

Abstracts

Naylor-Schweissdoc



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0539 ASIH STORER ICHTHYOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Lauren Naylor, Joshua Drew

Columbia University, New York, New York, USA

Anthropogenic Influence on Mangrove-dependent Fisheries in Fiji

Fisheries play a critical role in food security throughout the world, particularly in developing countries. Throughout the Pacific Island region, coastal fisheries constitute an essential part of local livelihoods as they contribute to both subsistence and market-based economies, while also serving as the primary source of protein for local communities. Mangrove ecosystems are of particular importance to many commercially important fish species in this region, as they provide crucial nursery habitat that promotes juvenile survivorship. As these fish not only provide an important source of income, but also a source of protein for local people, the health of local communities is intimately tied with the health of the ecosystem. In the face of increasing pressure from human activities, this project aims to build a baseline of overall health for mangrove-dependent fisheries in Fiji, and offer insight into their future vitality. For this project we examined the relationship between the degree of anthropogenic pressure and a) the availability of habitat for species of fish and invertebrates b) species richness in mangrove ecosystems and c) the quality of fish health. We found varying responses which underscore the importance of assessing a multi-pronged approach to research in tropical small scale fisheries.

0089 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Wesley Neely, Norman Dronen

Texas A&M University, College Station, Texas, USA

Parasites from Four Species of Threatened Malaysian Freshwater Turtles

The Chinese food and traditional medicine market supports unsustainable illegal harvesting of threatened and endangered species, oftentimes pushing these species to extinction. One prominent case is the consumption of freshwater turtles, which has led to the endangerment and extinction of many Oriental turtle species. On December 11th, 2001, the Customs and Excise Department and the Agriculture, Fisheries, and Conservation Department of Hong Kong seized 9,500 illegally harvested turtles from twelve different species that were destined for the Chinese food market. While some of the turtles confiscated could be rehabilitated and returned to the wild, many of the turtles were dead or dying and thus were sent to the USA for parasite studies. Forty individuals representing four species were sent to the University of Florida and examined for parasites. These turtles were the Malayan box turtle, *Cuora amboinensis*, the giant Asian pond turtle, *Heosemys grandis*, the Malaysian giant turtle, *Orlitia borneensis*, and the black marsh turtle, *Siebenrockiella crassicollis*. The parasites of these turtles were subsequently transferred to the Laboratory of Parasitology, Department of Wildlife and

Fisheries Sciences, Texas A&M University for further examination. Thirteen species of parasites (nine nematodes, three trematodes, and one leech) were recovered. *Cuora amboinensis*, *S. crassicollis*, and *H. grandis* are considered to be threatened and *O. borneensis* endangered according to the IUCN red list. Since these species are threatened or endangered, the current study will increase metazoan parasite biodiversity data of these scarcely studied protected freshwater turtles.

0161 SSAR SEIBERT ECOLOGY I, Glass Oaks, Thursday 13 July 2017

Heather Neilly, Eric Nordberg, Jeremy VanDerWal, Lin Schwarzkopf

James Cook University, Townsville, QLD, Australia

Arboreality Increases Reptile Community Resilience to Disturbance From Livestock Grazing

Domestic livestock grazing directly alters habitat features and communities of ground-dwelling animals, but its effects on arboreal habitats and communities are poorly known. While grazing has been implicated in the decline of many vertebrate species, some are apparently resilient to the effects of grazing, either benefiting from structural changes at ground level or avoiding them, as may be the case with arboreal species. Here we examine both arboreal and terrestrial habitat features and reptile community responses to grazing to determine whether arboreal reptile species are more resilient than terrestrial species. We conducted reptile surveys among four different grazing treatments and in two vegetation types, at a 19-year experimental grazing trial in northern Australia. We utilized overall measures of abundance and diversity, community analyses, and individual species analyses at landscape and microhabitat scales to compare the grazing response of arboreal and terrestrial reptile assemblages. Arboreal reptile species were resilient to the impact of domestic livestock grazing whereas terrestrial reptiles were negatively affected by heavy grazing. Terrestrial reptiles were positively associated with structural complexity measures (e.g., % grass cover, leaf litter, woody debris), which were greatly reduced in heavily grazed areas. Arboreal lizards responded positively to microhabitat features such as tree hollows. Our results indicate that arboreal and terrestrial reptiles have a differing response to the impact of livestock grazing. Arboreal reptiles showed resilience in a landscape that is grazed but where trees have not been cleared. We highlight the importance of retaining trees in rangelands for both terrestrial and arboreal microhabitats.

0323 Snake Biology II & Snake Genomics, Brazos, Sunday 16 July 2017

Dalton Neuharth¹, Connor Adams¹, Shelby Frizzell¹, Wade Ryberg¹, Toby Hibbitts², Josh Pierce³, Craig Rudolph³, Timothy Johnson¹

¹Texas A&M Institute of Renewable Natural Resources, College Station, TX, USA, ²Texas A&M University, College Station, TX, USA, ³USDA Forest Service, Nacogdoches, TX, USA

A Novel Method of Snake Detection Using Time-lapse Triggered Camera Traps

Advancements in game camera technology have allowed researchers to explore new methodologies for studying the distributions and ecologies of vertebrate species, particularly mammals. Passive infrared (PIR) and active infrared (AIR) triggered cameras are now widely used in wildlife research; however, these studies are often species specific and are unreliable for studying poikilothermic species such as snakes. Many modern camera traps include a programmable time-lapse trigger feature, which could resolve these problems. To evaluate this method, we conducted surveys for snakes throughout east Texas pine forests using time-lapse triggered cameras and a traditional drift fence design. These camera trap arrays consisted of a Reconyx PC800 mounted on a pole positioned in the center of the array, with the camera lens perpendicular to the ground. Twenty-six of these camera arrays were distributed across 7 sites and programmed to take a picture of the trap area every 30 seconds from 0545 to 2200. Here we present the results of our survey effort from March to October of 2016 and compare these results to traditional funnel trap arrays in similar habitats, operating in the same region at the same time. We obtained 8,388,078 images that resulted in 523 observations of 18 snake species. Our findings suggest that time-lapse triggered cameras in conjunction with a traditional drift fence design can be an effective method for surveying across snake taxa and that capture rates are better than those acquired by traditional funnel traps.

0777 SSAR SEIBERT ECOLOGY II, Glass Oaks, Thursday 13 July 2017

Brent Newman¹, Scott Henke¹, Susan Koenig², David Wester¹, Humberto Perotto-Baldivieso¹, Taylor Shedd¹

¹Texas A&M University-Kingsville, Kingsville, Texas, USA, ²Windsor Research Centre, Windsor, Trelawny Parish, Jamaica

Determining the Suitability of the Jamaican Boa (*Chilabothrus subflavus*) for Short-Distance Translocation in Cockpit Country, Jamaica

The Jamaican Boa *Chilabothrus subflavus* (Boidae) is a Jamaican-protected species whose numbers and distribution have declined during the last century. In order to protect Jamaican Boas, translocation has been recommended as a conservation strategy. From December 2010 to November 2012 a short-distance translocation (SDT) of seven resident female Jamaican Boas in Windsor, Trelawny Parish, Jamaica was conducted to assess the effects of SDT on the survivability, home range size and microhabitat use of translocated individuals. A subset of seven resident (non-translocated) Jamaican Boas radiotracked in Windsor from November 2008 to June 2009 was used for comparison to SDT snake data. No mortalities or significant differences in home range size were recorded for SDT

as compared to resident female Jamaican Boas in Windsor. Visual detectability was higher for resident as compared to SDT snakes, however, both groups utilized arboreal microhabitats in greater proportion to terrestrial locations. Both groups were found in areas characterized by tall, canopy layer trees with vines and epiphytes, but SDT boas utilized larger trees with greater epiphyte densities than resident snakes. Results suggest short-distance translocation has potential as a management strategy for the conservation of Jamaican Boa populations in Jamaica.

0771 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Brent Newman¹, Nicole Witzel¹, Laura Horton², William Sutton¹, Jeronimo Silva¹, Brittaney Hogan¹, Dominique Harris¹

¹Tennessee State University, Nashville, Tennessee, USA, ²Belmont University, Nashville, Tennessee, USA

Assessing Biodiversity and Leech (Hirudinea) Parasitism of Semi-aquatic Turtles in an Urbanized Wetland in Tennessee

Turtles are a major biodiversity component and often play a keystone role in wetland ecosystems. From April 2016 through September 2016 we surveyed an aquatic turtle community in a ~5 ha palustrine, emergent wetland adjacent to the Tennessee State University Agricultural Research and Extension Center. Large, single-opening baited hoop-net traps were used to sample for turtles. For all captured turtles we recorded morphometric data, provided individual notch codes for future identification and if present, collected external leeches. Overall, we captured four turtle species including the Red-eared Slider (*Trachemys scripta elegans*, $n = 169$), Common Snapping Turtle (*Chelydra serpentina*, $n = 22$), Stinkpot (*Sternotherus odoratus*, $n = 4$), and Spiny Softshell Turtle (*Apalone spinifera*, $n = 1$). Leeches collected from captured turtles represented four different genera under phylum Hirudinea including the Desserobdella, Placobdella, and Helobdella. Collectively, our data will be compared to other wetlands of similar physiognomy throughout the region to provide an estimate of overall species diversity and wetland condition as well as parasite-host relationships of semi-aquatic turtles in the southeastern United States.

0844 SSAR VICTOR HUTCHISON STUDENT POSTER AWARD: CONSERVATION & MANAGEMENT; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Jillian Newman, Kyle Barrett

Clemson University, Clemson, South Carolina, USA

Distribution and Occupancy of Green Salamanders in South Carolina

Green salamanders, *Aneides aeneus* (Plethodontidae), are experiencing a significant decline in the Blue Ridge Escarpment. The IUCN lists this salamander as "Near Threatened" globally and the state of South Carolina lists it as "Critically Imperiled." Two likely threats to green salamanders include habitat loss and climate change. This species is also vulnerable to extinction due to its patchy distribution, which stems from the species' dependency on rocky outcrops for at least a portion of its life cycle. Many of the historical localities in South Carolina have not been surveyed in 25 years or more. We sought to determine the current status of green salamanders in South Carolina by reassessing historically occupied locations and newly discovered potential habitat. We conducted visual encounter surveys at rock outcrops and adjacent forests (N = 61), and collected habitat variables at each site to determine factors influencing green salamander occupancy. We constructed a number of models that incorporated covariates for both occupancy and detection probability and compared them using an AIC framework. Detection probability was positively influenced by salamander activity while occupancy probability decreased with increasing elevation. Of the 51 sites that we surveyed with known historical occurrences, green salamanders were only detected at 45.1% of these sites. This suggests the possibility of local extinctions and a range contraction; however, throughout the survey period we also discovered new occupied sites. These data on habitat requirements and previously unknown populations will aid conservation and management efforts for the species in the Blue Ridge Escarpment.

0339 AES GRUBER AWARD II, Wedgewood, Thursday 13 July 2017

Kyle Newton, Stephen Kajiura

Florida Atlantic University, Boca Raton, FL, USA

Cognition and magnetoreception in the yellow stingray, *Urobatis jamaicensis*, and their potential roles in elasmobranch orientation and navigation

Sharks, skates, and rays are hypothesized to use the geomagnetic field (GMF) as a cue to orient and navigate during migrations. However, few studies have examined the magnetic sense and cognitive abilities of elasmobranchs. The yellow stingray, *Urobatis jamaicensis*, is a small, demersal batoid that has proven to be an excellent model for elasmobranch cognitive and magnetoreception research. We employed behavioral conditioning to demonstrate that the yellow stingray can learn to discriminate between magnetic and non-magnetic stimuli, and remember behavioral tasks for at least six months. Yellow stingrays can detect, and discriminate between, changes in the strength and inclination angle of the GMF. These are cues that magnetoreceptive species can use as a bicoordinate grid, or possibly a cognitive map, to derive a sense of their current location with respect to a goal. The yellow stingray can use the polarity (north and south poles) of the GMF as a cue to solve a navigational task. This indicates that this species might gain a sense of direction, and orient itself with respect to the GMF using a polarity compass. Throughout all training procedures, the yellow stingray could use different types of magnetic cues as conditioning stimuli equally well, and it learned tasks faster under subsequent reversal training. However, there were differences in performance

between the sexes depending upon whether subjects were reinforced using appetitive or aversive stimuli. These results support the notion that elasmobranch fishes have the sensory and cognitive capabilities to use the geomagnetic field to orient and navigate.

0458 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Katie Nickles¹, Yinan Hu¹, John Majoris², Peter Buston², Jacqueline Webb¹

¹University of Rhode Island, Kingston, RI, USA, ²Boston University, Boston, MA, USA

Ontogeny of the Lateral Line System in a Caribbean Reef Goby, *Elacatinus lori*

Elacatinus lori is a sponge-dwelling neon goby that is endemic to the Mesoamerican Barrier Reef. It has emerged as a model species for the study of population connectivity and mechanisms of navigation during the pelagic larval phase. The purpose of this study was to analyze the ontogeny of the lateral line (LL) system in *Elacatinus lori* to start to understand its potential contribution to the sensory biology of pelagic larvae and post-settlement individuals. Twenty-four individuals (3 mm TL - 62 mm SL) were imaged using 4-di-2-ASP (vital fluorescent mitochondrial stain) revealing superficial neuromasts (SN) on the head, trunk, and tail. Data from paraffin histology, SEM, and μ CT, provided additional information on neuromast and cranial LL canal morphology. SN distribution maps showed that SNs are present in young larvae, discrete SN lines develop, then SNs continue to proliferate, and papillae on which the SNs sit become apparent at the time of settlement. The LL system of gobies is typically quite complex, with 100's to 1000's of SNs arranged in numerous lines on the head and body. The ability to rear *E. lori*, which has a relatively small number of SNs, provided an additional opportunity to interpret variation in the complex SN distributions reported among other species. Thus, the SN lines in *E. lori* were compared to those in other *Elacatinus* species, *Tigrigobius* (sister genus), and other gobiids, as reported in the literature to aid in the interpretation of SN proliferation in these fishes. Funded by NSF grant 1459546 to JFW.

0041 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Bradley Nissen, Nathan Bendik

City of Austin, Austin, Texas, USA

Seasonal Changes in the Body Condition of *Eurycea sosorum* and *Eurycea tonkawae*

Body condition is commonly used in wildlife studies as an indicator of an animal's fitness, and can have valuable implications to ecologists. Seasonality is known to drive various biological processes in many ecosystems, however in groundwater systems the effects of seasonal changes are not typically as pronounced or well-known. In this study, we examined the effects of seasonality on the body condition of two different species of

central Texas spring salamanders, the Barton Springs Salamander (*Eurycea sosorum*) and the Jollyville Plateau Salamander (*Eurycea tonkawae*). These two neotenic species inhabit different springs and groundwater systems of two separate segments of the Edwards Aquifer in Austin, Texas. We conducted a 3 year, multi-season mark-recapture study of both species, using digital photographs of individuals (N = 2233) and photoID software (WILD-ID) to identify recaptures. We digitally measured body length and tail width of each individual. Body condition of individuals was calculated using residuals from a linear regression of tail width and body length. We used tail width as a measure of body condition because salamanders store energy reserves (lipids) in their tails. Both species exhibited seasonal differences in body condition, which was lowest in the winter and generally higher in the spring and summer. There was an interaction between gravidity and season, with gravid individuals having a lower body condition during the fall and winter (when the proportion of gravid individuals is the greatest) compared to non-gravid individuals.

0411 Lightning Talks II, Glass Oaks, Friday 14 July 2017

Fahmida Khaliq¹, Mahatub Khan Badhon², Md Kutub Uddin², Enamul Mazid Khan Siddique³

¹*Bianibazar Government College, Sylhet, Bangladesh*, ²*Save Our Sea, Dhaka, Bangladesh*, ³*IUCN Bangladesh Country Office, Dhaka, Bangladesh*

Identifying Priorities of Elasmobranch Biodiversity Conservation in the Bay of Bengal, Bangladesh

Our review evaluates the current scenario of elasmobranch conservation in Bangladesh and identifies future priorities. Using the framework from Royal society's Measuring Biodiversity for Conservation, literature review and Key Informant Interviews coupled with field observation were conducted. Review finds a total record of 77 species, however Key Informants affirm the lack of taxonomic scrutiny in literature. Owing to the limited scope of studies in using taxonomic identification methods, and studying distribution and abundance of species has resulted significant Linnaean, Wallacean and Prestonian shortfalls in the existing knowledge base. The 2015 national IUCN Red List of Threatened Species does not assess elasmobranch due to the knowledge shortfalls, nevertheless 34 species are globally threatened among the species reported in Bangladesh. Wildlife (Conservation and Security) Act, 2012 identifies 29 species as 'protected wild animal' and prohibits elasmobranch fishing in the Sundarban Reserve Forests. Being a party of CITES has arguably little impact as monitoring facilities in the land ports are absent, resulting dry products of listed species vulnerable to exporting in neighbouring countries. Analyzing the scenario, our review recommends that scientific information and evidence on the habitat and population is necessary to assess the conservation status of elasmobranch fauna that will inform policy. Besides, a collaboration mechanism among the policy implementing agencies (particularly, Forest Department and Department of Fisheries), awareness building at grassroots level

fishermen and traders and regional collaboration among neighbouring countries have been prioritised.

0609 ASIH STOYE ECOLOGY & ETHOLOGY II, Sabine, Thursday 13 July 2017

Jessica Noble¹, Lauren Kircher¹, Matia Gringas¹, Lissette Geubelle¹, Joy Young², John Baldwin¹

¹Florida Atlantic University, Davie, Florida, USA, ²Florida Fish and Wildlife Conservation Commission, Tequesta, Florida, USA

Effects of a Disturbance Event on Fine Scale Movement and Population Dynamics of an Estuarine Sportfish

Disturbance events (ex: wildfires, extreme temperature shifts, disease) are occurrences that are increased in magnitude, duration, and/or frequency compared to natural disturbances within the normal disturbance regime. Effects of disturbance events can impact a population through changes in behavior and population dynamics. This project will identify overwintering movement behavior of common snook (*Centropomus undecimalis*), and describe the changes in their overwintering home range size and habitat choice in relation to the 2010 extreme cold event by using acoustic telemetry. The study will be focused on overwintering season (October-April), highlighting the time period of the cold event (Jan 2-13) between years 2009-2012. Previous studies have described spawning sites and spawning site fidelity of common snook, however overwintering movement patterns within the Indian River Lagoon are still unknown. In addition to looking at the effect of the disturbance event on overwintering behavior, this study also aims to establish overwintering movement patterns for the first time using acoustic telemetry. To determine the effect the cold event had on population dynamics Fisheries Independent Monitoring (FIM) survey data, provided by FWRI, will be used to look at sex ratio, abundance, fish length frequency, age class, body condition, and gonadosomatic index. The goal is to understand fine scale movements under normal and disturbance event conditions, as well as the impacts of a disturbance event on short term and long term population dynamics.

0162 SSAR VICTOR HUTCHISON STUDENT POSTER AWARD: ECOLOGY, NATURAL HISTORY, DISTRIBUTION, & BEHAVIOR; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Eric Nordberg, Lexie Edwards, Lin Schwarzkopf

James Cook University, Townsville, QLD, Australia

Terrestrial Invertebrates as Formidable Predators of Vertebrates: An Underestimated Guild

Predator-prey interactions have critical influences on wildlife populations, but are rarely observed. Thus, there are many anecdotal observations of predation events, but they are seldom quantified in nature. Vertebrates are the top predators in many systems, but large invertebrates may be important predators of small vertebrates. We used several approaches to determine the relative frequency of predation by invertebrates on vertebrates in terrestrial systems, where it is not often studied. We conducted 500 man-hours of visual surveys and compiled observations of in situ predation events from 2014 – 2016 in north Queensland, Australia. Observing a predation event in nature was rare: in 500 man-hours of visual searches, we only observed 9 instances of predation (vertebrates consuming another vertebrate, $n = 4$; invertebrates consuming a vertebrate, $n = 5$). We also deployed model lizards, to measure attack frequencies and found that 6.8 – 23.3 % of model attacks were by invertebrate predators, depending on seasonal variation. Although rarely observed, we suggest that predation events by invertebrates as predators of vertebrate prey should not be overlooked in terrestrial systems. Invertebrate predators are likely important predators of small vertebrates, similar to more “typical” predators such as snakes, birds, and mammals.

0108 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

José Novaes¹, Camila Bezerra¹, Rodrigo Costa¹, Danielle Peretti²

¹Universidade Federal Rural so Semi-Árido, Mossoró/RN, Brazil, ²Universidade do Estado do Rio Grande do Norte, Mossoró/Rn, Brazil

Decrease in Reservoir Levels Induced by Prolonged Drought as a Threat to Fish Species of Different Trophic Guilds in a Tropical Semi-Arid Environment

The objective of the study was to evaluate if the decrease in the water level of a tropical semi-arid reservoir affected the length-weight relationship and condition factor of fish of different trophic guilds: insectivorous (*Triporthesus signatus*), carnivorous (*Hoplias malabaricus*) carcinophagous (*Plagioscion squamosissimus*), omnivorous (*Leporinus piau*) and detritivorous (*Curimatella lepidura*). The experiment was carried out between 2010 and 2015 in the reservoir of Santa Cruz, Northeast Brazil, and during the study period, the reservoir level decreased from 93.99% of its capacity to 31.43% due to the absence of precipitation. The standard length (cm) and total weight (g) of the captured fish were recorded. The parameters of the length-weight relationship, by year for each species, were estimated by linear regression after log-transforming the data, and the condition factor used was relative weight. Both *T. signatus* (ANCOVA: $df = 5$, $F = 12.27$, $p < 0.001$), due to a possible decrease in insects, and *C. lepidura* (ANCOVA: $df = 5$; $F = 10.22$, $p < 0.001$), due to the decrease in the organic matter input, presented differences between the slopes of the length-weight relationship. Only *T. signatus* presented a significant difference (ANOVA: $df = 5$; $F = 13.18$; $p < 0.001$) in condition factor, with the lowest value in 2015 compared to those of other years. The study showed that the insectivorous species *T. signatus* was the most sensitive to the prolonged drought event. Thus, insectivorous species demand greater attention for conservation in semi-arid lentic environments in the event of prolonged drought.

0366 ASIH STOYE ECOLOGY & ETHOLOGY IV, Sabine, Friday 14 July 2017

Megan Novak, Scott L. Parker

Coastal Carolina University, Conway, SC, USA

Spatial Ecology of the Southern Copperhead in a Fragmented and Non-fragmented Habitat: Knot your Average Study

Spatial ecology of animals is influenced by habitat type and their physical environment. Habitat fragmentation can potentially alter the habitat type and directly affects the spatial and temporal distribution of resources available within the physical environment. The southern copperhead (*Agkistrodon contortrix contortrix*) is a habitat generalist occurring in woodlands, farmlands, as well as suburban neighborhoods. In this study, we quantified habitat use and movement patterns of *A. contortrix* within a fragmented environment and non-fragmented environment. We measured the effective distance moved (EDM), the straight-line distance moved (SLD), and the occupied area (OA) of *A. contortrix* in a non-fragmented habitat (Waccamaw National Wildlife Refuge, WNWR, n=20 snakes) and a fragmented habitat (Coastal Carolina University, CCU, n=22 snakes) from May to October, 2016 in Conway, SC, USA. Copperheads were tracked by attaching a thread bobbin to the snake and following the trail of thread as the snake moved through its environment. Longitude, latitude, habitat location (forest core, edge, open), date and time were recorded every two days for each snake. Copperheads at CCU had a smaller OA than those in the WNWR ($OA_{CCU}=1037.8m^2$, $OA_{WNWR}=2310.9m^2$). Copperheads at the fragmented CCU site increased their daily movements (EDM: 20m/48hr) from summer to autumn, whereas snakes in the non-fragmented WNWR decreased their movements (EDM: 15m/48hr) between the two seasons. The reason for this increase in activity in the fragmented habitat is unclear, but possibly due to differences in food resource accessibility or availability winter brumation sites.

0528 ASIH STOYE ECOLOGY & ETHOLOGY III, Sabine, Friday 14 July 2017

Michael Novotny, Tracey Sutton

Nova Southeastern University, Dania Beach, FL, USA

Assemblage structure and trophic ecology of the bathypelagic fish family Platytroctidae in the northern Gulf of Mexico

Members of the family Platytroctidae are circumglobal (except the Mediterranean Sea), and primarily inhabit bathypelagic depths. Due to the rarity of specimens, this taxon has received little focused attention, despite recent evidence suggesting its predominance in the bathypelagic ichthyofauna. Within the Gulf of Mexico (GoM), a highly diverse deep-pelagic system, only four species have been reported. An extensive bathypelagic trawl series in the northern GoM collected 16 species of platytroctids, 12 of which are new

records. In this study the abundance, distribution, and diet of the five dominant species (*Mentodus facilis*, *Platytroctes apus*, *Barbantus curvifrons*, *Mentodus mesalirus*, and *Maulisia microlepis*) were examined. All species were collected from tows below 700 meters, with no individuals collected from tows above 700 meters. Evidence suggests that platytroctids actively avoid standard rectangular midwater trawls, evidenced by catches with a large, high-speed rope trawl. Preliminary data suggest that platytroctids consume gelatinous zooplankton, with occasional predation on crustaceous zooplankton. The majority of platytroctids examined in this study had empty stomachs, indicating that they feed infrequently, prey is rapidly digested, or both. No feeding guild shift was observed with growth, however ration appeared to increase with body size.

0512 AES Ecology II, Glass Oaks, Sunday 16 July 2017

Rob Nowicki¹, Mike Heithaus², Jordan Thomson³, Derek Burkholder⁴, Kirk Gastrich², Aaron Wirsing⁵

¹Mote Marine Laboratory, Summerland Key, FL, USA, ²Florida International University, North Miami, FL, USA, ³Deakin University, Victoria, Australia, ⁴Nova Southeastern University, Fort Lauderdale, FL, USA, ⁵University of Washington, Seattle, WA, USA

Does widespread resource loss influence trophic characteristics of tiger sharks?

Food web structure is an integral property of ecosystems, and can influence myriad ecosystem processes from nutrient transport to herbivory intensity. While there have been multiple studies investigating the role of resource loss on food web structure, questions yet remain about consumer responses to such events. Understanding to what degree resource losses alter food webs can allow us to better predict how disturbances and resource losses may propagate up food webs. Here, we use stable isotope analysis of Carbon and Nitrogen and a widespread loss of seagrass following a marine heat wave in Shark Bay, Western Australia, to evaluate whether loss in this portion of the resource base has altered trophic properties of tiger shark populations. Preliminary data indicate that while tiger sharks remain generalists on a population level, the average $\Delta^{13}\text{C}$ value of tiger shark tissues decreased, suggesting a lower incorporation of the seagrass base. This work suggests that the widespread resource loss has in fact propagated to tiger sharks, despite no evidence of population level shark declines. Ongoing work will evaluate whether this reflects a change in tiger shark diet preferences, or changes in feeding patterns of their herbivorous prey.

0259 LFC Multi-Stressor Effects, San Marcos, Friday 14 July 2017; LFC SALLY L. RICHARDSON BEST STUDENT PAPER

Janet Nye¹, Hannes Baumann², Teresa Schwemmer¹

¹*School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY, USA,* ²*Department of Marine Sciences, University of Connecticut, Avery Point, CT, USA*

Physiological Effects of Increased Temperature and Carbon Dioxide on Atlantic Silverside Early Life Stages

There is a critical need to mechanistically understand the combined effects of multiple stressors on fish physiology to better anticipate population consequences of marine climate change. We conducted a series of 2 x 2 and 3 x 3 temperature and carbon dioxide partial pressure (pCO₂) factorial experiments on embryos and larvae of the Atlantic silverside, *Menidia menidia*. Recent work has shown that high pCO₂ inhibits growth and survival of Atlantic silversides when exposed at the egg and early larval stage, suggesting that the energy required to cope with high pCO₂ leaves less energy for survival and growth. To elucidate the physiological effects of high temperature and pCO₂ on Atlantic silversides and the mechanisms of coping with these stressors, we quantified the temperature-dependent metabolic costs of high pCO₂ using microrespirometry to measure oxygen consumption rates. Our preliminary results agree with our predictions that increased temperature and pCO₂ raise metabolic costs, thus increasing oxygen consumption rates. We also measured abundance and size of ionocytes, the ion-exchanging cells, using immunohistochemical staining. We hypothesized that ionocyte size and abundance increase under high pCO₂ because it requires greater capacity for acid-base regulation. We expect the severity of effects on metabolic rates and ionocytes to decrease in fish spawned later in the spawning season due to transgenerational plasticity, by which the conditions adults experience in the wild influence the phenotypes of their offspring. Recent evidence suggests that this mechanism reduces sensitivity to high pCO₂ in Atlantic silversides and high temperature in other fishes.

0117 Snake Biology II & Snake Genomics, Brazos, Sunday 16 July 2017

Kyle O'Connell, Eric Smith, Matthew Fujita

University of Texas at Arlington, Arlington, TX, USA

Species delimitation of North American whipsnakes and the effects of missing SNP data on phylogenetic analyses

A stable alpha taxonomy is essential to understanding evolutionary processes and achieving effective conservation aims. Taxonomy depends on the identification of independently evolutionary lineages, and the delimitation of these lineages based on multiple lines of evidence. Coalescent species delimitation within an integrative framework has increased the rigor of the delimitation process. Here we use genome-wide SNP data and coalescent species delimitation to explore lineage relationships within several North American whipsnake species, and to test the species status of three of those lineages. We find support for the elevation of two previous subspecies to full species status, and confirm the species status of a third species. This study demonstrates

the power of molecular data, paired with model-based delimitation methods, to identify evolutionary lineage relationships, and to delimit previously overlooked evolutionary species within well-studied taxa.

0171 HL/SSAR/ASIH Symposium - The Science, Management, and Policy of Amphibian Conservation: Extending the Legacy of Ray Semlitsch, Glass Oaks, Saturday 15 July 2017

Katherine O'Donnell, Susan Walls

U.S. Geological Survey, Gainesville, FL, USA

Bridging the research-management gap: Effective conservation decisions for flatwoods salamanders through adaptive management

Globally, amphibians are among the most imperiled taxa; 35 native amphibian species are currently listed under the U.S. Endangered Species Act. Preventing extinction often requires both in situ actions (i.e., protecting species in their natural habitats) and ex situ strategies (i.e., conservation breeding programs). Conservation decisions about actions for federally-protected species are complex because managers must address regulatory requirements in addition to complicated biological issues. Thus, effectively evaluating the costs, risks, and benefits of recovery actions requires input from various stakeholders, including scientists, agency personnel, non-governmental organizations, and land managers. The flatwoods salamanders (*Ambystoma cingulatum* and *A. bishopi*) are federally-protected species native to the southeastern United States, but these species lack complete recovery plans. Substantial uncertainty regarding the effectiveness of possible conservation actions hinders recovery planning. In 2013, we established the informal Flatwoods Salamander Working Group to coordinate conservation actions among researchers and land managers. We opted to formally confront the complexity and uncertainty about potential recovery actions using structured decision making (SDM) - a process that decomposes a decision into key components: problem identification, management objectives, potential actions, prediction models, and optimization processes that reconcile tradeoffs. In this talk, I will present a summary of two SDM workshops, discuss decision outcomes, and highlight current efforts toward species recovery. I will also discuss the advantages of using adaptive management (a type of SDM) in resolving conservation problems involving data deficiencies, disagreements among stakeholders, and decision paralysis (delays in implementing actions due to uncertainty).

0822 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Kiernan Oknefski, Alexa Trujillo, Matthew Lawrance, Anna Savage

University of Central Florida, Orlando, Florida, USA

Impact of Genetic Structure on Pathogen Dynamics in North American Ranid Frogs

Rapid global amphibian declines caused by infectious diseases have raised questions about how pathogens interact with host species and contribute to lineage diversification and persistence over time. The two most impactful amphibian pathogens are Ranavirus and *Batrachochytrium dendrobatidis* (Bd). Ranavirus is an Iridovirus that causes mass mortality in amphibians by inducing liver necrosis, and Bd causes the skin fungal disease chytridiomycosis that is linked to declines and extinctions of amphibians worldwide. The influence of host genetic variation on susceptibility to pathogens such as Ranavirus and Bd remains poorly understood for a wide variety of taxa, but some studies suggest susceptibility of Ranavirus and Bd differs between host populations. We previously characterized Ranavirus and Bd infection states in larval amphibians collected from populations of the North American ranid frogs *Lithobates catesbaenia*, *Lithobates sphencephalus*, and *Lithobates palustris* utilizing quantitative PCR (qPCR). Here, we sequence ND2, ND4 and cytochrome B mitochondrial genes and conduct population genetic analyses, then relate population diversity to pathogen dynamics to determine if patterns of disease susceptibility are associated with individual or population level genetic variation. The results of this study will expand our understanding of the pathogen-host interface and address host demography as a potential explanation for disease variation across declining *Lithobates* species. This, in turn, will improve our ability to conserve threatened amphibian species and to predict and mitigate future declines.

0870 General Ichthyology I, Trinity, Sunday 16 July 2017

Ronald Oldfield², Mimi Guo², Jacob Hooks², Abhinav Kakuturu², Jeffrey Sommer², Shelly McCain¹, William Lutterschmidt¹, Tom Lorenz³, Adam Cohen⁴, Dean Hendrickson⁴

¹Sam Houston State University, Huntsville, TX, USA, ²Case Western Reserve University, Cleveland, OH, USA, ³Georgia Southwestern State University, Americus, GA, USA, ⁴The University of Texas at Austin, Austin, TX, USA

Taxonomy and Osmoregulatory Capacity in Non-Native *Herichthys* Cichlid Fishes in the Gulf Coast Region of the United States

Cichlid fishes are commonly introduced and successfully establish populations in the southern US. The Rio Grande Cichlid, *Herichthys cyanoguttatus*, is a cichlid species native to the drainages of the Gulf Coast of northern Mexico and southern Texas that has been introduced to several sites in the US. *Herichthys cyanoguttatus* in Texas primarily occupy inland riverine habitats while non-native *Herichthys cf. cyanoguttatus* in Louisiana occupy a coastal, and often estuarine, environment. First, we formally evaluate the taxonomic status of non-native *Herichthys cf. cyanoguttatus* populations in Texas and Louisiana based on morphological features. Next, we compare osmoregulatory ability between a population in Texas and a population in Louisiana to determine whether their difference

in habitats might be more likely due to the different places humans released them or due to differences in ability to live in various salinities, and if the two populations thus might be predisposed to invade different habitat types. The *Herichthys cf. cyanoguttatus* specimens we sampled in Louisiana had an obliquely oriented mouth, a rounded ventral profile, and larger iridescent spots than those in Texas, and we conclude that their taxonomic identity is not *H. cyanoguttatus* but is *H. carpintis*. Surprisingly, we found little difference in osmoregulatory capability between the two species, indicating that the differences in geographic distribution between them is due to where they were released and not due to differences in ability to survive in water of different salinities, and that we should not expect differences in invasion potential between the two species based on salinity.

0854 Amphibian Conservation I, Wedgewood, Sunday 16 July 2017

Jennifer Olori, Sofia Windstam

SUNY Oswego, Oswego, NY, USA

Multi-year Prevalence and Co-infection Dynamics of Ranavirus and Chytrid Fungus in Central New York

Although *Batrachochytrium dendrobatidis* (Bd) and ranavirus (Rv) are major contributors to global amphibian declines, few studies have compared the dynamics of these pathogens across multiple years in a single region, and investigations of co-infection are nearly absent. To document long-term prevalence patterns and identify potential infection co-factors, an ongoing survey of amphibians in Oswego County, NY, was begun in 2012. During the first four years, 564 individuals from 14 species were tested for the presence of both pathogens using a standardized end-point PCR protocol. From 2012-2015, Rv prevalence was relatively stable (23 to 38%), whereas Bd prevalence fluctuated annually, exhibiting peaks of 25-26% in 2012 and 2015, and lows of 2-6% in 2013 and 2014. Co-infections were rare but present in all years, and also varied annually, ranging from 0.6-10% of tested individuals. Additionally, females of our most commonly sampled species, *Lithobates clamitans* (n=267), were significantly more likely than males to test positive for Rv, a result that resembles patterns associated with sexually transmitted infections in humans involving super-spreaders. Bd prevalence showed no sex bias, and the larger fluctuations in annual prevalence demonstrate that Bd is more sensitive to seasonal environmental variation than is Rv. Although the rarity of co-infections suggests a current lack of strong synergism between Bd and Rv, the annual fluctuations in co-infection rates closely track those of Bd. We suggest that as the limiting factor, future changes in Bd virulence or geographic range resulting from climate change could increase the susceptibility of amphibians to multiple pathogens.

0696 ASIH STORER ICHTHYOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Emily Olson, Matthew Davis

St. Cloud State University, St. Cloud, MN, USA

The Widespread Evolution of Fangs in Ray-finned Fishes

Numerous lineages of vertebrates have evolved greatly enlarged fang-like teeth that serve a number of functions. This includes a variety of lineages of ray-finned fishes, in which these teeth often are hypothesized to use fangs for piercing and restraining prey. This study explores the repeated evolution of fangs in ray-finned fishes using a densely-sampled phylogeny to infer how many times fang-like teeth have independently evolved across the evolutionary history of ray-finned fishes. Character evolution of fangs among ray-finned fishes is investigated using a taxonomically robust hypothesis of actinopterygian evolutionary relationships based on nuclear and mitochondrial data.

0496 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Richard Orton, Lance McBrayer

Georgia Southern University, Statesboro, Georgia, USA

Corridors Facilitate Gene Flow in a Fragmented Landscape

Anthropogenic disturbance is likely to influence dispersal and population size by altering habitat quality and connectivity. In turn, genetic diversity within and among populations will be impacted. Thus, species with limited vagility and specific habitat preferences may be particularly susceptible to landscape-altering events. Populations of the Florida scrub lizard (*Sceloporus woodi*) within the Ocala National Forest (ONF) are subjected to prescribed fire, fire suppression and clearcutting. Stands of longleaf pine within the ONF are maintained on a biannual cycle of prescribed burning and harbor large populations of *S. woodi*. Meanwhile, clear-cut stands of sand pine scrub (SPS) only temporarily provide suitable habitat for *S. woodi*. We predict that *S. woodi* disperse from stands of SPS as vegetation density increases in the absence of a natural fire regimen. The objective of this study is to quantify temporal and spatial genetic diversity in *S. woodi* populations in the ONF and assess any correlation with habitat management practices. To this end, we used microsatellite markers to quantify genetic variation in *S. woodi* at two time points separated by approximately five generations, and spatial analyses to test for correlations between landscape metrics and genetic diversity. Microsatellite markers revealed a weak population genetic structure that was better described by a least cost path, than by Euclidean distance. Temporal shifts in genetic diversity are also correlated with several patch metrics, including habitat quality and proximity. Our data suggest that corridors may be important for facilitating gene flow between populations of terrestrial species in managed landscapes.

0501 Herp Ecology III, Sabine, Friday 14 July 2017

Richard Orton, Lance McBrayer

Georgia Southern University, Statesboro, Georgia, USA

Predation Alters Local Adaptation and Sexual Dichromatism

Animal coloration is often viewed as an adaptive response to predation. For example, crypsis can increase fitness for prey animals by blending their visual signal with the local background, thus reducing the probability of detection by visual predators. Because crypsis is dependent on the visual background, and visual backgrounds frequently vary across space, local adaptation in dorsal color is common for species that are often exposed to visual predators. *Sceloporus woodi*, a small, sexually dimorphic, diurnal lizard, occupies stands of longleaf pine and sand pine scrub habitats. In the Ocala National Forest (ONF), these habitats contrast in substrate type and abundance. Here, we use a combination of calibrated photographs, spectrometry, and data collected in the field to examine the effects of spatial heterogeneity and sex on animal color and pattern. First, we used clay models to demonstrate that selection pressure from visual predators in the ONF is contingent on crypsis, and that predation is higher in sand pine scrub habitats. We also show that subpopulations of *S. woodi* have locally adapted in the ONF. Furthermore, the degree of crypsis is related to predation intensity, and females more closely match the color of visual backgrounds than males. Finally, using data collected in the field, we correlate crypsis with intersexual differences in escape behavior and microhabitat use. Our data suggest that local adaptation and sexual dichromatism may be influenced by selection pressure from visual predators.

0461 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Filip Osaer¹, Krupskaya Narváez¹

¹ElasmoCan, Asociación Canaria para la Investigación y Conservación de los Elasmobranchios, Las Palmas de Gran Canaria, Spain, ²Fundación Colombiana para la Investigación y Conservación de Tiburones y Rayas, SQUALUS, Cali, Colombia

HAMMERHEAD SHARK RESEARCH: Knowledge from the populations in the Canary Islands

HAMMERHEAD SHARK RESEARCH is a project that studies hammerhead sharks *Sphyrna spp.* in the Canary Islands with the aim to contribute scientific base knowledge of these species in an understudied distribution. Hammerheads are prone to bycatch in a wide range of fishery gears and interesting for shark fin trade, which make them vulnerable to overexploitation considering their life history characteristics. Species knowledge in the Canary Islands is limited to the presence of the scalloped hammerhead shark *S. lewini* and the smooth hammerhead shark *S. zygaena*, isolated records about behaviour, and scant sighting reports by citizens in social media. To get insights into the population dynamics, tagging and tissue sampling is combined with biological and fisheries data collection in four of the seven islands from the Canarian Archipelago. The professional and recreational fishing communities are actively involved in the study,

and are together with citizens encouraged to report sightings of tagged and untagged individuals. To date, our results have revealed three potential critical habitats for *S. zygaena* in the islands of Gran Canaria, Fuerteventura and Lanzarote. In addition, tissue samples were collected, post-release behaviour monitored and relationship with ectoparasites established. Future data collection and subsequent analysis is required to document the first local knowledge that can help in effective decision making for the species.

**0164 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017;
HL/SSAR/ASIH SYMPOSIUM - THE SCIENCE, MANAGEMENT, AND
POLICY OF AMPHIBIAN CONSERVATION: EXTENDING THE LEGACY
OF RAY SEMLITSCH**

Brittany Ousterhout², William Peterman⁴, Thomas Anderson³, Dana Drake⁵,
Jacob Burkhart¹, Freya Rowland¹, Raymond Semlitsch¹

¹University of Missouri, Columbia, MO, USA, ²University of Arkansas, Fayetteville, AR, USA, ³University of Kansas, Lawrence, KS, USA, ⁴Ohio State University, Columbus, OH, USA, ⁵University of Connecticut, Storrs, CT, USA

Are hot-spots consistent? Spatiotemporal variation and annual synchrony in larval abundance of pond-breeding salamanders

Understanding variation in the spatial dynamics of populations has important implications for the stability of metapopulations and managing species of conservation concern. While a significant body of literature examines the theory of spatial dynamics, empirical studies that assess spatial and temporal dynamics in nature remain uncommon. To test whether a pond-breeding amphibian exhibits source-sink dynamics, we conducted extensive surveys of 200 ponds over three years in south-central Missouri for larvae of the ringed salamander (*Ambystoma annulatum*), an endemic species of the Ozark Highlands. We then used a graph theoretical parameterization of the metapopulation mean lifetime model to assess which ponds acted as demographic sources or sinks, and if these designations were temporally or spatially autocorrelated. Preliminary results indicate variation in the production of salamander larvae, with spatial variation being 4 – 10 times greater than temporal variation. While the abundance of larvae within a pond was correlated among years, we did not find strong support for the abundance of larvae being spatially autocorrelated. Our findings support the hot-spot model of source-sink dynamics, which predicts that only a few populations actually contribute to metapopulation processes. Knowing this dynamic structure, and how it might be affected by species life history requirements, changes in habitat quality, and their interaction with stochastic processes, is essential for understanding how management strategies can balance conservation of important source ponds with the loss of some sink ponds to meet socio-economic demands of growth.

0492 Fish Biogeography & Morphology, Trinity, Saturday 15 July 2017

Hannah Owens

University of Florida, Gainesville, FL, USA

Seeing the Invisible: Biogeographic Breaks in Circumtropical Billfishes (Istiophoridae and Xiphiidae)

Billfishes of the families Xiphidae and Istiophoridae are epipelagic and circumtropical, with pelagic larvae and highly vagile adult stages. Despite their putative ability to disperse nearly globally, several currently-recognized species pairs have disjunct Atlantic and Indo-Pacific distributions. These patterns have been attributed both to hard geologic barriers such as the closing of the Isthmus of Panama, and soft oceanographic barriers such as the formation of the cold-water Banguela Barrier. While these distributional patterns are not unique to billfishes, this commercially-important clade presents an ideal system in which to develop unique biogeographic hypothesis tests that are more broadly applicable to other marine groups. Present-day locality data were collected from databases of georeferenced observations and museum vouchers and integrated with observed primary productivity and physiochemical data using an ensemble correlative ecological niche modeling approach. Resulting distributional models were then used to test hypotheses that oceanographic properties play a part in defining the distributional ranges of billfishes, and whether primary productivity or physiochemical properties are more likely drivers of putative breaks. Ancestral niche reconstructions projected into modeled paleoceanographic conditions were subsequently used to infer ancestral *Tetrapturus*, *Kajikia*, *Makaira*, and *Istiophorus* distributions. Results suggest a combination of hard and soft biogeographic barriers, combined with changing ocean conditions throughout geologic history, have limited billfish dispersal; resulting allopatric speciation events likely led to the present geographic distribution of billfish biodiversity.

0891 LFC Physiological Performance II, San Marcos, Sunday 16 July 2017

Elias Oziolor, Cole Matson

Baylor University, Waco, TX, USA

Evolutionary toxicology: Genetic adaptation in Gulf killifish (*Fundulus grandis*) populations chronically exposed to environmental contaminants

The Houston Ship Channel (HSC) in Galveston Bay is an aquatic environment with a long history of contamination, including polychlorinated dibenzodioxins (PCDD), polychlorinated dibenzofurans (PCDF), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and heavy metals. Populations of Gulf killifish from the HSC have adapted to resist the developmental cardiovascular deformities associated with dioxin-like compound (DLCs) exposures in fish embryos. Embryos from HSC populations were up to 1,000x more resistant to PCB126- and 2-5x more resistant to coal tar-induced cardiovascular teratogenesis. A gradient of resistance was identified across

Galveston Bay that strongly correlated with contamination levels in the aquatic environment, as measured in sediment, fish and passive samplers. This polluted environment provides a unique opportunity to explore the mechanisms of evolution to anthropogenic contaminants in natural populations. A population genomic analysis was conducted to identify regions under selective pressure, and to study the evolutionary processes driving the adaptive response.

0583 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Lance Paden¹, Kimberly Andrews¹, Carmen Candal², James Renner³

¹*Odum School of Ecology, University of Georgia, Athens, GA, USA*, ²*Georgia Sea Turtle Center, Jekyll Island State Park Authority, Jekyll Island, GA, USA*, ³*Southern Ionics Minerals LLC, 116 Hamilton St., Saint Simons Island, GA, USA*

Use of Prescribed Fire to Increase Detectability of Gopher Tortoise Burrows Prior to Relocation

The relocation of gopher tortoise (*Gopherus polyphemus*) populations has become a commonly used mitigation strategy where their presence conflicts with industrial, agricultural, commercial, or residential development needs. In order to strive for a "no tortoise left behind" policy, we seek survey approaches that increase our detectability of covert, hidden burrows, especially those of juveniles in dense vegetation. Additionally, moving a more fully intact community would presumably reduce the impacts to important tortoise social networks, and hopefully, increase the likelihood of re-establishment and reduce the overall stress of relocation on individuals. In 2016, we conducted a large translocation of over 100 tortoises from approximately 16 hectares of sandhill forest habitat. Initial surveys revealed a high density of hatchling and juvenile tortoises. We conducted a prescribed burn to clear out dense herbaceous groundcover that small tortoises use to help hide their burrows and therefore increase burrow detectability. Here, we present pre- and post-burn survey results of both tortoise and armadillo burrows. Fire proved to be an excellent tool to increase survey efficiency and accuracy, resulting in a more effective extraction and translocation of animals. Approximately 22% of all gopher tortoise and armadillo burrows in the impact area were detected post-burn, indicating that many burrows would not have been detected solely using pre-burn surveys. Proper detection of burrows is also crucial to detecting priority commensal species, such as eastern indigo snakes, Florida pine snakes, and gopher frogs, which may also rely on tortoise and armadillo burrows and are worthy of mitigation action.

0210 Lightning Talks I, Glass Oaks, Friday 14 July 2017

Nicole Palenske

Central College, Pella, Iowa, USA

A Herpetological Survey of the Carlson-Kuyper Field Station in Iowa

The Carlson-Kuyper Field Station is a 62 acre nature preserve and outdoor laboratory located approximately 50 miles southwest of Des Moines, Iowa and 12 miles from the Central College campus in Pella, Iowa. The land is adjacent to Lake Red Rock and wildlife areas maintained by the Corps of Engineers. The land contains wooded valleys, restored prairies, and a pond near the center of the property. In March of 2017, I began to conduct a baseline herpetological survey of the Carlson-Kuyper Field Station. The objectives of the survey are to 1.) Develop a standardized monitoring protocol for herpetofauna; 2.) Determine population status estimates for herpetofauna; and 3.) Characterize and analyze habitat preferences of species for future conservation. Through the work of this baseline herpetological survey, I will gain a better understanding of the herpetofauna at the field station and will develop future projects engaging undergraduate students in research.

0354 Fish Ecology I, San Antonio, Sunday 16 July 2017

Grayce Palmer¹, Derek Hogan¹, Blair Sterba-Boatwright¹, Deborah Overath²

¹Texas A&M - Corpus Christi, Corpus Christi, Texas, USA, ²Del Mar College, Corpus Christi, Texas, USA

Invasive lionfish *Pterois volitans* reduce the density but not the genetic diversity of a native reef fish

The Indo-Pacific red lionfish *Pterois volitans* has spread throughout the western Atlantic causing declines in biomass and diversity of native species at local reefs; worst-case scenarios predict species extinctions and ecosystem phase shifts. While reductions in reef fish population density and recruitment are evident, it is not known whether lionfish are reducing genetic diversity of native species, a major driver of extinction in natural populations. A before-after control-impact experiment was used to determine whether lionfish removals cause an increase in density of native species and genetic diversity in one species, the bicolor damselfish *Stegastes partitus*. We found that removing lionfish significantly augmented the density of several reef fish species. However, while allelic frequencies in bicolor damselfish recruits changed after removals, genetic diversity did not increase substantially despite a 3-fold increase in recruit density. Responses to lionfish removal differed among native species; rare species with small population sizes may be more susceptible to recruitment failure and diversity loss as a result of lionfish predation than widespread species with large populations

0132 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Kristin Palmrose, James Gelsleichter

University of North Florida, Jacksonville, FL, USA

Reproductive Endocrinology of the Blacktip Shark, *Carcharhinus limbatus*, off the Southeastern U.S. Coast

It is useful to study the reproductive endocrinology of sharks because it provides greater information on the factors that regulate reproduction in these fish. It also provides non-lethal tools for addressing questions about reproduction that are relevant to fisheries management. Although past studies have examined reproductive endocrinology of several shark species, there has been surprisingly little focus on biennially reproducing placental viviparous sharks. With the intention of strengthening work on this group, this study examined plasma gonadal steroid concentrations in the blacktip shark, *Carcharhinus limbatus*, in relation to stage of maturity and reproductive stage. Blood samples and biological measurements were collected from 87 animals along the southeast U.S. coast. Female plasma estradiol concentrations showed no obvious inflection in relation to reported size-at-maturity (established to be ≥ 155 cm STL), but rather showed higher than expected levels in “sub-adult” animals (75-150 cm STL). Male plasma testosterone concentrations exhibited an obvious inflection in relation to maturity. In relation to month of capture, female estradiol levels portrayed two clusters of animals (i.e., a “high [>150 pg/mL] estradiol”, presumably non-pregnant group and a “low [<150 pg/mL] estradiol”, presumably pregnant group), which was anticipated based on the reproductive periodicity of this species and general knowledge about the importance of estradiol in regulating follicular development. Several individuals in the “low” and “high” estradiol groups were confirmed to be pregnant or non-pregnant, respectively, using ultrasonography, confirming our predictions. As anticipated testosterone levels peaked in the months May-June, correlating with the reproduction pattern found in the female sharks.

0811 Amphibian Conservation III, Wedgewood, Sunday 16 July 2017

Anjana Parandhaman, Madeleine J. Marsh, Michael R. J. Forstner

Texas State University, San Marcos/Texas, USA

Testing the Effectiveness of Captive Propagation as a Management Strategy for the Endangered Houston Toad (*Bufo* [= *Anaxyrus*] *houstonensis*)

The Houston Toad (*Bufo* [= *Anaxyrus*] *houstonensis*) is endemic to east-central Texas and has continued to decline, despite being federally listed as endangered. This decline in population is generally consequent to large-scale habitat loss. Reintroduction and population supplementation projects, via assurance colonies at the Houston Zoo, have been among the management approaches used in recent attempts to arrest this decline. Over the last three years, supplementation efforts have focused on recovery sites in Bastrop County. This includes the acclimation and release of egg strands/juveniles into predator exclusion devices, to enable greater transition rates of neonates and juveniles to adult stages. Released egg strands are monitored through to the emergent metamorph stage. These supplementation efforts are evaluated by determining naïve occupancy of the same sites, through auditory surveys for chorusing adult male Houston Toads.

Toads are captured, marked, and a tissue sample is taken for genetic mark-recapture analyses. Chorusing males have increased in number, this year, at historically occupied sites and have been detected at previously unoccupied sites (>10 years). These reflect sites that were supplemented in 2015 and 2016. The provenance of these adult Houston Toads, captured during nocturnal call surveys, is being determined with a pedigree analysis using microsatellite markers. The results suggest that captive propagation/headstarting have shown success, however this management approach should not be considered in isolation to ensure long-term persistence of the species.

0808 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Anjana Parandhaman, Shawn F. McCracken, Michael R. J. Forstner

Texas State University, San Marcos, Texas, USA

Modeling Habitat Suitability for the State Threatened Texas Tortoise, *Gopherus berlandieri*, in the Eastern Region of its Range

The Texas Tortoise, *Gopherus berlandieri*, has a small geographic range in the USA and faces threats due to habitat loss and alteration. Despite being a Texas state threatened reptile, it is surprisingly understudied. In particular, the eastern portion of the species range has historically low detections of tortoises, either because of less suitable habitat or the region being under surveyed. Assessing habitat suitability, and determining whether this region still supports the species, will aid in its conservation. Road surveys were conducted from March to October of 2014. Georeferenced tortoise locations, along with museum records, were compiled from online databases, and used to model habitat suitability with Maxent (v3.3.k). The model predicted relatively small patches of suitable habitat remaining in the eastern region for this tortoise. The largest extent of suitable habitat was detected in the western region and far south Texas, as well as some patches outside the historical range. This spatially explicit analysis allows for a redirection of conservation management efforts to highly suitable habitat patches that are at high risk of fragmentation and alteration. Limitations to our study include inaccessible large private landholdings with potential tortoise habitat and a single season of fieldwork. Until we are able to gain a better understanding of the effects of ongoing disturbances in the region, and considering our very low number of observations (seven in total) despite extensive survey effort, it is imperative that we continue monitoring to validate and update our model, to aid in the management of this threatened species.

0375 AES Trophic Ecology/Physiology, Wedgewood, Friday 14 July 2017

Sebastian Pardo, Nicholas Dulvy

Simon Fraser University, Vancouver, BC, Canada

Body mass, temperature, and depth independently shape productivity in sharks and rays

An important challenge in ecology is to develop a mechanistic understanding of what drives a species' productivity as this underpins our understanding of fishing limits, extinction risk, and recovery potential. Metabolic theory postulates that body mass and temperature drive productivity of species. In sharks and their relatives, hereafter referred to as sharks and rays, productivity is known to be lower in larger species, but also in those living at greater depths. While the deep ocean is associated with colder temperatures, other factors such as food availability and physiological constraints may influence the low productivities observed in deep sea sharks and rays independently of temperature. We use an information theoretic approach while accounting for phylogenetic relatedness to evaluate the relative importance of temperature and depth on productivity and the mass scaling of this relationship. We show that both temperature and depth have separate yet independent effects on productivity of sharks and rays, such that species living in deeper, colder waters have lower productivities. Furthermore, temperature also correlates with changes in the mass scaling coefficient as cold-water species have shallower mass scaling coefficients. These findings underline that there are multiple processes acting in concert which limit the productivity of deep sea sharks and rays and provide a useful template for assessing productivity of species based on easily accessible information such as temperature and depth, particularly for the most data poor species.

0513 ASIH STOYE GENERAL ICHTHYOLOGY I, Trinity, Thursday 13 July 2017

C. Elyse Parker, Kyle R. Piller

Southeastern Louisiana University, Hammond, LA, USA

Using statistical model choice to infer the biogeographic history of the live-bearing splitfins (Cyprinodontiformes: Goodeinae) in the Mesa Central of Mexico

The subfamily Goodeinae (Cyprinodontiformes: Goodeidae) comprises approximately 40 viviparous species distributed across the Mesa Central, a high-elevation plateau located in central Mexico. The hydrologic configuration of the region has been continuously altered by widespread tectonic and volcanic activity since at least the early Miocene, resulting in repeated compartmentalization and connection of major drainage basins and potentially driving complex patterns of allopatric speciation in isolated basins and dispersal and range evolution into connected basins. The primary objective of this study was to infer the biogeographic history of the subfamily Goodeinae in the geographically complex Mesa Central using a novel molecular dataset analyzed within Maximum Likelihood and Bayesian frameworks. We were also interested in comparing the statistical fit of our data to several different models commonly used for inferring

species range evolution (e.g. DIVA, DEC, BayArea). Phylogenetic relationships within the subfamily were recovered by analyzing a nuclear DNA dataset of 6 exons and 2 introns using maximum likelihood and Bayesian approaches. A time-calibrated phylogeny of the group was generated from this nuclear dataset using the oldest goodeid fossil, *Tapatia occidentalis*, as well as several external fossils to calibrate the ages of several nodes. Finally, we used the program BioGeoBEARS to statistically test which range evolution model best fit our data and to infer the biogeographic history of the group under the best-fit model. Our results not only present novel phylogenetic and biogeographic hypotheses for the subfamily Goodeinae, but also highlight the importance of statistical model choice in inferring biogeographic scenarios.

0523 ASIH STORER ICHTHYOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

C. Elyse Parker¹, Wilfredo Matamoros², Caleb D. McMahan³, Diego Elías⁴, Kyle R. Piller¹

¹*Southeastern Louisiana University, Hammond, LA, USA*, ²*Instituto de Ciencias Biológicas, Universidad de Ciencias y Artes de Chiapas, Tuxtla Gutiérrez, Chiapas, Mexico*, ³*The Field Museum of Natural History, Chicago, IL, USA*, ⁴*Museum of Natural Science, Louisiana State University, Baton Rouge, LA, USA*

Phylogeography and population genetic structure of *Profundulus hildebrandi* (Profundulidae), a microendemic from southern Mexico

The family Profundulidae (Cyprinodontiformes) includes eight species distributed from southern Mexico into Guatemala, Honduras, and El Salvador. Most species inhabit high-elevation headwater streams and possess relatively restricted distributional ranges. The species *Profundulus hildebrandi*, which exhibits a highly restricted distribution in the Valley of San Cristobal (VSC) in Chiapas, Mexico, has long been thought to exemplify a case of microendemism within the family. Recently, however, the species has been discovered to occupy additional stream habitats at lower elevations outside of the valley, reaching localities up to 150 kilometers east and west of the VSC. These surrounding sites appear to be physically disconnected from the endorheic VSC, indicating potential genetic divergence of populations isolated within the valley from populations in adjacent systems. The objectives of this study were to examine the phylogeographic history of *Profundulus hildebrandi* across its range of distribution and to examine directionality and magnitude of gene flow among populations within and outside of the VSC. Our study investigated genetic structure among multiple *P. hildebrandi* populations spanning 18 localities. Results from population genetic analyses shed light on the complex patterns of gene flow among populations of *P. hildebrandi* and demonstrate the utility of molecular datasets in revealing fine scale population structure.

0821 Reptile Behavior, Sabine, Friday 14 July 2017

Rocky Parker, Sydney Ashton, Shannon Richard

James Madison University, Harrisonburg, VA, USA

Inhibition of Snake Courtship Behavior via Heterospecific Odor

Snakes use skin lipids as scent markers of species, sex, and reproductive condition. In no other species is this more clearly understood than the red-sided garter snake, *Thamnophis sirtalis parietalis*. The garter snake pheromone is a mixture of several long-chain hydrocarbons (saturated and monounsaturated methyl ketones), the proportions of which affect female attractiveness to males. Another colubrid, the brown treesnake (*Boiga irregularis*), produces a similar mixture of methyl ketones which have potential roles as pheromones in this invasive species. In the spring of 2016, we tested female *Boiga* methyl ketones with wild male garter snakes during the spring breeding season in Manitoba, Canada. The *Boiga* ketones induced avoidance behavior (pausing, arrest of chemosensory sampling) in courting male garter snakes. In a Y-maze, male garter snakes paused often and took longer to follow female garter snake pheromone trails if the trails were interrupted with *Boiga* ketones. We did not observe this when neutral *Boiga* lipids were used instead nor when we interrupted Y-maze trails with garter snake ketone extracts. We conclude that brown treesnake ketodienes (diunsaturated ketones), the only additional compounds present in *Boiga* ketones but missing from garter snakes, evolved to mask the reproductive signal encoded by ketomonoenes that function as pheromones in multiple Thamnophiine snakes. To our knowledge, this is the first evidence of interspecific chemical masking of pheromones in a reptile.

0355 Herp Morphology & Development, Brazos, Saturday 15 July 2017

Scott Parker, Valerie Dimkovikj

Coastal Carolina University, Conway, South Carolina, USA

Comparative Responses to Hypobaric Versus Regional Hypoxia in Reptilian Embryos

Oxygen limitation during embryonic development can occur due to reduction in atmospheric oxygen partial pressure within the nest (hypobaric hypoxia), or a reduction in blood O₂ uptake in fetal membranes (regional hypoxia). Embryos from oviparous amniotes such as reptiles, provide a convenient model system for studying fundamental developmental consequences of hypoxia on embryonic development. The purpose of this study is to quantify the effects of hypobaric hypoxia versus regional hypoxia on growth and differentiation of lizard embryos. Hypobaric hypoxia was induced by incubating eggs of Gekkonid lizards at 9% or 21% O₂. Regional hypoxia was induced in gecko embryos by painting 3/4 of the eggshell surface with paraffin wax to reduce the available surface area for gas exchange. Eggs from each treatment combination were incubated at 28 °C for 10 days. Effects of hypobaric and regional hypoxia on development of experimental and control embryos was evaluated by measuring embryo O₂ consumption, embryo heart rate, developmental stage, and dry mass. Preliminary

results indicate that embryos from both hypobaric and regional hypoxia treatments responded with reduced growth, differentiation, and oxygen consumption, whereas embryo heart mass increased relative to embryo body mass in the hypobaric and regional hypoxia treatments. Increased relative heart mass presumably increases cardiac stroke volume to improve blood perfusion of the chorioallantois. Results indicate that embryos possess considerable plasticity in capacity to respond and survive in both hypobaric and regional hypoxia. This is the first comparative study on responses of amniote embryos to incubation under hypobaric versus regional hypoxia conditions.

0703 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Jason Parks, Peter Berendzen

University of Northern Iowa, Cedar Falls, Iowa, USA

A comparison of the population genetic structure of the rainbow darter, *Etheostoma caeruleum*, in glaciated and unglaciated environments

The rainbow darter, *Etheostoma caeruleum*, is a member of the Central Highlands ichthyofauna, distributed in the unglaciated regions of the Ozark, Quachita and Appalachian highlands and the glaciated regions of the upper Mississippi River and Great Lakes drainages. Populations within the upper Mississippi River drainage are hypothesized to have expanded out of a refugium in the Ozark Plateau. Within this region, rainbow darters have a disjunct distribution, shaped by historical glacial activity of the region. A recent landscape genetics study of the rainbow darter in the upper Mississippi River drainage revealed a single genetic population with a uniform distribution of genetic diversity across localities. This study concluded that this signature is indicative of recent expansion into the region following glacial retreat and not reflective of contemporary population structure. The objective of this study is to compare the population genetic structure of the rainbow darter from the unglaciated environment in the Ozark Plateau, to the observations in upper Mississippi River drainage. Microsatellite markers were used to estimate overall genetic diversity, population substructure and gene flow for comparison. Preliminary results will be presented.

0486 SSAR SEIBERT CONSERVATION, San Antonio, Friday 14 July 2017

Meghan Parsley

Western Kentucky University, Bowling Green, KY, USA

Adaptive Variation in Tiger Salamander Populations

Threatened amphibians face an unknown future in a time of rapidly changing environment due to global climate change. Since amphibians are often perceived to be indicators of ecosystem health in various habitats, understanding the causes of their

declines can also improve our perception of threats to other species in those ecosystems. Molecular techniques have allowed us to further explore these threats by estimating genetic variation and predicting evolutionary adaptive potential of amphibian species. Determining populations with the greatest adaptive potential to changing environmental variables may be a viable conservation strategy and aid in management efforts. We utilized targeted exon capture methods to identify adaptive variation in response to changing environmental variables in California tiger salamanders (CTS; *Ambystoma californiense*), a species threatened by land use change and hybridization with barred tiger salamanders (*A. mavortium*). We sampled tiger salamanders from ponds along a N/S transect extending from the highly admixed hybrid sward at the southern end of the range to the largely non-admixed northern portion of the CTS range. These six populations were samples at one historical time interval and one contemporary time interval. Our sequencing strategy resulted in 150 million sequence reads for 96 individuals among the six study sites. Using contemporary and historical climate data for the study area, we identified genomic regions that appear to be associated with deterministic environmental change. These data provide a glimpse into the potential for wild populations of CTS to respond to the predicted climatic changes for California.

0644 Herp Environment, Brazos, Saturday 15 July 2017

Katie Parson¹, Kimberly Andrews², Terry Norton³, Joseph Colbert³

¹Georgia Sea Turtle Center AmeriCorps, Jekyll Island Authority, Jekyll Island, GA, USA, ²Odum School of Ecology, University of Georgia, Athens, GA, USA, ³Georgia Sea Turtle Center, Jekyll Island Authority, Jekyll Island, GA, USA

The Influence of Temperature Fluctuations and Habitats on the Surface Activity and Reproduction of Eastern Diamondback Rattlesnakes in Coastal Climates

Eastern diamondback rattlesnakes (*Crotalus adamanteus*) have evolved to be opportunistic, driven by short-term, small-scale temperature cues and habitat changes. With changing climates, rapid and erratic temperature fluctuations have become commonplace. These abiotic dynamics are additive to those experienced by changing habitat conditions on barrier islands due to shifting shorelines and microhabitat succession. We investigated the role of temperature in driving surface activity and energy expenditure and the associated physiological consequences. Specifically, we noted foraging success through observed boluses and posture indicators, monthly changes in body mass, and reproductive success through monitoring of gravid females. We observed temperature to be a strong driver overall in surfacing activity and foraging success and maintenance of body mass. Average overwintering weight fluctuation from 12 snakes over two seasons was approximately 9.5% body weight loss. In addition, birthing weight was calculated from four females with an average weight loss of 25.1%. Further, we found that habitat and thermal microclimates also influence surfacing behavior, and therefore foraging success, body mass, and reproduction. Specifically, we observed the highest rates of activity in open dune and marsh habitats. Conversely,

maritime forest snakes surfaced less frequently and lost less body mass (1.4%) in the winter, but also fed and reproduced at reduced rates during the active season. Despite an evolutionary predisposition to handle dynamic conditions, climate change may be occurring at rates and scales that are not conducive to healthy trade-offs between activity patterns and physiological capacity.

0731 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Kristene Parsons, Jan McDowell, Heidi Brightman, Eric Hilton, Robert Latour

Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, VA, USA

Two new species of Butterfly Ray (Myliobatiformes: Gymnuridae) from the U.S. Atlantic and Gulf of Mexico coasts

The Smooth Butterfly Ray, *Gymnura micrura* Bloch & Schneider 1801, is considered a warm temperate and tropical batoid species that occurs in coastal Atlantic waters from the U.S. to Brazil. Recent life history studies on the species from U.S. waters revealed geographic differences in traits (e.g., maximum size, fecundity, morphological characters) that generated uncertainty in the taxonomic status of *G. micrura*. Previous taxonomic descriptions do not account for sexual dimorphism or ontogenetic variations in body shape, and a holotype is not available for comparison of U.S. specimens to type material. Resolving the taxonomy of the species is crucial for the assessment of populations and their vulnerability to fisheries, and to advance our understanding of the biodiversity of coastal U.S. ecosystems where they occur. Using fresh and preserved material from the type locality (Suriname) and the U.S. Atlantic and Gulf of Mexico coasts, the present study analyzed morphological and molecular data to assess the validity of *G. micrura*. Multivariate analyses of morphometric data, discrete morphological characters (e.g. color patterns), and genetic analyses using mitochondrial (ND2) and nuclear (Rag-1) gene sequences revealed unique taxa in the U.S. Atlantic and Gulf of Mexico. Descriptions and diagnoses for the two new species will be presented.

0826 ASIH STOYE CONSERVATION III, San Antonio, Friday 14 July 2017

Melanie Partin

Southeastern Louisiana University, Hammond, LA, USA

Physiological Stress in *Hyla chrysoscelis*- Could Traffic Noise be a Contributing Factor?

Noise pollution is an increasing concern throughout the world due to potential impacts it could have on the environment and wildlife, particularly in species using acoustic communication. Changes in calling characteristics in anurans and other animals in response to noise have been well established in the literature. It has been speculated

that these changes could lead to increased metabolic costs of calling. Traffic noise has been shown to cause physiological stress in different organisms. Raised concentrations of corticosterone has been found in White's tree frogs and female wood frogs in response to traffic noise. I seek to test the hypothesis that *Hyla chrysoscelis* males will exhibit a physiological stress response through increased corticosterone to high levels of traffic noise. When corticosterone concentration increases, it leads to changes in leucocyte profiles, namely increasing Neutrophil/Lymphocyte cell ratios, which also can be used as a method of assessing stress. Fieldwork was conducted at six sites, three of which were temporary pools in the presence of high traffic noise, while the others were in pristine sites (lacking traffic noise). 100µl blood samples were taken through cardiac puncture with heparinized hypodermic needles, and corticosterone concentrations are being measured via ELISA assays. A significant increase in Neutrophil/Lymphocyte ratios was found in Noisy vs. pristine sites. Primarily, the increase in the ratios centered on one Noisy site in particular, with no significant difference between the other sites. This implies that excessive traffic noise could be deleterious for anurans, which could influence conservation concerns of many species.

0547 NIA BEST STUDENT PAPER, Brazos, Friday 14 July 2017

Murilo Pastana¹, Aléssio Datovo¹, Flávio Bockmann²

¹*Museu de Zoologia da Universidade de São Paulo, São Paulo, São Paulo/SP, Brazil,*

²*Laboratório de Ictiologia de Ribeirão Preto, Ribeirão Preto, São Paulo/SP, Brazil*

Morphology of the cephalic laterosensory system of Characiformes (Teleostei; Ostariophysi) with comments on its phylogenetic implications

The cephalic lateral line canal and associated branches are relatively conserved among several lineages of fishes. Although well documented and successfully employed in phylogenetic analyses of some ostariophysans (e.g. Siluriformes and Cypriniformes), detailed descriptions of the lateral line system are very scarce in the Characiformes, hampering the interpretation of homologies and its use in phylogenetic analyses within the order. A complete description of the cephalic laterosensory system of Characiformes was performed, with the sampling all families and subfamilies of the order, and at least one representative of the other ostariophysan orders. The morphology of the cephalic laterosensory canals is relatively conserved across characiforms, allowing the identification of homologies for all canal segments and branches. At least one putative synapomorphy for the Characiformes, and 10 synapomorphies for diverse subgroups of the order are proposed (i.e. Erythrinioidea, Prochilodontidae, Acestrorhynchidae, Chilodontidae, Crenuchidae). This represents a considerable number of new characters bearing on the higher-level phylogeny of the Characiformes and demonstrates that the morphology of the cephalic laterosensory system is a rich source of phylogenetic information. It is expected that these results pave the way for further studies on the cephalic laterosensory system focused both on smaller subgroups of Characiformes and higher levels of the ostariophysan phylogeny.

0540 NIA BEST STUDENT POSTER; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Murilo Pastana¹, Alessio Datovo¹, David Johnson²

¹*Museu de Zoologia da Universidade de São Paulo, São Paulo, São Paulo/ SP, Brazil,*

²*National Museum of Natural History, Washington, District of Columbia, USA*

Phylogeny of the Stromateiformes (Teleostei: Percomorphacea) based on morphological data

The division Percomorphacea encompass the major diversity of living fishes, with nearly 17,000 species that correspond to a fourth of all extant vertebrates. Although the monophyly of the Percomorphacea is well supported by both anatomical and molecular data, the internal resolution of this clade remains contentious in several aspects. Among the 30 orders currently assigned to Percomorphacea, Stromateiformes is a small group with 77 species distributed in 16 genera and six families. Morphological studies corroborate the monophyly of this order based on the sharing of unique anatomical features, such as the presence of a toothed muscular pharyngeal sac and a subdermal canal system scattered over the head. Such analyses, however, employed a few outgroup taxa. Molecular analyses with larger taxon samplings, in turn, never recover the monophyly of the Stromateiformes, intercalating its representatives among other percomorph families that, in combination, form a large clade termed Pelagiaria. The phylogenetic allocation of rare taxa, such as *Amarsipus* and *Tetragonurus*, and the interfamilial relationships of the Stromateiformes are also surrounded by controversies. A preliminary phylogenetic analysis was performed based on 75 characters from external anatomy, osteology, and musculature and 46 taxa (10 stromateiforms and 36 outgroups, most of them belonging to the Pelagiaria). This analysis yields a monophyletic Stromateiformes, even with inclusion of a large number of members of the Pelagiaria, corroborating previous morphological hypotheses. Within the Stromateiformes, the analysis corroborates both morphological and molecular hypotheses resulting in a non-monophyletic Centrolophidae, and a monophyletic Stromateidae.

0409 SSAR SEIBERT ECOLOGY III, Glass Oaks, Friday 14 July 2017

Bailey Patillo, Matthew Parris

University of Memphis, Memphis, TN, USA

Impacts of Larval Exposure to Predators and Post-metamorphic Exposure to Chytrid Fungus on Growth in Spotted Salamanders

Due to their complex life-history, amphibians experience varied challenges throughout multiple life-stages. Often, conditions experienced during the larval stage impact responses to those experienced during the post-metamorphic stage. Aquatic predators

are a common stressor to larval amphibians, with exposure to predator cues often having lasting effects. In salamanders, larvae are not susceptible to the fungal pathogen *Batrachochytrium dendrobatidis* (*Bd*), however, post-metamorphic individuals can carry sublethal infections that may be detrimental. To examine the influence of larval exposure to predators on the post-metamorphic response of spotted salamanders (*Ambystoma maculatum*) to *Bd*, we calculated the average daily change in mass and SVL of post-metamorphic salamanders reared in the presence or absence of nonlethal dragonfly larvae predation cues and subsequently exposed to *Bd*. Significant independent effects of predation cues and *Bd* exposure were seen on post-metamorphic daily change in mass and SVL. Follow-up univariate analyses showed a non-significant trend for salamanders exposed to both stressors to exhibit reduced mass gain. Pairwise comparisons revealed that these salamanders significantly differed in mass gain from all other groups. Further, this was the only group that lost mass, losing an average of 1.872 ± 0.411 mg per day. As juvenile growth influences survival, time to reproductive maturity, and fecundity, exposure to aquatic predators during early life and *Bd* during the post-metamorphic stage may have lasting impacts on salamander populations even in the absence of direct mortality. Further, these results highlight the importance of considering combinations of stressors that occur throughout multiple life stages.

0895 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Michael Pauers^{1,2,3}

¹Milwaukee Public Museum, Milwaukee, WI, USA, ²UW-Waukesha, Waukesha, WI, USA, ³UW-Milwaukee School of Freshwater Science, Milwaukee, WI, USA

What Exactly is *Labeotropheus curvirostris* (Ahl 1927)?

When the genus *Labeotropheus* was first described by Ahl in 1927, he included two species, *L. fuelleborni* and *L. curvirostris*. Ahl distinguished these species based on what he felt was a more broadly curved snout in *L. curvirostris*. A later examination of the type specimens by Trewavas (1935) resulted in their synonymy; Trewavas felt the curvature of the snout of *L. curvirostris* was not sufficiently different from that of *L. fuelleborni*. Here I examine the enigmatic *L. curvirostris*, comparing its morphology to that of its two sympatric congeners, *L. fuelleborni* and *L. trewavasae*, demonstrating its unique and unusual morphology, and identifying questions regarding its taxonomy.

0896 Fish Biogeography & Morphology, Trinity, Saturday 15 July 2017

Michael Pauers^{1,2,3}, Cassandra Turinske⁰

¹Milwaukee Public Museum, Milwaukee, WI, USA, ²UW-Waukesha, Waukesha, WI, USA, ³UW-Milwaukee School of Freshwater Sciences, Milwaukee, WI, USA

Patterns of morphological divergence in the Orangespotted sunfish, *Lepomis humilis*, in Wisconsin and throughout the United States

Despite the popularity of the centrarchid sunfishes for food and sport, many species have been poorly studied, especially with regards to geographical divergence. The Orangespotted sunfish, *Lepomis humilis*, is one such species. We have examined differences in the morphology of this species throughout Wisconsin, as well as throughout the United States. In Wisconsin, we have identified one unique population, on the basis of lateral line scale number, and we explore possible sources of this variation. Among populations throughout the US, we have discovered a slight difference between northern and southern populations, but, surprisingly, no other unusually-scaled populations like the one found in Wisconsin.

0095 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Eva Paulus, Michael P Robinson

Barry University, Miami, FL, USA

Advertising Weapons: a Comparative Analysis of the Colors of the Caudal Spines of Surgeonfishes (Acanthuridae)

All species of surgeonfish (Acanthuridae) have one to multiple spines on their caudal peduncles presumably used as weapons during aggressive intraspecific interactions. These spines vary among species in their degree of conspicuousness. In some species, these spines are apparently advertised with colorful accents whereas in other species the spines almost appear absent because of masking colors. Surgeonfishes also have a diverse array of social systems, ranging from territorial individuals to schools of hundreds. We are attempting to determine the role of the spine and the underlying social explanations for why some fish would advertise while other fish hide their spines. We conducted surveys to assess the conspicuousness of the spines of surgeonfishes. Humans rated the conspicuousness of the caudal spines on a scale from 1 (least conspicuous) to ten (most). Fish ranged from 1 to 10 with an average value of 5.324 ± 0.042 . When analyzed in light of phylogenetic relationships, we determined that group-living species were more likely to have conspicuous spine coloration than solitary ones. This appears to contradict the idea that the coloration of these spines is to advertise them for intraspecific communication.

0810 Reptile Behavior, Sabine, Friday 14 July 2017

Gregory Pauly

Natural History Museum of Los Angeles County, Los Angeles, California, USA

Citizen Science is Transforming the Study of Squamate Mating Behavior: An Example from Alligator Lizards (*Elgaria*)

Studies of organismal behavior often have to focus on species that are common and conspicuous so that researchers can obtain adequate sample sizes for meaningful

inferences. As a result, for many species, we lack all but the most cursory understanding of fundamental behaviors. For some species, this problem can be resolved by crowdsourcing data collection through citizen science projects. Here, I demonstrate the utility of citizen science for studying mating behavior of two widespread, relatively common species of alligator lizards, *Elgaria multicarinata* and *Elgaria coerulea*. Standard sources of natural history information, including published accounts and museum databases, document the timing of breeding for only a handful of observations per species. Observations available through citizen science databases, however, provide over 20 times as many records, generating sample sizes adequate for studying variation over multiple breeding seasons and across latitudinal and elevational gradients. Critically, most of these records were generated in fewer than four years of promoting a citizen science project, in this case the Reptiles and Amphibians of Southern California (RASCals) Citizen Science Project. Using citizen science to study mating behavior has previously been used successfully in studies of birds and frogs; the advent of photo-vouchered citizen science platforms, such as iNaturalist, increases the opportunity for similar studies in many other species.

0737 HL/SSAR/ASIH Symposium - The Science, Management, and Policy of Amphibian Conservation: Extending the Legacy of Ray Semlitsch, Glass Oaks, Saturday 15 July 2017

Joseph Pechmann¹, David Scott², Brian Metts², Erin Cork³, Stacey Lance²

¹Western Carolina University, Cullowhee, NC, USA, ²Savannah River Ecology Laboratory, Aiken, SC, USA, ³University of Georgia, Athens, GA, USA

Shifts in the Salamander Community Over 36 Years at an Isolated Wetland: Has Climate Change Altered Wetland Habitat and Hydroperiod?

Geographically isolated wetlands (GIW) constitute critically important habitat for many plant and animal species, including threatened, endangered and at-risk species. Numerous pond-breeding amphibians rely on GIW for larval development and juvenile recruitment. Recruitment success for these species is determined largely by wetland hydroperiod, both directly (via the amount of time water is available for larval development) and indirectly (via effects on predatory and competitive interactions). Most pond-breeding amphibians have adaptations to subsets of conditions along the hydroperiod continuum; i.e., there are 'short-', 'intermediate-', and 'long-hydroperiod' species. Climate change has the potential to exacerbate the increasingly serious problem of amphibian decline by inducing shifts in average pond filling and drying dates, and thus the hydroperiod, of GIW. Hydroperiod reduction, along with altered fire regimes, may contribute to increased tree canopy coverage within GIW. Tree canopy closure may further shorten hydroperiods and also slow the growth and development of amphibian larvae. We examined the dynamics of a salamander community over 36 years in relation to changes in environmental variables and average wetland hydroperiod. During that period community dominance shifted from several long-hydroperiod species (e.g., *Ambystoma talpoideum*, *A. tigrinum*, *Notophthalmus viridescens*) to one short-hydroperiod

species (*A. opacum*). Species changes appear to be primarily related to shortened hydroperiods, later wetland filling, altered drought frequency and severity, canopy closure, and their combined effects on juvenile recruitment. Changes in hydroperiod dynamics of GIW across the landscape are likely to influence local population persistence, as well as metapopulation dynamics by altering exchange rates of amphibians among wetlands.

0247 LFC Contributed II, San Marcos, Friday 14 July 2017

Myron Peck¹, Catriona Clemmesen², Marc Hufnagel¹, Björn Illing⁴, Paul Kotterba³, Marta Moyano¹, Matthias Paulsen², Patrick Polte³

¹University of Hamburg, Hamburg, Germany, ²Helmholtz Center for Ocean Research, IfM GEOMAR, Kiel, Germany, ³Thünen-Institute of Baltic Sea Fisheries, Rostock, Germany, ⁴James Cook University, Townsville, Australia

Bottom-up and Top-down Processes Impacting Early Life Stages of Herring (*Clupea harengus*) in the Southwest Baltic: A Synthesis of Recent Laboratory, Field and Modelling Studies

A series of laboratory, field, and modelling studies has been conducted since 2010 to assess bottom-up and/or top-down processes influencing the growth and survival of early life stages of herring (*Clupea harengus*) in the southwest Baltic Sea. In a key spawning area, an extensive field sampling campaign and predator-exclusion experiments suggested intense predation mortality of newly spawned eggs. In some years and during specific periods, resident, nearshore fish were estimated to consume up to ~40% of the herring spawn while, in contrast, larvae appear to suffer very low rates of predation mortality. In terms of bottom-up processes, the presence of algae and protists during the yolk sac period increased the window of first feeding and led to increased size-at-age throughout the larval period in laboratory. In exogenously feeding larvae, field measurements of the abundance and quality (fatty acid composition) of the dominant zooplankton and larval growth rate suggested temperature- and density-dependent prey thresholds below (above) which larval growth and nutritional condition was relatively low (high). Laboratory measurements of thermal physiology suggest that temperatures experienced by late-stage (15- to 20-mm) larvae in the late spring may exceed upper tolerance limits, agreeing with the timing of migration to deeper, colder offshore waters. A physiological-based foraging and growth model correctly depicts the prey concentrations and temperatures limiting growth and survival. This suite of laboratory, field and modeling studies has helped us disentangle the plethora of factors and mechanisms impacting early life stage survival and year-class success of SW Baltic herring.

