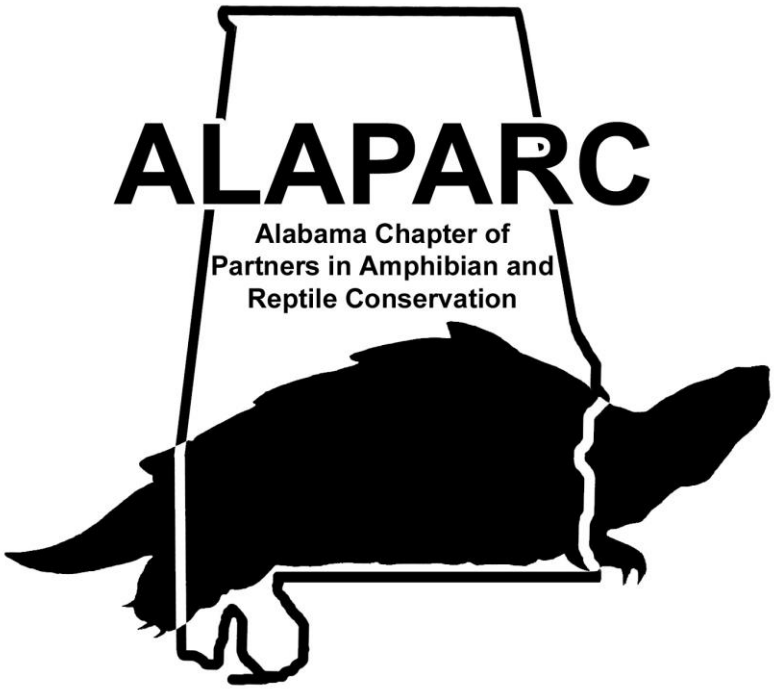

Alabama
Partners in Amphibian and Reptile Conservation
2014 Meeting Program

Solon Dixon Forestry Education Center, Andalusia, AL

PARC
PARTNERS IN
AMPHIBIAN AND REPTILE CONSERVATION

About Our Meeting

Welcome to the sixth 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 3th, 2013

Time	Event/Title	Presenter
1:30	Herp Outing around Dixon Center	
5:00	Return from Herp Outing	
6:00	***Dinner***	
	Oral/Poster Presentations 6:45-7:45	
6:45	Regional Warming and the Thermal Regimes of American Crocodile Nests in the Tempisque Basin, Costa Rica	Christopher M. Murray
7:00	Searching for the "Heartbreak Turtle": How the Efforts of Diverse Personalities Coalesced to Save the Kemp's Ridley Sea Turtle.	Thane Wibbels
7:15-7:55	Poster Viewing	
8:00	Social	

Saturday October 4th, 2013

Time	Event/Title	Presenter
	8:00	
	Oral Presentations 9:30-11:45	
9:30	Refuge Usage of the Flattened Musk Turtle (*Sternotherus depressus*) in Two Small Rivers	Arthur Joseph Jenkins
9:45	Population Ecology of Gulf Coast Box Turtles (*Terrapene Carolina major*) in Coastal Mississippi	Andrew T. Coleman
10:00	Trial Use Effects on Stream Salamanders and Macroinvertebrates at Oak Mountain State Park	Paige Van de Vuurst
10:15	Past and Present: Life history and Population Dynamics of *Plethodon montanus*	Nicholas M. Caruso
10:30	Relationship between Foraging Behavior and Diet in the Timber Rattlesnake, *Crotalus horridus*	Scott M. Goetz
10:45	***Coffee Break***	

11:00	Observing Pure and Hybrid morphology of the Species *Anaxyrus americanus, Anaxyrus fowleri,* and *Anaxyrus terrestris* in Alabama	Jacqualine M. Chivers
11:15	The Biogeography of Stress in the Wood Frog	Leslie Rissler
11:30	The Status and Population Genetics of the Flattened Musk Turtle	Peter A. Scott
12:00	***Lunch***	
1:30	Herp Excursion in Conecuh National Forest	
5:00	Return from Excursion	
6:00	***Dinner***	
6:45	Poster Viewing/ Social	

