33rd Annual Meeting of the Gopher Tortoise Council

"Gopher Tortoise Conservation- Yesterday, Today and Tomorrow"

14-16 October 2011

Meeting Location:

Wyndham Orlando Resort
Orlando, Florida

33rd Annual Meeting of the Gopher Tortoise Council

PROGRAM SCHEDULE

THURSDAY, OCTOBER 13TH, 2011

GTC Annual Fall Business Meeting Augustine's Restaurant at Wyndham Orlando Resort at 6:30 p.m.

FRIDAY, OCTOBER 14TH, 2011

Time	Event/Title	Presenter
8:00-9:00	Registration	
9:00-9:10	Welcome/Introduction	Ron Concoby
9:10-9:40	Keynote Speaker: Commensal Species Conservation: Yesterday, Today, and Tomorrow	Chris Jenkins
9:40-10:00	Dispersal of Neonate Timber Rattlesnakes in the SE Coastal Plain	Jennifer Howze
10:00-10:20	Future of GT Conservation is Dependant Upon Future of Private Family Forests	Joe Butler, Jr
10:20-10:35	Break	
10:35-10:55	Methods for Detecting New Invasions and Assessing Gopher Tortoise Burrow Visitation Rates by the Argentine Giant Tegu	Bernie Kaiser
10:55-11:15	Gopher Tortoise Ticks and a Novel *Rickettsia* from Gopher Tortoises in Georgia	Jessica McGuire
11:15-11:45	The Genetic Structure among Subspecies of E. Pine Snakes	Angela Getz
12:00-1:30	Lunch - Deli Buffet	
1:30-1:50	Changes in densities of Eastern Indigo Snakes over three decades at Gulf Hammock Wildlife Management Area, Florida	Steve Godley
1:50- 2:10	The Insect Guests of the Florida Land Tortoise: 1890's to Present	David Almquist, Don Stillwaugh
2:10-2:30	A five-year review of the juvenile Gopher Tortoise head-starting study at Camp Shelby.	Matt Hinderliter
2:30-2:45	Break	
2:45-3:05	Is the Gopher Tortoise Compatible With Cows?	Bill Hentges
3:05-3:25	Relocating Gopher Tortoises to a Cattle Ranch. How Does Reproductive Output Vary Between Years and Resident & Relocated Female?	Anna Hathaway
3:25-3:45	An Assessment of Gopher Tortoise Population Structure and Reproductive Output at White Oak Plantation, Nassau County, Florida	Rachel Smith
3:45-4:05	Contrasting Patterns of Habitat Use by Gopher Tortoises in Florida Scrub and Mesic Pine Flatwoods	Traci Castellon´
4:05-4:25	Population Structure and Nest Success of Gopher Tortoises and Vegetative Response to Prescribed Burning in Northeast Florida	Kristine Amatuli
5:30-6:45	Dinner, Awards Ceremony & GTC Business Update - Plated sit down dinner (Choice of Blackened Grouper or Hickory Smoked Brisket)	Ron Concoby David Steen
7:00	Social/Poster Session	

SATURDAY, OCTOBER 15TH, 2011

Time	Event/Title	Presenter
8:00-8:45	Registration & Continental Breakfast	
8:45-9:05	Introduction of Main Session	Ron Concoby
9:05-9:25	Looking for Links Between Bone-Density, "Yellow-spot", Soil Type and Burrowing Behavior in the Gopher Tortoise	Daniel Gaillard
9:25-9:45	Determining Gopher Tortoise Burrow Occupancy Using a Robotic Camera	Alexandra Legeza
9:45-10:05	Orange County Case Study Update: Recipient Site Permitting on Public Lands for the State-Listed Gopher Tortoise	Kelly Peterman
10:05-10:20	Break	
10:20-10:40	Field Trip Announcement, Poster Session Announcement(s)	Ron Concoby
10:40-11:15	Introduction to Special Session– Tortoises, Commensals and Special Research Needs	Deborah Burr
11:15-12:00	Special Session: Minimum patch size / Minimum viable population followed by informal audience discussion period	Henry Mushinsky Earl McCoy
12:00-1:30	Lunch	
1:30-2:10	Special Session: Restocking/ Relocation followed by informal audience discussion period	Tracey Tuberville, Laurie Macdonald, Kurt Buhlmann
2:10-2:50	Special Session: Juvenile needs and survival followed by informal audience discussion period	Lora Smith, Joe Butler, Matt Hinderliter
2:50-3:00	Break	
3:00-3:40	Special Session: Long-term population dynamics/movements followed by informal audience discussion period	Joan Berish, Becky Bolt, Dave Rostal
3:40-4:30	Special Panel & Audience Discussion Session: What are the major research/knowledge gaps and how do we drive future research to fill those gaps?	Deborah Burr Joan Berish
5:00-6:30	Dinner - Poolside Texas Barbeque Buffet (West Poolside Pavilion)	
7:00-10:00	Poolside Social w/ Old Fashion Keg Party & Live Band	
9:00-10:00	Poolside Ice Cream Social	