0143 LFC Phenotypic Variation I, San Marcos, Thursday 13 July 2017

Pierre Pepin

Fisheries and Oceans Canada, St. John's, NL, Canada

Feeding Patterns in Larval Fish: How Taxonomy, Behaviour and Morphology affect Differences among Individuals and Species

Because individual growth histories have important implications to the likelihood of survival, knowing the drivers of variations in feeding among larvae can help us understand how the early life stages of fish may respond to variations in prey availability. In this study, I use data on individual stomach contents to describe length-dependent differences in feeding success of 11 species of larval fish found in coastal waters of Newfoundland. In addition to differences in average ingestion rates, the dispersion in number of prey per stomach indicates that each species perceives the patchiness of their prey environment in slightly different ways. Subtle differences in gape-at-length appear to have a statistically significant influence on the number of prey in the stomachs of larvae. In contrast, the length-dependent rate of change in niche breadth appears to have much weaker influence on the variation in the number of prey among individual stomachs. However, the upper quartile of larvae, in terms of prey per stomach, ingest a much greater diversity of taxa than individuals in the lower three quartiles of the population. If higher individual larval growth is linked to stochastic incidences of high ingestion rates of diverse prey arrays, identifying environmental conditions suitable for strong survival, based on the principle that growth and mortality rate are linked, may have to consider how larval fish respond to changes in zooplankton community structure and abundance.

0349 ASIH STORER ICHTHYOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Larissa Pereira¹, Friedrich Keppeler², Angelo Agostinho¹, Kirk Winemiller²

¹*Universidade Estadual de Maringá, Maringá, Paraná, Brazil*, ²*Texas A&M University, College Station, Texas, USA*

Is There a Relationship between Fish Cannibalism and Latitude or Species Richness?

Cannibalism has been commonly observed in fish from northern and alpine regions and less frequently reported for subtropical and tropical fish in more diverse communities. Assuming all else being equal, cannibalism should be more common in communities with lower species richness because the probability of encountering conspecific versus heterospecific prey would be higher. A global dataset was compiled to determine if cannibalism occurrence is associated with species richness and latitude. Cannibalism occurrence, local species richness and latitude were recorded for 4,100 populations of 2,314 teleost fish species. Relationships between cannibalism, species richness and latitude were evaluated using generalized linear mixed models. Species richness was an important predictor of cannibalism, with occurrences more frequently reported for

assemblages containing fewer species. Cannibalism was positively related with latitude for both marine and freshwater ecosystems in the Northern Hemisphere, but not in the Southern Hemisphere. The regression slope for the relationship was steeper for freshwater than marine fishes. In general, cannibalism is more frequent in communities with lower species richness, and the relationship between cannibalism and latitude is stronger in the Northern Hemisphere. In the Southern Hemisphere, weaker latitudinal gradients of fish species richness may account for the weak relationship between cannibalism and latitude. Cannibalism may be more common in freshwater than marine systems because freshwater habitats tend to be smaller and more closed to dispersal. Cannibalism should have greatest potential to influence fish population dynamics in freshwater systems at high northern latitudes.

0581 Amphibian Biology, Ecology, & Conservation, Sabine, Sunday 16 July 2017

Leah Perez, D. Brent Burt, Matthew A. Kwiatkowski

Stephen F. Austin State University, Nacogdoches, Texas, USA

The Evolution of Potential Color Signals in Hylid Frogs

The study of anuran color has generally focused on a limited number of groups that exhibit aposematism. However, a growing number of studies show that some anuran colors can act as mating signals. Given this evidence on color and mate selection, and recent evidence that frogs can see color at night, the use of color as a signal may be more widespread in anurans than previously thought. Many frogs possess colors on lateral, inguinal, and femoral areas of the body that contrast with colors of the dorsum and limbs. Anurans can hide the lateral inguinal, and femoral colors by pulling the hindlimbs close to the body. We investigated evolutionary patterns of color patches in a relatively diverse anuran family, Hylidae. Species were scored for the presence of yellow, orange, red, or blue patches based on information available through AmphibiaWeb. Using published phylogenies, evolutionary gains and losses of yellow patches were reconstructed using parsimony and likelihood methods to examine rates of change. The ancestral state of the Family Hylidae was presence of lateral, inguinal, or femoral color patch, which are widespread among species. These patches were lost numerous times within the family, including genera such as *Acris*, *Aplastodiscus*, *Cyclorana*, two separate clades within *Hypsiboas*, *Lysapus*, *Osteocephalus*, and a large clade of *Pseudacris*. Our results suggest color patches that could act as social signals are widespread in Hylidae and supports growing evidence that visual signaling may be more common in anurans than previously realized.

0419 LFC Physiological Performance IV, San Marcos, Sunday 16 July 2017

Prescilla Perrichon

University of North Texas, Denton, Texas, USA

Behavioral Tools for Assessing Neurophysiological Performances in Fish Early Life Stages

Small fish are excellent models for genetics and developmental biology (e.g. zebrafish, medaka, killifish), and offer various advantages over traditional rodent models, especially for neurobehavioral research. Although neurotoxicity of chemicals and pharmaceuticals have been well established, behavioral phenotypes associated to these neurological disorders are still poorly understood. Since considerable attention has been expressed from world regulatory agencies in development and validation of high throughput screening for human health risk assessment, larval fish provide useful alternative for studying the developing vertebrate nervous system. This presentation indicates how small model fish encode, process and traduce information in terms of neurobehavioral responses from their environment. Larval sensory and motor behavior functions (e.g. locomotor, optomotor, touch-elicited reflexes) will be explored through emerging analytical challenges using computerized digital video live tracking. During the last decade, these behavioral bioassays have considerably gained popularity and may provide in the near future the best noninvasive and efficient tools for understanding neurodevelopmental and neurobehavioral processes from drugs exposure or toxic environment.

0424 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Prescilla Perrichon¹, Edward Mager¹, Christina Pasparakis², John Stieglitz², Daniel Benetti², Martin Grosell², Warren Burggren¹

¹*University of North Texas, Denton, Texas, USA*, ²*University of Miami, RSMAS, Miami, Florida, USA*

Temperature Influence upon Cardiotoxicity of Deepwater Horizon in Larval Mahi-mahi (*Coryphaena hippurus*)

In 2010 the Deepwater Horizon incident, the largest marine oil spill in US history, exposed spawning pelagic fish species, including mahi-mahi (*Coryphaena hippurus*), to toxic compounds such as polycyclic aromatic hydrocarbons (PAHs). Developing fish are especially vulnerable to the toxicity of crude oil-derived PAHs and exhibit a suite of developmental and morphological defects. Despite a rich literature on the topic, physiological significance of toxicity on larval heart performance is still lacking, particularly when interacting environmental factors are changing. Against this backdrop, this study investigated cardiac performance in larval stages of mahi-mahi exposed to Deepwater Horizon oil and under two rearing temperatures, 26° and 30°C. Mahi-mahi embryos were exposed to oil-enhanced sea water for 24 hours. Incidence of edema, heart rate, stroke volume and cardiac output were monitored in 56 hpf larvae. At a rearing temperature of 26°C, oil-exposed larvae displayed strong bradycardias, a drastic reduction of stroke volume and cardiac output and a high proportion of pericardial edemas. A correlation existed between the severity of edema and the

reduction of heart performance. Increased rearing temperature at 30°C led to a reduction of PAH concentration at the end of exposure and appeared to play a protective role reducing severity of edemas. However, heart performance was not reduced. These cardiovascular impairments, regardless of water temperature, might lead to a high energy cost by the organism and increasing oxygen demands to restore homeostasis and perform key physiological function (e.g. swimming, feeding) required for survival.

0115 AES Morphology, Pecos, Sunday 16 July 2017

Flavia Petean¹, Marcelo de Carvalho⁰

¹Universidade Federal do Rio Grande do Norte, Natal, RN, Brazil, ²Universidade de Sao Paulo, Sao Paulo, SP, Brazil

Taxonomic Review and Comparative Morphology of the Species of the Genus *Isistius* Gill, 1864 (Chondrichthyes: Squaliformes: Dalatiidae)

The genus *Isistius* Gill (1864) belongs to the family Dalatiidae and has currently three valid species recognized in the literature: *Isistius brasiliensis* Quoy & Gaimard (1824), *I. plutodus* Garrick & Springer (1964), and *I. labialis* Meng, Zhu & Li (1985). The most common species, *I. brasiliensis*, has a wide geographic distribution and can be found in subtemperate and tropical seas circumglobally; a comparative analysis of specimens from different localities throughout its range, however, had never been done. The morphological variation of this species along its entire distribution has been thoroughly analyzed, elucidating that it represents a single widespread species and that *I. labialis* is a junior synonym of *I. brasiliensis*. The other species, *I. plutodus*, is known from only few specimens, also distributed worldwide. A detailed comparative analysis of available material of *I. plutodus* was undertaken verifying its validity. Therefore, the present study analyzed in detail the external morphology (coloration, dentition, dermal denticles), internal morphology (skeleton, musculature), and lateral line canals of the known species of *Isistius*, also covering morphometric and meristic aspects, to better define the genus and species.

0123 HL/SSAR/ASIH Symposium - The Science, Management, and Policy of Amphibian Conservation: Extending the Legacy of Ray Semlitsch, Glass Oaks, Saturday 15 July 2017

William Peterman¹, Rio Schondelmeyer⁰

¹The Ohio State University, Columbus, Ohio, USA, ²University of Missouri, Columbia, Missouri, USA

The Role of Genetic Diversity and Stress on Growth and Survival in Wood Frogs

Genetic diversity is generally accepted as being important to individual fitness and the evolutionary potential of populations. However, there is little understanding about how reductions in genetic diversity can affect fitness in amphibian populations. In this study, we experimentally examined the effects of genetic diversity on larval growth and survival of Wood Frogs, building upon previous research describing declining genetic diversity of Wood Frogs near the edge of their Midwestern range in Missouri. Tadpoles were collected from three conservation areas and raised under controlled conditions in outdoor mesocosms. To accelerate larval development and create a more stressful environment, the water level of half of the mesocosms was systematically lowered throughout the experiment. Parameters measured in the experiment included maximal burst swimming speed of tadpoles, tadpole growth rate, survival to metamorphosis, time to metamorphosis, as well as metamorph length, mass, femur length, and body condition. Each metamorph was also genotyped at eight microsatellite loci. Overall, there were significant growth and survival differences between conservation areas and treatments. The number of metamorphs, tadpole size, time to metamorphosis, and femur size at metamorphosis differed significantly among conservation areas and by treatments. A reduction in genetic diversity significantly increased the time to metamorphosis, decreased the number of metamorphs, and decreased the body condition of metamorphs. The drying treatment caused tadpoles to metamorphose sooner and with shorter legs, which increased their probability of dying following metamorphosis. Results of this experiment indicate that genetic diversity should be an important consideration when managing amphibians populations.

0863 AES Conservation & Management I, Pecos, Saturday 15 July 2017

Cheston Peterson¹, R. Dean Grubbs²

¹Florida State University, Tallahassee, FL, USA, ²FSU Coastal and Marine Laboratory, St. Teresa, FL, USA

A Selectivity Comparison of Gillnet and Longline Fishing Gear Composed of a Range of Mesh and Hook Sizes Using Data from Coastal Shark Survey

Data from surveys using different fishery gear types and sizes are often compared or combined, despite differences in size- and species-selectivity among gear types. We use data from a long-term, fishery-independent study to examine differences in size- and species-selectivity based on gear type, hook and mesh size, and bait. We found longline gear outfitted with a range of hook sizes to select for a broader size range of sharks, and therefore a greater number of species, than gillnets composed of a range of mesh sizes. However, one species - bonnethead sharks (*Sphyrna tiburo*) - was caught with high frequency in gillnets and was nearly absent in longline catches - presumably due to the bait used. Additionally, we found bait type to affect catch rates of large coastal shark species when using either Spanish mackerel (*Scomberomorus maculatus*) or pieces of small coastal sharks (Atlantic sharpnose sharks, *Rhizoprionodon terraenovae*, and bonnethead sharks). Our analyses suggest these characteristics of fishing gear affect selectivity, and

we suggest future studies of elasmobranch distribution, abundance, and life history strongly consider the selective properties of the fishing gear used.

0629 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Christopher Peterson

The University of Texas, Austin, TX, USA

Spatial variation in *Anolis conspersus* toepad lamellae

Anole toepad scales (lamellae) are a functionally significant morphological character. Evidence suggests that lamellae count is associated with different habitat use (perch height and diameter) among anoles of the Greater Antilles; however, these associations often do not hold within species. I examined variation in hind limb lamellae morphology in 286 adult *Anolis conspersus*, identified associations with ecological and morphological covariates, and investigated spatial trends across the species distribution. Intraspecific toepad variation could provide a greater understanding of anole habitat use and ecology.

0799 Amphibian Conservation II, Wedgewood, Sunday 16 July 2017

John Peterson¹, Nick Boehme¹, Tyler Sternbach¹, Gary Casper²

¹*University of Wisconsin-Platteville, Platteville, WI, USA*, ²*University of Wisconsin-Milwaukee Field Station, Saukville, WI, USA*

Should frog vocalization surveys be conducted later at night?

As amphibian populations decline around the world there is need for more effective population monitoring. Frog vocalization surveys often assess population occupancy and abundance a few times per year at one time of day. We suggest that automated recording systems may be an effective tool for monitoring frog occupancy and abundance. We monitored occupancy and abundance of Gray Treefrogs (*Hyla sp.*), Green Frogs (*Lithobates clamitans*), and state-endangered Blanchard's Cricket Frogs (*Acris blanchardi*) at five wetlands in southwest Wisconsin in 2014 and 2015. Occupancy (detection frequency) and abundance (call index) were determined hourly throughout the afternoon and evening across the month of June. Occupancy and abundance were also assessed at peak daily calling times throughout the summer. Occupancy and abundance displayed similar trends on both daily and seasonal time scales. Additionally, sites with greater daily occupancy and abundance tended to also have greater values throughout the season. For all species, sites with lower occupancy and abundance tended to peak later in the evening for a shorter number of hours. These results suggest that it may be advantageous to conduct frog vocalizations surveys later in the evening than previously thought.

0165 Fish Conservation II, San Antonio, Sunday 16 July 2017

Mark Peterson¹, Todd Slack², Erik Lang³

¹University of Southern Mississippi, Ocean Springs, MS, USA, ²USACE-ERDC, Vicksburg, MS, USA, ³LDWF, Baton Rouge, LA, USA

***Fundulus jenkinsi* (Evermann 1892) (Saltmarsh Topminnow) in Coastal Mississippi Watersheds, with Comments on Range-Wide Occurrences Based on Non-Vouchered and Museum Records**

Fundulus jenkinsi (Saltmarsh Topminnow) is listed as "at risk" by the USFWS and as a Tier 2 conservation priority in Mississippi, in part, because of marsh-habitat loss due to storms, urbanization, its specialized habitat requirements, and limited geographic distribution. To provide additional quantitative data for conservation planning, our objectives were to (1) determine the distribution and abundance of Saltmarsh Topminnow within coastal Mississippi, (2) characterize its habitat requirements, and (3) organize and present all Saltmarsh Topminnow data records (non-vouchered and museum records and those from this study) for use in the development of management/conservation plans. We collected 497 fish and associated habitat data from 27 February to 1 August 2009. PCA produced 3 meaningful components: 1) a landscape-position axis (32.40% of the total variance), 2) a seasonal/spatial axis of species occurrence (18.99%), and 3) a geomorphic bank-slope axis (18.78%). Ninety-six percent of all fish (representing 78.8% of collection effort) were captured in water with salinity <13 psu. We compiled 831 geo-referenced occurrences from 1891 to 2015. To better quantify and conserve the closely linked habitat requirements of this species within a reduced salinity range, additional sampling should be focused in under-sampled areas between Lake Borgne, LA, to west of Galveston Bay, TX.

0663 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Matthew Pierson, Chris Gienger

Austin Peay State University, Clarksville, TN, USA

Metabolic Response to Predation Risk in *Agkistrodon contortrix*

Direct interactions between predators and prey can have fatal consequences, typically resulting in the predator consuming the prey. Indirect interactions can also have consequences by modifying an organism's physiology or behavior. This study examines how snakes metabolically rate respond to the chemical scent cue of a known predator. We measured the effect of Coyote scent (urine) on resting metabolism of Copperheads, and this provides insight into the snakes' internal response to chemical cues in the environment. Overall, the responses to the coyote urine stimulus were very modest, and among the five individuals tested only one showed a significant response to chemical stimulus. Even after adjusting for mass-specific VO₂, there was very little change in

measurements. Other studies show that snakes respond to various chemical cues, none have demonstrated a response metabolically to predator chemical cues. With such a small sample size, our priority was to first develop a successful method of quantifying such a response among snakes.

0176 ASIH STORER ICHTHYOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Amanda Pinion, Kevin Conway

Texas A&M University, College Station, TX, USA

A new terminology for cranial tubercles demonstrated using multiple species and genera of North American Minnows (Teleostei: Cyprinidae)

Members of the Cyprinidae often display sexual dimorphism in the size and number of tubercles present on the surface of the head, body, and fins, and characters of tuberculation often are useful for distinguishing between sister taxa. Previous studies on the tubercles of cyprinids have used different terms to describe the location and arrangement of tubercles on the surface of the head rendering it difficult to make general comparisons between studies. We introduce a new terminology for cranial tubercles based on location in relation to the cephalic lateral line system and underlying cranial bones. We demonstrate the utility of this terminology for comparative studies using representatives of several North American cyprinid genera, including *Notropis*, *Macrhybopsis*, *Pimephales* and *Cyprinella*. Additionally, we demonstrate the utility of this terminology for taxonomic studies by documenting differences in cranial tuberculation between three members of the *Miniellus* subgroup of *Notropis* (*Notropis stramineus*, *N. procne* and *N. topeka*) and between populations of the widespread *N. stramineus*.

0917 Lightning Talks II, Glass Oaks, Friday 14 July 2017

Nicolas Pinte¹, Vincent Zintzen², Laurent Duchatelet¹, Ulrich Martin¹, Jérôme Mallefet¹

¹*Catholic University of Louvain, Louvain-la-neuve, Brabant Wallon, Belgium*, ²*New Zealand Department of Conservation, Wellington, New Zealand*

Swimming speed velocity of deep-water sharks infer by stereo video footage analyses

The ecology of deep-water sharks is still poorly documented. The improvement of technology these last years allowed to get more and more information about these animals. One classical method to get information on deep-sea organisms is the stereo video recording. Between 2009 and 2010, the faunal diversity of New-Zealand continental slopes was studied using stereo baited remote underwater video deployments from 50 to 1200 meter depth. Up to now, fauna diversity was the most

commonly data extracted from this video deployment. Here we will show another use of stereo video footages to extract the swimming speed of deep-water sharks. Indeed, the deep-water sharks swimming velocity is still unknown due to the difficulty to catch these sharks and keep them alive in captivity. The use of stereo video allows a 3D reconstruction of shark's movements in their environment allowing to follow their displacements and all parameters which characterize this one such as cruise and maximal swimming velocities. The data obtained by this method show that all deep-water sharks are not slow swimmers as commonly thought and that small luminous sharks seem to exhibit a faster cruise swimming speed than their non-luminous counterparts. This result could be supplementary evidence to the "isolume follower" hypothesis which says that luminous sharks should swim rapidly in the water column to correlate their ventral light emission with the surrounding ambient light of their environment in order to disappear from bottom predator's sight. Experimental design developments are in progress to extract more data from stereo video.

0643 AES Conservation & Management II, Pecos, Saturday 15 July 2017

Linda Planthof, Paddy Walker, Irene Kingma

Dutch Elasmobranch Society, Amsterdam, The Netherlands

Elasmobranch Management in the European Union: Progress and Challenges

Elasmobranchs in Europe are managed under the Common Fisheries Policy (CFP) of the European Union, as well as through international conventions, Regional Fisheries Management Organizations, and regulations at the Member State level. After the first introduction of quotas for elasmobranchs in 1998, shark management progressed with the adoption of the Community Plan of Action for the Conservation and Management of Sharks, a finning ban, and the designation of prohibited species. The CFP has been undergoing a major reform since 2013 with consequences for elasmobranch management. Especially the adoption of a landing obligation poses new challenges. The obligation will make the landing of all species that are subject to catch limits compulsory. As most elasmobranch species are taken as bycatch, a limited quota for these species will effectively 'choke' the target fishery. An improvement of species-specific data and cooperation with the fisheries sector is now needed to deal with the challenges associated with the new policy changes. Therefore, we propose steps forward and research priorities for successful management.

0285 Lightning Talks II, Glass Oaks, Friday 14 July 2017

Renata Platenberg

University of the Virgin Islands, St Thomas, U.S. Virgin Islands

Self-recovery in the Caribbean: The Snake That Made it Back on its Own

Caribbean snakes have been besieged by severe threats over the past several centuries. Non-native predators coupled with habitat loss have driven many endemic snakes to localized extinctions, particularly the diurnal ground dwellers. Efforts to reverse these trends can be culturally, financially, and ecologically challenging and do not always result in desired population restorations. The Puerto Rican Racer (*Borikenophis portoricensis*) is an exception. The racer is native across the Puerto Rican Bank, but has been extirpated from the human-inhabited islands of St. Thomas and St. John in the US Virgin Islands, primarily due to high numbers of mongoose (*Herpestes auropunctatus*). The snakes do, however, persist in abundance on nearby mongoose-free islands. At some point in the 1990s the mongoose populations on the eastern end of St. Thomas crashed, and there has been a slow recolonization of that part of the island by racers who have been arriving by sea, on their own, from nearby islands. Which islands are providing the source population is unknown. This offers an interesting study into metapopulation dynamics, species colonizations, and over-water movement. The results can provide valuable direction for island species conservation and insight into species invasions. Collaborators interested in these questions would be most welcome to participate in this study.

0704 ASIH STORER ICHTHYOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Jeffrey Plumlee¹, Jay Rooker¹, Brooke Shipley², David Wells¹

¹Texas A&M University at Galveston, Galveston, TX, USA, ²Texas Parks and Wildlife Department, Austin, TX, USA

Feeding ecology of reef fishes utilizing fatty acid and stable isotope biomarkers

In the northwestern Gulf of Mexico (NW GoM), artificial reefs harbor rich biodiversity and support a wide variety of trophic relationships. How these trophic relationships affect the functionality of artificial reefs as habitat for fishes is widely debated and requires additional studies with multiple techniques. The feeding ecology of three reef fishes; Red Snapper (*Lutjanus campechanus*), Pigfish (*Orthopristis chrysoptera*), and Tomtate (*Haemulon aurolineatum*) was examined in the NW GoM. A total of 75 fishes (29 Red Snapper, 28 Tomtate, and 18 Pigfish) were collected off of high relief (toppled platforms) artificial reef structure and 18 Red Snapper were collected off of low relief (concrete rubble and pyramids) artificial reef structure. All individuals had both epaxial muscle and liver tissue analyzed for stable isotope (carbon, nitrogen, and sulfur) ratios and fatty acid signatures to reveal long-term (months) and short-term (days to weeks) feeding strategies, respectively. Differences among species existed within the high relief structure and between high and low relief structures for Red Snapper using both biomarkers. In addition, dietary shifts were estimated comparing fast turnover tissue (liver) and slow turnover tissue (epaxial muscle). The equilibrium of the isotopic ratios and fatty acid signatures in long-term tissues versus short-term tissues can indicate dietary stability, while biomarkers that are not in equilibrium can indicate recent dietary

flux. This study provides important ecosystem-based feeding information of reef associated fishes on artificial reefs in the NW GoM.

0727 AES Ecology I, Glass Oaks, Sunday 16 July 2017

Jeffrey Plumlee¹, Kaylan Dance¹, Phillip Matich², John Mohan¹, Travis Richards¹, Thomas TinHan¹, David Wells¹

¹Texas A&M University at Galveston, Galveston, TX, USA, ²Sam Houston State University, Huntsville, TX, USA

Community structure of elasmobranchs in estuaries along the northwest Gulf of Mexico

Bays and estuaries in the northwest Gulf of Mexico (NW GoM) harbor high biodiversity and serve as essential fish habitat to many predatory species such as sharks and rays. For many coastal elasmobranchs, estuaries function as nursery habitat and feeding grounds. Elasmobranch community structure was analyzed among eight bays along the Texas coast utilizing bi-annual fisheries independent gillnet surveys conducted by Texas Parks and Wildlife Department over three decades (1984 - 2014). Ten species made up 99.4% of the elasmobranchs collected; 36.1% Bull Sharks (*Carcharhinus leucas*), 17.6% Bonnetheads (*Sphyrna tiburo*), 16.4% Cownose Rays (*Rhinoptera bonasus*), 13.0% Blacktip Sharks (*Carcharhinus limbatus*), 6.3% Atlantic Stingrays (*Dasyatis sabina*), 2.9% Atlantic Sharpnose Sharks (*Rhizoprionodon terraenovae*), 2.4 % Spinner Sharks (*Carcharhinus brevipinna*), 2.1% Scalloped Hammerheads (*Sphyrna lewini*), 1.7% Finetooth Sharks (*Carcharhinus isodon*), and 0.9% Lemon Sharks (*Negaprion brevirostris*). Temporal and spatial differences in community structure were investigated across all bays using analysis of similarity (ANOSIM) with corresponding similarity percentage analysis (SIMPER) in PRIMER. Environmental variables including temperature, salinity, depth, dissolved oxygen, and turbidity were analyzed with GAMs to elucidate trends in CPUE for individual elasmobranch species. Among the three decades examined, elasmobranch community structure significantly changed among individual estuaries and decades. Northern estuaries were dominated by Bull Sharks while southern estuaries were dominated by Cownose Rays. Salinity was the most important environmental variable in predicting individual elasmobranch species abundance. Understanding these long-term trends in community structure can provide both baseline data and insight to the role of specific estuaries for elasmobranch species in the NW GoM.

0068 Fish Reproduction & Development, San Antonio, Saturday 15 July 2017

Gianluca Polgar¹, Hans-Georg Rupp², Hieu Van Mai³, Atsushi Ishimatsu⁴

¹Universiti Brunei Darussalam, Bandar Seri Begawan, Brunei Darussalam, ²St. Angela-Schule, Königstein im Taunus, Germany, ³Can Tho University, Can Tho, Viet Nam, ⁴Nagasaki University, Nagasaki, Japan

Observations on the Reproductive Cycle of the Mudskipper, *Periophthalmus variabilis* (Teleostei, Gobioidae) in Semi-natural Conditions

Mudskippers are amphibious gobies (Gobiidae, Oxudercinae) that live in peritidal tropical and subtropical habitats of the Western Atlantic and Indo-Pacific regions. The behavioral reproductive cycle has been described in a few species, but several details are missing. A description of the breeding cycle of *Periophthalmus variabilis* is provided, using three complete reproductive events in an experimental tank equipped with simulated tides and a mud slope. Underground observations allowed us to describe that spawning and fertilisation behaviours occur in a water-filled egg chamber, which is subsequently filled with air by the male. As previously documented in a congeneric species, the male maintains the air-phase contained in the egg chamber during the development of the embryos, performing air-gulping and shuttling behaviors during low tide. Some videos also show an 'upside-down-tail-waving' behaviour inside the shaft of one of the two openings of the burrow, that the male performs during high tide, before or during the hatching event, which is here proposed as the mechanism of larval dispersal out of the burrow.

