

Reddish Egret (Egretta rufescens) is one of the least studied herons in North America. This dimorphic bird ranges from Baja California to Bahamas, north to Texas and Louisiana and southwards to Central America and northern part of South America. For this study we examined gene flow and genetic diversity among populations across the range of the species. We specifically tested the hypothesized distinct management units (Western, Central, Eastern) based on geographic distribution and the findings of Hill et al. (2012). We collected blood and feather samples from nestlings (n = 145) of 8 populations (Baja California, Chiapas, Yucatan, Tamaulipas, Texas, Louisiana, Florida and the Bahamas). We extracted DNA from collected samples and used 10 microsatellite markers and one mtDNA (control region) to estimate deviations from Hardy-Weinburg equilibrium, genetic differentiation, structure and gene flow. In all analysis we had more differentiations among groups and regions (Fst = 0.21) than among populations within groups (Fst = 0.09). Our results revealed three primary breeding concentration centers, one in each of the management units (Baja California for Western, Chiapas for Central, and Bahamas for Eastern) providing further support for the established management units. We found greater differentiation between populations in our mtDNA analysis suggesting less movement across populations and management units and greater philopatry in females in comparison to males. Differences in movement patterns between males and females is also supported by recent banding and telemetry data. Lastly, gene flow between the Baja California population and the remainder of species' populations is weak whereas we detected weak to moderate gene flow between populations in Central and Eastern management units

Bio: Golya Shahrokhi received her Bachelor's degree at Shahid Beheshti University (National University of Iran) in Biology with a minor in Zoology from Iran in 2012. She enrolled in the Wildlife Ecology Master program at Texas State University - San Marcos in 2013 and has started to work with Dr. M. Clay Green since then. While her studies at Texas State, she won the Kushlan Research Award from Waterbird Society and Texas State University Graduate College Thesis Research Support Fellowship. Her poster, also, won the best student poster at Waterbird Society meeting in Bar Harbor, Maine in August 2015.

Thesis Defense

Characterization of an IBR5 interacting protein, ARA2 in Arabidopsis auxin response

Prabesh Ghimire

Major Advisor: Dr. Nihal Dharmasiri, Department of Biology, Texas State University

Committee Members: Dr. Hong-Gu Kang, Department of Biology, Texas State University

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

October 29, 2015, 2.00 pm in Supple 257

Auxin controls plant growth and development through both genomic and non-genomic processes. Genomic processes are regulated through the degradation of a group of transcriptional repressors called Aux/IAAs. Recent studies indicate that IBR5 (Indole-3-butyric acid response5), a dual specificity phosphatase, also regulates degradation of Aux/IAAs through an unknown mechanism. To better understand how IBR5 regulates plant auxin response, we recently carried out a yeast two hybrid screen to identify IBR5 interacting proteins. ARA2 was isolated as one of the putative IBR5 interacting proteins. ARA2, which is a small GTP binding protein, belongs to Ras super family of proteins that play essential roles in the intracellular transport pathways of yeast, mammalian cells, as well as in plant responses to various environmental stimuli. Several other small GTPases such as ROP2 and ROP6 are also known to be involved in plant auxin responses suggesting that small GTPases are integral components of auxin signaling. Thus, it was hypothesized that ARA2 play a role in plant auxin responses through interaction with IBR5. Results presented here show that ARA2 physically interacts with IBR5 both in-vitro and in vivo. This interaction occurs through the catalytic domain of IBR5. Interestingly, Aux/IAA degradation in loss-of-function ara2 mutant is affected suggesting that ARA2 may be a positive regulator of auxin responses. Nevertheless, ara2 mutant does not any show altered auxin related physiological responses probably due to genetic redundancy. However, characterization of ara2/ibr5-1 double mutant reveals that ara2 mutation functions as a mild enhancer of ibr5-1 especially in stress responses suggesting that ARA2 together with IBR5 may function in modulating the auxin responses during environmental stress.

Bio: Prabesh Ghimire was raised in Kathmandu, Nepal and received his BS degree in Biotechnology from Purbanchal University, Kathmandu in December 2011. Then he joined the Department of Biology, Texas State University to follow graduate studies in 2013. During his MS program, he worked both as a research assistant and an instructional assistant. In 2014, he was awarded the best poster presentation at the Biology Colloquium.

Thesis Defense

HABITAT SUITABILITY AND AVAILABILITY FOR RAINBOW TROUT ONCORYNCHUS MYKISS IN THE CANYON RESERVOIR TAILRACE AND EVALUATION OF SIDE SCAN SONAR FOR HABITAT MAPPING IN A SEMI-WADABLE RIVER

Greg A. Cummings

Major Advisor: Dr. Thomas B. Hardy

Committee Members: Dr. Timothy H. Bonner, Dr. Adam J. Kaeser

October 27, 2:00 PM, The Meadows Center for Water and the Environment, (SLH 107)

Rainbow Trout Oncorhynchus Mykiss are typically stocked in tailraces across the southeastern United States to mitigate fish habitat and assemblage alterations caused by large impoundments. Hypolimnetic discharges from Canyon Reservoir have created conditions suitable for a coldwater tailrace fishery and Rainbow Trout have been stocked there since 1966. This study examined changes in suitability and availability of Rainbow Trout habitat with discharge rate to provide flow and stream restoration recommendations for the Canyon Reservoir tailrace. Physical habitat modeling incorporated habitat suitability information for three life stages of trout coupled with hydraulic modeling to assess habitat quality and quantity at various flow rates. Habitat mapping included traditional surveying, remote sensing, bathymetric mapping, and side scan sonar. Side scan sonar was evaluated for efficiency and applicability to semi-wadable rivers. Results indicate the tailrace is spawning limited and temperature, not habitat, is the primary limiting factor for adult trout. Modified flow rates and specific stream restoration measures could increase adult trout abundance and assist put-grow-and-take strategies in the upper portion of the tailrace. Side scan sonar provided efficient mapping of non-wadable sections of the study area. However, there were limitations related to water level, access, navigability, positional accuracy, and post-processing. Trial runs, training, map accuracy assessments, and further development with instruments and post-processing will improve this method in similar scenarios.

Bio: Greg A. Cummings graduated from Oklahoma State University in 2003 earning a B.S. in Wildlife and Fisheries Ecology with a minor in Geography. After graduating, he interned with a North Carolina State University graduate study investigating Striped Bass diet in the Albemarle Sound estuary. Since 2004, he has worked for the Inland Fisheries Division of Texas Parks and Wildlife, managing public fisheries in Central Texas. In 2010, he began pursuing a M.S. in Aquatic Resources at Texas State University, studying habitat mapping techniques and stream modeling.

Thesis Defense

Ionic Requirements of Blue Crab, Callinectes Sapidus, in Environments Containing Low Concentrations of Total Dissolved Solids

Duane A Friedman

Major Advisor: Dr. Joseph R. Tomasso

Committee Members: Dr. Weston H Nowlin, Dr. Benjamin Schwartz

Friday, October 23, 2:00 pm, Freeman Aquatic Building, Room 130

The goal of this study was to develop an ionic environment containing 1 g/L total dissolved solids (TDS) that would support the survival and growth of juvenile blue crabs (designated a “mixed-ion solution”). The 1 g/L TDS level was selected in order to minimize the cost of preparing ponds and to potentially reduce the need for effluent permitting in inland areas. The general approach was to provide selected ions in approximate concentrations found in 1 g/L dilute seawater. In a series of three-week exposures beginning with ~20 mm carapace-width crabs, we found: Growth in artificial sea-salt treatments of 1, 2, 4, and 8 g/L TDS averaged 76% ± 20.2% (mean ± SD) and was not significantly affected by treatments. The number of molts, feed intake and modified feed conversion ratio were not significantly affected by treatments. Growth during exposure to 1 g/L sea-salt, 0.5 g/L sea-salt + 0.5 g/L mixed-ions or 1 g/L mixed-ions averaged 41% ± 0.49% and was not significantly affected by treatment. Although not quantified, some exoskeletons in the mixed-ion treatment appeared soft and off-colored, leading us to investigate the need for environmental strontium in the next experiment. Average survival during the 21-d exposure of 1 g/L mixed-ions with 0, 1 and 2 mg/L strontium was 89% ± 12.7% and did not differ significantly across treatments. Growth across treatments averaged 40% ± 25.3% and was not significantly affected by treatment. All crabs in the 1 g/L mixed-ion environment (with 1 mg/L strontium) survived the 21-d exposure to temperatures of 26, 29, and 32oC. Growth in all treatments averaged 71% ± 12.1% and was not significantly affected by treatments. Due to two previous, failed experiments, 133 mg/L of sodium bicarbonate was substituted for 133 mg/L of sodium chloride to maintain pH levels above 7.5. These results indicate that blue crabs can survive and grow in 1 g/L mixed-ion solution.