SUNDAY, OCTOBER 16TH, 2011

FIELD TRIPS

Wekiva Springs State Park Gopher Tortoise Walk** - Time: 10:00 a.m. – 12:00 p.m.

Merritt Island National Wildlife Refuge Tour** - Time: 10:00 a.m. – 12:00 p.m

Savage Christmas Creek Preserve Proposed Gopher Tortoise Recipient Site Tour** - Time: 10:00 a.m. – 12:00 p.m

All field trips are subject to having adequate number of participants

Friday, October 14, 2011

8:00 – 9:00 a.m. Registration

9:00 – 9:10 a.m. Welcome/Introduction by Ron Concoby, CoChair

9:10 – 9:40 a.m. Keynote Speaker – Chris Jenkins
"Commensal Species Conservation: Yesterday, Today and Tomorrow"

FORMAL PRESENTATION ABSTRACTS

9:40 – 10:00 a.m.
DISPERSAL OF NEONATE TIMBER RATTLESNAKES IN THE SOUTHEASTERN COASTAL PLAIN

JENNIFER M. HOWZE, KEVIN M. STOHLGREN, ELIZABETH M. SCHLIMM, LORA L. SMITH, Joseph W. Jones Ecological Research Center, 3988 Jones Center Drive, Newton, Georgia 39870

In colder climates, survival of neonate Timber Rattlesnakes *(Crotalus horridus)* following dispersal relies heavily on conspecific scent trailing and the ability to locate suitable communal hibernacula. Less is known regarding populations in the southern portion of their range where they are more likely to den solitarily in ephemeral overwintering sites. On 6 August 2009, we captured a post-parturient female Timber Rattlesnake with a litter of 23 neonates in a hardwood thicket within a Longleaf Pine (*Pinus palustris*) forest in southwestern Georgia. Fourteen of the neonates were radio-tracked to examine their movements and activity range overlap as they dispersed from the natal site. Snakes were tracked for periods of 1-110 days, daily for the first three weeks and at least three times per week thereafter. Dispersal distances increased over time and overlap of activity ranges was minimal, potentially reducing intraspecific competition between litter mates. Neonates were predominantly located beneath clumps of vegetation or beside coarse woody debris (62.4%), in hardwood tree branches (31.6%), or just off the ground in vegetation or on top of course woody debris (6.0%). Selection of appropriate cover structure may aid in reducing susceptibility to predation.

10:00 – 10:20 a.m.
THE FUTURE OF GOPHER TORTOISE CONSERVATION IS DEPENDANT UPON THE FUTURE OF PRIVATELY OWNED FAMILY FORESTS.

JOE W. BUTLER, JR.

Survival of the gopher tortoise depends upon habitat protection. The range of the gopher tortoise in the southeastern US lies within the historical range of the longleaf pine/wiregrass forest system. Virgin longleaf forests once occupied 92 million acres across the Southeast. Today, longleaf pine forests occupy less than 3 million acres in the Southeast. Family forest owners control over 58% of the South's forest lands. Good forest management relies upon frequent use of prescribed fire. Gopher tortoise habitat also benefits from fire on a regular basis. Major threats to the gopher tortoise are caused by changes in forest land ownership and use. These include urbanization, conversion, fragmentation, parcelization, and take over by invasive plant species. Another problematic trend is the necessity to sell off or cut huge tracts of timber to pay estate taxes upon the death of private forest landowners. It is projected that forest land will decrease by about 23 million acres between 2010 and 2060. Another threat to gopher tortoise habitat is increasing restriction on use of prescribed fire. The future of the gopher tortoise is closely linked to the future of the private family forest landowner. In order to prevent the gopher tortoise from becoming endangered or nonexistent over much of its historic range, the Gopher Tortoise Council and entities interested in gopher tortoise conservation must work closely in the future with private forest landowners to promote mutual interests in forest habitat preservation.