Sunday October 5th, 2013

Time	**Event/Title**	**Presenter**
8:00	Breakfast	

SCHEDULE DETAIL

FRIDAY October 3rd

1:30 Herp Excursion around Solon Dixon FEC

5:00 Return from Excursion

6:00 Dinner

6:45
Christopher M. Murray (cmm0054@auburn.edu), **Michael Easter**, **Sergio Padilla**, **Mahmood Sasa Marin** and **Craig Guyer**, Auburn University, *Regional Warming and the Thermal Regimes of American Crocodile Nests in the Tempisque Basin, Costa Rica*

The spatial variation in global climate change makes population-specific responses to this enigmatic factor pertinent on a regional scale. Organisms with temperature-dependent sex determination (TSD) potentially possess a unique physiological susceptibility that threatens population viability. Rapid environmental effects on sex ratios may render populations non-viable. A uniquely male-biased hatchling cohort in the American crocodile population of the Tempisque Basin, Costa Rica requires assessment at the level of sex determination. Here, we investigate the extent of regional warming in the Tempisque Basin, test the hypothesis that regional thermal regimes are responsible for male-biased clutches, generate a general thermal profile of American crocodile nests, and test the compensatory benefit of nest location as a behavior liberating crocodiles from the effects of climate change. While an increase in daily low temperature is rapid across the region, thermal regimes of nests do not indicate male-biased clutches. Multiple data loggers per nest indicate high within-nest variation in temperature. Further, our data suggest that egg size outweighs microhabitat parameters in influencing nest thermal regimes as a function of metabolic heating.

7:00
Thane Wibbels (twibbels@uab.edu**) , Elizabeth Bevan, Amy Bonka**(University of Alabama), **Jaime Pena**, **Francisco I. Martinez, Javier M. Cuevas,** and **Hector Chenge,** (Gladys Porter Zoo, Brownsville, TX)**.** *Searching for the "Heartbreak Turtle": How the efforts of a diverse group of historic personalities coalesced to save the Kemp's ridley sea turtle.*

The Kemp's ridley sea turtle (Lepidochelys kempi) was once considered one of the most mysterious animals in North America. It was found throughout the Gulf of Mexico and along the Atlantic coast of the U.S., but it was not known to breed or nest. When the nesting beach was finally discovered by the scientific community, the species was in decline and it became the most endangered sea turtle in the world, nearing the brink of extinction by the mid 1980's. The discovery of the nesting beach and the recovery of this species was facilitated by the efforts of a diverse group of individuals from a wide variety

of backgounds. The Kemp's ridley history exemplifies the logistical and political hurdles associated with the recovery of an endangered species.

7:15 Poster Session

8:00 Social

Poster Abstracts

Lacy E. Rucker (ruckerlacy@gmail.com), **Yong Wang**, Alabama A&M University
Callie Jo Schweitzer USDA Forest Service Southern Research Station, *The Effects of Forest Disturbance on the Oviposition Site Preference of Amphibians on the mid-Cumberland Plateau in Southern Tennessee*

Amphibians' response to silviculture practices has merited a significant amount of interest because of their sensitivity to habitat disturbance; the effects of these practices on adult egg deposition have yet to be fully explored. The purpose of this study is to evaluate the impact of forest disturbance, distance from a forest edge, and the effect of light intensity on the breeding pool preference of anurans on the mid-Cumberland Plateau. One of three silviculture treatments (control with gaps, shelterwood, and oak shelterwood) were applied to stands and replicated 4 times, and pool arrays were randomly placed at distances of 10, 50, and 100 meters from the edge within the treatment stands and replicated for a total of 42 pool arrays. Pool arrays contained three artificial mesocosms, and each pool was assigned a screen to manipulate light intensity. Artificial pools were monitored over two peak-breeding seasons from April to September. Opportunistic encounter, visual encounter surveys, coverboards, and dip-net surveys were conducted every 7-10 days, and metamorphic data will be recorded on all collected individuals. Repeated measures ANOVA and multiple linear regression was used to analyze the correlation of forest disturbance on breeding pool preference. The results of this study will improve our understanding of forest disturbance on the community ecology of amphibians, and will also provide forest managers and private landowners the knowledge to help reduce the negative impacts of forest management techniques on amphibian populations while managing for oak species regeneration on the Cumberland Plateau.

Iwo P. Gross (iwogross@gmail.com), **Yong Wang**, Alabama A&M University, &
Callie J. Schweitzer, USDA Forest Service, Southern Research Station. *Maternal and juvenile habitat use, dispersal, and hibernation of Copperheads (Crotalinae; Agkistrodon) in a managed southeastern forest.*

Recent studies have identified the neonatal snake cohort as an important dispersal vector in several species. Unfortunately, the comprehensive examination of early-life characteristics in snakes is logistically challenging as a result of ineffective tracking techniques and low detection probabilities in wild populations. In this study, we will examine the activity patterns, overwintering habitat requirements, and survival of gravid female Copperheads (*Agkistrodon contortrix*) and their offspring that inhabit Bankhead

National Forest (BNF) in northwestern Alabama. Gravid snakes will be implanted with standard radiotransmitters and tracked continuously from early summer until hibernation. In advance of parturition (late August), we will bring females into the lab and hold each snake in isolation until they give birth. Select neonates >8g will be tracked using harmonic direction finder (HDF) tags, which function by reflecting incoming microwave signals at a harmonic frequency that can be detected by a handheld transceiver and pinpointed using basic telemetry methods. These schottky diodes require no batteries, are lightweight (*ca.* 80 mg), and have a detection range appropriate for a study involving small organisms. Macro- and microhabitat surveys will be conducted alongside tracking efforts of both age classes throughout the activity season. The simultaneous implementation of these methods will help us draw conclusions concerning vital snake nesting and overwintering habitat, and the variation in habitat use and survival across Copperhead age classes.

Justin Haynes (jrhaynes@bsc.edu) and **Dr. Megan Gibbons**, Birmingham Southern College. *Examination for the amphibian chytrid fungus at Ruffner Mountain Nature Preserve.*

In the summer of 2014, research was conducted in the Biology Department of Birmingham Southern College to document the presence of amphibian chytrid fungus, *Batrachochytrium dendrobatidis* (Bd), in the area. Field sampling of amphibians took place at nearby Ruffner Mountain Nature Preserve. The skin of adult individuals was swabbed in the field for Bd, and larval amphibians were euthanized and swabbed in the lab. Following DNA extraction from the swabs, polymerase chain reactions (PCR) were used to amplify the Bd DNA. Finally, the PCR product was evaluated using gel electrophoresis to test for Bd. Of 115 amphibian samples from different animals, none of them tested positive for Bd. While this contradicts previous research that has found Bd at Ruffner Mountain, this data could give some support to the hypothesis that Bd can be found at a location during the cooler months but not in the hotter months of the year at that same location.

Amy Bonka (abonka@uab.edu**),** University of Alabama at Birmingham**, Mauricio H. Hernandez,** Gladys Porter Zoo**, Thane Wibbels,** University of Alabama at Birmingham**, Marco A.C. Martinez,** CONANP**, Jaime Pena,** Gladys Porter Zoo**, Pat Burchfield,** Gladys Porter Zoo. *Emergence Times and Sea-finding Orientation of Hatchling Kemp's ridley (Lepidochelys kempii) Sea Turtles at Their Natural Nesting Beach.*

Two important events in the life history of sea turtles are the emergence from the nest and the sea-finding orientation following the emergence event. These events are critical to the survival of hatchlings and are therefore of biological, behavioral, and conservational interest. The current study evaluated emergence times and sea-finding behavior in hatchlings produced in the Bi-National Kemp's Ridley Recovery Program at this turtle's primary nesting beach located at Rancho Nuevo, Mexcio. Emergence times were recorded using infrared, time-lapse wildlife cameras. These cameras were placed above nests in the hatching corrals on nights of expected emergence. The results indicate that hatchlings emerge after midnight, with the majority of activity happening in the early

morning hours. Sea-finding behavior was evaluated in orientation arenas on the natural nesting beach. The orientation arena facilitated the quantifying of hatchling movements. Trials were conducted using two different horizon regimes and three different time periods in the early morning during the 2014 nesting season. Trials were run with ten to fifty hatchlings per time period and all hatchlings were used only once per trial. The results indicate that factors such as openness of horizon and the surrounding light-field affected hatchling orientation. These findings suggest that visual cues represent important components in sea-finding behavior. The results of this study have implications for the biology and conservation of the Kemp's ridley sea turtle. .

Christopher M. Pellecchia (cpellecchia@jsu.edu), Jacksonville State University. *Reptile and Amphibian Survey with Focus on Fossorial Snakes of Cleburne County, Alabama*

Seven small "fossorial" snake species may be found in east-central Alabama: The Southern Ringneck Snake (*Diadophis punctatus*), the Dekay's Brown Snake (*Storeria dekayi*), the Northern Red-bellied Snake (*Storeria occipitomaculata),* the Southeastern Crowned Snake (*Tantilla coronata*), the Rough Earth Snake (*Virginia striatula*), the Eastern Smooth Snake (*Virginia valeriae*), and the Eastern Worm Snake (*Carphophis amoenus*). These smaller, secretive snakes and their roles in the herpetofaunal communities are often overlooked by larger or more dangerous species. This study will be to focus a population survey on these seven species at Boy Scouts of America's Camp Seqouyah (a 1387 acre property) in Cleburne Co, Alabama. Pitfall traps, drift fences, and coverboards have been placed at six sites (three upland and three lowland) spread across the property to facilitate monitoring of these species. Special focus will be placed on the interactions between the rear-fanged and occasionally ophiophagus, *D. punctatus*, and the six other target species. All species of reptiles and amphibians recorded as "by-catch" during this survey will be recorded and used to update state and county records of this region of Alabama.

SATURDAY

8:00 Breakfast

9:30

Arthur Joseph Jenkins (ajj0012@auburn.edu) and **Jim Godwin**, Alabama Natural Heritage Program. *Refuge Usage of the Flattened Musk Turtle (Sternotherus depressus) in Two Small Rivers*

The Flattened Musk Turtle (*Sternotherus depressus*) is reliant on refuges for protection and hibernation. However, little has been published focusing on this important aspect of its natural history. Using radio telemetry, we followed 33 *S. depressus* in two small rivers (Sipsey Fork and Brushy Creek) in Bankhead National Forest (Winston County, Alabama). Refuge type was recorded for 654 observations from June of 2013 to August of 2014. Throughout this study, *S. depressus* utilized rocks (n=197), crevices (n=335), mud (n=6), roots/debris (n=64), logs (n=38), sand (n=3), and algea (n=11) for cover at varying frequencies. *S. depressus* used crevices ($p<.001$) and logs ($p<.001$) as refuge

significantly more than expected from stream habitat transects. Sand was used for cover significantly less than expected ($p<.001$). We discovered a correlation between refuge usage diversity and the time scale of this study. This correlation supports our hypothesis that *S. depressus* is less particular about refuges in late spring and summer, during increased activity due to reproductive and foraging efforts, than in the rest of the year. Our results reflect the importance of rock bottom streams with low siltation on the continued survival of this threatened turtle.

9:45
Andrew T. Coleman (acoleman@imms.org), Institute for Marine Mammal Studies.
Population Ecology of Gulf Coast Box Turtles (Terrapene carolina major) in Coastal Mississippi

Coastal Mississippi supports an apparently healthy population of Gulf coast box turtles (*Terrapene carolina major*); however, this population has been poorly studied and could be experiencing an unsustainable amount of road mortality. A long–term study was initiated in 2012 to collect important demographic data on this population. For box turtles that were encountered and collected, a suite of morphological measurements, sex, and location were noted. Adult males were generally larger (average straight-line carapace length (SCL): 16.6 cm ± 1.53 cm) than adult females (average SCL: 14.22 cm ± 2.05 cm). Turtles that inhabited the area around the IMMS property were tagged before release, and recaptures allowed for examining growth in tagged individuals. These baseline data will be critical in any future management activities for this coastal species.

10:00
Paige Van de Vuurst (vvandevu@samford.edu), Samford University, **Éléonore É. Dupal,** Virginia Polytechnic Institute and State University, **Elizabeth G. Dobbins**, and **Kristin A. Bakkegard**, Samford University. *Trail Use Effects on Stream Salamanders and Macroinvertebrates at Oak Mountain State Park*

Little is known about the effects of hiking and mountain biking trails on stream ecosystems. Oak Mountain State Park in Shelby Co., Alabama is a popular recreational location with both hiking and mountain biking trails. We studied the effects of these trails on adjacent streams (within 10 m) by measuring the deposition of inorganic sediment, the physical and chemical water quality characteristics, and both the salamander and macroinvertebrate populations during June and July 2014. We found that mountain bike trails significantly increased sediment deposition and turbidity in adjacent streams. In addition, mountain bike trails significantly reduced salamander population densities and macroinvertebrate richness, density, and percent EPT. Our results suggest a negative effect on stream ecosystems adjacent to mountain bike trails. Streams associated with hiking trails were not distinctly different from control streams. We also compared the effectiveness of leaf litter bags and visual quadrat sampling as methods for counting salamanders. Further study is needed to determine the mechanism by which mountain bike trails effect streams, but our results implicate sediment. We recommend that future mountain bike trails be placed at least 10m from adjacent streams to protect these fragile ecosystems.

10:15
Nicholas M. Caruso (carusonm@gmail.com)**, Leslie J. Rissler**, University of Alabama
Past and Present: Life History and Population Dynamics of Plethodon montanus

We used extensive museum collections and multiple years of mark-recapture to document life history and population dynamics among past and present population of a montane endemic salamander, *Plethodon montanus*. For past populations, we measured 1,409 *P. montanus* specimens from the natural history collections at the National Museum of Natural History (NMNH) to determine body size and individual growth rates, sex ratios, and reproductive status of the same populations sampled from 1960-1996. While for current populations, we surveyed five mark-recapture sites along an elevational gradient from 2013-2014, to determine population size and growth rates, survivorship, movement and home range sizes, body size and individual growth rates, sex ratios, surface activity, resource availability, and genetic diversity. Current population densities ranged from 0.38-1.96 salamanders/m^2 and were highest at the mid-elevation site while lower densities were found at highest and lowest elevations. For both current and museum specimens, males and females were in equal proportions at smaller sizes but there was a higher proportion of females at the largest sizes. Salamanders that were captured at least twice showed strong site fidelity, similar to other *Plethodon* species. These data will establish lacking life history information for a recently described species and lead to the development of population models to understand the impacts of a changing climate on reproduction, individual growth rates, survivorship and ultimately population growth.

10:30
Scott M. Goetz (Goetz@auburn.edu), Auburn University, **Christopher Petersen**, Naval Facilities Engineering Command Atlantic, **Robert Rose**, Old Dominion University, **John Kleopfer**, Virginia Department of Game and Inland Fisheries, and **Alan Savitzky**, Utah State University. *Relationship between Foraging Behavior and Diet in the Timber Rattlesnake, Crotalus horridus.*

Although dietary records for many snake species are becoming more comprehensive, few studies have examined the relationship between foraging behavior and dietary habits. Interpopulation dietary variation in the Timber Rattlesnake (*Crotalus horridus*) has been documented, at both regional and local population levels. Dietary variation between snake populations has been linked to differences between open forest-floor and log-oriented ambush postures. However, there is a lack of comparative dietary information for populations exhibiting a vertical-tree ambush posture. During the course of a 10 year telemetry study, we examined the diet and ambush posture of a population of *C. horridus* in southeastern Virginia. A total of 40 dietary items were identified from 37 fecal samples. We documented 722 instances of snakes in an ambush posture. The most common prey item was the Gray Squirrel (*Sciurus carolinensis*), which accounted for 45% of all dietary items. *S. carolinensis* were consumed at a higher proportion than expected based on small mammal availability and constituted a greater proportion of prey in comparison to other populations. In agreement with diet, ambushing snakes were most

often (61%) observed in the vertical-tree posture. Our data provide indirect evidence that the vertical-tree foraging posture is adopted to target the arboreal *S. carolinensis*. Further, our results highlight the importance of understanding relationships between foraging behavior and diet.

10:45 ***Coffee Break***

11:00

Chivers M. Jacqueline (jmc0026@auburn.edu), **Craig Guyer**, Auburn University.
Observing pure and hybrid morphology of the species Anaxyrus americanus, Anaxyrus fowleri, and Anaxyrus terrestris in Alabama

The American toad (*Anaxyrus americanus*), Fowler's toad (*Anaxyrus fowleri*) and the southern toad (*Anaxyrus terrestris*) are known to hybridize. In this study we observed the extent of hybridization among these species using morphological characteristics. We examined 180 preserved toads from Auburn University's Museum of Natural History and collected morphological data including body length, condition of the junction of the interorbital and postorbital crests, size of tibial warts, number of warts per dorsal dark spot, and contact of the postorbital crest with the parotoid gland for all three species. Location coordinates for each specimen were plotted on a map of Alabama to examine geographic range. Using MDS and cluster analysis, the results showed morphology is useful in identifying *Anaxyrus fowleri*. *A. americanus* and *A. terrestris* are not as morphologically distinct as gene trees claim. *Anaxyrus fowleri* had a higher frequency of hybridization with *A. terrestris* than with *A. americanus*. *Anaxyrus americanus* specimens exhibited a higher hybridization frequency with *A. terrestris* than with *A. fowleri*. *Anaxyrus terrestris* showed a higher hybridization frequency with *A. americanus* compared with *A. fowleri*. Morphological hybrids between *A. americanus* and *A. terrestris* occur mainly along the fall line where the species' geographic ranges meet. Morphological hybrids of *A. fowleri* occur without geographic limitations.

11:15

Sarah Duncan, **Nichole Mattheus**, **Erica Crespi**, and **Leslie Rissler** (rissler@as.ua.edu) University of Alabama.
The Biogeography of Stress in the Wood Frog

The idea of environmental stress is an inherent component of biogeographic and macroecological ideas surrounding species' range distributions. One of the most cited hypotheses explaining broad macroecological patterns is the Core-Periphery (C-P) hypothesis (also called core-edge hypothesis and an associated centre-abundance hypothesis), which has been called a 'general rule' in biogeography. The C-P hypothesis predicts that patterns of abundance, genetic variability, and stress are directly correlated with environmental quality that varies in predictable ways across a species' range. We test this using the wood frog as our model system. We present some highlights of recent and ongoing ecological experiments and genetic assessments showing how allelic richness, corticosterone levels, and body size vary both latitudinally and across areas that vary in environmental suitability.

11:30
Peter A. Scott (pscott@crimson.ua.edu) and **Leslie J Rissler** The University of Alabama. *The Status and Populations Genetics of the Flattened Musk Turtle*

The Flattened Musk Turtle, *Sternotherus depressus*, is a federally threatened and IUCN listed (critically endangered) freshwater turtle endemic to the upper reaches of the Black Warrior River basin in north-central Alabama, USA. We conducted a large scale study on the current physical status, conservation genetics, and assessment of possible deleterious genetic introgression from *S. minor* to *S. depressus*. Our current work shows that the range of *S. depressus* is greatly reduced from its historic distribution. Additionally, mtDNA and morphological data shows strong signal of unidirectional gene flow from *S. minor* into *S. depressus*. Although useful for initial inferences, the low genetic diversity in the turtle mitochondrial genome and general limitations due to the nature of mtDNA render it less than ideal for assessing hybridization throughout contact zones. Expanding on mtDNA work, preliminary RADseq based genomic sequencing of a subset of individuals show cytonuclear discordance in genetic signal. This suggests that strong signals of mtDNA introgression may result from a mtDNA sweep and not from ongoing introgression between species. This research has major implications for the long-term survivorship of *S. depressus* in three ways: 1) identifying regions where *S. depressus* populations are currently extant and reproducing; 2) inference genetic population structure between *S. depressus* populations; and, 3) identification of pure *S. depressus* populations without *S. minor* alleles. Additional samples in our genomic data set combined with our current work on the physical status of *S. depressus* will continue to provide a comprehensive assessment of *S. depressus* in the wild outline a framework for conservation priorities to ensure the long-term survivorship of *S. depressus*.

12:00 Lunch

1:30 Herp excursion in Conecuh National Forest

5:00 Return from Excursion

6:00 Dinner

6:45 Poster Session/Social

SUNDAY

8:00 Breakfast

About Our Chapter

Alabama PARC is chaired by Jimmy Stiles and Taylor Roberge and is a chapter within Southeast PARC (SEPARC) co-chaired by Bill Sutton and Theresa Stratmann. For more information about SEPARC visit www.separc.org. ALAPARC's website is www.alaparc.org. National PARC's website is www.parcplace.org.

Map of Dixon Center Campus