Bio: Duane Friedman was born in Philadelphia, Pennsylvania, grew up in the Naval life-style, living along most of the Eastern coastline. Following high school in West Deptford, New Jersey, he relocated to Oceanville, New Jersey, and entered the workforce. Eventually, his aspirations of working in the fisheries industry got the best of him and he became a commercial blue crab fisherman/aquaculturist. This led to an undergraduate degree, earning a B.S. in Marine Biology from the Richard Stockton College of New Jersey in Galloway, New Jersey. As part of his B.S., Duane completed an internship at the MOTE Marine Laboratory in Sarasota, Florida, culturing snook, pompano and amberjack. His journey to complete his life-long goal of becoming a Fish Biologist, Duane has had the opportunity since June of 2015, to work as a Biological Fisheries Student/Trainee at SMARC. At SMARC, he served as a caretaker in the endangered and threatened devil river minnow refugium, successfully completing production of 2800 F1 offspring. Following graduation Duane hopes to pursue a Doctorate degree and continue his career in aquaculture research for the federal government.

Thesis Defense

SPRING FLOW AND HABITAT-MEDIATED EFFECTS ON REPRODUCTIVE EFFORT OF THE FOUNTAIN DARTER

Harlan T. Nichols

Major Advisor: Dr. Timothy H. Bonner

Committee Members: Dr. Kenneth G. Ostrand (USFWS), Dr. Joseph A. Veech

Thursday, October 22, 10:00am, Freeman Aquatic Building, Room 130

Reductions in Edwards Aquifer spring flows are hypothesized to reduce reproductive effort of spring-associated fishes. Purposes of this study were to test relationships among spring flow, associated habitat changes, and reproductive effort of the federally-listed Fountain Darter Etheostoma fonticola, a spring-associated fish inhabiting Comal and San Marcos rivers of central Texas. Study objectives were to quantify annual reproductive effort (i.e., ovarian stages, gonadosomatic index, and batch fecundity) across low to high flow gradients and aquatic habitats using natural and anthropogenically-altered stream reaches (N = 4) within the Comal and San Marcos rivers to represent in situ flow reductions. Contrary to previous studies reporting year-round spawning, annual reproductive cycle of the Fountain Darter consisted of an optimal reproductive season (January through April), and tailing reproductive season (May through August), lack of spawning in September, and a leading reproductive season (October through December). Among reproductive seasons, stages of ovarian condition, gonadosomatic indices, and batch fecundity generally were not different along a flow gradient or among habitats, though two exceptions were noted. Gonadosomatic index and batch fecundity were greater ($P < 0.05$) at the higher flow environment (3.6 m3/s) during optimum reproductive season and greater ($P < 0.05$) at the lowest flow environment (0.01 m3/s) during the leading reproductive season. Collectively, seasonality of reproductive effort was similar to sister taxa (Cypress Darter E. proeliare, Least Darter E. microperca), though protracted, and reproductive effort was not related consistently to flow environment observed during the study period. However, other measures of reproductive effort (e.g., numbers of larvae hatched, survival of larvae through recruitment age) are necessary to quantify in order to assess the relationship among Fountain Darter viability and flow environments.

Bio: Harlan T. Nichols graduated from Texas State University in 2013 with a B.S. in Aquatic Biology. During his time as an undergraduate he published research while working as an assistant for several other projects. He is currently working toward a M.S. in Aquatic Resources.

Thesis Defense

TESTING OF TROPHIC CASCADE WITHIN A HEADWATER SPRING COMMUNITY: IMPLICATIONS FOR WATER QUANTITY MANAGEMENT

Myranda K. Clark

Major Advisor: Dr. Timothy H. Bonner

Committee Members: Dr. Kenneth G. Ostrand (USFWS), Dr. Joseph A. Veech

Wednesday, October 14, 1:00pm, Freeman Aquatic Building, Room 130

A management strategy adopted to protect a federally-listed Fountain Darter Etheostoma fonticola during low flow conditions is the removal of a piscine carnivore Largemouth Bass Micropterus salmoides. However, headwater spring communities with benthic Fountain Darters include another potential predator (Red Swamp Crayfish Procambarus clarkii). Removal of a top predator, which consumes both benthic fish and crayfish, can produce a cascading effect and unintentionally increase rates of consumption on the Fountain Darter by removing top-down regulation of crayfish communities. The purpose of this study was to test for cascading effects of benthic fish predation by quantifying number of Fountain Darters consumed by crayfish, bass, and combined crayfish and bass within vegetated and non-vegetated holding tanks. Three water temperature trials were conducted to mimic low-flow winter temperatures (18°C), average spring-flow temperatures (22°C) and low-flow summer temperatures (27°C). Among temperature trials, bass and crayfish and bass treatment levels consumed about equal numbers ($P > 0.05$) of Fountain Darters, whereas crayfish consumed the fewest number ($P < 0.05$) of Fountain Darters, except at 22°C. Numbers of Fountain Darters consumed were unrelated to presences or absence of vegetation. Collectively, study results were not consistent with cascading effects but rather with additive model of prey consumption. As such, predator removal appears to be a viable option in reducing abnormal forms of mortality on benthic fishes during anthropogenically-induced periods of low flow, but removal efforts might create additional cascading effects. Therefore, removal efforts should be monitored to further assess efficacy of the management strategy.

Bio: Myranda Clark received her Bachelor's degree at Missouri State University in Springfield, MO, majoring in Wildlife Biology. Throughout her undergraduate career, she interned for the Heartland Inventory and Monitoring Network of the National Park Service. Upon completion of her Bachelor's, she moved to San Marcos, Texas to pursue her education in Aquatic Biology under the direction of Dr. Tim Bonner. As a full-time graduate student, she continued research in fish ecology, taught various labs including Ichthyology and served as president of the Aquatic Biology Society.

Thesis Defense

The prevalence of Trypanosoma cruzi, the causal agent of Chagas Disease, in rodent populations in Texas

Adriana Aleman

Major Advisor: Dr. Dittmar Hahn

Committee Members: Dr. Michael Forstner, Dr. Ivan Castro-Arellano, and Dr. Hardin Rahe

August 6, 2015, 3:00 pm, Supple 257

Trypansoma cruzi is the parasite that causes Chagas disease, which affects over 8 million people in at least twenty-one countries in Central and South America. While Chagas disease has been recognized as a significant health threat to the 28 million people living in Central America, it has not been considered a significant threat to the people in the United States. Since rodents are one of the reservoir hosts for T. cruzi and abundant close to human housing, detections of T. cruzi in rodents provide a good approximation of the prevalence of Chagas disease and the potential threat to human health. The purpose of this study was to determine the incidence of rodents infected with T. cruzi in five geographical regions across Texas. T. cruzi was detected by real-time quantitative PCR (qPCR) in DNA extracted from heart tissue of rodents and detection assessed as a function of location, time of the season, and of rodent species. Of approximately six hundred samples analyzed, eight samples representing 6 rodent species were shown to be infected with T. cruzi, all from the most southern geographical region. The data indicate that rodent populations in selected regions of Texas are infected with T. cruzi. Further studies should be conducted to determine if other animal populations in the regions of Texas with rodent populations infected with T. cruzi may also be positive for the organism.

Bio: Adriana was born and raised in Dallas, TX. She received her Bachelor's degree in Animal Science with emphasis in Pre-Veterinarian in May 2013 from Texas A&M University-Commerce in Commerce, TX. She started her Master's program in Biology at Texas State University in August 2013, and has been working as a graduate research assistant. While working on her M.S., she had the opportunity to be part of a two week "study abroad" program in Costa Rica. Her research was funded by the United States Department of Agriculture.

Thesis Defense

Effects of Temperature and Nitrogenous Wastes on Survival and Growth of the Barton Springs Salamander Eurycea sosorum

Justin C. Crow

Major Advisor: Dr. Joseph R. Tomasso

Committee Members: Dr. Michael R. J. Forstner, Dr. Kenneth G. Ostrand (USFWS)

Thursday, August 06, 11:00 am, Freeman Aquatic Building, Room 130

The Barton Springs Salamander (BSS), Eurycea sosorum, is a federally endangered obligate aquatic salamander found only in a few spring outflows located in a highly urbanized recreational area of Austin, Texas. The purpose of this study was to gain essential information regarding the physiological response of the BSS to thermal manipulations and three common aquatic nitrogenous toxins (ammonia, nitrite, and nitrate). All salamanders used in this study were produced at the San Marcos Aquatic Resource Center (SMARC, U.S. Fish and Wildlife Service) in San Marcos, Texas as part of a captive breeding program. To examine thermal stressors, salamanders were subjected to a nominal temperature increase of 0.5°C/day until a loss-of-righting response (LRR) was observed. Additionally, salamander growth was assessed following a 69 day trial in which young salamanders were reared at five different temperature treatments (nominal 15, 18, 21, 24 and 27°C). The cumulative ET50 of the LRR observed in the BSS was 32.6 ± 0.2°C (mean ± SD). The optimal temperature for growth of the BSS for weight and total length was estimated to be 19.0°C and 18.5°C, respectively. To investigate the effects of nitrogenous wastes on the BSS, ninety-six hour median-lethal concentration (96-hour LC50) trials were conducted for un-ionized ammonia-N (UIA-N), nitrite-N, and nitrate-N. The 96-hour LC50 of UIA-N, nitrite-N, and nitrate-N to the BSS was 2.1 ± 0.19 mg/L, 27.7 ± 0.72 mg/L, and 851.1 ± 49.21 mg/L, respectively. These results will aid in the conservation, management, and ongoing efforts to culture the BSS in captivity.

Bio: Justin Crow was born and raised in Fort Worth, Texas. Following high school he relocated to Austin, Texas and entered the workforce. Eventually, his aspirations of working in conservation biology got the best of him and he completed his undergraduate degree earning a B.S. in Marine and Freshwater Biology from The University of Texas at Austin. He then pursued his life-long goal of becoming a Fish Biologist. Justin has had the opportunity to work as a Biological Sciences Technician at the SMARC since 2013. At the SMARC he served as a caretaker in the endangered and threatened salamander refugium. Following graduation Justin hopes to remain with the U.S. Fish and Wildlife Service and continue his career in conservation. Justin is married to his loving and supportive wife Ana, and they have two amazing daughters who share their love of nature.

Thesis Defense

Determining the Seasonal Diets of Sable Antelope (Hippotragus niger) at Mason Mountain Wildlife Management Area

Amanda Hargrave

Major Advisor: Dr. Thomas R. Simpson

Committee Members: Dr. Dittmar Hahn, Dr. Floyd Weckerly, Dr James Gallagher

July 2, 2015 at 10:00 am in Supple 153-A

Abstract: The seasonal diets of sable antelope at Mason Mountain Wildlife Management Area were investigated from June 2013 to April 2014 using microhistological technique and an emerging technique of DNA analysis of fecal material. Forty samples were collected during summer 2013 with 20 samples collected in each of the remaining seasons. Vegetational analyses were conducted simultaneously with the fecal collection. Herbaceous plants were sampled using the Daubenmire method. Woody plants were sampled using the line-intercept method. Annually, the bulk of the diet was comprised of little bluestem (Schizachyrium scoparium) and Texas wintergrass (Stipa leucotricha). Plant use by sable antelope was compared with the availability of plants at Mason Mountain WMA to determine if sable antelope were selectively feeding. During spring, summer, and fall little bluestem (Schizachyrium scoparium) was selected. During the summer, switchgrass (Panicum virgatum) was also selected. Sable antelope selected Texas wintergrass (Stipa leucotricha) during the winter. DNA analysis targeted a portion of the chloroplast trnL (UAA) intron and 13 samples were successfully amplified and sent to the University of Texas at Austin's Genomic and Sequencing Analysis Facility for next-generation sequencing. The vast majority of plants consumed by sable antelope were grasses. While sable antelope may not compete for food resources with browsers such as white-tailed deer and greater kudu, careful consideration should be made when stocking with other grazers such as cattle, waterbuck, gemsbok, and scimitar-horned oryx.

Bio: Amanda Hargrave was raised in a small town in East Texas called Mabank where she first developed an interest in the natural world. She began her undergraduate career at Trinity Valley Community College and obtained an associate's degree in liberal arts. She received a Bachelor of Science in Wildlife Biology in 2012 from Texas State University in San Marcos, Texas. While completing her undergraduate requirements she served as both vice president and president of the student chapter of The Wildlife Society and obtained an internship with Texas Parks and Wildlife Department at Government Canyon State Natural Area. In 2013, she entered the graduate program in Wildlife Ecology at Texas State University. While enrolled in the program she completed a second internship with Texas Parks and Wildlife Department at Mason Mountain Wildlife Management Area. As a graduate student she completed the GIS certification requirements through the geography department and worked as an instructional assistant for Modern Biology II, Techniques in Wildlife Management, and Vertebrate Natural History. Amanda's goal is to help manage and conserve the natural resources and wildlife in Texas, while also gaining experience in the field and becoming more knowledgeable on ecological relationships and resource management.

Dissertation Defense

FUNCTIONAL CHARACTERIZATION OF SAUR GENES IN PLANT GROWTH AND DEVELOPMENT

Praveen Kumar Kathare

Major Advisor: Dr. Nihal Dharmasiri

Committee Members: Dr. Dana Garcia, Dr. Hong Gu Kang, Dr. Sunethra Dharmasiri,

Dr. Rachell Booth, Dr. Enamul Huq

Wednesday, July 1, 2015, 02:00 PM Supple 257

The plant hormone auxin regulates many key aspects of plant growth and development as well as plant response to both biotic and abiotic stresses. This is mainly achieved through controlled gene expression of group of three early auxin responsive gene families. SAUR (Small Auxin Up RNA) family of genes are one of three early auxin responsive genes, whose expression is induced within minutes of auxin application. In model plant Arabidopsis, SAUR family consists of more than 72 genes. However, except for few genes, functions of most of these SAUR genes are not known. With the aim of functional characterization of some of Arabidopsis SAURs, we selected four different SAUR genes belonging to clade III of the SAUR family. Results from this work indicate that all the four SAUR proteins physically interact and form complex with calmodulin proteins. These four genes are involved in the regulation of cell and organ elongation, and therefore, overexpression of any of these genes results in pleotropic growth related defects. SAUR overexpression transgenic seedlings are defective in polar auxin transport and are significantly insensitive to plant hormone ethylene. Moreover, SAUR overexpression and loss-of-function mutants show altered responses to salinity and drought stress responses. Taken together these data suggest that all four SAUR genes are important modulators of plant growth and development, and also regulate plant responses to environmental stresses.

BIO: Praveen Kumar received his BS majoring in Biotechnology from Gulbarga University- Gulbarga, India and MS in Biotechnology from Bangalore University- Bangalore, India. He entered aquatic resources Ph.D. program in spring 2010. As an instructional assistant he has taught laboratory courses in plant physiology and developmental biology. He is also working as a research assistant in the Department of Biology.

Thesis Defense

Characterization of AFB5 in Arabidopsis Auxin Signaling

Lauren Minter

Major Advisor: Dr. Nihal Dharmasiri

Committee Members: Dr. Sunethra Dharmasiri and Dr. Dhiraj Vattem (Department of Nutrition and Foods)

Monday, June 29, 2:00 PM, Norris Room

Auxin regulates nearly every aspect of plant growth and development by controlling both genomic as well as non-genomic responses. Genomic responses are regulated through the degradation of a group of transcriptional repressors called Aux/IAA proteins. These repressors are degraded through the ubiquitin-proteasome pathway involving SCFTIR1/AFBs in which TIR1/AFBs function as auxin co-receptors. TIR1 gene family in Arabidopsis consists of 6 genes, of which AFB4 and AFB5 are distantly related to TIR1. We isolated two mutant alleles of Arabidopsis AFB5 (pic3 and pic59) through a genetic screen using picloram, a synthetic auxin commonly used as an herbicide. Both mutant alleles exhibit differential primary root growth resistance to different auxinic chemicals. AFB5 expresses highly in tissues with actively dividing cells, such as the primary and lateral root tip, lateral root primordia, and hypocotyl, suggesting that AFB5 may function in cell division and/or expansion. Altered lateral root densities have been observed in pic3 and pic59 and AFB5::AFB5-GUS expresses highly in lateral root primordia, indicating that AFB5 may regulate lateral root development. Results so far indicate that AFB5 may have a limited role in Aux/IAA degradation, suggesting that it functions partially or completely differently from TIR1. Additionally, recent published data suggests that ROP GTPases regulate both auxin and ABA signaling. Two members of this family, ROP2 and ROP6 express highly in actively dividing tissues and mutants show defects in lateral root development. We hypothesized that the functions of AFB5 may be regulated through ROP GTPases and found that AFB5 expression is significantly higher in the rop2 and rop6 background. Using phenotypic analysis of rop2 or rop6 and afb5 double mutants, we sought to identify the role of AFB5 in plant growth and development.

Bio: Bio: Lauren was born and raised in Austin, Texas. In 2013, she earned a B.S. in Biology with a minor in Women's Studies from Texas State University-San Marcos, during which she conducted undergraduate research in the Dharmasiri lab. Upon completion of her bachelors, she join the lab as a full-time graduate student, where she continued research on auxin signaling, taught a variety of labs as an Instructional Assistant, and served in the Student Government as the Graduate Representative for the College of Science and Engineering.

Thesis Defense

The effects of net confinement and rapid salinity change on red drum (Sciaenops ocellatus) fed supplemented diets

Shawntel M. Lopez

Major Advisor: Dr. Joseph Tomasso

Committee Members: Dr. Dittmar Hahn, Dr. Michael Forstner, and Dr. Hardin Rahe

Friday June 26, 2015, 9:00 AM FAB 130

Due to increasing temperatures and changing precipitation patterns, hatchery raised juvenile red drum are sometimes faced with abrupt environmental changes when stocked into coastal bays. For this study, red drum fingerlings were fed either a reference or supplemented diet (2% salt, 2% salt and a prebiotic, 3% salt, 5% salt, or 7% salt) to determine if diet supplementation fostered better tolerance to net confinement and rapid salinity changes. Fish were fed diets for four to five weeks and then confined in a net for one hour, during which salinity was increased to either 40‰ or 55‰. Seventy-two hours after confinement, 100% survival was seen in those placed in the 40‰ and 0-47% survival was seen in treatment groups raised to 55‰. Plasma osmolality levels, plasma glucose concentration, plasma lactate concentrations, liver glycogen levels and hematocrits showed no significant variation across diet treatments or when comparing pre- and post-confinement values. Results of this study suggest that red drum fed a salt supplemented diet may be able to better tolerate rapid salinity increase, but further research is needed. However, if we compare performance of fish fed the reference diets in both experiments, it is clear that transfer of red drum to 40‰ may be feasible, but transfer to 55‰ risks losses of some or all of the fish.

Bio: Shawntel M. Lopez was born and raised in Pasadena, Texas. She graduated from Texas State University in August of 2013 with her Bachelors degree in Biology, and immediately began work on her Masters degree in Biology at Texas State University. Upon graduation, she will return to her hometown of Pasadena, TX to mold the minds of future scientist as a high school Biology teacher.

Thesis Defense

A SPATIOTEMPORAL HABITAT FRAGMENTATAION ANALYSIS FOR THE HOUSTON TOAD (BUFO HOUSTONENSIS)

Derek M. Wallace

Major Advisor: Dr. Michael R. J. Forstner

Committee Members: Dr. Jennifer Jensen, Dr. Joseph A. Veech

Thursday, June 25, 2015, 1:00 pm Supple Science Building, Norris Room

The loss of biodiversity worldwide is an issue of great concern and in the last quarter century amphibians have been at the forefront of this issue. Of particular note for South-Central Texans is the regional species Bufo houstonensis (Houston Toad). B. houstonensis is a Texas endemic amphibian first described as a species in 1953 and was the first amphibian listed on the U.S. Endangered Species Act in 1970. Historically the species has been found in the following counties: Austin, Bastrop, Burleson, Colorado, Fort Bend, Harris, Lavaca, Lee, Leon, Liberty, Milam, and Robertson, but is reported to be extirpated from Harris, Burleson, Fort Bend and Liberty counties. To date, Bastrop County has maintained the largest population since the 1970's. The causes behind B. houstonensis' decline across the range are largely attributed to habitat destruction and degradation. In addition to habitat destruction, two severe droughts have occurred across the range of B. houstonensis, the most recent resulted in a severe wildfire which drastically reduced critical habitat within Bastrop County. In 2001, the United States Fish and Wildlife Service established Focus Areas in order to direct conservation within smaller areas across the species range. Given the endangered status of B. houstonensis it is necessary to better understand these Focus Areas regarding the habitat of B. houstonensis on a temporal basis and use any information derived to assist in future conservation efforts.

Bio: Derek Michael Wallace was born in Longview, Texas and relocated to Central Texas in 2001. He enrolled in Texas State University – San Marcos in 2004 and received a B.S. in Biology, with a minor in English, in 2008. After two years working for the Texas Department of State Health Services he enrolled in the Wildlife Ecology Masters program at Texas State University – San Marcos in 2011. Between 2011 and present he also worked as a biological consultant performing field work for the protection and conservation of the Houston Toad.

Thesis Defense

GOLDEN EAGLE NEST SITE SELECTION AND HABITAT SUITABILITY MODELING ACROSS TWO ECOREGIONS IN SOUTHERN NEVADA

Sarah Weber

Major Advisor: Dr. Randy Simpson and Dr. John Baccus

Committee Members: Dr. Michael Clay Green

Thursday, June 25, 2015, 11:00 AM Room 153

Because of perceived declines in golden eagle (Aquila chrysaetos) populations in the western United States, United States Fish and Wildlife Service (USFWS) are closely monitoring population trends throughout their range. An inventory of golden eagles in 2 ecosystems in Nevada (northern Mojave Desert and southern Great Basin) was conducted from 2011-2014 with the objectives to: (1) locate nest sites and territories across several mountain ranges (Kawich Range, Belted Range, Stonewall Mountain, Cactus Range, Black Mountain, Quartz Mountain, Tolicha Peak, Sheep Mountain, Pintwater Range, Desert Range, Pahranagat Range, Spotted Range, Buried Hills, Half Pint Range), (2) estimate breeding population, and (3) map suitable nesting habitat based on nest site parameters. Cliff and canyon habitats of the southern Great Basin and northern Mojave Desert were surveyed by helicopter from 2011-2014 for active and inactive nests and to measure nest site parameters. Nest site parameters used for analysis were: general location, mountain range, cliff height, viewshed, soils, geology, elevation, aspect, slope, habitat, use, productivity, distance to nearest road and distance to water. Using these parameters, a suitability index was created using the program MaxEnt to map potential nesting habitat throughout they study site boundaries. A total of 96 nest sites (old/abandoned and newly decorated) were analyzed. During the four years of inventory 27 active nests produced 36 fledglings. Two nests were occupied for three years and three nests had double year occupancy. Results of this project will aid in establishing a monitoring program to provide guidance for avoiding and minimizing disturbances and other kinds of future “take” for federal agencies in consultation with USFWS.

Bio: Sarah A. Weber was born in Indianapolis, IN and moved to San Antonio, Texas in 1998. She graduated from Texas A&M University in 2006 with a B.S. in Wildlife and Fisheries Science and a concentration in Conservation Biology and Biodiversity. Sarah has continual education in Geographic Information Systems (GIS) from Penn State University and has a current application pending for Certified Wildlife Biologist through The Wildlife Society. Sarah is president and co-owner of a biological and spatial surveying company called Bio-Spatial Services, Inc. Sarah has been in the consulting field for eight years and is looking forward to continuing to provide high quality expertise in the field of Natural Resources. Sarah is an avid field biologist and enjoys helping landowners (public and private) manage their wildlife and biological resources with sound science and wise use. Sarah has a 4 year old daughter, Olive and lives in the Texas Hill Country.

Thesis Defense

The Physiological Effect of Hypersalinity and Temperature on Juvenile Red drum

Erica M. Molina

Major Advisor: Dr. Joseph Tomasso

Committee Members: Dr. Dittmar Hahn, Dr. Michael Forstner and Dr. Hardin Rahe

Thursday June 25, 2015, 8:00 AM FAB 130

Recreational and commercial fishing have decreased the population of many fish species. As a consequence, fish hatcheries in many costal states produce fingerlings, for stocking, in effort to increase overfished populations. The purpose of this study was to determine the physiological response of juvenile red drum to warm, hypersaline conditions in order to determine whether fish are able to acclimate to life in the wild during drought conditions (ie. very low instream flows to the bays). Red drum, Sciaenops ocellatus, fingerlings were cultured in recirculating systems for 4-5 weeks at different temperature/salinity regimen, i.e. at a temperature of 30°C and a salinity of 35 ‰ (reference conditions), and a temperature of 34°C and either 45 ‰, or 55 ‰ salinity (treatment conditions). Comparison of physiological stress indicators such as hematocrits, plasma osmolality concentrations, plasma lactate concentrations, plasma glucose concentrations and liver glycogen levels in fish held under reference conditions or increased temperature and salinity regimen did not result in statistically significant differences between treatments. Indicating, that as long as food is not limiting and water quality is acceptable, juvenile red drum can tolerate warm, hypersaline conditions with no apparent detrimental effects, if gradually acclimated to environmental conditions prior to exposure to these conditions.

Bio: Erica was born and raised in San Antonio, Texas. She received an Associates degree in Veterinary technology from Palo Alto College and has worked as an LVT at the Emergency Pet Center while in school. She also received her Bachelors in Animals Science with a minor in Biochemistry and then immediately went into her Maters program in Biology at Texas State University. After graduation she will be moving to Auburn, Alabama to pursue her PhD in Biology under the supervision of Dr. Mendonca.

Thesis Defense

Effect of compost tea on plant growth performance and the fate of microbial communities in soil

Name Elise Claire Valdes

Major Advisor: Dr. Dittmar Hahn

Committee Members: Dr. Michael Forstner, Dr. Robert McLean, and Dr. Hardin Rahe

June 24, 2015, 10.00 AM, Supple 257

Compost tea is a popular amendment used to improve soil quality and to control soil-borne diseases in plants. With proper brewing, compost tea contains many of the beneficial microbes and nutrients of compost, but is more easily applied to plants. The purpose of this study was to (i) analyze the fate of microbial communities in spent mushroom substrate compost tea applied to soil microcosms planted with corn, and (ii) determine if growth of corn is influenced by specific constituents from compost tea, including microbes only, nutrients only, or a combination of both (i.e. the complete compost tea). Two trials were performed, one with anaerobic soil conditions and a second with aerobic soil conditions. Bacteria and Eukarya were quantified over the 30 days with sampling events on days 0, 1, 2, 5, 10, 20, and 30, as were plant growth performance characteristics like root and sprout length or their biomass. Results demonstrated a significant drop (70-90%) in abundance of microbes after application of compost tea, without recovery during the 30-day incubation period. Plant growth performance characteristics were not statistically significantly different for corn on soil receiving compost tea or separated components (i.e. microbes or nutrients) only, or a water control. While these results cannot support assumptions on beneficial effects of compost tea on plant growth performance and microbial communities in soil after application, further scientific research should consider long-term studies with different plant species and soils to further investigate potential beneficial effects of compost tea.

Bio: Elise Claire Valdes is originally from Sugar Land, Texas. She received her B.A. in Agriculture- Animal Science from Texas State University. She initially became interested in sustainable agriculture after a trip to the Galapagos Islands. Soon after, she received the opportunity to get her Master's degree in Biology at Texas State University under a USDA grant and with a sponsorship from the Kitchen Pride Mushroom Farm, Inc. The grant allowed her and five other students to go on a study abroad to Costa Rica last May, where she gained further insight into the dynamics of sustainable living.

Thesis Defense

Population Genetics of the Big Bend Slider (Trachemys gaigeae gaigeae) and the Red Eared Slider (Trachemys scripta elegans) in the Contact zone in the Lower Rio Grande drainage of Texas

Name: Lauren Schumacher

Major Advisor: Dr. Michael R.J. Forstner (Chair)

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

Monday, June 22, 2:30 PM, Supple Science Building, Norris Room

The red-eared slider (Trachemys scripta elegans) is well-known for its popularity in the pet trade. It is also known for its near cosmopolitan distribution, which is partly due to the release of these pet turtles. When introduced to a new area, non-native T. s. elegans can hybridize with other native Trachemys species. An example of this occurs between T. s. elegans and the Big Bend slider (T. gaigeae gaigeae) in western Texas. Recent research and trapping efforts have primarily focused on Big Bend National Park. Mitochondrial haplotypes unique to T. g. gaigeae have been observed in T. s. elegans inhabiting Rio Grande tributaries downstream of the park, which could indicate historical hybridization. This study sought to address these concerns by utilizing specifically targeted additional sampling within these areas. I used twenty polymorphic microsatellite loci and model-based clustering methods to detect hybrids. Out of the 120 turtles sampled, 7.5% were identified as hybrids using the program Structure v2.3.4, and 23.3% were identified as hybrids using NewHybrids v1.1. My results supported the findings of past research as hybridization was found between T. g. gaigeae and T. s. elegans. They also supported the idea that morphology cannot identify hybrids. Some of the backcrossed individuals were located in areas outside of the range of T. g. gaigeae. This may represent an ancestral polymorphism caused by previous gene flow between individuals in the Rio Grande, Pecos River, and Devils River.

Bio: Lauren grew up in a small town in southern Illinois where she was constantly bombarding her classmates with fun facts about one animal or another. She eventually moved to Florida to earn her B.S. in Marine Biology from Florida Institute of Technology. After graduation, she started working at the Dauphin Island Sea Lab where she assisted with a number of projects that involved the restoration and subsequent monitoring of coastal marine habitats. This was followed by three months of fieldwork in the Mojave Desert assisting with a desert tortoise disease ecology project out of the University of Nevada, Reno. She joined the Population and Conservation Biology Masters Program at Texas State in the fall of 2012. While at Texas State, Lauren has taught Genetics labs and worked as a Houston toad monitor.

Thesis Defense

Landscape scale habitat associations of Sprague's Pipit (Anthus spragueii) overwintering in the southern United States

John A. Muller

Major Advisor: Dr. Joe Veech

Committee Members: Dr. Clay Green, Dr. Rich Kostecke (Nature Conservancy)

Monday, June 22, 10:00 AM in Norris Conference Room

Sprague's Pipit is a North American endemic migratory grassland songbird that has experienced a substantial population decline over the last half-century. There has been very limited research done on Sprague's Pipit especially on their wintering grounds. There is no complete account of their historic wintering range and there is also limited knowledge about the status of their current wintering range in the United States and Mexico. On the breeding range, Sprague's Pipits seem very selective in their habitat use, although there are reports that there may be a broader use of habitats on the wintering grounds. My objective was to determine the habitat types that Sprague's Pipit associates with at the landscape scale. I used land cover data from the National Land Cover Database GIS layers, CropScape GIS layer, and pipit point locations retrieved from eBird. I examined landscape-scale (1, 2 and 5 km) habitat associations of Sprague's Pipits over wintering in areas of Arizona, New Mexico, Texas, and Louisiana. I then compared these habitat associations to those of random locations and to locations of the closely related American Pipit. I found that Sprague's Pipit locations had minimal canopy cover, lower percent cover of woody vegetation and certain agriculture land cover types in comparison to random locations. I also found that although Sprague's Pipit is known to be negatively affected by non-native and anthropogenic grasslands at fine spatial scales, these grassland types may be suitable for the species at the landscape scale. Sprague's Pipit also appeared to be much less of a habitat generalist than the more common American Pipit. The results of my study could potentially be used in landscape-level planning for the conservation of the species on its wintering grounds.

Bio: John was born and raised in Austin, TX. He received a B.S. in Wildlife Biology from Texas State University in 2012. After receiving his bachelor's degree he worked as a biotech and wildlife monitoring intern for the USFWS for 18 months at both Tishomingo NWR, Oklahoma and Buenos Aires NWR along the Arizona/Mexico border. He started the M.S. program in Wildlife Ecology in January of 2014, and has been working as a graduate research assistant.

Dissertation Defense

Efficacy and Efficiency of Head-starting and Captive Propagation of an Endangered Amphibian: Implications for Continued Population and Habitat Management Following Catastrophic Wildfire

Melissa Jones

Major Advisor: Dr. Michael Forstner

Committee Members: Dr. Dittmar Hahn, Dr. Floyd Weckerly, Dr. Audrey McKinney and Dr. Todd Swannack

Friday, June 19, 2015, 11:00 AM Norris Room

The Lost Pines ecoregion of Texas is a loblolly pine (Pinus taeda) and oak (Quercus stellata) dominated woodland forest with remaining fragments in Austin, Bastrop, Colorado and Fayette Counties. Bastrop County Texas continues to support the largest known and best studied population of Houston toads (Bufo [Anaxyrus] houstonensis). The Houston toad was first described in Houston, Texas in 1953, and was the first animal from Texas and first amphibian federally listed as an endangered species. To date, nearly all recovery efforts have centered on the "robust" population remnant in Bastrop County. Houston toad populations have remained in a continual decline consequent of multiple stressors, including habitat fragmentation, urban growth of the city of Bastrop, red imported fire ants, fertilizers and chemical run off, agricultural practices, drought, and most recently, catastrophic wildfire. The aftermath of the Bastrop County Complex fire of 2011 has left the county with the need for immediate, active and continual restoration of plant communities on public and private land. This recent fire event now presents us with the rare opportunity to explicitly test habitat suitability and species survivorship pre and post catastrophic wildfire on native amphibian populations. I seek to provide data that are relevant to continued population conservation programs and the ongoing habitat remediation and restoration efforts in Bastrop County. I have investigated 1) the efficacy and effectiveness of head-starting and captive propagated releases of Houston toads; 2) assessed habitat suitability and the effects of catastrophic wildfire on Houston toad populations, and 3) assessed familiarity and community support of recovery efforts for the Houston toad among Bastrop residents. My results will guide future management strategies and contribute to conservation recovery efforts for the remaining Houston toads in this altered landscape.

Bio: Melissa Jones was born in San Antonio, TX on March 29th 1980 to Curtis and Carolyn Jones. In 2002, she received her Bachelors of Science degree in Zoology from Southwest Texas State University. In 2004, she returned to Texas State University and received her Masters of Science degree in Wildlife Ecology in 2006. In 2010, she entered the Aquatic Resources doctoral program at Texas State University to focus on habitat and population management of the endangered Houston toad.

Thesis Defense

AUTOMATED DETECTION OF RARE AND ENDANGERED ANURANS USING ROBUST AND RELIABLE DETECTION SOFTWARE

Andrew R. MacLaren

Major Advisor: Dr. Michael R. J. Forstner

Committee Members: Dr. Shawn F. McCracken, Dr. Floyd W. Weckerly

Friday. June 19, 2015, 8:00 AM Supple Science Building, Norris Room

Abstract: Amphibian populations are experiencing rapid rates of decline, the causes of which are sometimes controversial. The vocalization of the male anuran is used as an indication of a potential breeding event. Researchers have been relying on these vocalizations to monitor the health, reproductive status, and diversity of anuran populations for centuries. As technology advances so does our ability to innovate and improve the way anuran populations are monitored. One such innovation comes in the form of portable commercially available audio recording devices (ARD). These tools enable researchers to capture the sounds produced by populations of any vocalizing animal species and analyze them using machine-learning techniques of pattern recognition. The application of these techniques is understudied and not well documented for anurans. I conducted rigorous testing of these techniques to improve methods of monitoring populations of the endangered Houston Toad (Bufo houstonensis). The desired result of these tests would be a reliable and robust tool for recognizing the call of the Houston Toad. This would allow researchers to search vast quantities of digital audio files for the unique sound of this animal. I also compared the efficacy of this machine-learning technique to a highly trained professional listening for the call. Researchers often doubt the reliability of automated techniques, thus my recognition tool must be able to perform capably. Additionally, I employed these automated machine-learning techniques to document the presence or absence of the Houston Toad in two counties of Texas, and then coupled those data with highly resolute details of the environmental conditions to examine call phenology of the Houston Toad and graphically visualize this behavior across a complete chorusing season.

Bio: Andrew MacLaren relocated to Houston, Texas from Bay City, Michigan in 2000. Received a B.S. Biology, minor in Philosophy, in December of 2013 from Texas State University - San Marcos. He joined the Master of Biology program here at Texas State beginning June 2014. He also worked as a biological consultant monitoring populations of Houston Toads in the interim of his enrollment as a student.

Thesis Defense

Using a Habitat Suitability Model and Molecular Analyses to Aid in the Conservation Management of the Texas Tortoise, Gopherus berlandieri

Anjana Parandhaman

Major Advisor: Dr. Michael R. J. Forstner

Committee Members: Dr. Shawn F. McCracken, Dr. Thomas R. Simpson, Dr. M. Clay Green

Thursday, June 18, 2015, 2:00 PM Supple 257-A

The Texas tortoise, Gopherus berlandieri, is a threatened species in the state of Texas and strict conservation action is required to ensure that continuing population decline does not occur. The historical range of the Texas tortoise includes a much larger area than recent observations support, especially in the eastern range. Assessing the habitat suitability of the eastern historical range of the species and determining whether this region still supports the species will aid in its conservation. For the first chapter of my thesis, I conducted road surveys, from March to October of 2014, in these understudied regions. GPS coordinates of tortoises from these surveys, along with coordinates obtained from online databases were used with environmental predictors to model habitat suitability for the species using ArcGIS and Maxent. I found that there are some patches of habitat in the eastern range that could potentially support the species. In addition, some areas of suitability exist outside the species range. For the second chapter of my thesis, a population genetics study was carried out using tortoise samples, found outside its current and historic range, to determine genetic diversity and population structure using microsatellite loci. I found that selected tortoises likely belong to the same population, although some loci have a relatively high amount of genetic diversity. Both of my chapters attempt to explain the poorly understood factors of habitat suitability and aid in genetic diversity research for the Texas tortoise. This in turn will allow for better management and conservation of the species throughout its range.

Bio: Anjana was born in a land far, far away (also known as Chennai, India) and obtained her Bachelor's degree in Zoology from Stella Maris College, Chennai, in 2011. She spent a year working on coastal issues, crocodiles and Olive Ridley Sea turtles, and volunteered for various other organizations. Anjana then moved to Texas, joined the Masters program in Wildlife Ecology at Texas State University in January of 2013, and has been trying to do awesome science ever since.

Thesis Defense

THE EFFECTS OF WATER VELOCITY AND SEDIMENT COMPOSITION ON COMPETITIVE INTERACTIONS BETWEEN NATIVE AND INVASIVE MACROPHYTE SPECIES IN A SPRING FED RIVER

Jacob N. Bilbo

Major Advisor: Dr. Thomas B. Hardy

Committee Members: Dr. Paula S. Williamson & Dr. Weston H. Nowlin

Friday, April 24, 2015, 1:30 PM FAB 130

Abstract: Hydrilla (Hydrilla verticillata) is an invasive species that is problematic globally and also in the San Marcos River where it competes with native species. Hydrilla has been described as the "perfect aquatic weed" because it is able to propagate under a wide range of environmental conditions including low nutrient and variable light conditions (Langeland 1996). Treatment methods for control of non-native aquatic plants can be restricted due to the co-occurrence of native endangered species, requiring an integrated approach of several methods for restoration, including removal by hand, and manipulating environmental factors to encourage growth of native species. I conducted a competition study to determine if native species can out-compete non-native species under a set of environmental conditions. The experiment was conducted within Spring Lake at the headwaters of the San Marcos River, Hays Co. Texas between 03/28/2014 and 05/21/2014. I used a three-factor replacement design: (water velocity, substrate type, and competitive pressure) to assess competitive interaction between a native and non-native aquatic macrophyte. Illinois pondweed (Potamogeton illinoensis) and hydrilla were potted in monoculture (intraspecific competition) and mixtures (interspecific competition) using sand or silt sediment, and high or low velocity for a period of seven weeks. Above- and belowground dry biomass, total stem length, and number of stems were measured. Across all treatments, pondweed demonstrated significantly ($P<0.05$) higher growth rates than hydrilla. Substrate type and monocultures were not statistically significant factors in plant growth, however growth indices indicated that total dry biomass of both plants was slightly higher in sand substrate and high velocity. I also found intraspecific competition was greater than interspecific competition for both species, and that both species produced more biomass when in monoculture and at lower ratios in mixtures. Therefore, data from this study suggests optimal growing conditions for Illinois pondweed to out-compete hydrilla are in sand substrate and high velocity conditions. Continued research is required to further understand the competitive interactions of native and non-native macrophyte species in the San Marcos River.

Bio: Jacob Bilbo is originally from El Paso, TX where he earned his B.A in Interdisciplinary Studies at the University of Texas at El Paso. He became interested in aquatic biology after researching arctic zooplankton community dynamics for his senior thesis. While pursuing his M.S. in Aquatic Resources at Texas State University, he has worked as a consultant for the Southeastern Aquatic Resources Partnership. He then worked as a graduate research assistant at the Meadows Center for Water and the Environment conducting habitat restoration in the San Marcos River.

Thesis Defense

Small mammal communities and urban land cover associations in San Marcos, Hays County, TX

Lauren Cody

Major Advisor: Dr. Thomas R. Simpson

Committee Members: Dr. M. Clay Green and Dr. Ivan Castro-Arellano

April 17, 2015 1:00 PM SUPP 153-A

The importance of understanding small mammal diversity in urban areas is multifaceted. Small mammals affect predator population dynamics, habitat structure, and the spread of zoonotic diseases. Small mammal populations can help evaluate habitat fragmentation and quality and can potentially delineate habitat management strategies. My objectives were to determine the composition and diversity of small mammal communities within the city of San Marcos, and to evaluate relationships between composition and diversity by meteorological seasons and land cover type. I surveyed 20 sites within urban San Marcos between August 2013 and May 2014 for a total of 11,590 trap nights over 4 seasons. A total of 280 small mammals among 12 species were captured; the hispid cotton rat (Sigmodon hispidus) had the highest relative abundance overall (46.1%), in all seasons, and in all land cover types except urban developed, where the house mouse (Mus musculus) was most abundant. The northern pygmy mouse (Baiomys taylori) was also significantly more abundant than other captured species. Grassland sites showed the highest trap success (7.7%). The highest diversity index (1.39) and species richness (n = 5) were found in Speck Parking Lot, an urban developed site. Bicentennial Park, classified as forest/woodland, yielded no captures over the entire survey period. The Lower Purgatory Greenspace area, a grassland site, had the highest relative abundance (n = 87) and trap success (15.9%). While I did not find a significant difference in species diversity based on land cover type or season, more surveys should be conducted to gain a clearer picture of the small mammal communities of this area. Many sites did not yield any captures during some or all seasons, potentially deflating species diversity indices. I also saw fewer captures in the spring season, most likely due to the extreme cold winter season experienced by the San Marcos area. Two of the forest/woodland sites had large stands of privet trees (Ligustrum spp.), which likely account for lower relative abundance in those areas. Now that areas with high abundance and diversity of small mammals have been identified in San Marcos, these sites can provide opportunities for future surveys and projects, and can be used to assess and monitor the habitat quality of this urban area.

Bio: Lauren Cody was born in Fort Sill, OK, but quickly moved to Texas. She grew up in San Antonio and received her B.A. in Biology from the University of Texas at Austin in 2007. After working in environmental testing for a pharmaceutical company in North Austin, she decided to pursue higher education. While working towards her M.S. in Wildlife Ecology here at Texas State University, she has volunteered with Austin Water Quality and Plateau Land and Wildlife Management, and has been an IA for Functional Biology labs.

Thesis Defense

INFLUENCE OF LIGHT AND TEMPERATURE ON DENSITY OF SWALLOW NESTS

Lorissa Di Giacomo

Major Advisor: Dr. M. Clay Green

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

Monday, April 13, 2015, 12:00 PM Supple 153-A

Habitat parameters that affect survival and reproduction can be enhanced or degraded from human activities including disturbance and development. While the development of human-made structures can obviously degrade (e.g. loss of habitat) a species' ability to survive and reproduce, human structures can also promote population growth through a species use of these structures for basic life history requirements, such as nesting and roosting. My study examined the overlap (spatially and temporally) of Cliff Swallows and Cave Swallows during the nesting season as well as the seasonal use of 5 bridges in Central Texas by both species. Specifically, I examined spatial isolation between swallow species and investigated the influence of temperature and ambient light properties on nest site selection. For both years of this study, Cliff and Cave Swallows were present during our surveys; while the numbers were variable between years and among bridges, in general Cliff Swallows were the dominant species present. In contrast, Cave Swallows were only recorded at two of the five sites: B2-Plum Creek, and B5-Blanco State Park during both years. I found no significant interaction between bridges and probe ($F = 0.901$, $P = 0.493$) for mean temperature (°C) but the three bridges (B2, B3, B5) did significantly differed in mean temperature with B2 significantly warmer than B3 and B5 ($F = 15.104$, $P < 0.001$). For mean light (Lux), I found a significant interaction between bridge and probe ($F = 63.75$, $P < 0.001$) with all bridges receiving less light within the interior spans then the outer spans and the bridges differing significantly in overall ambient light; in order of decreasing light: B2, B3 and B5. Cave Swallows were found only within the interior spans of bridges (i.e. darker areas) and at the two bridges that received the less light. However, Cave Swallows did not appear to be influenced by temperature as Cave Swallows occupied the hottest (B2) and coolest (B5) bridges. Based on my results, it appears Cave Swallows are selecting bridge site that are relatively dark but not influenced as much by temperature at the nest site. Future studies are warranted to continue investigating the nest site selection of Cave Swallows as they continue to expand their range into the south western United States.

Bio: Lorissa Di Giacomo earned a B.A. in Biology from Texas Lutheran University in 2012. While in college, she worked at the San Antonio Zoo as a Playleader. As a Population and Conservation Biology Master's student at Texas State University, she was funded to do her research from Texas Department of Transportation. Upon graduation, Lorissa hopes to work for TPWD but until that time she will remain at the San Antonio Zoo, where she has been a part of for the past 11 years.

Dissertation Proposal Defense

Investigating Population Structure and Evolutionary History of Three Focal Taxa in the Edwards – Trinity Aquifer System Using Integrative Systematic Methods

Emrah Ozel

Major Advisor: Dr. Michael R. J. Forstner

Committee Members: Dr. David R. Butler, Dr. Benjamin F. Schwartz, Dr. Chris Nice, Dr. Marshal Hedin

Monday, April 13, 2015, 9:00 AM, Supple 257A

Caves are fascinating environments that harbor many obligate and facultative organisms. In general, these species share a set of troglomorphic characters at various degrees depending on their life cycles. Darkness, relative climatic stability and significant humidity lead the convergent evolution of subterranean lineages. Three focal taxa (Asellidae, Stenasellidae, Cirolanidae; Order: Isopoda / Ceuthophilus; Order: Orthoptera / Cambala, Speodesmus; Class: Diplopoda) in the Edwards – Trinity Aquifer system are selected to investigate the influence of these physical and climatic habitat features on subterranean evolution and population structure. Studies showed that morphological analysis can easily be deceived by the convergent nature of subterranean evolution. On the other hand, molecular techniques provide deeper insights on phylogeny and population structure; however, it is still a controversial idea to use molecular methods solely for defining species boundaries. Integrative systematics is a recent trend in biology aims to utilize various data sources for species delimitation process. In this study, I will seek to use high resolution three-dimensional morphological data, molecular genetic data including nuclear, mitochondrial and anonymous DNA markers and basic climatic data to infer species boundaries. In addition to this, taxon sampling will allow assessing colonization histories, habitat connectivity and inter/intra-cave variations. Also, using these analytical methods, some other parameters such as strength of convergent evolution and the effect of UV radiation can be estimated. Lastly, my research will be one of the few studies that follows an integrative approach to evaluate subterranean evolution in the Edwards – Trinity aquifer system of Central Texas.

Bio: Emrah Ozel earned a BSc. degree in Biology from Hacettepe University, Ankara, Turkey. In 2010, he received a MSc. in Zoology from Hacettepe University, Turkey. He entered the Ph.D. program in the Department of Biology at Texas State University in Fall 2011. As a Ph.D. student, he has been employed as an instructional assistant for Genetics lab.

Thesis Defense

RIO GRANDE BEAVER (Castor canadensis mexicanus) SURVEY IN BIG BEND NATIONAL PARK

Howland J. Reich IV

Major Advisor: Dr. Thomas R. Simpson

Committee Members: Dr. Floyd W. Weckerly, Texas State University & Dr. M. Clay Green, Texas State University

Thursday, April 9, 2105, 2:00 PM, LBJ 3-3.1

The Rio Grande River and its tributaries are home to the southwestern subspecies of North American beaver, Castor canadensis mexicanus. National Park Service biologists and biologists of protected areas in Mexico are concerned with the status of beaver populatons in this area. The last survey for the Rio Grande beaver, sometimes known as the Mexican beaver, in Big Bend National Park was conducted in 1981 by P. Strong and J. Bissonette. My objectives were to document centers of beaver activity and estimate the beaver population in Big Bend National Park. I surveyed 130 km of Rio Grande River with kayaks and canoes from the mouth of Terlingua Creek to the mouth of Boquillas Canyon during several trips from February 2013 to May 2014. I recorded water depth, type of vegetation, sign of active beaver colonies (dens, beaver tracks, scat, and cuttings), and ranked the amount of beaver activity within each colony as high, medium or low. From these data, I created a map in ArcGIS showing bathymetry of the river, vegetation profiles, and sites of active beaver sign. I delineated a total of 98 active beaver colonies in the study area. Analysis of water depth with respect to den locations indicated that colonies were located in the deeper pools along the Rio Grande. I conducted camera surveys on 11 colonies to estimate the number of beaver in each colony. With camera survey data and activity ranking of each colony, I estimated a population of 185 beaver occupying the 98 colonies. This represents a 38% increase in the beaver population along the Rio Grande since the 1981 survey.

Bio: Howland J. Reich IV (Joey) earned a B.S. in Wildlife Biology from Texas State University- San Marcos in 2013. While in college, he worked as a wildlife biologist for a private landowner in the Texas hillcountry. As a Wildlife Ecology Master's student at Texas State University, he taught functional biology labs, worked as a wildlife biologist for All Out Ranch Improvements, and held an RA position conducting surveys of the Rio Grande beaver in Big Bend National Park. Upon graduation, Joey will continue to work as a wildlife biologist for All Out Ranch Improvements.

Thesis Defense

Nutrient Limitation of Algae and Heterotrophic Bacteria in Reservoir Ecosystems:

Implications for Pelagic Competition along a Trophic Gradient

Amelia Everett

Major Advisor: Dr. Weston Nowlin

Committee Members: Dr. Alan Groeger, Texas State University & Dr. Dittmar Hahn, Texas State University

Wednesday, April 8, 2015, 1:00 PM, FAB 130

In low productivity pelagic ecosystems with low concentrations of inorganic nutrients, bacteria have been shown to play a relatively greater role in C and nutrient cycling and the importance of bacteria is thought to decline as productivity and dissolved inorganic nutrients increases. Plankton ecologists have proposed several mechanisms which lead to this pattern, but it is generally thought that bacteria should exhibit a competitive advantage over algae in unproductive systems with relatively high concentrations of dissolved inorganic C (DOC) and low concentrations of dissolved inorganic nutrients. However, there is a limited amount of data examining if the intensity of competition between algae and bacteria for inorganic nutrients varies with ecosystem productivity. My thesis focused on examining the potential for competition between heterotrophic bacteria and algae across a productivity gradient in a group of 19 Texas and Ohio reservoirs. Across reservoirs, DOC:dissolved inorganic nutrient ratios decreased with increasing productivity, signifying a shift in the dominant forms of available nutrients for algae and bacteria along a trophic gradient. The N and P content of algal and bacterial cells (i.e., C:N and C:P) follow a similar pattern of increasing cellular nutrient content with increasing productivity. Concurrent nutrient limitation assays indicated that algae across reservoirs were equally likely to be primarily limited by N or P, whereas bacteria were most frequently primarily limited by P and rarely limited by C. The magnitude of nutrient limitation responses (i.e., a response ratios) were greater overall with P addition over N or C, likely due to competition for inorganic nutrients. Both algae and bacteria exhibited heightened response ratios to P than with N or C comparatively due to low concentrations of P found within unproductive systems, thus an important limiting nutrient in these reservoirs studied.

Bio: Amelia Everett earned a B.S. in Environmental Science- Marine and Coastal Resources from Texas A&M University- Corpus Christi in 2012. While in college, she worked as a research field technician for the Conrad Blucher Institute for Surveying and Science. As an Aquatic Resources Master's student at Texas State University, she taught general ecology labs and held an RA position conducing water quality analyses for the San Marcos River in 2014. Upon graduation, Amelia will work as a GLOBE intern for the Nature Conservancy assisting in stewardship of private lands surrounding the Pedernales and Blanco River watersheds.

Dissertation Defense

Biological and Environmental Influences on Developmental Variation of Ungulates in Variable Environments

Daniel M. Wolcott

Major Advisor: Dr. Floyd W. Weckerly

Committee Members: Dr. R. Terry Bowyer, Dr. Paul L. Leberg, Dr. Thomas R. Simpson, and Dr. M. Clay Green

Friday, April 3, 2015, 12:00 PM, Supple 116

Fundamental to lifetime fitness is the amount of body development that occurs during the life of an individual. This is especially apparent in long-lived species in which age-structured populations and sexual dimorphism affect breeding success among individuals. A considerable amount of research has been conducted on ungulates in order to understand factors that affect developmental variation within populations. However, much of this work has been conducted in regions in which metabolism - and subsequently body development - is influenced by photoperiod and environmental seasonality. Recently, several studies have demonstrated that increasing environmental heterogeneity at high latitudes has negatively affected ungulate population dynamics. My dissertation focused on understanding factors that influence skeletal and somatic development of ungulates across variable environments. Specifically, I addressed developmental variation at critical life stages (natal to adulthood) and highlight new findings on body development in two species of new world cervids (Capreolinae). My dissertation demonstrated that seasonal limitations to body development, considered pervasive in ungulate populations, are less present in populations that experience benign winter conditions and higher degrees of environmental stochasticity. The new insights gleaned from this dissertation are beneficial in understanding how populations of these biologically and economically important species may adapt to changes in local climate.

Bio: Daniel M. Wolcott was born in Daytona Beach, Florida, and raised in Memphis, Tennessee. He earned a B.S. in Biology with a pre-med emphasis from The University of Memphis in 2007. He continued his education by enrolling in the M.S. program at The University of Memphis with an emphasis in ecology under the advisement of Dr. Michael L. Kennedy. Upon receiving his M.S. in 2011, he began his Ph.D. in the Aquatic Resources program at Texas State University under the advisement of Dr. Floyd W. Weckerly. His research interests are largely focused around understanding factors that affect the diversity and distribution of species. He enjoys teaching and anything related to the outdoors and family. He is thankful to his wife of 8 years, Amy, and their two children Emma (7) and Millie (2) who have been supportive throughout his education.

Dissertation Defense

Quantification of frankiae in soil

Suvidha S. Samant

Major Advisors: Dr. Dittmar Hahn, Department of Biology, Texas State University

Committee Members: Dr. Jeffrey O. Dawson, University of Illinois at Urbana-Champaign, Dr. Mark Paschke, Colorado State University, Fort Collins, Dr. Michael Forstner, Department of Biology, Texas State University, Dr. Bob McLean, Department of Biology, Texas State University

Friday, April 3, 2015, 8:00 AM, Supple 257

The genus Frankia represents nitrogen fixing bacteria that form root nodules with more than 200 actinorhizal plant species. In nature, Frankia is found in soil and in root nodules of specific host plants. Due to their low abundance in soil and difficulties to isolate them, most studies on Frankia focus on populations in root nodules, which are a natural locale of enrichment for Frankia. As a consequence, little is known about the ecology of Frankia in soil. This PhD. dissertation work therefore focuses on two basic objectives: (1) to develop molecular detection and quantification methods for the analyses of Frankia populations in soils, and (2) to elucidate the effects of environmental conditions on the fate of frankiae in soils. Initial work on the first objective resulted in the development of two SYBR Green based qPCR methods, using either rRNA gene sequences or nifH gene sequences as targets for the detection of all frankiae or specific subgroups in soils. Both qPCR methods are currently refined, and will finally be used to analyze Frankia populations in two studies: (1) to compare the abundance of indigenous Frankia populations in soils beneath alder and birch from 4 sites in Illinois to assess the effects of plant species and sampling location (rhizosphere, crown cover, no plant impact) on the abundance and diversity of indigenous Frankia strains, and (2) to determine variables that affect growth and abundance of specific indigenous Frankia populations in soil microcosms over time as a function of plant species and carbon resource supply. Overall, this dissertation will result in the development and application of molecular tools that will be used to increase our understanding of the fate of specific Frankia populations in soils.

Suvidha (Suvi) Samant earned a BSc. in Zoology from Carmel College, Goa, India. In 2005, she received a MSc. in Marine Biotechnology from Goa University, India, and later earned an M.S. in Biological Sciences from Wichita State University, Kansas. She entered the Ph.D. program in the Department of Biology at Texas State University in Fall 2011. As a Ph.D. student, she has been employed as an instructional assistant for Microbiology and Microbial Ecology labs.

Dissertation Proposal Defense

Population Dynamics and Habitat Conservation for the Golden-cheeked Warbler (Setophaga chrysoparia)

Adam Duarte

Major Advisor: Dr. Floyd W. Weckerly and Dr. Jeff S. Hatfield

Committee Members: Dr. James D. Nichols, Dr. Michael R. J. Forstner, and Dr. M. Clay Green

Friday, March 13, 2015, 2:00 PM, Supple 116

Central to wildlife conservation and management is the ability to forecast how species will behave and persist under future environmental conditions. To accomplish this, biologists must have a deep understanding of factors that impact population dynamics for a species of interest at a variety of spatial and temporal scales. During this seminar, I will discuss my dissertation research, which is centered on updating and extending our knowledge on golden-cheeked warbler (Setophaga chrysoparia) population dynamics and habitat conservation at multiple spatial scales. Specifically, I will present papers that examine warbler habitat change, survival, immigration, productivity, and population dynamics using a variety of contemporary statistical and geospatial analyses. Using Landsat imagery, I provided quantitative evidence for a large-scale reduction in total warbler breeding habitat, which became more fragmented across the warbler's breeding range. I estimated survival probabilities using 20 years of capture-resight data that suggest previous warbler population models were overly optimistic with respect to adult survival. Further, I found no strong evidence for spatial variation in survival or temporal patterns in survival that relate to observed warbler population dynamics. Using long-term monitoring data, I found immigration was important to stabilize local warbler populations, indicating conservation and management plans need to be implemented at a larger spatial scale. Lastly, I used these estimates to program a range-wide, spatially explicit population model to project warbler population and habitat dynamics into the foreseeable future. The model results indicated population viability could be achieved under current conditions, and that increasing the amount of protected lands would have a substantial impact on warbler carrying capacities at the end of a 50-year simulation. Overall, this research will help guide conservation decision making for the golden-cheeked warbler, at the local and range-wide scale.

Adam Duarte was raised in Wichita Falls, Texas. He earned a BS in Wildlife and Fisheries Sciences from Texas A&M University in May 2009, while simultaneously serving in the U.S. Marine Corps Reserve. In Fall 2009 he enrolled in the Wildlife Ecology MS program at Texas State University and joined Butch Weckerly's lab. Upon completion of his Masters in May 2011 he joined the PhD program in Aquatic Resources at Texas State University, working with Butch Weckerly (Texas State University) and Jeff Hatfield (USGS Patuxent Wildlife Research Center). His research interests are focused on contributing to the effective conservation and management of natural resources through the application of modern statistical methods and geospatial analyses.

Dissertation Proposal Defense

RODENT ASSEMBLAGE STRUCTURE AND ECOLOGICAL FACTORS AFFECTING HANTAVIRUS PREVALENCE AT VARYING SPATIAL SCALES

Matthew T. Milholland

Major Advisor: Dr. Iván Castro-Arellano

Committee Members: Dr. Joe Veech, Texas State University, Dr. Rodney Rohde, Texas State University, Dr. Tom Lee, Abilene Christian University, Dr. Gerardo Suzán Azpiri, Universidad Nacional Autónoma de México

Friday, February 27, 2015,11:00 AM, Supple 257

Zoonotic pathogens are the dominant cause of novel and reemerging infectious diseases. Hantaviruses (family Bunyaviridae) and their associated human diseases occur globally and differ according to their geographic distribution and type of illness exhibited in humans. Prevention of these diseases requires surveillance of seroprevalence in animal populations. Hantaviruses occur in close association with particular rodent, bat, and shrew reservoir hosts. Small mammal assemblage structure and species richness are suggested as strong drivers for the maintenance and spread of hantavirus infections. Climatic factors, such as precipitation, can influence reservoir density and abundance by increasing available food resources. These fluctuations in rodent assemblage structure can contribute to the maintenance or reduction of hantavirus seroprevalence. Dominance indices of competent hosts and assemblage characteristics may predict disease risk. The research objectives of the dissertation are to: 1) to determine the ecological correlates of hantavirus prevalence in small mammal assemblages at the site, region, continental, hemisphere, and global levels; 2) to compare and contrast differences in prevalence found in sylvan and disturbed habitats; 3) investigate the relationship between phylogenetic diversity and seroprevalence; 4) to develop predictive models for hantavirus prevalence in small mammal assemblages using defined ecological correlates; and 5) to quantify transmission events and seroconversions between naïve and infected rodents. Preliminary results suggest a relationship between the weighted site seroprevalence and the relative species abundance, observed species richness, and phylogenetic relatedness of species within the assemblage. Current research regarding hantavirus disease dynamics usually follows outbreaks of hantaviral disease in localized areas. My research aims at understanding the small mammal assemblage components and climatic factors influencing hantavirus prevalence, and developing a means of preventative surveillance.

Matthew T. Milholland received his B.S. in biology in 1996 from Abilene Christian University and studied integrative physiology at The University of North Texas Health Science Center at Fort Worth before obtaining his M.S. in wildlife ecology from Texas State University in 2005. He was a lead biologist studying the impacts of windfarms on bat and bird mortalities in Abilene, TX. He has also worked as a contract biologist throughout Texas and as an adjunct instructor at Cisco College before beginning the Ph.D. Aquatic Resources program at Texas State in January 2013. He and his wife of 19 years, Megan, have two children, Noah (9) and Posey (7), of whom he is very proud.