0087 Lightning Talks I, Glass Oaks, Friday 14 July 2017

Sinlan Poo¹, Ming-Feng Chuang², Yeong-Choy Kam²

¹Memphis Zoo, Memphis, TN, USA, ²Tunghai University, Taichung, Taiwan

Oviposition Site Selection between the Sexes: Examination of a Treefrog with Male Territoriality and Biparental Care

Oviposition sites selected by parents can protect offspring from competition, predation, and harsh environmental conditions. Though sites are selected by females in most amphibians, the distinction between male and female choice can be blurred in species with territorial males. Using a phytotelm-breeding frog with male territoriality and biparental care, we examined 342 oviposition sites to determine (1) male choice based on site characteristics (height, hole diameter, hole depth, and water depth), (2) female choice based on site characteristics and male characteristics (snout-vent length and body condition), and (3) hatching success based on site characteristics. We hypothesized that either one or both sexes would select oviposition site based on characteristics that would correlate with higher offspring survivorship. We found males preferred sites with larger hole depth and water depth, while females showed no preference for sites or males. However, hatching success was not correlated with site characteristics preferred by males. Our findings provide empirical evidence of male oviposition site selection in an amphibian with male territoriality. Contrary to our predictions, we did not find evidence of offspring benefits based on parental site preferences. We suspect this is due to a threshold of habitat suitability reached by male-selected sites or advantages some sites may offer for larval development.

0035 LFC Contributed III, San Marcos, Saturday 15 July 2017

Steven Porter¹, Lorenzo Ciannelli²

¹NOAA, Alaska Fisheries Science Center, Seattle, WA, USA, ²Oregon State University, Corvallis, OR, USA

Contrasting Flathead Sole (*Hippoglossoides elassodon*) spawning in the southeastern Bering Sea during warm and cold periods

Over the last decade and half a pattern of alternating multi-year warm (2001-2005, 2014 to present) and cold (2007-2013) periods has occurred during the spring, summer and fall in the southeastern Bering Sea. These periods are defined by ocean temperature and are related to the amount of sea ice present in early spring. Flathead Sole (*Hippoglossoides elassodon*) inhabit the southeastern Bering Sea and bottom water temperature has been shown to alter their spatial distribution, thus temperature can potentially influence where they will spawn. Our objective was to infer Flathead Sole spawning area in the southeastern Bering Sea from egg distribution and assess how warm and cold periods affected it. Egg abundance (number/10m²) was determined from ichthyoplankton surveys conducted in the spring during the last warm and cold periods. We used generalized additive models to analyze Flathead Sole spawning. During the warm period, eggs were abundant over a wide area of the southeastern Bering Sea shelf indicating that temperature most likely did not limit where spawning occurred. In response to low temperatures during the cold period, spawning area contracted and shifted west. Thermal conditions altering the location of spawning can affect subsequent advection of larvae toward nursery areas. Stronger Flathead Sole recruitment years have been associated with eastward on-shelf springtime winds that may advect larvae toward nursery areas. Those winds are present during warm years suggesting that warm conditions may be beneficial for Flathead Sole recruitment. Our results provide insight to understanding the adaptability of this species to climate variability.

0101 Herp Biogeography & Phylogeography I, Brazos, Sunday 16 July 2017

Daniel Portik¹, Adam Leache², Danielle Rivera¹, David Blackburn³, Matthew Fujita¹

¹University of Texas at Arlington, Arlington, Texas, USA, ²University of Washington, Seattle, Washington, USA, ³Florida Museum of Natural History, University of Florida, Gainesville, Florida, USA

Evaluating mechanisms of diversification in a Guineo-Congolian forest frog using demographic model selection

The accumulation of biodiversity in tropical forests can occur through multiple allopatric and parapatric models of diversification, including forest refugia, riverine barriers, and ecological gradients. Considerable debate surrounds the dominant diversification process, particularly in the West African Lower Guinea forests, which contain a complex geographic arrangement of topographic features and historical

refugia. We investigated alternative mechanisms of diversification in a forest frog, *Scotobleps gabonicus*, using genomic data to identify populations and to perform demographic model selection and spatially explicit analyses. On deeper timescales, we found overwhelming support for allopatric models involving population divergence in isolation with subsequent expansion and gene flow, consistent with the forest refugia hypothesis. These population divergences occurred simultaneously and conform to predictions based on several climatically stable regions we inferred through ecological niche modeling. Though forest refugia played a prominent role in the initial diversification of *S. gabonicus*, the high elevation reliefs of the Cameroonian Volcanic Line also influenced historical gene flow, and additionally we found support for riverine barriers either maintaining population divergences or driving more recent population splitting. We outline limitations of studies involving limited geographic sampling or exclusively organelle loci, especially regarding their ability to distinguish between alternative allopatric models, and demonstrate the importance of investigating genome-wide variation in a model-testing framework. Though some patterns in our study may be species-specific or related to life history traits of amphibians, additional comparative studies utilizing genomic data can begin to separate shared historical processes from idiosyncratic influences on the demographic histories of Lower Guinea taxa.

0059 SSAR VICTOR HUTCHISON STUDENT POSTER AWARD: ECOLOGY, NATURAL HISTORY, DISTRIBUTION, & BEHAVIOR; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Andrew Powers, Tim J. Karels

CSU Northridge, Northridge, CA, USA

Effect of Habitat Fragmentation on Snakes in the Southern California Chaparral

Urbanization creates fragments of natural habitat causing negative effects on wildlife diversity and dispersion. Studies of habitat fragmentation have focused on lizards, mammals, and birds, but rarely on snakes. Studies have shown in areas of high fragmentation and urbanization, lizard diversity becomes lower. However, this trend might not carry across all reptile groups. I will explore the relationship between snake diversity and habitat fragmentation in Thousand Oaks, California. My study will be the first to focus on newly fragmented chaparral patches. I will capture and identify snakes to species, and I will record mass, length, and sex in order to quantify snake diversity and population composition. I expect to find differences in snake species composition dependent upon patch size and age, with greater diversity in larger and younger patches. I also predict that diversity and average body size of larger snakes will be positively related to patch size.

0813 Amphibian Conservation III, Wedgewood, Sunday 16 July 2017

James Prather, Shawn McCracken, Michael Forstner

Texas State University, San Marcos, TX, USA

Increasing Habitat Connectivity of the Endangered Houston Toad (*Bufo houstonensis*) in the Lost Pines Ecological Area.

Infrastructure development continues to increase to keep pace with the growth and expansion of human populations. Core infrastructure, such as roads, results in wildlife mortality and continued fragmentation of available habitat. Artificial wildlife-corridors are a potential solution to mitigating wildlife-motorist collisions and maintaining habitat connectivity. Such structures are components toward conservation stewardship of both species and landscapes. The Lost Pines region is home to the endemic, and endangered, Houston Toad. These structures serve as mitigation efforts to allow the Houston Toad and other wildlife a safe passage among habitat patches despite barriers to dispersal. Highway 290 in Bastrop County bisects critical habitat of the endangered Houston Toad. Wildlife corridors have now been installed at locations based on previous data indicating areas of high wildlife traffic. Our study applies a suite of monitoring techniques to determine usage of artificial wildlife corridors along section the roadway. Monitoring techniques include camera trapping and wildlife mortality surveys (walking and driving). In order to determine usage of these corridors, camera traps were placed at the opening of each culvert. Wildlife mortality surveys along the roadway seek to determine areas of high density, and examine mortality densities post-installation of corridors. Preliminary analysis compared wildlife mortality observations found in the construction area during pre-construction and during construction. These results show no difference in mortality observations between treatments. However, there is a significant difference in observations between survey methods (walking vs driving). Currently, there are no camera trap detections of wildlife utilizing the crossing structures at each location.

0608 AES Life History, Pecos, Sunday 16 July 2017

Harold Pratt¹, Theo Pratt², Dani Morley³, Susan Lowerre-Barbieri⁴, Angela Collins⁵, Jeffrey Carrier⁶, Kristen Hart⁷

¹Mote Marine Laboratory, Tropical Research Laboratory, Summerland Key, FL, USA, ²Elasmobranch Field Research Association, Summerland Key, FL, USA, ³Florida Fish and Wildlife Conservation Commission, Marathon, FL, USA, ⁴Florida Fish and Wildlife Conservation Commission, St Petersburg, FL, USA, ⁵Florida Fish and Wildlife Conservation Commission, St Petersburg, FL, USA, ⁶Albion College, Albion, MI, USA, ⁷U.S. Geological Survey, Davie, FL, USA

Partial Migration of the Nurse shark, *Ginglymostoma cirratum*, from the Dry Tortugas Islands

Nurse sharks have not been previously known to migrate. Nurse sharks of the Dry Tortugas (DRTO) mating population return to the Dry Tortugas Courtship and Mating

Ground (DTCMG) annually to triennially during the June and early July mating seasons. In 22 years we have followed the movements of 76 recaptured adults of a total of 115 tagged adults. Telemetry detections of 40 females tagged with acoustic transmitters show that most tagged and presumably post-partum females are continuously present in the DRTO in the fall, winter and spring following the June mating season but these females depart in late March to early May. Detections reveal these females avoid the DTCMG during the next mating season, returning from late summer to fall. Telemetry records of nine of 17 adult males that co-habited with these females in the DTCMG depart DRTO waters every July. Both genders may overwinter in the DRTO, but the location of these sharks during the summer/fall absence has remained unexplained. Between 2011 and 2016 three males and five females with transmitters were detected to quickly migrate up the west coast of Florida to locations in the waters off Tampa Bay (~335km). Six others were detected in the lower Florida Keys (~292 km). Nine sharks returned to DRTO; one returned six times. Some overwintered and some resumed courtship in June, demonstrating both resident and migratory contingents within their population, or partial migration and an ability to navigate with high spatial and temporal precision.

0330 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Tyleia Prendergast, Lynnette Sievert

Emporia State University, Emporia, Kansas, USA

Effects of Digestion on Temperature Selection and Meal Size on SDA in Cornsnakes (*Pantherophis guttatus*)

Behavioral regulation of body temperature affects the rate of digestion and has implications for the number of times snakes can eat during their active season. Our purpose was to study the effect of postprandial temperature selection and meal size on the energetics of cornsnakes. We measured temperature selection of individual cornsnakes during a fast and through digestion of a meal size of 10% of the snake's body mass. We monitored oxygen consumption of cornsnakes during a fast, while digesting a meal that was 10% of each snake's body mass, and while digesting a meal that was 16% of body mass. Selected body temperatures peaked on day 2 post-feeding at $27.3 \pm 1.0^\circ \text{C}$ and returned to pre-feeding temperatures 6 days after ingesting meals. Meal size did not affect the magnitude of increase in oxygen consumption or the length of time to return to pre-feeding levels. Oxygen consumption for snakes digesting a meal that was 10% of body mass peaked at 24 h post-feeding ($177.9 \pm 19.3 \mu\text{L/g}\cdot\text{h}$), and for snakes digesting meals of 16% of body mass it peaked at 36 h post-feeding ($171.5 \pm 17.2 \mu\text{L/g}\cdot\text{h}$). Oxygen consumption rates returned to pre-feeding levels by 96 h for both meal sizes.

0124 AES GRUBER AWARD IV, Wedgewood, Friday 14 July 2017

Bianca Prohaska, R Dean Grubbs

Florida State University, Tallahassee, FL, USA

Stress Physiology of Deep Demersal Sharks in the Gulf of Mexico

Prior to the Deep Water Horizon oil spill, little research effort was focused on studying the physiology of deep demersal sharks inhabiting the Gulf of Mexico. While the physiology of these fishes remains virtually unknown, they are still routinely captured in commercial fisheries, both as targeted catch and as bycatch. With the absence of basic biological data, effective management plans cannot be formulated, making populations highly susceptible to declines. Also unknown is what effects the oil spill has had and will continue to have on these organisms, and if the effects have the potential to result in population declines. Blood chemistry analysis can be used as a method of assessing physiological stress in elasmobranchs, and using this method three main questions will be addressed: 1) What are the baseline blood chemical parameters in deep demersal elasmobranchs? 2) Are the stress responses in these species ecologically-mediated or taxonomically-mediated? 3) Are there significant differences in blood chemical profiles between elasmobranchs potentially affected by the oil spill and those captured in less affected areas? Preliminary results suggest that stress responses are relatively similar among the seven elasmobranch species that have been sampled thus far, including *Mustelus sinusmexicanus*, *M. canis*, *Squalus cubensis*, *S. c.f. mitsukurii*, *Centrophorus uyato*, *C. granulosus*, and *Hexanchus griseus*. However, lactate concentrations in *M. sinusmexicanus*, and *S. cubensis* are relatively higher than that of the other species sampled, potentially suggesting a depth mediated stress response.

0320 ASIH STOYE ECOLOGY & ETHOLOGY III, Sabine, Friday 14 July 2017

Nina Pruzinsky, Tracey Sutton

Nova Southeastern University, Dania Beach, FL, USA

Faunal Composition and Spatiotemporal Dynamics of Tuna (Family: Scombridae) Early Life Stages in the Oceanic Gulf of Mexico

Fishes within the family Scombridae (tunas, mackerels and bonitos) are of high economic and ecological value in the Gulf of Mexico (GoM), as they are heavily targeted by commercial and recreational fisheries. In coastal and open-ocean environments, adult tunas are high-level predators, while larval and juvenile tunas serve as prey for numerous species. Much is known about the distribution and abundance of adult tunas, but high taxonomic uncertainty and limited knowledge regarding the distributional patterns of larval and juvenile tunas have led to an "operational taxonomic unit" gap in our understanding of tuna ecology. This study examined the spatiotemporal dynamics of larval scombrids collected in the northern GoM from April to September, 2011, as part of the Offshore Nekton Sampling and Analysis Program. The distribution and relative abundance of the family Scombridae collected from the sea surface to 1500 m depth were characterized with respect to depth, time of year, and in relation to mesoscale oceanographic features. Generalized linear models were used to investigate the relationships between several environmental parameters and scombrid abundances in

the epipelagic waters of the oceanic GoM. The dominant species collected in this study were *Euthynnus alletteratus* and *Thunnus atlanticus*. *Euthynnus alletteratus* abundances were highly seasonal and marginally influenced by fronts and day/night cycle. Higher abundances of *T. atlanticus* were associated low chlorophyll *a* concentrations. Integrated aspects of scombrid ecology in continental shelf and oceanic environments will be used to enhance management and conservation efforts for this highly important taxon.

0555 NIA BEST STUDENT POSTER; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Yasmin Quintana Morales¹, Christian Barrientos²

¹Texas A&M University, College Station, Texas, USA, ²Universidad de San Carlos de Guatemala, Guatemala, Guatemala

Fish assemblages associated with macrophyte patches in lakes of Guatemala

Aquatic macrophytes provide habitat, shelter and food for fishes in lakes, rivers and wetlands. Several studies have shown that fish assemblages in macrophyte beds are influenced by patch size and environmental conditions. We studied the fish assemblages, density and biomass in macrophyte patches two largest lakes in northern Guatemala: Lake Petén Itzá (100 km²) and Lake Izabal (600 km²) located in the Gulf of México and Caribbean drainages, respectively. Fishes were sampled in macrophyte patches using 100-m² block nets and rotenone. Macrophyte area coverage, species composition and biomass were measured in each patch. Dominant macrophytes in Petén Itzá were *Vallisneria americana*, followed by *Potamogeton illinoensis* and *Chara* sp.; dominant macrophytes in Lake Izabal were *Hydrilla verticillata*, *Nimphae ampla*, and *P. illinoensis*. Fish species richness was similar in the lakes, but composition differed. Petén Itzá samples yielded 19 species, with 75% of biomass consisting of *Thorichthys affinis*, *Mayaheros urophthalmus* and *Poecilia mexicana*. Izabal samples had 22 species, with biomass dominated by 7 cichlids and *Atherinella meeki*. Lake Izabal had marine species, including *Hyporhamphus roberti*, *Strongylura notata* and *Mugil curema*. Additional factors that may affect Lake Izabal fish assemblages include predators, invasive plants and local fishing methods.

0661 Lizard Ecology, Trinity, Sunday 16 July 2017

Dan Rabosky

Museum of Zoology, University of Michigan, Ann Arbor, Michigan, USA

From Arid Australia to the Amazon: Comparative Ecology of the World's Most Diverse Squamate Communities

Arid Australia and the humid neotropics harbor the most diverse syntopic assemblages of squamate reptiles on Earth. However, the extent to which general principles of community organization might pertain to similarly species-rich communities from radically different physiographic landscapes remains poorly known. Here, I contrast patterns of community structure between these two systems to better understand the role of evolutionary history and contemporary ecological interactions in shaping patterns of species richness, abundance, and resource use. Using a phylogenetic comparative framework, I address the contributions of distinct evolutionary radiations to the squamate faunas of these regions and quantify the importance of phylogenetic niche conservatism for contemporary patterns of trophic ecology and habitat use among co-occurring species. I consider how broad-scale macroevolutionary trends in the tempo and mode of ecological trait evolution in major squamate clades influences the assembly and structure of local communities. I conclude that, while some features of these systems can be described by sweeping generalizations, a richer understanding of how and why these iconic communities have become so diverse requires a renewed attention to foundational natural history data.

0135 Amphibian Conservation II, Wedgewood, Sunday 16 July 2017

Muhammad Rais, Ayesha Akram, Muhammad Saeed, Sadia Munir, Saleha Abbasi, Tariq Mahmood, Maqsood Anwar

PMAS Arid Agriculture University Rawalpindi, Rawalpindi, Punjab, Pakistan

Anuran Assemblage and Identification of Sites for Population Monitoring in Sub-tropical Scrub and Pine Forest, Rawalpindi and Islamabad Capital Territory, Pakistan

We employed standard time-constrained survey method, visual encounter survey, to document anuran species diversity in sub-tropical scrub forest (STSF) and sub-tropical pine forest (STPF) of Rawalpindi District and Islamabad Capital Territory during spring and summer seasons of 2014 and 2015. We recorded a total of nine anuran species: Indus Valley Toad (*Duttaphrynus stomaticus*), South-east Asian Toad (*Duttaphrynus melanostictus*), Ant Frog (*Microhyla ornata*), Hazara Torrent Frog (*Allopaa hazarensis*), Skittering Frog (*Euphlyctis cyanophlyctis*), Cricket Frog (*Fejervarya limnocharis*), Murree Hills Frog (*Nanorana vicina*), Bull Frog (*Hoplobatrachus tigerinus*) and Indian Burrowing Frog (*Sphaerotheca breviceps*). The similarity index revealed 80% similar anuran fauna between the two habitats. We recorded more anuran species (eight species) from sub-tropical pine forest with two unique species (22% uniqueness index). The species included South-east Indian endemic species- Murree Hills Frog and Pakistan's endemic anuran- Hazara Torrent. We attribute high elevation with associated high precipitation and low temperature, and freshwater torrent springs to this relatively high endemism in sub-tropical pine forest. Of the 79 sites visited, we identified 30 sites (STSF 13 sites; STPF 17 sites) as significant for monitoring of populations of anurans. We found that egg mass count, calling index and tadpole count can be used for monitoring of populations of anuran species of the area except Hazara Torrent Frog and Murree Hills Frog for which

only tadpole count is recommended. We suggest regular monitoring of anuran populations, particularly endemics and inclusion of management of their habitat at landscape level in future development projects of the area.

0667 General Ichthyology II, Trinity, Sunday 16 July 2017

Kristian Ramkissoo, Tracey Sutton

Nova Southeastern University, Davie, FL, USA

Species composition, abundance and vertical distribution of the numerically dominant meso-to-bathypelagic fish genus *Cyclothone* (Stomiiformes; Gonostomatidae) in the northern Gulf of Mexico

The vertical ecology of the numerically dominant bristlemouths (Gonostomatidae: *Cyclothone*) is a key component of the distribution of overall biomass in the deep-pelagic ocean. The genus *Cyclothone* are cosmopolitan throughout the world's deep oceans. As a result of their global presence and abundance, *Cyclothone* play a major role in many oceanic ecosystem attributes, including the deep-scattering layer and the cycle and distribution of carbon in the deep-pelagic realm. Here we report on the species composition, abundance and vertical distribution of *Cyclothone* from the northern Gulf of Mexico (GoM), collected during an extensive epi- to bathypelagic (1500 m) sampling series. The *Cyclothone* specimens analyzed in this study represent roughly 33% of the total biomass collected during this series. *Cyclothone pallida* was the numerically dominant species collected, comprising 52% of the collected *Cyclothone* biomass, and also showed the widest vertical depth range. *Cyclothone acclinidens*, *Cyclothone alba*, *Cyclothone braueri*, *Cyclothone obscura*, and *Cyclothone pseudopallida* accounted for 7.28%, 5%, 4.35%, 12.62%, and 13.1% of the collected *Cyclothone* biomass, respectively. No evidence of diel vertical migration was seen in any of the six species investigated. These data provide baseline data for what may be the most abundant fish genus in the GoM, and perhaps the World Ocean.

0136 LFC Contributed I, San Marcos, Friday 14 July 2017

Jessica Randall¹, Morgan Busby², Adam Spear², Kathy Mier²

¹*Ocean Associates Inc., Seattle, WA, USA*, ²*Alaska Fisheries Science Center, Seattle, WA, USA*

Spatial and Temporal Variation of Summer Ichthyoplankton Assemblages in the Northeast Chukchi Sea 2010 - 2015

During the summers of 2010 - 2015, ichthyoplankton surveys were conducted by the Alaska Fisheries Science Center with funding from the Bureau of Ocean Energy Management in the Northeast Chukchi Sea. A Tucker sled equipped with two nets was used to sample both benthic and pelagic habitats. To examine temporal and spatial

assemblage structure with a focus on Arctic Cod (*Boreogadus saida*), an ecologically important species of Arctic food webs, catch data from each net were analyzed independently. Cluster analysis and correlation coefficients were used to identify groups of similar species composition by station and to relate observed groups to environmental data. Although benthic catch data did not reflect any clear patterns of group occurrence or distribution, analysis of pelagic data indicates a shift in predominant groups across the study period. In years of warm summer temperatures (sea surface 4 - 11°C) in the Chukchi Sea, 2010 and 2011, groups were primarily typified by Yellowfin Sole (*Limanda aspera*). The following years, 2012 and 2013, temperatures were much colder (sea surface -1 - 9°C) resulting in the prevalence of Arctic cod within groups. Other dominant taxa across groups from both habitats include Bering flounder (*Hippoglossoides robustus*) and Arctic Sand Lance (*Ammodytes hexapterus*). Both sea surface and bottom water temperature were significant ($p < 0.001$) factors explaining variation. These findings help inform ecosystem-based management strategies as the Arctic larval fish communities may continue to shift with the rapidly changing environment.

0832 SSAR SEIBERT CONSERVATION, San Antonio, Friday 14 July 2017

Rhett M. Rautsaw¹, Scott A. Martin³, Bridget A. Vincent¹, Katelyn Lanctot¹, M. Rebecca Bolt⁴, Richard A. Seigel², Christopher L. Parkinson¹

¹University of Central Florida, Orlando, FL, USA, ²Towson University, Towson, MD, USA, ³The Ohio State University, Columbus, OH, USA, ⁴Integrated Mission Support Services, Kennedy Space Center, FL, USA

Stopped dead in their tracks: The impact of railways on Testudine movement and behavior

Habitat fragmentation is one of the leading causes of biodiversity decline and most commonly results from urbanization and construction of transportation infrastructure. Roads are known to negatively impact species, but railways often cause similar effects. Certain taxa are more vulnerable to railways than others due to limitations in mobility. Here we used Gopher Tortoises (*Gopherus polyphemus*) as a model system to study the impacts of railways on turtle movement and behavior. First, we used radio-telemetry to determine the frequency of railway crossings and compared this to correlated random walk (CRW) simulations. Second, we measured behavior for one hour to determine tortoise crossing ability and tested for behavioral differences associated with the familiarity of the railways using principal component analysis. Lastly, we tested trenches dug underneath the rails as a management strategy to alleviate the impact of railways on tortoises. We found that railways impacted the movement of Gopher Tortoises. Gopher Tortoises crossed the railway less often than what would be expected by unhindered movement and, during behavioral trials, no tortoise was capable of crossing the rails due to the rails being too tall. Using game cameras, we demonstrated that trenches dug underneath the rails and between the ties was an effective management strategy. For minimal financial cost, it allowed tortoise movement across the railway, maintained full rail functionality, and created an escape route for

individuals that were trapped between the rails. We suggest trenches be dug to alleviate the impact of railways on turtle movement and mortality.

0129 Herp Systematics II, Sabine, Sunday 16 July 2017

Christopher Raxworthy¹, Sara Ruane², Richard Pearson³, Frank Burbrink¹

¹American Museum of Natural History, New York, USA, ²Rutgers-Newark University, New Jersey, USA, ³University College, London, UK

Evolutionary Radiation of the Pseudoxyrhopiine Snakes in Madagascar

Madagascar, as an ancient, isolated, and massive microcontinent, represents an ideal environment to determine the patterns and processes of evolutionary radiation. One of the most ecologically diverse and species rich endemic radiations in Madagascar are the pseudoxyrhopiine snakes, which represents about 99% of the Madagascan colubroid snake diversity. This group has a single dispersal origin into Madagascar, arriving during the Oligocene Period. Currently 82 species have been described from Madagascar, with additional cryptic diversity expected to be discovered. Here we present our preliminary findings on the phylogeny and diversification rates for this Madagascar species radiation, based on a large anchored phylogenomic data set of more 370 nuclear loci and 366 snakes, which includes most of the pseudoxyrhopiine species diversity sampled broadly across populations and species. Speciation has occurred in all major habitats and regions of the island (except for the very highest elevations), and some closely related genera show striking morphological and ecological variation. Surprisingly, throughout the Neogene, speciation rates appear to have remained largely constant for this radiation in Madagascar. Preliminary investigation of sister species provides some support for ecological speciation along environmental clines, indicating that the environmental landscape in Madagascar may play an important role in driving speciation on this microcontinent.

0163 Herp Morphology & Development, Brazos, Saturday 15 July 2017

Deran Reddy

University of the Witwatersrand, Johannesburg, South Africa

A Morphogenetic Study of the Lungs of the Nile Crocodile Using Electron Microscopy

This study's purpose was to document the morphology of the Nile crocodile lung at various ages, namely 3, 6, 12 and 24 months old. All animals were euthanized and the lungs intra-tracheally instilled using 2.5% glutaraldehyde in a sodium phosphate buffer. The lungs of the animals were divided into dorsal and ventral halves with cranial, middle and caudal samples being taken from each half using systematic random sampling. These samples were processed for and viewed under a SEM. In crocodiles of all ages, the lungs were more subdivided in the cranial regions decreasing in a cranio-

caudal direction with the ventral regions all being more subdivided than their dorsal counterparts. All lung regions of the 3 and 6-month age group were more subdivided than the older age groups, indicative of lungs better suited to gas exchange. Both interfaveolar pores and stereocilia were found to be in different ratios through all lungs. The interfaveolar pores (increase gas exchange efficiency) were predominant in the cranial regions and decreased cranio-caudally. The opposite trend was observed for the stereocilia (mechano-receptors) but these structures were observed mainly in the older individuals. The basic lung design is consistently heterogeneous through all ages but the varying degrees of subdivision indicates varying lung efficiency. This couples well to the crocodile's ontogeny and ethology. The presence of stereocilia make the hypothesis of air storage viable as individuals can sense pressure (governing diving depths to prevent lung collapse) and air movement (governing movement of air to areas suited for gas exchange).

0363 Fish Life History, San Antonio, Saturday 15 July 2017

Erin M. Reed¹, Bryan Black¹, Martha J. Román², Ishmael Mascareñas³, Catalina Lopez-Sagastegui⁴, Octavio Aburto-Oropeza⁵, Kirsten Rowell⁶, Brad Erisman¹

¹*University of Texas at Austin Marine Science Institute, Port Aransas, TX, USA,* ²*Comisión de Ecología y Desarrollo Sustentable del Estado de Sonora, Sonora C.P., Mexico,* ³*Centro para la Biodiversidad Marina y la Conservación, La Paz, Mexico,* ⁴*UC MEXUS, University of California Riverside, Riverside, CA, USA,* ⁵*Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA, USA,* ⁶*University of Colorado Boulder, Boulder, CO, USA*

Relationships between climate, growth and fisheries production in a heavily exploited marine fish from the Gulf of California

Climate variability can affect fish populations and fisheries production in numerous ways, including inducing measurable fluctuations in fish growth, condition, and fisheries production. Unfortunately, linkages between climate, fish populations, and fisheries is poorly understood for most exploited species, which hinders effective management. The purpose of this study was to use the Gulf Corvina (*Cynoscion othonopterus*), a heavily exploited marine fish in the Gulf of California, Mexico, as a model to investigate the relationship between the Multivariate ENSO Index (MEI) and three parameters: adult condition, growth rate, and fisheries production. Fish condition was assessed using annual variations in length to weight ratios in relation to MEI using an exponential model. Fish growth rate was measured using otolith chronologies for adult and juvenile growth. Lastly, annual catch data was compared to MEI for relationships between climate and fisheries production. Results indicate that adult condition and juvenile growth rate are enhanced during El Niño conditions. Additionally, climatic conditions during the birth year showed a positive relationship with fisheries production at the peak age of capture five years later. These results suggest that relationships between these factors can be used in a predictive manner to adjust harvest limits based on climate variability.

0200 ASIH STORER HERPETOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Kelsey Reider, Maureen Donnelly

Florida International University, Miami, FL, USA

Wide Thermal Range and Frost Tolerance in a High-Elevation Andean Frog

Climate change is driving changes in the elevational distribution of many species. Our primary field site is in the Cordillera Vilcanota, a heavily glaciated range in Cusco Department, southern Perú, within a region of the tropical Andes where significant changes in temperature, glacier cover, and species distributions have been recorded in recent decades. Glacial runoff forms new ponds and one anuran, *Pleurodema marmoratum* (Leptodactylidae), has expanded its range 200 vertical meters to new habitat created within the last 70 years, making it among the highest recorded amphibian populations on the planet. We determined the critical thermal maximum (CT_{max}) for *P. marmoratum* from 5200-5300 masl. *Pleurodema marmoratum* has one of the highest CT_{max} (>32° C) reported from the tropical Andes of Peru, with one of the widest thermal ranges of any amphibian. We also attempted to determine the CT_{min} of *P. marmoratum*, and found that this species is frost-tolerant. Our finding expands our knowledge of frost-tolerant amphibians to the widespread tropical family Leptodactylidae.

0168 ASIH STOYE ECOLOGY & ETHOLOGY I, Sabine, Thursday 13 July 2017

Kelsey Reider¹, Tracie Seimon², Alessandro Catenazzi³, Maureen Donnelly¹

¹*Florida International University, Miami, FL, USA*, ²*Wildlife Conservation Society, Bronx, NY, USA*, ³*Southern Illinois University, Carbondale, IL, USA*

Seasonality of *Bd* Prevalence and Infection Intensity in High Elevation Anuran Populations in the Cordillera Vilcanota, Perú

Climate change is driving changes in the elevational distribution of hosts and pathogens. Significant changes in temperature, glacier cover, and species distributions have been recorded in recent decades in the tropical Andes. At our primary field site in the Cordillera Vilcanota, a heavily glaciated range in southern Peru, glacial runoff forms new ponds and two frog species, *Pleurodema marmoratum* and *Telmatobius marmoratus*, have expanded their ranges to habitat created within the last 70 years. The newly colonized ponds reach 5400 masl, making these among the highest recorded amphibian populations on the planet. The amphibian chytrid fungus, *Bd*, and chytridiomycosis, have been found in both species in the recently deglaciated zone since 2003, and a mass-mortality event affected *T. marmoratus* in 2004. In 2013 we encountered adults and juveniles of *T. marmoratus* for the first time since that event. We found a seasonal pattern of *Bd* infection in both species: prevalence and infection intensity peaked in the dry season.

We also surveyed *Bd* infection in *P. marmoratum* in eight remote valleys. We found *Bd* in six of the new sites and four sites had *Bd* prevalence greater than 50%. Our study shows that *Bd* has spread in frog populations in rapidly changing habitat throughout the Cordillera Vilcanota, but anuran populations have persisted despite high *Bd* prevalence in *T. marmoratus* (27%, 95% CI 19-36%) and *P. marmoratum* (42%, 95% CI 37-49%). Additional research is necessary to understand how continued climate and environmental changes will impact amphibian health in these extreme populations.

0426 SSAR VICTOR HUTCHISON STUDENT POSTER AWARD: ECOLOGY, NATURAL HISTORY, DISTRIBUTION, & BEHAVIOR; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Carolyn Reiland-Smith, Jon Moore

Florida Atlantic University, Boca Raton, Florida, USA

Seed Dispersal of Native Drupe Bearing Plants by Gopher Tortoises (*Gopherus polyphemus*)

The gopher tortoise, *Gopherus polyphemus*, is a keystone species and an ecosystem engineer based on the characteristic burrows they excavate. While burrowing, the gopher tortoise affects its surroundings by turning soil and increasing the species richness of the community, but the tortoise grazing activity may also change the abundance of plant species in their surroundings if seeds survive gut passage. The cocoplum bush, *Chrysobalanus icaco*, is a popular large-seeded shrub in South Florida and a regular find in tortoise scat. The saw palmetto, *Serenoa repens*, another large-seeded native plant found throughout Florida, is also a known food source for the gopher tortoise. As large-seeded fruits, both study species are less likely to be consumed by other frugivores compared to small-seeded fruits. When the large fruits fall after ripening, the longer they remain on the ground the greater their risk of insect depredation. These fruits may be of particular interest to reptiles because of their fragrant and colorful flesh, and gut passage may benefit their germination time through scarification. This study will investigate the germination rates and percentages of the cocoplum bush and the saw palmetto after gut passage. With this data we may be able to uncover another aspect of the gopher tortoise's keystone effect and ecosystem engineering ability through the process of plant propagation. This research has the potential to provide novel data that will be useful in management decisions; particularly when native plant introductions are considered in relation to known gopher tortoise activity.

0431 Lightning Talks II, Glass Oaks, Friday 14 July 2017

Carolyn Reiland-Smith, David Lucien, Jon Moore

Florida Atlantic University, Boca Raton, Florida, USA

Gigantic *Gopherus* Gastroliths

Many species of vertebrates ingest gastroliths and a variety of motivations for the behavior include endoparasite removal, stomach cleaning, food grinding, and calcium supplementation. Gravid gopher tortoises, *Gopherus polyphemus*, have been found with significantly more ingested gastroliths than non-gravid adult females. There is also evidence supporting gastrolith ingestion by juvenile tortoises. This behavior may provide a supplemental source for calcium intake which would be vital during both eggshell formation and juvenile growth stages. The study site in Jupiter Florida has procured a great variety of gastroliths found through opportunistic sampling of scat during a subsequent study, and ongoing projects that have collected numerous radiographs showing gravid and non-gravid tortoises with gastroliths. One extraordinary sample was collected on site that included an 11.5cm Eastern cotton tail (*Silvilagus floridanus*) femur which had passed intact through a resident gopher tortoise. Many other unique gastroliths have been collected, including another bone fragment with a length of 8.5cm and many large shells and rocks that have been opportunistically ingested by the resident population's tortoises. This data set presentation is a call for additional research into the incredibly large items these tortoises can apparently pass without incident.

0296 NIA Contributed/Fish Ecology, Brazos, Friday 14 July 2017

Roberto Reis¹, Edson Pereira¹, Mario de Pinna², Alexandre Clistenes³

¹PUCRS - Laboratório de Sistemática de Vertebrados, Porto Alegre, RS, Brazil, ²USP - Museu de Zoologia, São Paulo, SP, Brazil, ³UFES - Laboratório de Ictiologia, Feira de Santana, BA, Brazil

An Enigmatic New Hypoptopomatinae Catfish from a Relictual Area in Northeastern Brazil

During fish surveys conducted in 2005 and 2007 in the Chapada Diamantina, southern Bahia state, northeastern Brazil, an enigmatic new loricariid catfish has been revealed. Initial external analyses suggested an uncertain position among the clade Neoplecostominae + Hypoptopomatinae, as some characters appeared to be intermediary between the two subfamilies. The inclusion of the new taxon in an ongoing phylogenetic analysis of the Neoplecostominae, using various Hypoptopomatinae and members of the other loricariid subfamilies as outgroups, placed it unequivocally as a representative of one of the earliest splits within the Hypoptopomatinae, as sister-group to most other taxa in that subfamily. Traditional taxonomic methods were used to clear and stain specimens, study the anatomy and external morphology, and to include it in a phylogenetic framework. The new taxon should thus be recognized as a new genus and species of the subfamily Hypoptopomatinae, diagnosed from remaining members of the subfamily by the lateral ethmoid presenting a large exposed area bearing odontodes in the posterior rim of the nostril, the possession of one pair of enlarged plates in front of the nostril, and small

fleshy lobes with slightly hypertrophied odontodes on the lateral margins of the head. The phylogenetic position and narrowly endemic distribution of the new taxon suggest that it is a relictual element, much like the trichomycterid subfamily Copionodontinae, also restricted to the Chapada Diamantina.

0739 ASIH STOYE ECOLOGY & ETHOLOGY II, Sabine, Thursday 13 July 2017

Travis Richards¹, Tracey Sutton², David Wells¹

¹Texas A&M University at Galveston, Galveston, TX, USA, ²Nova Southeastern University, Halmos College of Natural Sciences and Oceanography, Dania Beach, FL, USA

Spatial and temporal patterns of distribution and relative abundance of meso- and bathypelagic micronekton in the northern Gulf of Mexico

The deep pelagic ocean represents the largest biome on earth yet despite its enormous volume remains the most understudied marine ecosystem. Micronekton, a key component of deep pelagic communities, are extremely abundant, contribute to vertical carbon flux through vertical migration, and have been shown to be important dietary components of higher trophic level consumers. The Deepwater Horizon oil spill, which released hydrocarbons into the deep-pelagic environment of the Gulf of Mexico (GoM), revealed a paucity of information regarding the distribution and abundance of meso- and bathypelagic micronektonic fishes. Using catch data collected during four oceanographic cruises in 2015-2016, we describe the distribution and abundance of model meso- and bathypelagic micronekton fishes in the northern Gulf of Mexico. In total 42,684 fishes were collected from 82 tows of a 10-m² MOCNESS midwater trawl which sampled specific stratified depths from the surface to 1500 m. The four most abundant vertically migrating taxa were selected as model species and included *Sigmops elongatus*, *Ceratoscopelus warmingii*, *Argyropelecus aculeatus*, and *Lampanyctus alatus* which collectively represented 5% of all fishes collected. Model non-vertically migrating taxa included *Cyclothone pallida*, *Cyclothone obscura*, *Sternoptyx diaphana* and *Argyropelecus hemigymnus* which represented 36.5% of all fishes collected. By describing and contrasting the distribution and relative abundance of vertically migrating and non-migrating micronekton this project will provide information critical to understanding ecosystem functioning in the deep pelagic realm of the GoM and provide insight into the level of resiliency of its communities in the face of large-scale perturbations.

0037 ASIH STORER HERPETOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Julia Riley¹, James Baxter-Gilbert¹, Jacqueline Litzgus²

¹Macquarie University, Sydney, New South Wales, Australia, ²Laurentian University, Sudbury, Ontario, Canada

Tails and Tribulations: A Comparison of Three External Transmitter Attachment Methods for Snakes

Radio telemetry is a widely used and informative tool in studies of animal ecology, behavior, and conservation, and over the last 50 years, many different methods have been used to outfit animals with radio transmitters. Radio telemetry studies on snakes typically require anesthesia and surgery to internally implant transmitters; however, internal implantation methods can increase snake mortality and infection rates, and may alter natural behaviors, thereby reducing data validity. We qualitatively compared three methods of external transmitter attachment (i.e., glue, tape and glue, and a subdermal stitch), and compared their utility for collection of spatial data. Transmitters attached with the glue only, and tape and glue methods, fell off shortly after deployment because of environmental factors and snake shedding. Both of these methods also resulted in skin irritation and slightly impeded snake movements. Conversely, the subdermal stitch method was long lasting in both the field and lab, and did not cause significant skin irritation. Also, the subdermal stitch method did not affect movement or the rattlesnake's ability to rattle. Additional quantitative research is required to determine if the subdermal stitch method triggers immune responses, infections, or negatively impacts snake fitness. Our results suggest that the subdermal stitch method may be a viable external attachment method for snake radio telemetry studies.

0036 ASIH STOYE ECOLOGY & ETHOLOGY III, Sabine, Friday 14 July 2017

Julia Riley¹, Come Guidou¹, Caroline Fryns¹, Johann Mourier¹, Stephan Leu², Daniel Noble³, Richard Byrne⁴, Martin Whiting¹

¹Macquarie University, Sydney, New South Wales, Australia, ²Flinders University, Adelaide, South Australia, Australia, ³University of New South Wales, Kensington, New South Wales, Australia, ⁴University of St. Andrews, St. Andrews, Fife, UK

Late Bloomers: Early Experience Impacts Social Behavior of a Family-Living Lizard

An animal's social environment can be both dynamic and complex. Thus, social species are often highly plastic in their social behavior in order to garner fitness benefits. Yet, behavioral plasticity can be constrained by an individual's social experience. We examined the influence of early social environment on social behavior in the tree skink (*Egernia striolata*), a family-living lizard. In the first phase of this study, we reared juveniles in two different social environments for 1.5 years: either in isolation or in unrelated pairs. We quantified each lizard's sociability at four-month intervals using a standardized laboratory assay, and found that isolated lizards were more sociable than socially-reared lizards. In the second phase of this study (at the end of 1.5 years), we released all lizards into a semi-natural environment, observed their associations, and used social network analysis to quantify social behaviour (focusing on three network

metrics: binary degree, weighted degree, and coefficient of variation). During the initial six weeks post-release, rearing treatment had no effect on social behavior. However during the following six months we found that, at first, isolated lizards were more sociable (higher binary and weighted degree) than socially-reared lizards. Over time isolated lizards became less sociable, potentially converging with the lower sociability of socially-reared lizards that was stable over time. Overall, our findings suggest that social experience influences how *E. striolata* associate with conspecifics, but, surprisingly, isolation rearing did not constrain their ability to adapt flexibly to a novel social environment.

0914 HL/SSAR/ASIH Symposium - The Science, Management, and Policy of Amphibian Conservation: Extending the Legacy of Ray Semlitsch, Glass Oaks, Saturday 15 July 2017

Tracy Rittenhouse¹, Susan Walls², Katie Beilfuss³, Rochelle Renken⁴

¹University of Connecticut, Storrs, CT, USA, ²USGS-ARMI, Gainesville, FL, USA,

³Wisconsin Wetlands Association, Madison, WI, USA, ⁴Missouri Department of Conservation, Columbia, MO, USA

Questions that Matter: Conducting Research that Managers Will Use

Conservation is currently working to close the research-implementation gap. Under the traditional model, scientists share their knowledge by publishing papers. One benefit is that a publication can be used today or re-found in the future. Ray Semlitsch produced a notable legacy in the literature (>200 publications) and successfully wrote papers for managers (e.g., Semlitsch 2000 in JWM). Yet, scientists who conduct conservation research intend to first produce quality research that will subsequently inform conservation actions. Publication is not the end point but rather the paper must then generate on-the-ground conservation actions. The question I address here is how does a scientist conduct research that managers will use? I argue that a scientist can assist in closing the research-implementation gap with changes at both the beginning and the end of the scientific process. But first, I discount the notion that managers do not read the literature. My experiences have repeatedly confirmed that managers search the literature to find novel solutions and when they need to identify a scientist who could help create solutions. Ray's success came from asking the right questions. To ask the right question, an audience or user group should be identified before the project is designed. A known user group will also improve the end of the process, the published paper, as the paper will more naturally include the details needed for implementation. In this way, science that is used by managers is co-produced by the scientist and the user, and thus there is no gap to fill.

0276 Herp Reproduction & Life History I, Pecos, Thursday 13 July 2017

Jesus Rivas

New Mexico Highlands University, Las Vegas, New Mexico, USA

Exploring the Life of an Extinct Giant Snake Using a Current Pretty Big Snake: What Studying Anacondas Can Tell Us About Titanoboa

Studying the life of extinct species is fraught with challenges since paleontological evidence can only tell us so much about an extinct species. However, when the extinct species has a very close living relative that also uses the same ecological niche, we have an unprecedented opportunity to explore the life of extinct species. Extinct Boidae, *Titanoboa cerrejonensis*, is the largest snake that ever lived. It was an aquatic predator that lived in what is currently Colombia, 58-60 million years ago. So far as we can tell its life history and ecology was very similar to that of current day anacondas. In this contribution I used data from a long term study involving hundreds of Green anacondas (*Eunectes murinus*) to make inferences about aspects of Titanoboa's natural history that perhaps will not easily be available studying the fossil record. Drawing parallels with anaconda's biology I estimate that a non-breeding female Titanoboa weighed 925 kilos, and 1618 kg when pregnant. It started breeding at 480 cm SVL, weighing 91kg. Newborn babies of first time breeders are estimated 1.5 cm in SVL and 2.5 Lg. At 12 meters SVL its babies would have been 195 cm in SVL and 5.2 kilos. Its average meal was estimated to be 305 Kg, with a potential maximum of 1350 Kg. Although the contribution is largely speculative, it helps have a better idea of what the life of an extinct snake was like.

0235 ASIH STORER ICHTHYOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Pedro P. Rizzato¹, Flávio A. Bockmann¹, Eric J. Hilton²

¹Universidade de São Paulo/FFCLRP, Ribeirão Preto, SP, Brazil, ²Virginia Institute of Marine Sciences, Gloucester Point, VA, USA

'Say my name': a review of the nomenclature of the cranial bones in Polypteridae (Cladistii: Polypteriformes)

Polypteridae is a group of African freshwater fishes that includes the Bichirs (*Polypterus* spp.), and the Ropefish (*Calamoichthys calabaricus*). Ever since the discovery of the first representatives in 1801 polypterids have been of great interest to ichthyologists due to the presence of many characters that are unusual among living fishes, including several plesiomorphies, such as the presence of ganoin on the scales. Because it is hypothesized to be sister-group to all other extant actinopterygians, Polypteridae is considered to be a key group for understanding the evolution of bony fishes. However, there are striking differences in the anatomical nomenclature that is used for the group across authors, creating the need for a standardization based on robust homology statements. As a first step towards this goal, we reviewed the nomenclature of the cranial bones of polypterids from the primary anatomical accounts of the family from the early 19th century to the present day. Some bones have been consistently referred to by the same names (or variants), and sometimes the change of a specific name was simply due to the updating of an anatomical term (e.g. 'suprascapular' was replaced by 'extrascapular'). In

other cases, however, different names are applied to the same bone due to divergent views by the authors about the identity of the element in question (e.g. the 'preopercular', "squamoso-preopercular" and "preopercular-supramaxillary complex" have been applied to the same element). This study provides the foundation for elucidating the numerous homology issues regarding the skull anatomy of Polypteridae.

**0612 ASIH STOYE GENETICS, DEVELOPMENT, & MORPHOLOGY II,
Trinity, Friday 14 July 2017**

Pedro P. Rizzato¹, Anna Pospíšilová², Flávio A. Bockmann¹, Eric J. Hilton³

¹*Universidade de São Paulo/FFCLRP, Ribeirão Preto, SP, Brazil,* ²*Department of Zoology, Charles University, Prague, Czech Republic,* ³*Virginia Institute of Marine Sciences, Gloucester Point, VA, USA*

Ontogeny and homology of dermal bones associated with the laterosensory canal system in the skull of Polypteridae (Cladistii: Polypteriformes)

There is a long-standing dispute in the literature regarding the relationship between the laterosensory system and some dermal skull bones of fishes. Some authors advocate for a causal relationship between the formation of canals and the origin of the bones that support them, since they are often intimately connected in adults, which ultimately serves as the basis for homology statements about these elements. However, there are still few developmental data about the formation of these bones in many groups of fishes, especially those representing relatively plesiomorphic conditions of the cranial skeleton of actinopterygians. By studying a detailed and unique developmental series of the Senegal Bichir, *Polypterus senegalus*, we were able to analyze and describe the sequence of origin and formation of each of the bones associated with the laterosensory canal system. The tubular ossifications that form around the laterosensory canals comprise an additional, superficial layer of bone that interacts with the underlying ossifications in distinct ways during development. When an underlying ossification is present, the interaction produces compound bones (e.g., the dentary, angular, maxilla, and premaxilla), while when it is absent, the bone in the adult represents only the tubular ossification of the laterosensory canal (e.g., the lacrimal, postorbital, extrascapular, and the anterior-most nasals). These findings may shed light on the homology of several skull elements of basal actinopterygian lineages, especially fossils, pointing out to the need of a thorough reappraisal, including comparative ontogenetic data, of the homology of the bones of fishes associated with the laterosensory system.

**0471 ASIH STOYE GENERAL ICHTHYOLOGY II, Trinity, Thursday 13 July
2017**

Adela Roa-Varon¹, Eric J. Hilton¹, Chenhong Li²

¹Virginia Institute of Marine Science (VIMS), Gloucester Point, VA, USA, ²Shanghai Ocean University, Pudong Xinqu, Shanghai, China

Using Phylogenomics to Study the Interrelationships of Gadiformes

Gadiformes includes some of the most important commercially harvested fishes in the world (e.g., cods, hakes, and haddocks). Currently, different authors recognize anywhere between 11 and 14 families, about 84 genera, and more than 600 species within the group. The monophyly of the order has been supported by both morphological and molecular data, yet the relationships among families and subfamilies remain poorly understood and interpreting phylogenetic patterns has been historically difficult. To study the higher-level relationships (i.e., above the genus level) of Gadiformes, we targeted coding DNA sequences from single-copy protein-coding genes, followed by next generation sequencing on the Illumina platform. A total of 58 species were included representing virtually all recognized families and subfamilies. Maximum likelihood analyses in both species tree and concatenation frameworks recovered a highly congruent and well-supported phylogeny at both shallow and deep levels. Most major clades obtained in prior molecular studies were validated as monophyletic. Specifically, we recovered strong support for previously problematic groups such as lotines, the inclusion of only macrouroids within Macrouridae, and the position of the enigmatic family Lyconidae (not previously sampled in molecular phylogenetic studies) as sister group to Macruronidae, among other results. Our study confirms the utility of the exon-capture approach for analyzing phylogenetic relationships at a range of evolutionary depths.

0915 Fish Biogeography & Morphology, Trinity, Saturday 15 July 2017

D Ross Robertson¹, Luke Tornabene², Carole C Baldwin³

¹Smithsonian Tropical Research Institute, Balboa, Panama, ²University of Washington, Seattle WA, USA, ³Smithsonian Institution, Washington, DC, USA

What do different databases indicate about Caribbean fish depth-ranges?

Public databases containing the depth-maxima and -minima of large numbers of wider-Caribbean marine fishes include Biodiversity of the Gulf of Mexico (BioGoMx), FishBase (FB), the IUCN Redlist (RL) and Shorefishes of the Greater Caribbean (SFGC). A recent study that analyzed those BioGoMx data concluded that four taxonomically distinct assemblages of fishes are associated with different depth strata between 0-300m in the Gulf of Mexico, with a strong peak in species-turnover at 60m and smaller peaks at 100m and 200m. To assess those results we analyzed species-turnover vs depth among fishes shared between BioGoMx and each of FB, RL and SFGC. While the 100m and 200m peaks were evident in all databases, the 60m peak occurred only in BioGoMx. Reef-fishes in SFGC, both all species and the subset shared with BioGoMx, showed only a (small) 100m turnover peak. Depth-ranges for individual species varied considerably among databases, clearly indicating that all databases need to be rigorously reviewed before use.

0049 Amphibian Conservation IV, Wedgewood, Sunday 16 July 2017

Donelle Robinson

City of Austin Watershed Protection Department, Austin, TX, USA

Stream Habitat Recreation for the Barton Springs Salamander

The Barton Springs Salamander, *Eurycea sosorum*, is an aquatic perennibranchiate species that inhabit the Edwards Aquifer springs known as the Barton Springs complex. It was listed as federally endangered primarily due to its small range, threats to water quality and quantity, and harm associated with the maintenance of Barton Springs Pool. The largest number of salamanders is found at Eliza Spring, although this spring was highly modified in the early 1900s. A concrete amphitheater was built around the spring pool, and the spring outflow was buried into a pipe, which destroyed the salamander stream habitat. The failing pipe can backup and create a pond-like environment in the amphitheater that impacts the remaining habitat. This pipe will be removed and the stream recreated, a process known as daylighting. The project incorporated salamander habitat requirements, including ideal water velocity and depth, substrate type, and native stream vegetation. The recreated stream will increase the amount of habitat available for the Barton Springs Salamander at Eliza Spring, allowing for more salamanders and their prey to live here and improving the resiliency of the species. The project will also improve the salamander habitat in the amphitheater by eliminating the pond-like conditions that sometimes occur.

0859 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Camila Rodriguez, Steve Johnson

University of Florida, Gainesville, Florida, USA

Interspecific Interactions Between Two Species of Invasive Lizards in an Urban Environment

Anthropogenic environments often support a diversity of non-native wildlife species. Urbanized areas of South Florida, for example, support numerous species of nonindigenous herpetofauna. However, trophic interactions among many of these species have not been investigated despite their influence on ecosystem dynamics. Our study seeks to increase understanding of the predator-prey relationship between two introduced species of lizards in an urban setting. We performed a field experiment at eight shopping plazas in Broward County, Florida, to investigate how the abundance, body condition, and survivorship of the Brown Anole (*Anolis sagrei*) would respond to reduction of its predator, the Northern Curly-tailed Lizard (*Leiocephalus carinatus*). We used Visible Implant Elastomers to individually mark brown anoles and built a Cormack-Jolly-Seber model (CJS) to estimate parameters. Additionally, multiple environmental and biotic factors such as insect density were tested in our model. Our

results indicate that Brown Anole abundance and survival probability are significantly lowered by removal of the Northern Curly-tailed Lizard, whereas Brown Anole body condition was influenced only by time. Our results provide evidence for the role of the Northern Curly-tailed Lizard as a regulator of another introduced lizard in urban communities.

0879 ASIH STOYE CONSERVATION II, San Antonio, Friday 14 July 2017

Victoria Rodriguez, Chad W. Hargrave, Christopher P. Randle

Sam Houston State University, Huntsville, Texas, USA

Hybridization Between Two Livebearing Fish, the Endangered *Gambusia nobilis* and Introduced *Gambusia geiseri*, in Texas

Introduced species are a major cause of biodiversity loss because of predation, competition for limited resources and space, and hybridization with native taxa. Hybridization poses the greatest risk for native taxa when the non-native and native taxa are closely related. This can compromise the genetic structure of native populations and drive those taxa to extinction. Moreover, the extinction risk to native taxa by hybridization with non-native is greatest when native taxa are rare (e.g., endangered or threatened) because rare taxa often lack the genetic variation necessary mitigate ongoing hybridization events. Herein, we provide morphological and genetic evidence to suggest that the introduced Largespring *Gambusia* (*Gambusia geiseri*) and endangered Pecos *Gambusia* (*Gambusia nobilis*) are hybridizing within the San Solomon Spring complex, Reeves, Co. Texas. We inferred hybridization and gene flow from data collected on seven morphometric characters, nine meristic measurements, and five molecular markers (the mitochondrial gene *Cytb*; nuclear genes *Rag 1*, *Rag 2*, and *RPS7*; and one microsatellite) from the two species and the putative hybrid. Morphological data was analyzed using discriminant functions analysis. This analysis accurately identified three groups based on morphology (*G. nobilis*, *G. geisier* and putative hybrid) with ~99% confidence. Genetic data supported the morphology results. Several levels of genetic admixture within the population suggested extensive hybridization over several generations. Thus, the congruence between our morphological and molecular data suggest a need for an alternate conservation plan that may counteract the effects hybridization on the endangered Pecos *Gambusia*.

0864 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Aura S. Romero-Alemán¹, Sabas G. Sabas G. Mejía-Alvarez¹, Fredys F. Segura-Guevara¹, Angel L. Martínez-González¹, Glenys Tordecilla-Petro², Charles W. Olaya-Nieto¹

¹Fishery Biology Research Laboratory-FBRL, Department of Aquatic Sciences, University of Cordoba., Lorica, Córdoba, Colombia, ²Institución Educativa Lácides C. Bersal. Alcaldía de Lorica., Lorica, Córdoba, Colombia

Reproductive ecology of Bagre rayado *Pseudoplatystoma magdaleniatum* in the San Jorge River basin, Colombia

Reproductive ecology of Bagre rayado *Pseudoplatystoma magdaleniatum* in the San Jorge River basin, Colombia, was studied, and 178 individuals were collected between January and December 2013. Total length (TL) ranged between 32.1-113.7 (60.2 ±16.0) cm and total weight (TW) ranged between 158.0-11333.2 (1818.8 ±1970.0) grams. The gonads were placed in Gilson solution, the Vazzoler scale was applied and sexual proportion, sexual maturity index, spawning season, the length at first maturity, oocytes's diameter and fecundity were estimated. 110 females and 68 males were found, with sexual proportion female: male of 1.6:1, different from expected. The spawning season extends from March to October, the length at first maturity was estimated in 82.0, 61.6 and 72.4 cm TL for females, males and combined sexes, respectively, oocytes's average diameter was 83 mm and average fecundity estimated was 433040 oocytes. The results obtained in this study suggest that Bagre rayado is a rheophilous fish with synchronous gonadal development in two groups, spawning season extends from March to October, with annual spawning in the rainy season associated with water level of San Jorge River, oocytes of medium size and high fecundity, which is strongly associated to the weight of the ovaries.

0567 Herp Ecology II, Pecos, Friday 14 July 2017

Jonathan Rose, Brian Halstead, Glenn Wylie, Michael Casazza

U.S. Geological Survey, Western Ecological Research Center, Dixon Field Station, Dixon, CA, USA

Spatial and temporal variation in growth of the threatened giant gartersnake, *Thamnophis gigas*, in the Sacramento Valley, California

The growth rate of reptiles is highly plastic, and often varies among individuals, populations, and years in response to environmental conditions. For an imperiled species, the growth rate of individual animals is an important component of demographic models, and changes in individual growth rates may indicate population-level trends in survival and abundance. We analyzed a long-term dataset on the growth of a threatened reptile, the giant gartersnake (*Thamnophis gigas*) to characterize spatial and temporal variability in growth, and evaluate potential environmental predictors of growth. We collected data on the growth in snout-vent-length of *T. gigas* using capture-recapture data over 22 years (1995 - 2016) from eight sites distributed throughout the Sacramento Valley of California. We fit von Bertalanffy growth curves to these data, and found that male *T. gigas* grew faster and reached smaller asymptotic snout-vent-lengths than females. There was nearly equal variability in growth attributable to differences among years and among sites. From 2003 - 2016, we collected data on precipitation,

temperature, and the abundance of fish and anuran prey at each site, and included these variables as predictors in growth models of *T. gigas*. We found that snake growth was positively related to the amount of precipitation that fell during the prior water year and the abundance of anurans at a site. Our results highlight the plasticity of growth in this threatened snake, and provide valuable data for future demographic modeling efforts. Results suggest that long-term, multi-population studies are needed to characterize growth patterns in reptiles.

0234 Herp Ecology III, Sabine, Friday 14 July 2017

Adam Rosenblatt

Yale University, New Haven, CT, USA

What Happens to Black Caiman (*Melanosuchus niger*) When Their Prey Disappear?

Crocodylian populations across the globe are faced with myriad threats, some of which (poaching, habitat destruction, pollution) have been studied extensively. At the same time, the depletion of crocodylian prey populations due to competition with humans has received considerably less attention despite its potentially profound effects on crocodylian ecology and population dynamics. To address this knowledge gap I studied the ecology of a population of black caiman for three years in a region of Guyana experiencing a decline in fish abundance. During this time I quantified the relative proportions of different prey groups consumed by black caiman, as well as caiman movement patterns within a river system. I found that fish consumption varied across years and that cannibalism rates varied inversely with fish consumption. I also found that caiman in the river system can show very strong site fidelity year-round, and some hardly seem to move around the river at all. Together, these results suggest that black caiman in the study area may not migrate to new habitats as populations of their preferred prey decline, and that instead they may alter their feeding habits and target other prey more frequently, even their own species. Thus, declining primary prey abundance may threaten the long-term viability of some crocodylian populations.

0134 Amphibian Conservation IV, Wedgewood, Sunday 16 July 2017

Jason Ross, Christina Feng, Michael Dreslik

Illinois Natural History Survey, Champaign, IL, USA

Evaluating Reptile and Amphibian Passage Gates using Remote Camera Traps

The Asian Carp bypass barrier in northeastern Illinois was built to prevent the invasive from entering the Great Lakes during high floods but has since resulted in habitat fragmentation. A year after the terrestrial barrier installation, wildlife passage gates were installed to facilitate movement of native organisms, including the state

endangered Blanding's Turtle (*Emydoidea blandingii*). To determine the effectiveness of gates, we conducted 45 visual encounter surveys along the barrier and placed wildlife cameras on 14 of 20 gates. We found ten reptile species along the barrier and photographed nine using the gates. Common Gartersnakes (*Thamnophis sirtalis*), Northern Water Snakes (*Nerodia sipedon*), and Painted Turtles (*Chrysemys picta*) were commonly found along the barrier and were photographed using the gates frequently. Three Blanding's Turtles were found along the barrier, but none used the monitored gates. We found five amphibian species along the barrier and photographed three species using the gates. The cameras also documented abundant mammalian mesopredators, and our visual surveys found 34 depredated turtle nests. The barrier may act as a conduit for nest predators to search along. Adult reptiles typically used gates during daylight hours whereas potential mammalian predators used gates at night. Overall, the gates were somewhat effective at facilitating movement of most reptile species present other than the Blanding's Turtles.

0503 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

David Rostal¹, Wade Carruth¹, Luke Wyrwich², Robert Hill², Brad Lock³

¹Georgia Southern University, Georgia, USA, ²Zoo Atlanta, Georgia, USA,

³International Reptile Conservation Foundation, Inc., Arizona, USA

Reproductive patterns in five species of Asian turtles: *Manouria impressa*, *Heosemys depressa*, *Cuora mccordi*, *Cuora galbinifrons* and *Leucocephalon yuwonoi*

Asian turtle reproductive patterns vary greatly between species. Conservation efforts to breed some of these species have lacked key information. Here we present reproductive data on five different species of threatened Asiatic turtles and compare their reproductive traits: the Impressed tortoise (*Manouria impressa*), the Arakan forest turtle (*Heosemys depressa*), McCord's box turtle (*Cuora mccordi*), the Flowerback box turtle (*Cuora galbinifrons*) and the Sulawesi forest turtle (*Leucocephalon yuwonoi*). Reproductive cycles were monitored using a combination of ultrasonography and hormone analysis. All female individuals (*M. impressa*- 4, *H. depressa*- 1, *C. mccordi*- 4, *C. galbinifrons*- 4, *L. yuwonoi*- 5) were examined with ultrasound once per month for a minimum of 12 months. All five species were seasonal and reproduced at different times of the year. *Cuora mccordi* and *C. galbinifrons* hibernated during the winter and produced clutches of 1 to 2 eggs during the summer (June to August). Vitellogenesis and follicular development were primarily observed in fall prior to hibernation. *Cuora mccordi* produced multiple clutches. Both *M. impressa* and *H. depressa* produced single larger clutches of eggs but at different times of the year. *Manouria impressa* underwent vitellogenesis and follicular growth during the fall and winter (October to March) and produced eggs in April and May. They displayed nest building characteristics like *Manouria emys*. *Heosemys depressa* underwent vitellogenesis and follicular growth in the summer and produced eggs in October to November. *Leucocephalon yuwonoi* displayed

vitellogenesis and follicular growth during all times of year, with multiple size classes of follicle visible each month.

**0248 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017;
HL/SSAR/ASIH SYMPOSIUM - THE SCIENCE, MANAGEMENT, AND
POLICY OF AMPHIBIAN CONSERVATION: EXTENDING THE LEGACY
OF RAY SEMLITSCH**

Betsie B. Rothermel, Ethan J. Royal

Archbold Biological Station, Venus, FL, USA

Driven by Extremes: Pond Community Structure on an Ancient Sand Ridge in Florida

Long-term studies of the fire-maintained Florida scrub ecosystem have generated deep understanding of vegetation dynamics and ecology of numerous imperiled species endemic to inland sand ridges of peninsular Florida. However, the disturbance regimes and community structure of seasonally inundated wetlands embedded in scrub have not been described, making it difficult to predict and mitigate effects of climate change or other anthropogenic threats. During a recent El Niño event, hundreds of seasonal ponds in a 2,100-ha protected scrub preserve on the Lake Wales Ridge failed to dry down. To determine community-level responses to enhanced wetland connectivity and other extreme conditions (i.e., water pH 3.3–4.7), we sampled larval anurans, fish, and macroinvertebrates in 30 ponds from April–December 2016. We used multiple linear regression to examine factors influencing species richness and relative abundance (catch-per-unit-effort in dipnets and minnow traps), with data pooled or averaged across four sampling events. In total, we detected 10 species of amphibian, three native fishes, and two non-native fishes (African Jewelfish, Walking Catfish). Despite high water levels, non-native fish invaded fewer than nine ponds. Abundances of larval hylids and ranids were affected by water chemistry and pond depth/area but not by abundance of native fish or predatory macroinvertebrates. Vertebrate richness ranged from 1–10 species and was significantly related to water chemistry, pond depth/area, and an area-weighted index of wetland proximity. Ongoing, multi-year sampling will be needed to clarify effects of hydrological variation, fire, and other disturbances on occupancy dynamics and community structure in this unique system.

0476 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

John Rowe¹, Chelsea Martin¹, David Clark¹, Carlos Valle², Cristina Vintimilla²

¹*Alma College, Alma, Michigan, USA*, ²*Universidad San Francisco de Quito, Quito, Ecuador*

Habitat Use and Spatial and Thermal Ecology of Two Species of Lava Lizards (*Microlophus*) on Islas Santa Cruz and San Cristóbal, Galápagos

We used radiotelemetry to study habitat use, spatial, and thermal ecology of two *Microlophus* species on Galápagos. During the warmest time of the year (February-March), use of rock faces generally declined throughout the day while during August, the use of rock faces was generally highest during midday. As measured by minimum convex polygons, males of both species occupied larger areas than did females although there were no significant species or seasonal effects. When we parceled daily distances moved into three daily time segments, males moved farther than did females in *M. indefatigabilis*. In *M. bivittatus*, neither sex nor season affected distances moved although movement increased over the course of the day. Hourly T_s was cyclic with a sharp increase occurring between 0600-0700 h, a peak (*M. indefatigabilis*) or plateau (*M. bivittatus*) occurring during midday, with a gradual decline beginning during the late afternoon and continuing through the evening and early morning hours of the following day. Microhabitat temperature cycling indicated that lizards probably used open rock faces during the morning warming phase but used shaded microhabitats to avoid excessive midday temperatures, particularly during the warmest times of the day and during the warmest time of the year (February-March). Male *M. indefatigabilis* maintained significantly higher T_s than did females throughout the course of the day. Female *M. bivittatus* maintained higher T_s values than did males, apparently by selecting relatively warm sleep sites relative to males. However, in August, male *M. bivittatus* maintained relatively high T_s than did females especially during midday.

0669 HL/SSAR/ASIH Symposium - The Science, Management, and Policy of Amphibian Conservation: Extending the Legacy of Ray Semlitsch, Glass Oaks, Saturday 15 July 2017

Freya Rowland, Raymond Semlitsch

University of Missouri, Columbia, MO, USA

The Ecological Role of Pond-Breeding Amphibians

Amphibians with complex life cycles can have substantial effects on both the aquatic and terrestrial habitats they inhabit during their larval, juvenile, and adult stages. Furthermore, it has been shown that at high densities, amphibian larvae can strongly influence nutrient cycling and serve as important prey or predators. Yet, we do not fully understand the importance of amphibians to aquatic communities compared to abiotic factors, particularly in the absence of density effects. Here we present results comparing the relative importance of bottom-up effects including light supply (low/high) and nutrients (low/high), versus top-down effects of Southern Leopard Frog tadpoles (*Lithobates sphenoccephalus*; presence/absence) and larval Spotted Salamanders (*Ambystoma maculatum*; presence/absence). Tadpoles had stronger effects on multiple components of the food web (e.g., algae, Daphnia, chironomids) than light and nutrients, whereas salamanders only affected Daphnia biomass. In addition, overall zooplankton biomass was 65% higher in treatments without tadpoles. We also show that light availability and amphibian community can have significant impacts on the size-independent nutrient content of metamorphs, which has implications for aquatic-

terrestrial linkages. These results provide evidence for the role of amphibians in community dynamics, including large effects on algal and invertebrate biomass, zooplankton communities, and nutrient flux between aquatic and terrestrial habitats. Furthermore, our data also support legacy effects of amphibians on the pond community. Weeks after the last amphibian metamorphosed, we could still detect changes in the food web relative to controls.

0687 ASIH STORER HERPETOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Averil Royal, Natalie Claunch, Mason DuBois, Kathleen Ivey, Elina King, Emmeleia Nix, Kiley Rucker, Tanner Shea, John Stepanek, Sunny Vansdadia, Emily Taylor

California Polytechnic State University, San Luis Obispo, California, USA

Body Size Effect on Thermal Tolerance in Certain Species of *Sceloporus*

Studies examining how physiological processes are affected as ectotherms respond to increased temperatures are crucial with the specter of global warming on the horizon. We tested the thermal tolerance of four species of *Sceloporus* lizards that vary in body sizes while exposed to normoxic (21% oxygen) and hypoxic gas (6% oxygen). In a previous study, we had observed that large *S. occidentalis* exhibited reduced thermal tolerance when exposed to hypoxic gas. The goal of this study was to examine whether body size affects thermal tolerance in additional lizard species and populations. *S. jarrovi* and *S. occidentalis* (the two larger species) exhibited a negative relationship between snout-vent length (SVL) and critical thermal maximum (CTMax) under hypoxic conditions, and *S. jarrovi* also exhibited this same relationship under normoxic conditions. In contrast, *S. virgatus* and *S. graciosus* (the two smaller species) did not exhibit negative relationships between body size and CTMax; in fact, in *S. virgatus*, there was a positive relationship between SVL and CTMax under normoxic conditions. Our study suggests that there is a significant negative relationship between body size and CTMax in large *Sceloporus* species only, and we suggest several mechanisms that could be responsible for these effects.

0064 Herp Systematics I, Sabine, Sunday 16 July 2017

Sara Ruane¹, Christopher Austin⁰

¹*Rutgers University-Newark, Newark, NJ, USA*, ²*Louisiana State University, Baton Rouge, LA, USA*

Museum Specimens in the Age of Phylogenomics

Preserved museum specimens provide numerous data to biologists, but obtaining genetic data from formalin-fixed and fluid-preserved specimens is a challenge. Most

efforts that aim to recover sequence data from such specimens are time-consuming and produce low data quality and quantity. Here we describe our work using a modified DNA extraction protocol combined with high-throughput sequencing to recover DNA from formalin-fixed and fluid-preserved snakes that were collected up to 100+ years ago; most of these species are poorly known and have no fresh tissue available for DNA sequencing. We successfully extracted DNA and sequenced 1000's of ultraconserved elements from 10 fluid-preserved snakes and included them in a phylogeny with modern samples. This phylogeny demonstrates the general use of such specimens in phylogenomic studies and provides genetic evidence for the placement of enigmatic snakes, such as the rare Indian *Xylophis stenorhynchus*, the elusive elapid *Parapistocalamus hedigeri*, and the only known specimen of a ~50 year old *Toxicocalamus ernstmayri*. Our study illustrates the importance of museum collections in modern research, even for large-scale genetic work.

0840 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017; AES CARRIER AWARD

Cassandra L. Ruck¹, Nicholas J. Marra¹, Michael J. Stanhope², Mahmood S. Shivji¹

¹*Save Our Seas Shark Research Center USA, Nova Southeastern University, Dania Beach, FL, USA*, ²*Department of Population Medicine and Diagnostic Sciences, Cornell University, Ithaca, NY, USA*

Global Population Genomics of the Great Hammerhead Shark, *Sphyrna mokarran*

The great hammerhead shark, *Sphyrna mokarran*, is a circumglobal coastal-pelagic species of high conservation concern (IUCN Red List Endangered). An earlier analysis of the mitochondrial control region in globally distributed animals uncovered two highly divergent matrilineal lineages in this species (Testerman et al. In prep.). Here we present preliminary findings of a genomic level assessment of global population dynamics of the great hammerhead shark with an analysis of nuclear single nucleotide polymorphisms (SNPs) and whole mitochondrial genomes (17,719 bp). Genotyping-by-sequencing was used to genotype SNPs across 181 individual great hammerhead sharks. Preliminary principle component analysis of the SNP data reveals at least three, distinct global populations: the Western Atlantic, the Northwest Indian Ocean, and Australia. Mitochondrial genomes were generated via a long PCR and sequenced on an Illumina MiSeq platform. Preliminary analyses of 8 whole mitochondrial genomes supports two highly divergent, matrilineal evolutionary lineages. Further analyses will investigate the complex evolutionary dynamics of the great hammerhead shark.

0908 ASIH STORER HERPETOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Kiley Rucker, Adam Aslam, Natalie Claunch, Mason DuBois, Kathleen Ivey, Elina King, Emmeleia Nix, Averil Royal, Tanner Shea, John Stepanek, Sunny Vansdadia, Emily Taylor

California Polytechnic State University, San Luis Obispo, CA, USA

Testing the Effect of Blood Oxygen Carrying Capacity on Thermal Tolerance in Lizards

Despite numerous studies, the physiological mechanisms behind thermal tolerance in air-breathing organisms remain poorly studied and are a major area of interest in light of impending climate change. We tested the oxygen- and capacity-limited thermal tolerance (OCLTT) hypothesis, which states that as an organism's metabolic rate increases due to rising temperatures, it reaches a point at which its circulatory system cannot sustain its body's demand for oxygen and the animal loses coordinated muscle control. This point is deemed their critical thermal maximum (CTMax). If the OCLTT is true, then animals with induced anemia (representing reduced blood oxygen carrying capacity) should have lower CTMax than control animals. We tested how the CTMax of Western fence lizards (*Sceloporus occidentalis*) is affected by their blood oxygen carrying capacity by experimentally reducing their hematocrit by 50-60% over two days, then heating them in either normoxic air (21% oxygen) and hypoxic air (6% oxygen). Control lizards were also tested. Sex, final hematocrit, and oxygen treatment significantly affected the CTMax. Females exhibited higher CTMax than males; lizards with lower hematocrit exhibited lower CTMax; and lizards exposed to hypoxic gas had lower CTMax than those exposed to normoxic gas. We are also currently examining the effect of induced anemia on release of immature (e.g., polychromatophilic and/or mitotic) red blood cells to examine whether mature red blood cell count was related to CTMax. Understanding the physiological mechanisms responsible for the CTMax will help allow us to understand the role of thermal tolerance in animals' responses to climate change.

0510 SSAR SEIBERT PHYSIOLOGY & MORPHOLOGY, Brazos, Friday 14 July 2017

Ariana Rupp¹, David Sever²

¹*University of Louisiana Lafayette, Lafayette, LA, USA*, ²*Southeastern Louisiana University, Hammond, LA, USA*

Junk in the Trunk: Caudal Courtship Glands Present in Plethodontid Salamanders Without Mental Glands

Salamanders in the family Plethodontidae exhibit a unique tail-straddle walk during courtship that can include the use of sexually dimorphic mental glands and caudal courtship glands. Mental glands are found in the skin of the lower jaw and caudal courtship glands are found in the skin of the dorsal base of the tail in some male plethodontids. Both are thought to increase female receptivity during courtship. While many studies focus on the variation and possible evolution of mental glands, few

studies of caudal courtship glands exist and only the male morph A specimens of *Eurycea wilderae* are known to have caudal courtship glands without the presence of mental glands. This study analyzed museum specimens from genera known for absence of mental glands and used standard histological methods to determine presence or absence of caudal courtship glands. Presence of mature sperm in the Wolffian duct was also analyzed to identify sexual maturity and breeding status of males. Results show that there are caudal courtship glands present in males of species with no mental gland present, indicating the importance of these glands in courtship behavior. More data must be collected on caudal courtship glands before character optimization on a phylogeny would be useful for studying their evolution, but our data suggest that these glands may be driving the tail straddle walk in Plethodontidae.

0619 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Amelia Russell¹, Kyle Brown¹, Michaela Lambert², Tracey Tuberville³, Melissa Pilgrim¹

¹University of South Carolina Upstate, Spartanburg, SC, USA, ²University of Kentucky, Lexington, KY, USA, ³University of Georgia, Athens, GA, USA

Mercury Bioaccumulation in Florida Green Watersnakes (*Nerodia floridana*) Inhabiting Former Nuclear Cooling Reservoirs on the Savannah River Site

Anthropogenic activities have significantly increased the amount of mercury (Hg) cycling globally. Mercury can become bioavailable, accumulate in organisms, biomagnify in food webs, and can negatively impact wildlife health. Mercury contamination on the Savannah River Site (SRS) is a result of atmospheric deposition, coal combustion, and use of contaminated water from the Savannah River in nuclear reactor cooling reservoirs. Florida green watersnakes, *Nerodia floridana*, are primarily piscivorous top predators that inhabit the reservoirs and can serve as bioindicators of Hg contamination. We captured 76 snakes from three reservoirs: Pond B, Pond 2, and PAR Pond. Total mercury (THg) concentrations in watersnake tail tissue from Hg contaminated reservoirs ranged from 0.167 ppm to 2.10 ppm dry weight. Although snake THg concentrations were not significantly different among sites, we determined there was a significant relationship between snout-vent length and THg in *N. floridana*. Our work demonstrated that *N. floridana* can serve as useful bioindicators of Hg contamination in aquatic ecosystems and aid in conservation efforts.

0084 ASIH STORER ICHTHYOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Kelsi Rutledge¹

¹University of California Los Angeles, Los Angeles, CA, USA, ²University of North Carolina Wilmington, Wilmington, NC, USA

Nekton Utilization of Created and Natural Intertidal *Crassostrea virginica* Reefs

Since the 1970s, eastern oyster restoration efforts have increased. Oyster reefs provide habitat and refuge for organisms, improve water quality, and decrease erosion. Oyster restoration projects aim to construct reefs that function similarly ecologically to their natural counterpart. Therefore, post-creation monitoring of these reefs is crucial in determining their success. However, monitoring is often lacking or focused on harvest size rather than ecosystem services such as nekton utilization. This study examines nekton utilization among created reefs compared to natural reefs in an estuary in North Carolina. The objective was to determine whether the created reefs function similarly to the natural reefs in abundance, species richness, and fish size. Through seine netting and Breder traps, reefs were sampled over a 5 month period. No significant difference was detected among reefs for nekton abundance, species richness and standard length. This is a promising result for future management, indicating the success of restoration efforts of one important ecosystem service.

0918 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017; HL/SSAR/ASIH SYMPOSIUM - THE SCIENCE, MANAGEMENT, AND POLICY OF AMPHIBIAN CONSERVATION: EXTENDING THE LEGACY OF RAY SEMLITSCH

Travis Ryan

Butler University, Indianapolis, IN, USA

Timing of Breeding Migrations and Metamorphosis: The Lasting Impact of Ray Semlitsch's Early Career Research

Like many ecologists, much of Ray Semlitsch's early research was field-oriented and descriptive in nature. As his career advanced, Ray incorporated complex experiments and large-scale field manipulations into his research program, and his reputation as one of his generation's most influential ecologists is based on this later research. Many of those early descriptive studies, however, have had a long-lasting impact in amphibian ecology and related fields. This presentation will analyze the literature to document the way that these early studies shaped the research of Ray and his collaborators and those working in amphibian ecology and related fields.

0062 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Jung-Hwa Ryu, Jin-Koo Kim

Pukyong National University, Busan, Republic of Korea

Biogeography of Marine Fish around the Korean Peninsula

The Korean peninsula is surrounded by three seas: the Yellow Sea to the west, the Korean Strait to the south, and the East Sea (Sea of Japan) to the east. The currents between these seas, as well as paleoclimatic change, are likely to be the drivers of species diversity in Korean marine fish. To understand the current biogeography of fish species around the Korean peninsula, we measured the species composition of the marine fish community in Korean waters. Fish were collected from 16 stations around the Korean peninsula, primarily using set nets (though some gill nets were also used), four times a year from 2006 to 2013. Fish of 228 species were collected. The dominant species was *Engraulis japonicus* (81.6%), followed by *Trachurus japonicus* (9.2%) and *Sardinella zunasi* (1.0%). The number of fish species, individuals, and species diversity (H') were highest at Gunsan in the mid-Yellow Sea, and lowest at Gwangyang in the mid-Korean Strait. Based on a Bray-Curtis similarity of 35%, the 16 stations fell into five groups, group A, comprised of three stations in the Yellow Sea; group B, comprised of two stations in the western Korean Strait; group C, comprised of two stations in Jeju Island; group D, comprised of two stations in the eastern Korean Strait and two in the southern East Sea; and group E, comprised of four stations in the mid-to northern East Sea. These groupings may have been determined by the characteristics of the sea currents or water masses.

0289 Amphibian Conservation I, Wedgewood, Sunday 16 July 2017

Allison Sacerdote-Velat¹, Mary Beth Manjerovic², Rachel Santymire²

¹Chicago Academy of Sciences, Chicago, IL, USA, ²Lincoln Park Zoo, Chicago, IL, USA

Community, Health, and Stress Response of Reintroduced and Resident Amphibians to Oak Woodland Restoration

To improve oak regeneration in Illinois forested wetlands, a restoration project was implemented that creates light gaps via invasive understory removal and selective thinning of overstory trees. Restoration sites include a Wood Frog (*Lithobates sylvaticus*) reintroduction site where persistence and recruitment has been documented since 2010. To determine the impact of oak restoration on amphibian communities, we began a three-year study to examine amphibian community structure, *Batrachochytrium dendrobatidis* (*Bd*) incidence, and amphibian stress in five restoration sites and one control site along the Des Plaines River. In 2016, wood frogs expanded breeding from two ponds to four ponds. We observed a north-south gradient of low to high representation of Spring Peepers (*Pseudacris crucifer*), which are thought to be declining throughout the region. We collected 188 chytrid swabs, and 410 non-invasive stress swabs for cortisol (CORT). Of these samples, 33 tested positive for *Bd* resulting in a sample prevalence of 17.5% across sites. *Bd* was detected in four of six sites. *Bd*-positive species included Green Frogs (*Lithobates clamitans*), Bullfrogs (*Lithobates catesbeianus*), Northern Leopard Frogs (*Lithobates pipiens*), Boreal Chorus Frogs (*Pseudacris maculatum*), Spring Peepers, American Toads (*Anaxyrus americanus*), and Blue-Spotted Salamanders (*Ambystoma laterale*). *Bd* was not detected in swabs from Wood Frogs or Tiger Salamanders (*Ambystoma tigrinum*). CORT levels of each species were similar across

sites, but Northern leopard frog CORT was significantly greater with positive *Bd* status. As habitat quality improves over the next two seasons, we expect increased amphibian diversity, decreases in CORT across sites, and decreased incidence of *Bd*.