10:20 – 10:35 a.m. Break

10:35 – 10:55 a.m.
METHODS FOR DETECTING NEW INVASIONS AND ASSESSING GOPHER TORTOISE BURROW VISITATION RATES BY THE ARGENTINE GIANT TEGU (*TUPINAMBIS MERIANAE*)

BERNARD W. KAISER, Conservation Services Section, Hillsborough County Parks, Recreation & Conservation Department, 10940 McMullen Road, Riverview, FL 33569

KIMBERLY J. OSORIO, Conservation Services Section, Hillsborough County Parks, Recreation & Conservation Department, 10940 McMullen Road, Riverview, FL 33569

RICHARD M. ENGEMAN, USDA/APHIS/Wildlife Services, National Wildlife Research Center, 4101 LaPorte Ave, Fort Collins, CO 80521-2154

STEPHEN F. DICKMAN, Conservation Services Section, Hillsborough County Parks, Recreation & Conservation Department, 10940 McMullen Road, Riverview, FL 33569

RICHARD L. ROSS, Conservation Services Section, Hillsborough County Parks, Recreation & Conservation Department, 10940 McMullen Road, Riverview, FL 33569

The Argentine giant tegu lizard (*Tupinambis merianae*) has become established on the Balm Boyette Scrub Preserve in west-central Florida and this species frequently visits gopher tortoise burrows on the preserve. Of particular concern is the ability of *T. merianae* to invade and become established in natural habitats, such as the xeric oak scrub on the Balm Boyette Scrub Preserve. Detecting the arrival of *T. merianae* onto a heretofore uninfected nature preserve can be a challenging endeavor. With the goal of developing generally applicable and cost-effective methodologies to detect new invasions, we applied four techniques to monitor activity of *T. merianae* on Balm Boyette Scrub. We first applied camera traps by placing unmodified, commercially available wildlife cameras at the entrances of 16 gopher tortoise burrows and continuously operated the cameras from May 2010 to July 2011. The cameras detected gopher tortoises, rodents, and *T. merianae* using the burrows. We are currently applying three additional methods, including passive tracking plots; pedestrian transects; and drift fence arrays. For the track counting plots we customized an established passive tracking index method used to monitor a wide variety of animal populations including feral swine in Florida by delineating fourteen 100-meter long plots on fire lanes within the study area. The plots were established in April 2011 and are monitored for two-day sampling periods on a roughly monthly basis. In May 2011 we established five pedestrian transects across portions of the scrub habitat within the study area. All five transects are walked each morning and afternoon during two-day sampling periods on a monthly basis. The fourth technique is the standard 4-winged drift fence array often used for herpetofaunal surveys. Two 4-winged arrays equipped with 19-liter pitfall traps and funnel traps were installed in late spring 2011 and are opened for 5-day sampling periods each month.

10:55 – 11:15 a.m.
GOPHER TORTOISE TICKS (*AMBLYOMMA TUBERCULATUM*) AND A NOVEL RICKETTSIA FROM GOPHER TORTOISES (*GOPHERUS POLYPHEMUS*) IN GEORGIA

JESSICA L. GONYNOR-MCGUIRE, Jones Ecological Research Center, 3988 Jones Center Dr. , Newton, GA 39870 and Warnell School of Forestry and Natural Resources, Southeastern Cooperative Wildlife Disease Study, University of Georgia, 589 D.W. Brooks Drive, Wildlife Health Building, Athens, GA. 30602

LORA L. SMITH, Jones Ecological Research Center, 3988 Jones Center Dr. , Newton, GA 39870

MICHAEL J. YABSLEY, