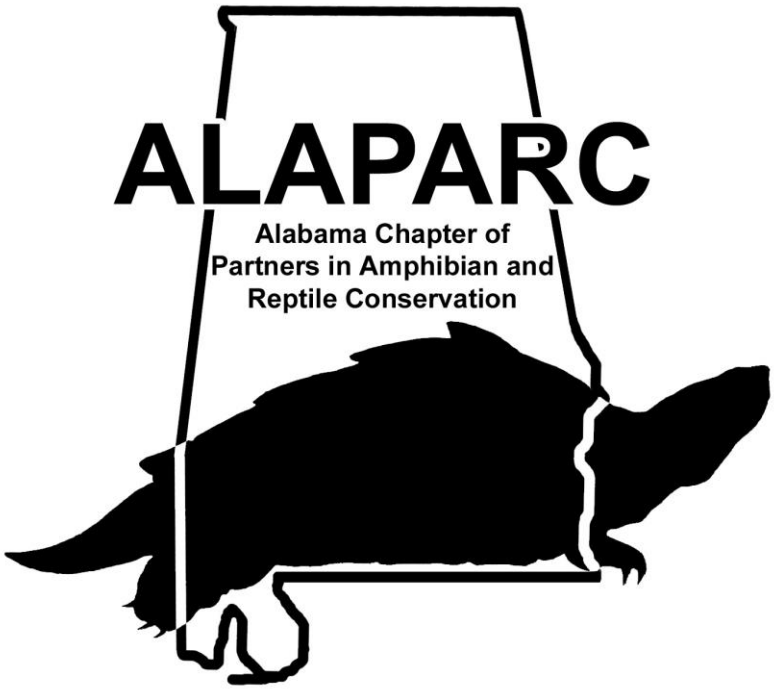

Alabama
Partners in Amphibian and Reptile Conservation
2013 Meeting Program

Solon Dixon Forestry Education Center, Andalusia, AL

PARC
PARTNERS IN
AMPHIBIAN AND REPTILE CONSERVATION

About Our Meeting

Welcome to the fifth annual meeting of the Alabama Chapter of Partners in Amphibian and Reptile Conservation (AlaPARC) at the Solon Dixon Forestry Education Center, Andalusia, Alabama. Maps of Solon Dixon are provided at the back of this program. All talks will occur in the Learning Center and all meals will be served in the Cafe. The poster session and socials will also occur in Learning Center.

Solon Dixon Forestry Education Center

Accommodations

Solon Dixon will furnish sheets, pillows, blankets, wash cloths, and towels. The towels are not very absorbent and you may prefer to bring your own. They do not furnish soap, shampoo, hair dryers, or any other personal items. Please make sure to bring a flashlight/ headlamp.

Meals

All meals will be served in the Cafe. Try to make it to the Cafe in a timely manner at the assigned times.

Internet Access

Solon Dixon does have wireless internet and a few hardwired computers available if needed.

Sustainability

Please consider bringing your own coffee mugs and beer steins to our meeting so that use of disposable cups will be minimized. We will also be recycling or reusing any glass bottles.

SCHEDULE

Friday October 4th, 2013

Time	Event/Title	Presenter
1:30	Herp Outing around Dixon Center	
5:00	Return from Herp Outing	
6:00	*Dinner*	
6:45	Introduction	
6:50	Alabama's Wildlife Action Plan	Mark Bailey
7:00	Aquatic surveys of Five Runs Creek in South Alabama	James Stiles
7:15	How old are Alligator Snapping Turtles (*Macrochelys temminckii*)? Glacial growth rates of an exceptionally long-lived species.	Brian Folt
7:30	Slimy Salamanders in central Alabama infected with chiggers.	Kristin Bakkegard
7:45	Temperature-dependent sex determination in the biology and conservation of the endangered Kemp's Ridley sea turtle	Thane Wibbels
8:00	Poster Session/Social	

Saturday October 5th, 2013

Time	Event/Title	Presenter
7:00	*Breakfast*	
8:30	Herp Outing to Indigo Snake Area	
12:00	*Lunch* will be a sack lunch out in the field	
2:30	Return from Herp outing	
3:45	Update on habitat structure requirements of gopher tortoises	Sharon Hermann
4:00	An introduction to the Auburn University Museum of Natural History FrogWatch USA Chapter	David Laurencio

4:15	Effect of moon phase on nocturnal activity of snakes and implications to make ecological surveys more efficient	Kevin Messenger
4:30	Effects of fluctuating temperatures on the phenotype of the red eared slider (*Trachemys scripta*)	Taylor Roberge
4:45	Stream-breeding plethodontid salamanders in the Gulf Coastal Plain: are assemblages shaped by environmental gradients?	Jennifer Lamb
5:00	The Alabama Herp Atlas Project (AHAP): past results and future directions	David Laurencio
5:15	Using morphometrics to distinguish between two slimy salamander species in central Alabama (*Plethodon glutinosus* & *Plethodon mississpippi*)	Kristin Bakkegard
5:30	Size does matter- evidence of sexual dimorphism in skull morphology of adult American alligators (*Alligator mississipiensis*)	Colt Sanspree
6:00	Dinner	
6:45	Effects of lipopolysaccharide on thermoregulation and circulating leukocyte profile in the gopher tortoise, *Gopherus polyphemus*	Jeffrey M. Goessling
7:00	Factors influencing aquatic turtle trap success	Scott Goetz
7:15	Diagnostic cranial variation between independent lineages of alligator snapping turtle (*Machrochelys temminckii*)	Christopher Murray
7:30	Temperature effects on the Anuran immune system	Chelsea Ward
7:45	The status of the diamondback terrapin in Alabama saltmarshes (Video)	Ken Marion
8:00	Social	

Sunday October 6th, 2013

Time	**Event/Title**	**Presenter**
7:00	Breakfast	

SCHEDULE DETAIL

FRIDAY

1:30 Herp Outing around Solon Dixon

6:00 Dinner

6:45 Introduction

6:50
Mark Bailey (baileycse@gmail.com) Conservation Southeast Inc. *Alabama's Wildlife Action Plan*

State Wildlife Grants ("SWiG"Grants) have funded a number of herpetological studies in Alabama in the past decade. In order to receive SWG funds, in 2005 Congress required each state to develop a wildlife action plan. Called State Wildlife Action Plans (SWAPs), they outline the steps that are needed to conserve wildlife and habitat before they become too rare or costly to restore. Alabama's 2005 SWAP assessed the health of wildlife and habitats, identified the problems they faced, and outlined the actions that are needed to conserve them over the long term. Work is about to begin on a major revision of Alabama's State Wildlife Action Plan for 2015-2025, drawing on the results of the 2012 Nongame Symposium and other stakeholder input. ALAPARC should be prepared to provide expert input as the new plan is developed over the next couple of years. To review the current SWAP, go tohttp://teaming.com/wildlife-action-plan/alabama.

7:00
Jimmy Stiles (stileja@auburn.edu), **Sierra Stiles**, **Craig Guyer**, Auburn University Biological Sciences, and **James Godwin** Alabama Natural Heritage Program. *Aquatic surveys of Five Runs Creek in South Alabama*

In this presentation we will tell stories and discuss current results from project to survey the aquatic herpetofauna of Five Runs Creek. Five Runs is a major tributary of the Yellow River and flows through the Conecuh National Forest. This watershed contains some of the highest herpetofaunal richness of any drainage in Alabama. From May through September, we surveyed throughout the varied habitats within the watershed. During this time we conducted trapping and visual encounter surveys to assess the current species richness and diversity. We will then compare the current richness and diversity to historical records to help determine if there have been changes to the aquatic herpetofaunal assemblages. Currently we have been able to document the majority of the historical species with the exception of a few. Some of these species have very low detection probabilities while others are possibly extirpated from the drainage. However, we were able to document two new species previously not known from this watershed. Our findings indicate that this important watershed seems to be maintaining the majority of its rich species diversity.

7:15
Brian Folt (brian.folt@gmail.com), Auburn University, and **John Jensen**, Georgia Department of Natural Resources – Nongame Endangered Wildlife Program. *How old are Alligator Snapping Turtles (*Macrochelys temminckii*)? Glacial growth rates of an exceptionally long-lived species.*

The Alligator Snapping Turtle (*Macrochelys temminckii*) is the largest freshwater turtle in North America but appears to have declined throughout the 20th century as a result of commercial harvesting. Despite much concern towards the conservation status of this species, conservation efforts toward this species and other large freshwater aquatic turtles are hindered by the paucity of knowledge relating to the natural history and population biology of this and other large freshwater aquatic turtles. In this study, we undertook a long-term capture-mark-recapture study of *M. temminckii* in Spring Creek, Georgia. Over a 16 year period, we made 152 captures of 71 individuals, 37 of which were captured multiple times. Mean body size from Spring Creek was comparable to other recent studies from across the species' range. Growth rates varied significantly by size, as a log-transformed regression of growth rate (cm/yr) by average carapace length (CL; cm) found that for every 1 cm increase in carapace length there is a 5.06 cm/year (± 3.21, 95% C.I.) decrease in growth rate (P = 0.003). We then used Faben's (1965) method, a variant of the von Bertalanffy equation, to estimate growth curves for female and male *M. temminckii*. This method allows robust estimation of growth rates using data from organisms of unknown age. Our growth curves for *M. temminckii* indicate that growth rates slow dramatically and asymptotically through time. Females reach an asymptotic maximum size of 44.0 cm CL and are 20 – 55 yr of age (mean = 31.6; N = 12), while Males reach an asymptotic maximum size of 55.9 cm CL and are 34 – 104 yr (mean = 59.5; N = 22). These results differ greatly with those of Tucker and Sloan (1997) based on data from harvested animals in Louisiana, and we discuss the implications. We conclude with a discussion of future research aimed to better understand the population and conservation biology of *M. temminckii* and other imperiled large aquatic freshwater turtles throughout the world.

7:30
Austin H. Patton, Warren-Wilson College, and **Kristin A. Bakkegard** (kbakkega@samford.edu), Samford University. *Slimy Salamanders in central Alabama infected with chiggers.*

Chiggers are the parasitic larval form of mites which infect a variety of terrestrial vertebrates. In salamanders, chiggers burrow in and under the skin and can be seen by the naked eye as a moving red or orange dot, or as swollen nodules, skin lesions, or pustules. There is only one previous report for chiggers infecting salamanders (*Eurycea bislineata*) in Alabama. We visually examined 45 Slimy Salamanders (most likely *Plethodon glutinosus*) from 5 localities in Jefferson and Shelby Counties and counted the number of chiggers. The total infection rate was 66.7% and the number of chiggers per salamander ranged from 0 to 52. Feet and limbs were most heavily infested (28.5% of chiggers found on fore limbs/feet and 35.0% found on hind limbs/feet). By body region, 2.6% were found in the head and throat, 4.2% were present in/on the cloaca, 13.8% in the tail, and

15.9% were in the body. Infected salamanders were found at all localities except one, Red Mountain Park (Jefferson Co.) but at the Trussville locality (Jefferson Co.), only 1 of 9 salamanders was infected and that was with just two chiggers. Salamanders (N=6) from the Moss Rock Preserve (Jefferson Co.) were all infected. This locality had the salamander with 52 chiggers. Of the 25 salamanders collected at four locations within Oak Mountain State Park (Shelby Co.), all but two had chiggers. The species of mite has not yet been identified, but *Hannemania dunni* is most likely candidate. However, there are other possibilities, such as *Eutrombicula alfreddugesi* and several other species of *Hannemania*, which also infect amphibians.

7:45
Elizabeth Bevan, Thane Wibbels (twibbels@uab.edu)**,** University of Alabama at Birmingham, **Marco A.C. Martinez,** CONANP, **Mauricio H. Hernandez,** Gladys Porter Zoo, **Amy Bonka,** University of Alabama at Birminham **Jaime Pena,** Gladys Porter Zoo, **Pat Burchfield,** Gladys Porter Zoo. *Temperature-dependent sex determination in the biology and conservation of the endangered Kemp's Ridley sea turtle*

A variety of reptiles including all sea turtles have temperature-dependent sex determination in which the incubation temperature of the egg determines the sex of the hatchling. For the past 16 years we have been generating a long-term database regarding nest and beach temperatures, and hatchling sex ratios for the Kemp's ridley sea turtle (historically the most endangered sea turtle in the world). Due to its endangered status, the majority of the nests have been moved to protected egg hatcheries over the past three decades. The results indicate that this program has produced a significant female bias which may have accelerated the recovery of this species. The study also indicates that the natural sex ratio produced from the primary nesting beach for the Kemp's ridley would be female biased. The long-term database provides insight on the impact of global climate change on a species whose biology is significantly affected by changes in environmental temperature.

8:00 Poster Session/Social

Poster Abstracts

George Cline (gcline@jsu.edu), **Jamie Marcus**, **Sarah Lagon**, **Chanel Jahn**, **Jamie Hernandez**, and **Issac Hernandez**, Jacksonville State University – *Update on the distribution of Green Treefrogs (Hyla cinerea) in Northeastern Alabama.*

In his survey of the herpetofauna of Alabama, Mount (1975) noted the distribution of green treefrogs (*Hyla cinerea*) as running diagonally from Lee County to northern Talladega and Shelby Counties, then extending west through Tuscaloosa and Fayette Counties. This distribution included parts of the southern Piedmont physiographic province, through the southern Ridge & Valley province and the Fall Line Hills. Mount further noted two specimens, possibly representing isolated populations in the

Appalachian Plateau in Marshall and Blount Counties. Boudreaux et al. (1994) reported the first specimens from Calhoun County.

In May 2013, a natural history class from Jacksonville State University traveled throughout Northeastern Alabama, recording species observed in various habitats. Students recorded green treefrogs from Jackson County along the Tennessee River, and from atop Lookout Mountain in Dekalb County. Additional treefrogs were recorded from Calhoun County, and new records were collected from Clay County. These additional sites fill in gaps between Alabama sites and those in eastern Tennessee.

Megan E. Gibbons (mgibbons@bsc.edu), **Meredith Councell**, and **Julia Guyton**, Birmingham-Southern College, and **David M. Frings**, Samford University. *Monitoring the hydroperiod of a vernal pool at Oak Mountain State Park: Can amphibians complete their life cycles?*

Vernal pools are temporary pools of water which serve as habitats for many organisms, including amphibians. Amphibians use vernal pools as a resource for reproduction, and because they are temporary, the pools are devoid of fish predators; this makes vernal pools an important resource for maintaining amphibian diversity. Oak Mountain State Park (OMSP) is the largest State Park in Alabama and hosts a variety of habitats and rich hepetofauna. Because of mounting concerns regarding a possible change in substrate permeability of one of the vernal pools at OMSP, in 2011, Birmingham-Southern students started examining the amphibian biodiversity of a vernal pool in OMSP with the help of David Frings, the Director of the Interpretive Center. Occasional visits starting in October and weekly surveys during the months of February, March, and April were conducted to determine the hydroperiod of the pond, water levels, and presence and absence of amphibian species. During surveys, cover objects within 10 meters of the water line were checked, water was sampled for eggs and larvae, and frog calls were recorded. For each amphibian species identified in the study, students recorded the first and last date that it was found, the habitat in which it was found, the relative number of individuals, and whether it was in a larval or terrestrial form. In spring 2012, the vernal pool dried (April 13) before many of the species could complete their lifecycles; the marbled salamander, *Ambystoma opacum*, appears to be the only species to have successfully metamorphosed before the pool disappeared. Other species using the pond that (presumably) were unable to complete their lifecycle included spotted salamanders (*Ambystoma maculatum*), spring peepers (*Pseudacris crucifer*), and gray treefrogs (*Hyla versicolor*). In 2013, the pond was still filled with water at the end of April, with no indication of drying, but monitoring at that point stopped. Because rainfall through May and June of 2013 was close to average, it is likely that all four species monitored were able to complete their lifecycles, potentially making up for the significant losses in 2012. This project is important in determining if this vernal pool is able to support a high diversity of amphibians at Oak Mountain State Park, and may contribute to the information determining whether or not the permeability of the substrate beneath the pool has been compromised. The information collected in this study is reported to OMSP as part of a collaborative effort to maintain important amphibian biodiversity in this the vernal pool.

Lesley Hanson (LHanson@jsu.edu), **George Cline**. Jacksonville State University.
Preliminary study of egg mass variation in *Ambystoma maculatum* from four sites in Calhoun County, Alabama.

Spotted Salamanders (*Ambystoma maculatum*) are a type of mole salamander (Family Ambystomatidae) that makes mass migrations to woodland ponds under the influence of warm rains. Spotted salamanders have three types of egg masses: white, clear, and intermediate. This color variation results from a mutation of a single gene (Ruth et al. 1993). Opaque egg masses may increase survivorship by reducing predation rates, or it is possible that opacity helps reduce thermal variability by retaining heat longer. Field work commenced in spring 2013 and included counting *Ambystoma maculatum* egg masses in four ponds in Calhoun County, Alabama. Two of the sites had closed canopies, while the remaining two sites were more open. Total number of egg masses at each site was recorded as well as the color of each egg mass. Pin flags were placed at each oviposition site and the number of clear or opaque egg masses was recorded on the flag. Sites were visited every two weeks during February and March 2013 and these data were updated. During this time, three of the four sites had similar abundances of egg masses (149-183), but one site, Henry Farm Park, had 1,139 egg masses. Opaque egg masses represented 28% of the egg masses detected at these four sites. Opaque egg masses were detected at two of the sites studied, which had closed canopies. In the upcoming season we plan to continue data collection and add data on the occurrence of symbiotic algae in these egg masses and to quantify environmental parameters at these sites.

Taylor Roberge (troberge@uab.edu)**, Kayla Bieser, Thane Wibbels, Ken Marion,** University of Alabama at Birmingham, **David Nelson**, University of South Alabama.
Experimental evaluation of hatchling sex ratios predicted for the main nesting each of the diamondback terrapin in Alabama.

Cedar Point Marsh (CPM) has been identified as the location of the largest aggregation of diamondback terrapins (*Malaclemys terrapin*) in coastal Alabama. It includes a beach that supports the largest nesting aggregation of terrapins reported in the state. In the current study, temperature profiles were recorded for the nesting beach over the 2011 nesting season. The nesting season for diamondback terrapins in Alabama extends from early May through July. The results indicate that temperatures gradually increase during May and then stay relatively warm throughout the remainder of the nesting season, with the exception of weather events. The current study utilized a simple model for predicting sex ratios based on mean temperature of the nesting beach during the middle third of the incubation period. The results predict that the Cedar Point Marsh nesting beach produced a significantly female-biased hatchling sex ratio during the 2011 nesting season. Mixed sex ratios were predicted for nests laid at the start of the nesting season when temperatures were cooler. However, by mid- to late-May, significant female-biases or 100% female hatchling sex ratios would be predicted. Shaded areas (due to vegetation) and open areas were both relatively warm and predicted to produce significant female biases during the majority of the nesting season. An experimental approach was also adopted in which commercially-available turtle (*Trachemys scripta*) eggs were used as a

surrogate for evaluating actual hatchling sex ratios produced on the CPM nesting beach. Eggs laid during two different time periods of the nesting season (i.e., early nesting season and mid-nesting season) were used in this study. The temperature-dependent sex determination in this species is similar to that of the diamondback terrapin. The results were consistent with our temperature-based prediction model in that all nests produced female biases or 100% females. Collectively, the results indicate that the nesting beach at Cedar Point Marsh was predicted to produce mostly female hatchlings during the 2011 nesting season. It is plausible that year to year variations in tropical weather systems could affect beach temperatures and thus hatchling sex ratios. It would of interest to evaluate if this hatchling bias is reflected in the overall population sex ratios in CPM. Female-biased sex ratios have frequently been reported in populations of turtles with temperature-dependent sex determination. From a conservation viewpoint, female biases could be advantageous in the recovery of a depleted population by enhancing future egg production.

SATURDAY

7:00 Breakfast

8:30 Herp Outing to Indigo Snake Area

12:00 Lunch

2:30 Return from Herp Outing

3:45
Sharon M. Hermann (hermasm@auburn.edu), Auburn University. *Update on habitat structure requirements of gopher tortoises.*

Everyone interested in gopher tortoises can visualize the ideal, open-canopy pine woodland with a lush, sunlit understory of native grasses and forbs. This image guides management efforts to promote high quality habitat. Although a sunny outlook is a good thing, new data suggests that there are additional variables that we may need to consider as negative habitat components.

I'll present information from our study at Ft Benning that evaluates a wide range of variables associated with habitat structure both around burrows and across the landscape. The data supports the focus on some traditional factors (canopy cover, percent cover of herbaceous plants, etc.) and those that are sometimes discussed but not often measured, such as extent of a hardwood midstory. Results support the conventional idea that tortoises are positively associated with grass cover. In addition the data provide quantitative support for previous observations that suggested apparent avoidance of locations with higher stem density of small or large midstory hardwoods.

The most interesting and perhaps useful result is documentation that burrows are negatively associated with small hardwood stems in the ground layer. Surprisingly this negative relationship may be more important than a positive association with herbaceous cover. This information has ramifications for future assessment of tortoise habitat and for planning management activities, including prescribed fire.

4:00

David Laurencio (norops@auburn.edu)**, Craig Guyer**, Auburn University Museum of Natural History. *An introduction to the Auburn University Museum of Natural History FrogWatch USA Chapter.*

Not only do frogs and toads provide the soundtrack to our spring and summer nights, they also play important roles in wetland ecosystems, serving as both prey and predator, and are considered indicators of environmental health. Unfortunately, population declines of many anuran species have been documented throughout the United States and around the world. Collection of long-term population data of frog and toad populations is critical in enabling scientists to understand the scope, geographic scale, and cause of population declines of these indicator species. FrogWatch USA is a long-term citizen science program that collects frog call data, which facilitate an understanding of local species diversity and shifts in that diversity, enable detection of rare and invasive species, as well as provide long-term data on seasonal timing (phenology) of reproduction. Volunteers are offered the opportunity to learn about the environment while collecting valuable information about the frogs and toads local to their area. Participants collect and report information about frog and toad populations, develop and/or enhance their appreciation for the diversity of frog and toad species in their communities, gain a better understanding of the importance of protecting wetland habitats, and establish a closer relationship with the natural environment.
This year saw the establishment of a FrogWatch USA chapter at the Auburn University Museum of Natural History and plans are underway to conduct training workshops and start collecting data during the upcoming 2014 breeding season. This talk will introduce the program and its protocols, discuss upcoming events and invite attendees to become involved.

4:15

Kevin R. Messenger (kevinrmessenger@gmail.com), **Yong Wang**, Alabama A & M University**,** and **Harold F. Heatwole,** North Carolina State University. *Effect of moon phase on nocturnal activity of snakes and implications for making ecological surveys more efficient.*

Abiotic and biotic factors can affect animals' behavior, thereby complicating predicting patterns of activity. Understanding the interaction of variables can enhance the efficiency and accuracy of ecological surveys. The effect of moon phase on nocturnal activity of snakes in an assemblage in South Carolina was studied over

a 7-year period; snakes were surveyed on 502 nights, yielding 2097 snakes of 27 species. The number of snakes encountered during full moon was lower than during new moon between the time of moonrise and moonset. With the exception of colubrids, the effect of moon phase was not evident when data collected before moonrise or after moonset were included. The correlation between moon phase and number of snakes detected became stronger if observations were restricted to the 50% of the time of each night that the moon was up and highest above the horizon; i.e., when the perceived light was the strongest. During periods where there was little or no illumination, activity levels may be high, but are sparse throughout the night, thus making surveys less efficient. Interaction with moon phase with snake activity is unique, poorly documented, and more complex than previously thought

4:30

Taylor M. Roberge (troberge@uab.edu), **Thane Wibbels,** University of Alabama at Birmingham. *Effects of fluctuating incuabiotn temperatures on the phenotype of the red eared slider* (Trachemys scripta).

The use of constant temperatures when examining the relationship between incubation temperature and phenotype in turtles has been fairly common. This method, while appropriate for species with relatively deep nests (i.e. sea turtles) does not accurately represent the fluctuations seen in shallow nesters (e.g. emydid turtles). It has been suggested in species exhibiting temperature-dependent sex determination that fluctuating temperatures can cause observed sex ratios to stray from predicted sex ratios in a constant temperature model. This study, tests how incubation temperatures varying ±6 °C from a mean of 28.2 °C affects phenotype, and incubation duration of the red eared slider (*trachemys scripta*). Results indicate that fluctuating temperatures cause a significant increase in incubation duration, while also skewing the sex ratio predicted to be primarily males by the mean temperature model to 100% female. Eggs incubated at a constant 28.2 °C produced male biased hatchling sex ratios. No significant differences were found in carapace width, length, or mass of the individuals. Collectively, the results indicate that fluctuation incubation temperatures may have a more complex effect on hatchling phenotype that cannot be explained by differences in developmental rates alone.

4:45

Jennifer Y. Lamb (Jennifer.lamb@eagles.usm.edu), **Carl P. Qualls**, The University of Southern Mississippi and **Hardin Waddle**, U.S. Geological Survey Lafayette, LA. *Stream-breeding plethodontid salamanders in the Gulf Coastal Plain: Are assemblages shaped by environmental gradients?*

Plethodontid salamanders that breed in lotic systems are exposed to multiple ecological gradients that could affect their survival and fitness. Consequently, species occupancy, and species richness, may vary along these transitions. There is a dearth of information regarding the habitat associations of stream-breeding plethodontids in the Gulf Coastal plain, and our ability to effectively conserve and manage populations and assemblages is hampered without these kinds of baseline data. Previous research suggests that Gulf

Coastal plain plethodontids segregate in to different assemblages along two particular gradients, stream size and the topography of the stream valley (Means, 2000). Local hydrology is likely also important because the larval period of some of the species in question lasts for greater than one year. We sampled larval plethodontid salamanders in 60 sites, spread across 16 streams in the Pascagoula River Watershed in South Mississippi, to determine the influence of these, and other, gradients on species occupancy. We sampled 31 sites in Summer 2012 and the remaining 29 sites in Summer 2013. We used leaf-litter bags (Waldron et al., 2003) to capture salamanders, and sampled each site three times. We also collected a variety of habitat data that describe the gradients of interest, as well as other potentially important variables. We analyzed these data using hierarchical multi-species Bayesian models, which are particularly useful when dealing with systems wherein false-absences are common and the probability of detection is less than 1 (MacKenzie, 2006; Royle and Dorazio, 2008). Over the course of the study, we captured 2065 larval and transformed salamanders belonging to 5 species of stream-breeding plethotdontids, including the southern two-lined salamander, *Eurycea cirrigera,* three-lined salamander, *E. guttolineata*, dwarf salamander, *E. quadridigitata*, spotted dusky salamander, *Desmognathus conanti*, and the southern red salamander, *Pseudotriton ruber vioscai.* These species differed in their overall probabilities of occupancy, with *E. cirrigera* being the most likely species to occur at any site. Furthermore, each species also responded differently to the environmental gradients of interest. Our data suggest that, at least for some species, previously described habitat associations may underestimate where these species of salamanders are likely to occur.

5:00

David Laurencio (norops@auburn.edu)**, Craig Guyer**, Auburn University Museum of Natural History. *The Alabama Herp Atlas Project (AHAP): past results and future directions.*

The Alabama Herpetological Atlas Project (AHAP) is a volunteer network of amateur herpetologists, teachers, and students established throughout the state to gain a better understanding of the distribution and abundance of Alabama's amphibians and reptiles. Since its inception in 1994, hundreds of volunteer citizen scientists have participated by turning in thousands of slides, photographs, digital images, or audio/video recordings along with corresponding species and locality data. Specimens have been submitted from 60 of Alabama's 67 counties and comprise just under 70% of the state's species. We look now to re-launch the project via an interactive website that will be developed to serve, not only as a data entry interface, but also as a portal to Alabama herpetofaunal information, including maps, species accounts, keys, etc. We also plan to develop standards-based lessons and activities for both formal and informal settings so that educators can utilize the AHAP as a hands-on, inquiry-based, experiential educational tool.

5:30

Austin H. Patton, Warren-Wilson College, and **Kristin A. Bakkegard** (kbakkega@samford.edu), Samford University. *Using Morphometrics to Distinguish*

between Two Slimy Salamander Species in Central Alabama (Plethodon glutinosus & Plethodon mississippi)

The *Plethodon glutinosus* species complex is comprised of at least 13 species. When the group was first split, ranges of each species were approximated using the unequally distributed sampling regime originally used to identify each species group. However, this did not fully account for Alabama's physiographic regions, which often influences the distribution of the state's herpetofauna. The ranges of *Plethodon glutinosus* and *P. mississippi* meet in central Alabama, where four of the state's physiographic regions also converge. Complicating this matter is the cryptic morphology of these two species, which made distinguishing between each species problematic. Consequently, we used geometric and linear morphometric methodologies to determine whether we could distinguish between each species morphologically and thus refine the range of *P. glutinosus* and *P. mississippi* by classifying specimens taken from central Alabama into their correct species groups. We found no difference in head shape between the two species, but did find that *P. glutinosus* was significantly larger than *P. mississippi* in body size. This was not expected, as geometric morphometric methods have been shown to be sensitive to subtle shape differences. It is possible that the ranges of these two species do not overlap, limiting interspecific competition, thus resulting in minimal shape change. We recommend that genetics studies, which focus on the boundaries between the state's different physiographic regions, be conducted to refine these two species' range limits and identify broad scale patterns of gene flow across these regions.

5:45

Colt R. Sanspree (crs0027@auburn.edu), Auburn University, **Scott Cohen**, and **Chris Murray** (cmm0054@auburn.edu), Auburn University. *Size Does Matter- Evidence of Sexual Dimorphism in Skull Morphology of Adult American Alligators (Alligator mississipiensis).*

Sexual dimorphism is apparent in many forms in vertebrates and invertebrates. Color, size, shape, structure, and behavior are some examples, with color and structure being the most recognizable differences in many species. However, many sexually dimorphic species are hard to distinguish between males and females due to their subtle variances. For example, Crocodylians are sexually dimorphic but many of the distinctions between males and females require close examination. Moreover, sexual dimorphism in many animals is not expressed until sexual maturity is reached. American alligators, *Alligator mississipiensis,* are thought to have ontogenetic shift in skull morphology that is evident at maturity in males. We predict that mature male American alligators will have larger skulls than mature female American alligators, and that juvenile male and female American alligators will not have any significant difference in skull size. We also predict that this size difference may be advantageous in males for courtship and defending territory. We test our hypothesis by using geometric morphometric analysis on dorsal photographs of American alligator skulls.

6:00 Dinner

6:45

Jeffrey M. Goessling (goessling@auburn.edu)**, Mary T. Mendonça, and Craig Guyer,** Department of Biological Sciences, Auburn University. *Effects of lipopolysaccharide on thermoregulation and circulating leukocyte profile in the Gopher Tortoise,* Gopherus polyphemus

The vertebrate immune system is responsible for preventing and combating infection by a complex, yet tightly regulated system of both innate and adaptive features. One innate response to infection is the generation of fever, wherein thermoregulatory setpoint is increased. Additional adaptive changes associtated with fever include alterations in circulating leukocyte profile, plasma biochemistry, and metabolic rate. Herein we were interested in testing whether the Gopher Tortoise (*Gopherus polyphemus*) generates a febrile response to a well-documented pyrogen, lipopolysaccharide (LPS). We injected Gopher Tortoises intraperitoneally with either LPS suspended in saline or saline control. In response to the treatment we found that Gopher Tortoises alter their thermal setpoint and thermoregulatory behavior, thereby indicating a fever response in this species. Additionally, we found that Gopher Tortoises alter their leukocyte profile in response to LPS injection such that total leukocytes and heterophils are increased in circulation. These data suggest a role for fever as an adaptive mechanism of the innate immune system in preventing infection in the Gopher Tortoise.

7:00

Christopher M Murray (cmm0054@auburn.edu**), Craig Guyer, James L. Dobie,** Auburn University. *Diagnostic cranial variation between independent lineages of alligator snapping turtle (*Machrochelys temminckii*)*

The alligator snapping turtle (*Macrochelys temminckii)* has been under studied from an evolutionary perspective until recently. Severe harvesting pressure has resulted in low densities across the species' distribution. Since recovery has been made possible, the species has been extensively examined from an ecological perspective; however, recent investigations have elucidated the potential for independent evolutionary lineages within the taxon. Current evolutionary investigations using molecular and morphological datasets are underway. This study attempts to diagnose cranial synapomorphic characters unique to independent lineages within the taxon and assist morphological description and identification as these unique lineages are diagnosed. Here, a geometric morphometric approach is used to expound upon traditional mensural and morphometric characters. Preliminary analyses reveal variation in maxilla and palatine width, basisphenoid shape, and head length. Character variation among specimen groups is consistent with previously hypothesized biogeographic barriers. Results need to be compared to traditional molecular and morphological data analyzed in a phylogenetic context.

7:15
Chelsea Ward, Kyle Taylor, Kaori Knights (Cward3@aum.edu), Auburn University Montgomery. *Temperature effects on the Anuran immune system.*

Temperature has long been known to affect physiological processes in ectotherms. It is generally accepted that an increase in temperature will increase physiological processes, including immune processes, up to a thermal maximum. The temperature effects are supported by ectotherm behaviors. Animals that are infected with pathogens often bask or choose warmer areas. We tested whether an increase in temperature would cause an increase in the activity of the Anuran immune system. Fifty-six marine toads, (*Rhinella marina*), were collected from Dade Co., Florida and placed in ten gallon aquariums. The toads were divided into two temperature treatments. Cool toads (n=28) were kept at room temperature (22◦C) and warm toads (n=28) were kept at 24◦C. These temperatures are within the normal range for this species. Toads were allowed to acclimate for two weeks. Half of the cool toads (n=14) and half of the warm toads (n=14) were given lipopolysaccharide from *E. coli* to mimic bacterial infection. Phagocyctic activity, complement activity, antibody production, and histamine levels were then measured in all toads, each week, for 6 weeks. A two degree increase in temperature negatively affected all measures of the immune system. Antibody production to a novel antigen and phagocytic activity were significantly decreased in both healthy and pseudo-infected toads ($p<0.05$) kept at warmer temperature. Complement activity and histamine levels were significantly decreased in pseudo-infected but not healthy toads ($p<0.05$) at the warmer termperature. This data is counter intuitive to the current understanding of ectotherm physiological processes and may provide a link between climate change and the pathogenic infections believed to be a leading cause of amphibian decline.

7:45 (Video)
Ken Marion (kmarion@uab.edu), **Taylor Roberge, Andrew Coleman, Thane Wibbels,** University of Alabama at Birmingham, **David Nelson,** Univeristy of South Alabama, **John Dindo,** Dauphin Island Sea Lab, **Claire Datnow, Boris Datnow,** Video Producers and Editors. *The status of the diamondback terrapin in the salt marshes of Alabama*.

This video was produced by Boris and Claire Datnow to be used as an educational tool for a younger audience. Claire Datnow is an author of an eco-mystery series known as the Sizzling Six. When she completes her book on the diamondback terrapin there will be links on the digital version and QR codes on the printed copies that will bring you to the video. The goal of the video and book is to bring awareness to the diamondback terrapin and introduce conservation to a younger audience.

8:00 Poster Session/Social

SUNDAY

7:00 Breakfast

About Our Chapter

Alabama PARC is chaired by Taylor Roberge and Chris Murray and is a chapter within Southeast PARC (SEPARC) co-chaired by JJ Apodaca and Jessica Homyack. For more information about SEPARC visit www.separc.org. ALAPARC's website is www.alaparc.org. National PARC's website is www.parcplace.org.

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