0341 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Daniel Saenz¹, Toby Hibbitts², Cory Adams¹

¹*Southern Research Station, US Forest Service, Nacogdoches, Texas, USA*, ²*Department of Wildlife and Fisheries Sciences, Biodiversity Research and Teaching Collections, Texas A&M University, College Station, Texas, USA*

The Calling Ecology of the Crawfish Frog (*Lithobates areolatus*) in Texas

The crawfish frog has suffered declines across much of its range and is currently considered for state protection in five of the twelve states where it occurs. It is a secretive species that spends most of its time in or near crawfish burrows, making it difficult to detect outside of the breeding season. During the breeding season, however, they have exceptionally loud advertisement calls that allow auditory surveys to be conducted with relative ease. Most of what is known about the biology of the crawfish frog is from studies conducted in the northern portion of their range. Our study is an attempt to learn about crawfish frog seasonal calling phenology, diel calling activity, and the exogenous factors that influence calling in the southern part of its range, the coastal prairie of Texas. We conducted auditory surveys for crawfish frogs and collected environmental data at the Attwater Prairie Chicken National Wildlife Refuge in Austin and Colorado Counties, Texas. Our analyses suggest that several abiotic factors are important predictors of crawfish frog calling activity. Breeding pond water depth, relative humidity, and rainfall have a significant positive relationship with crawfish frog calling and water temperature and wind speed are negatively associated. We suggest that crawfish frogs from the coastal prairies of Texas behave quite differently than their northern con-specifics with regard to calling phenology, daily calling activity, and possibly their relationships with abiotic factors that influence calling activity.

0872 ASIH STOYE PHYSIOLOGY & PHYSIOLOGICAL ECOLOGY II, San Antonio, Thursday 13 July 2017

David Saenz, Michael Markham, Kirk Winemiller, Jose Alves Gomes

Texas A&M University, College Station, Texas, USA

Effects of Melanocortin Hormones on the Electric Organ Discharge of Two Weakly Electric Fish

Gymnotiform fishes are a diverse and widely distributed order of Neotropical fish frequently studied for their ability to generate and detect electric fields. These nocturnal fish use electrolocation as a means of navigating and foraging in dark, turbid waters.

The waveforms and frequencies of their electric organ discharges (EODs) have species specific properties, allowing them to signal and identify conspecifics during social interactions. We examined one mechanism regulated by adrenocorticotrophic hormone (ACTH) through which some species increase the amplitude of their EOD in response to circadian rhythms and social stimuli. This is particularly interesting because amplitude changes involve the regulation of sodium channels in the membranes of electrocytes (electric cells). These ion channels are highly conserved throughout the evolutionary history of vertebrates, but may have undergone interesting adaptations in electric fishes. We tested the effects of ACTH in two species, *Brachyhyppopomus bennetti* and *Sternopygus obtusirostris* (Gymnotiformes, Hypopomidae and Sternopygidae), by injecting fish with 1 µg of ACTH per gram of body weight and recording fish EODs in a recording chamber. We also used current-clamping techniques on single electrocytes, in order to determine the effects of ACTH on membrane potentials. We found variable effects of ACTH between species that we suspect are due to the unique properties of the waveforms each species produces.

0633 LFC Multi-Stressor Effects, San Marcos, Friday 14 July 2017; LFC SALLY L. RICHARDSON BEST STUDENT PAPER

Andria K. Salas¹, Preston S. Wilson¹, Megan S. Ballard¹, Andrew H. Altieri², Timothy H. Keitt¹

¹The University of Texas at Austin, Austin, Texas, USA, ²Smithsonian Tropical Research Institute, Panama City, Panama

The Role of Intermittent, Short-range Acoustic Cues on Larval Fish Settlement

The combined acoustic behavior of soniferous organisms living on coral reefs produces a soundscape that is predicted to have a role in the settlement behavior of fish larvae. However, the distance at which acoustic cues may operate to influence navigation and habitat selection is unclear given the complexities of shallow water sound propagation and uncertainties about the hearing abilities of larval fishes. Here we investigate the role of acoustic cues in settlement using an individual-based model. In the model, we use a conservative detection distance as informed by sound propagation modelling calibrated with acoustic transects. Cues are available only intermittently as informed by field data. Given the frequency-specific sound detection abilities of fishes, only a portion of the soundscape will have the frequency and amplitude characteristics to serve as potential acoustic cues, thus creating an acoustic cuescape composed of intermittent cues. We recorded the soundscapes of four coral reefs in Caribbean Panama for six weeks and predicted the sounds most likely to be used as cues by larval fishes by using knowledge of their hearing sensitivity. Using an individual-based model, we tested the relationship between the temporal characteristics of the acoustic cues and settlement success. To do this we created cue time-series that represented the temporal variability observed at the four reef sites. We found that even short range, temporally variable cues produced at a low rate improved settlement success, suggesting these cues may improve the

probability of survival under a broader range of conditions than has been typically considered.

0166 Herp Ecology III, Sabine, Friday 14 July 2017

Steven Salinas, Tristen Ortega, Jesús Rivas

New Mexico Highlands University, Las Vegas, New Mexico, USA

Control of Northeastern New Mexico Rivers: American Bullfrogs (*Lithobates catesbeianus*) vs. Northern Crayfish (*Orconectes virilis*) vs. Rainbow Trout (*Oncorhynchus mykiss*)

The cumulation of a multiyear study of invasive and nonnative species in river systems in Northeastern New Mexico. Invasive species are among the worst conservation problems; however, the presence of an invasive species can produce a synergistic effect on others increasing their odds of success and their impact in the environment. Continuous analysis of the diet of a population of American Bullfrogs we found it consisted of over 80% of Northern Crayfish, another invasive. Given the high proportion of crayfish in the diet of bullfrogs we hypothesize that Bullfrogs follow the Crayfish and it may first require the crayfish to get establish before they can successfully colonize a new habitat. In this study, we explore the density of bullfrogs and crayfish in locations where there are bullfrogs, trout, and crayfish, a site with both bullfrogs and crayfish but not trout, and a site where only crayfish occur. Which species has the control of the Northeastern New Mexico Rivers? In areas where Rainbow Trout of been stocked, crayfish and bullfrog populations are pushed back. In areas with bullfrog removal a 73% increase in crayfish population occurs when compared to areas with bullfrogs and crayfish. Crayfish populations with no predation have a population difference of nearly 1200% compared to areas with predation by both trout and bullfrogs.

0573 ASIH STORER HERPETOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Emily Sanchez, Christopher R. Tracy

California State University, Fullerton, Fullerton, CA, USA

Effects of Sex and Season on Thermoregulatory Activity of Common Chuckwallas, *Sauromalus ater*

Intraspecific thermoregulatory variability due to habitat, temperature availability, and seasonality have been studied extensively, but fewer studies focus on thermoregulatory variability due to sex. Sex-specific thermoregulatory strategies may affect relative fitness disproportionately, driving differences in response to environmental changes (e.g., climate change). The common chuckwalla (*Sauromalus ater*) is a great model for

investigating sex differences in thermoregulation because they are sexually dimorphic in behavior; males hold territories that they actively patrol and defend. We hypothesized that male and female chuckwallas thermoregulate to the same temperatures and to the same extent, but that males spend more time thermoregulating outside of refuges, to defend territories, compared to non-territorial females. Body temperatures of free-ranging adult chuckwallas (ten of each sex) were continuously recorded from May to early July 2016, as were operative temperatures in crevices and above ground basking sites to provide context for lizard body temperatures. Preliminary analyses compared effects of month and sex on the average time chuckwallas selected body temperatures above, below, and within their preferred temperature range (34-39°C) in May, June, and July. Chuckwallas on average spent significantly more time above and within preferred range in July, and below temperature range in May. This reflects temporal and spatial changes in availability of suitable operative temperatures. On average, males in June spent significantly more time within and above preferred range than females, who spent significantly more time below. This may reflect different late-season reproductive priorities, with males seeking final mating opportunities aboveground, and females seeking underground nesting sites.

0273 ASIH STOYE ECOLOGY & ETHOLOGY III, Sabine, Friday 14 July 2017

Jessica Sanchez, Joel Trexler

Florida International University, Miami, FL, USA

Testing alternative hypotheses for the evolution of herbivory using the Sailfin Molly (*Poecilia latipinna*)

Relative to carnivory, herbivory is thought to be an inefficient diet. But herbivory evolved from carnivorous ancestors in many metazoan groups and has been maintained alongside animal-containing diets throughout most of these lineages, suggesting that herbivory is adaptive in some circumstances. We tested two hypotheses to explain the adaptive evolution of herbivory: 1) The Heterotroph Facilitation Hypothesis, which states that herbivory is adaptive because herbivores supplement their diets with heterotrophs; and 2) the Lipid Allocation Hypothesis, which states that herbivory is adaptive because consumption of algae with high lipid concentrations is nutritionally similar to a carnivorous diet. We placed enclosure cages stocked with Sailfin Mollies (*Poecilia latipinna*) in the Everglades and manipulated the composition of colonizing epiphyton using shading and phosphorus. We then examined the effects of this varying food quality on lipid assimilation, growth and survival of juvenile *P. latipinna*. Epiphyton grown in the different conditions varied in heterotroph abundance, stoichiometry and fatty acid composition, but only fatty acid composition explained the differential survival of fishes. The abundance of algal-derived fatty acids drive fish survival, specifically eicosapentaenoic acid (EPA; $F = 6.639$, $df = 2$, $R^2_{adj} = 0.339$, $p = .028$) and docosahexaenoic acid (DHA; $F = 5.588$, $df = 1$, $R^2_{adj} = 0.294$, $p = 0.04$). Our results do not support the Heterotroph Facilitation Hypothesis, but instead support the Lipid Allocation Hypothesis (Sanchez and Trexler 2016). These results are similar to our recent

lab study, providing further support for the Lipid allocation hypothesis as a mechanism for diet evolution.

0851 General Ichthyology I, Trinity, Sunday 16 July 2017

Michael Sandel¹, Andres Aguilar², David Neely³, Kayla Fast¹

¹*The University of West Alabama, Livingston, Alabama, USA*, ²*California State University Los Angeles, Los Angeles, California, USA*, ³*Tennessee Aquarium Conservation Institute, Chattanooga, Tennessee, USA*

Evolution of the Coolest Hotspot: Interspecific Phylogeny of Baikal Sculpins

Ancient lakes are renowned as hotspots of freshwater biodiversity, and Siberia's Lake Baikal ranks as the oldest, deepest, and most biodiverse freshwater lake on Earth. Baikal is thus a biogeographic anomaly, standing in stark contrast to the latitudinal biodiversity gradient. Plants and invertebrates comprise the vast majority of the 1,500 Baikal endemic species, but sculpins represent the sole vertebrate radiation within the Lake. Extensive morphological variation among Baikal sculpins led to the description of twelve genera (10 endemic) and two endemic families. In order to understand the mechanisms driving adaptive radiation in Baikal, we conducted a multi-locus phylogenetic analysis including 24 described species and 3 undescribed groups. Sculpins were sampled extensively throughout Baikal and select tributaries. PCR and Sanger sequencing were used to construct DNA sequence alignments for four mitochondrial genes (ATP6, ATP8, CO1, Cytb) and multiple nuclear genes. Phylogenies inferred using multiple optimality criteria supported a monophyletic Baikal radiation, but consistently rejected the monophyly of certain Baikal endemic sculpin families and genera. A new sister taxon is identified for the Baikal radiation. We provide a novel hypothesis of interspecific relationships among Baikal sculpins that discords with best available morphological data. We recommend appropriate taxonomic changes, and discuss conservation implications as well as ongoing research in functional genomics.

0192 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Mark Sandfoss, Harvey Lillywhite

University of Florida, Gainesville, Florida, USA

Precipitation Patterns and Hydration Status of a Unique Insular Snake Population

Water is essential to survival, and thus invasion of habitats having limitations of water necessitates adaptations to maintain water balance. A unique population of Florida cottonmouth, *Agkistrodon conanti*, inhabits Seahorse Key (SHK) near coastal Levy County, Florida where they are entirely terrestrial without permanent sources of fresh water. Insofar as cottonmouths are generally associated with freshwater habitats, this

insular population of snakes is likely to exhibit adaptations for living with limited resources, especially water. Our objective is to measure the hydration status in free-ranging snakes to better understand the possible stresses related to dehydration. We hypothesize that hydration status of cottonmouths on SHK will follow patterns of precipitation. We tested dehydration and drinking behavior of cottonmouth snakes inhabiting SHK from 2001–2017. Snakes were captured and tested for thirst immediately following capture. They were provided access to fresh water for at least 12 hours while we noted drinking and weighed snakes before and after. Mass gains reflected drinking and therefore hydration status. These data were compared to satellite data for cumulative precipitation during seven days preceding capture (NASA TRMM & GPM). Preliminary results support the prediction that hydration status of cottonmouths on SHK correlates strongly with rainfall patterns, suggesting that snakes rely on periodic rainfall to remain hydrated.

0472 Lightning Talks I, Glass Oaks, Friday 14 July 2017

Inah Satiro¹, Bruno Juca-Queiroz¹, Wasley Pinheiro¹, Isabelle Arthaud¹, Thiago Basilio², Jones Santander-Neto², Vicente Faria¹

¹Universidade Federal do Ceará - UFC, Fortaleza, CE, Brazil, ²Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo - IFES, Piuma, ES, Brazil

Tiger shark seasonality and structure in the southwestern equatorial Atlantic derived from fisheries data

The goal of the present study was to describe tiger shark, *Galeocerdo cuvier*, seasonality and structure along the southwestern equatorial Atlantic. This description was based on fisheries data from three independent fleets operating from northern to northeastern Brazil in coastal areas, along the continental shelf break, and over oceanic banks. Sampling occurred in multiple periods from 1999 to 2016. Tiger sharks captured in coastal areas are primarily juveniles and occur seasonally, mainly from February to April. Tiger sharks appear to separate by size across locations. Juveniles (< 200cm) are captured in coastal and at the continental shelf break. Young immature (200 to 300 cm) and adult individuals (> 300 cm) are captured from the continental shelf break to oceanic banks.

0572 Herp Genetics, San Antonio, Saturday 15 July 2017

Anna Savage, Matthew Lawrance, Elizabeth Abney, Katherine Mansfield

University of Central Florida, Orlando, Florida, USA

Co-Evolution of Immune Genes and Herpesviruses in Juvenile Green and Loggerhead Sea Turtles

The tumor disease fibropapillomatosis (FP) causes cutaneous benign tumors in all sea turtle species and is linked to a chelonid fibropapilloma-associated herpesvirus (CFPHV) that globally infects juvenile sea turtles. Here, we investigate the host and pathogen genetic factors influencing sea turtle FP dynamics by sequencing turtle immune genes and CFPHV genes from juvenile green turtles (*Chelonia mydas*) and loggerhead turtles (*Caretta caretta*) from Florida, USA. Immune genes of the Major Histocompatibility Complex (MHC) code for proteins that identify pathogen molecules and present them to T-cells to initiate acquired immunity. MHC genes are therefore ideal markers for measuring the genetic viability and health of populations, particularly in the context of disease. We sequence MHC class I loci from *C. mydas* and *C. caretta* individuals with and without FP and CFPHV, as well as three genetically variable CFPHV genes, and conduct co-phylogenetic analyses to test for associations between host immune genes and viral strains. We also determine whether FP occurrence is linked to MHC variants or viral strains to better resolve the relationship between CFPHV infection and development of FP tumors. Understanding the mechanisms driving FP emergence is a necessary first step in developing the management and conservation approaches needed to mitigate this infectious disease.

0904 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Neha Savant, Matthew Palmer

Columbia University, New York, NY, USA

Genetic Structure of the Long-tailed Salamander, *Eurycea longicauda longicauda*

For wild species to sustain healthy populations, it is often essential for individuals to maintain sufficient dispersal and movement between habitats and populations. Maintaining connectivity across a wide variety of landscapes is especially important for amphibians, most of which are small-bodied, slow-moving, and moisture-dependent. Many studies assume that amphibian populations are inhibited by anthropogenic disturbance, but some species' distributions and movements can be influenced more by other factors. The range of the long-tailed salamander (*Eurycea longicauda longicauda*) is associated with physiographic provinces of the Appalachian Valley and though the species is threatened in some states, it can still be found near residential and agricultural areas. Previous studies in New Jersey suggest that this species' distribution may be highly influenced by finer scale hydrology and geology. As dispersal is difficult to study and often requires intensive, large-scale and long-term demographic studies, genetic studies can reduce the effort required to describe dispersal. Using microsatellites, I will examine the genetic structure and connectivity of long-tailed salamanders in different hydrologic landscapes: pond networks and stream networks. Genetic variation of salamanders found near ponds will be compared to variation of salamanders found near stream networks with the expectation that salamanders in stream networks will be more genetically similar due to the continuous moisture rich habitat offered by streams.

Understanding how hydrology and geology can affect genetic structure will help delineate populations and can inform effective management for this threatened species.

0367 AES Conservation & Management I, Pecos, Saturday 15 July 2017

Matthew Scanlon¹, Bryan Fluech², Christine Bedore¹

¹Georgia Southern University, Statesboro, GA, USA, ²Marine Extension and Georgia Sea Grant, Brunswick, GA, USA

Evaluating elasmobranch interactions in the Georgia shrimp fishery

The Georgia shrimp fishery has seen a dramatic decrease in profit and productivity since the 1980's due to a number of economical factors. Additional, yet undocumented, pressures on this fishery include interactions between foraging sharks with trawl gear. Fishermen report that sharks frequently bite nets in an attempt to prey on netted fish, resulting in large holes in the mesh or entanglement of the animal in the gear. Further elasmobranch interactions with trawl gear occur as bycatch; shrimp trawls represent nearly 100% of elasmobranch commercial bycatch in Georgia state waters, the species composition of which is largely unstudied. Shark interactions with nets were detailed through fishery-dependent observations on commercial shrimp boats in Georgia (n=5 vessels). Number of damaged sites, location of damage on the net, estimated repair time, and tow/environmental variables (turbidity, temperature, depth, tow time, and tides) were recorded for 38 trawling events between May-November 2016. Sharks bit an average of 1.55 holes (± 0.4 SE) in the nets for every trawl. All elasmobranch bycatch was also identified and measured for each trawl day. Of twelve total species caught, three species in particular accounted for 75% of all elasmobranch bycatch (n=37 trawls): *Rhizoprionodon terraenovae* (CPUE = 2.47 ± 0.38 individuals per trawl hour \pm SE), *Gymnura micrura* (CPUE = 1.5 ± 0.37), and *Dasyatis sabina* (CPUE = 1.17 ± 0.23). Because the fishery has decreased in size and effort over the last two decades, it is unknown if bycatch in shrimp trawls are drastically decreasing stock sizes in elasmobranch species.

0377 ASIH STORER HERPETOLOGY; Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017

Simon Scarpetta, David Ledesma

University of Texas at Austin, Austin, Texas, USA

Cranial Osteology of Extinct and Extant Gerrhonotine Lizards

Gerrhonotinae is an extant clade of anguillid lizards with a rich Cenozoic fossil record in the Americas and a diverse assemblage of species that still inhabit regions of North America and much of Central America. My preliminary analysis of x-ray computer tomography (CT) scans of a previously known but unidentified Pliocene lizard specimen from the Palm Spring Formation in Anza Borrego Desert State Park in

southern California indicate that it is a gerrhonotine of the genus *Elgaria* and is potentially a new species. Species belonging to the genus *Elgaria* are currently found in western and central North America, often in mesic habitats. Despite the relative familiarity of some species to biologists and paleontologists, comprehensive studies of the cranial anatomy of *Elgaria* are currently lacking. Description of the bones in the skull supplies useful data for examining morphological variation and phylogeny, and thus provides an excellent tool for any morphological study. Here, I describe the cranial anatomy of eight *Elgaria* species in addition to other gerrhonotine taxa, especially species from the genus *Gerrhonotus* and some *Mesaspis*, *Barisia*, and *Abronia*. I provide novel anatomical information for many of the almost 60 modern gerrhonotine species, expanding the currently limited cranial osteological data available. Comprehensive cranial descriptions will supply the framework for diagnosing phylogenetic placement of fossils, in particular the Anza Borrego gerrhonotine specimen. I employ traditionally prepared skeletons as well as CT scans; the latter enables me to generate data about rare specimens of many gerrhonotine species for which no skeletal data exists.

0167 Amphibian Conservation II, Wedgewood, Sunday 16 July 2017

Christopher Schalk¹, Carmen Montana¹, Kelsey Kralman¹, Daniel Leavitt²

¹Sam Houston State University, Huntsville, TX, USA, ²Arizona Game and Fish, Phoenix, AZ, USA

Functional distance and establishment of non-native species with complex life cycles

More than 80% of animals have complex life cycles (CLCs) and undergo distinct changes in ecology and morphology during ontogeny. The strength and type of factors regulating each life-stage may differ as an organism may occupy different niches during ontogeny. We examined the functional distance at larval and adult life-stages of two non-native anurans (Green Tree Frog [*Hyla cinerea*] and Bullfrog [*Lithobates catesbeianus*]) that have established in a Chihuahuan Desert anuran assemblage in Big Bend National Park. The larval and post-metamorphic stage of both non-native species occupied niche space outside the recipient assemblage. At the larval stage, the ability of the tadpoles to utilize permanent aquatic habitats and coexist with predatory fishes differentiated it from the majority of the native species that are restricted to temporary pools. At the post-metamorphic life stage, each species appears to have established by exploiting unoccupied niches in the recipient community. The arboreal habits of *H. cinerea* may enable it to utilize resources in microhabitats that are otherwise not used by native species as arboreal frogs are absent in this assemblage. The large body size of post-metamorphic *L. catesbeianus* may enable it to utilize larger food resources that are otherwise unavailable to the smaller-bodied natives. Both species have strong ties to permanent aquatic habitats, which suggests that their dispersal and impact will be localized to permanent aquatic sites.

0792 General Ichthyology I, Trinity, Sunday 16 July 2017

Ray Schmidt

Smithsonian Institution, Washington, DC, USA

Community Structure and Conservation Status of Fishes in the Northern Ewaso Ng'iro in Kenya, East Africa.

Freshwater biodiversity in East Africa is threatened by population growth, land use changes, and the effects of climatic change. These systems are critical to the region as they are usually the only source of freshwater available. Despite their importance, the diversity and health of these systems remains poorly understood. Recent surveys in the semi-arid Northern Ewaso Ng'iro are re-assessing the diversity of freshwater fishes present and how land use practices and seasonal variation affect the aquatic community. The well-watered, headwater streams arise on the slopes of Mount Kenya and the Aberdares; then flow through urban and agricultural areas with large amounts of water extraction. The main rivers then flow through rangelands serving as an important source of water for livestock, wildlife, and the pastoralist communities. Monthly surveys throughout the basin show that although the fish fauna is fairly depauperate, compared to neighboring basins, there is a high degree of endemism within the basin. These surveys also reveal the importance of seasonal floods in sustaining and recolonizing populations of fishes in the basin. The diversity and current distribution of fishes in the basin is presented. Current threats to the diversity in the region, and the ramifications of a large dam slated for construction in the region will also be discussed.

0816 Poster Session II, Rio Grande Exhibit Hall, Saturday 15 July 2017

Amy Schneider, Christopher Howey

Pennsylvania State University, University Park, PA, USA

Identification of Individual Timber Rattlesnakes Using Camera Trap Data

Snake biologists have typically struggled to estimate population sizes due to the secretive nature of snakes which leads to low recapture rates. Timber Rattlesnakes (*Crotalus horridus*) tend to congregate at den sites during ingress and egress throughout the northern latitudes of the species' range. Although it may be difficult, time-consuming, or logistically unfeasible to personally monitor den sites, camera traps may be used to continuously monitor these sites throughout the day during these seasons. Further, wildlife biologists have successfully identified individuals of various species within camera trap photos using WildID software. We tested if this digital software could be used to successfully identify individual *C. horridus* in both the lab under controlled conditions and in the field while snakes were emerging from den sites. First, we brought captured *C. horridus* back to the laboratory where we photographed individual rattlesnakes in various postures. We then determined if WildID software could successfully match photos of known individuals accurately. Second, we positioned a field camera (Reconyx Hyperfire camera trap) in front of a known den site

where we have captured and photographed numerous individuals. The camera trap recorded a picture every 10 seconds throughout the egress period. We then determined if WildID software could accurately identify individuals emerging from the den. If this technique works, this would allow biologists to create individual encounter histories, which could be used to estimate population sizes. We will discuss the efficacy of this technique.

**0857 SSAR VICTOR HUTCHISON STUDENT POSTER AWARD:
EVOLUTION, GENETICS, & SYSTEMATICS; Poster Session I, Rio Grande
Exhibit Hall, Friday 14 July 2017**

Tonia S. Schwartz¹, Randy L. Klabacka¹, Dawn Reding², Anne M. Bronikowski²

¹Auburn University, Auburn, AL, USA, ²Iowa State University, Ames, IA, USA

Targeted sequence capture for functional population genomics of genetic networks

Studies in evolutionary biology have focused largely on either genes and gene families, or organisms and populations. However, there has been relatively little focus on the evolution of genetic networks. While the idea that genetic networks - or a group of genes that produce protein products that must interact for cellular function - may be units of evolution has become accepted, relatively few studies have assessed this hypothesis in the context of selection. The development of cost-efficient high-throughput sequencing technologies has allowed for the genomic architecture of non-model organisms to be studied, and thereby has increased feasibility for evolutionary studies involving gene networks via targeted approaches. Here we describe a procedure to conduct sequence capture for full genetic pathways in a non-model organism starting with transcriptomic data. Our data was collected from populations of the western terrestrial garter snake (*Thamnophis elegans*). We sequenced 500 genes in focal molecular pathways from 96 individuals. The resulting sequence variation data can be used to test for evidence of natural selection at the level of the pathway. Determining the most effective reference for aligning the genomic sequence data in the absence of a reference genome is an obstacle of this approach. We address this question by mapping sequences to (1) a reference transcriptome, (2) predicted exons from the transcriptome, and (3) a de-novo assembly of the sequence captured loci. We discuss the results in the context of optimization of this procedure for molecular ecologists interested in functional divergences in genetic networks across natural populations.

**0232 Poster Session I, Rio Grande Exhibit Hall, Friday 14 July 2017; AES
CARRIER AWARD**

Katherine E. Schweiss¹, J. Marcus Drymon², Toby S. Daly-Engel³, Nicole M. Phillips¹

¹The University of Southern Mississippi, Hattiesburg, MS, USA, ²University of South Alabama Dauphin Island Sea Lab, Dauphin Island, AL, USA, ³Florida Institute of Technology, Melbourne, FL, USA

Development of environmental DNA techniques to assess habitat usage in bull sharks (*Carcharhinus leucas*)

Identifying the distribution and habitat use of elasmobranchs traditionally requires setting nets, capturing, and handling the target species to attach tags and collecting tissue biopsies for genetic analysis. Such methods are costly, time consuming, and inflict stress to both target and non-target species. Environmental DNA (eDNA) samples provide a non-invasive approach to studying elasmobranchs, eliminating the need to capture or even observe the target organism. EDNA has been used to survey freshwater and marine species using a variety of methods. In the Gulf of Mexico, Bull Sharks (*Carcharhinus leucas*) are known to use the interface between freshwater and marine systems; however, the extent to which they use the rivers feeding these systems is unknown. To investigate riverine habitat use, we established a standard protocol for collecting and filtering highly turbid coastal water samples, extracting the DNA from the filters, and amplifying a target sequence specific to *C. leucas* via polymerase chain reaction (PCR). Water samples were filtered using a two-step filtration process, testing various filter sizes in each step, and DNA was extracted from the particulate material collected on the filters. Droplet digital PCR (ddPCR) was used to detect *C. leucas* DNA in each water sample. DdPCR can identify minute amounts of target DNA present with unparalleled precision by partitioning the sample into individual droplets, conducting PCR reactions, and quantifying resultant products from each droplet. Having a reliable and consistent method of filtering and amplifying *C. leucas* eDNA will improve our knowledge of this species' distribution and habitat usage.
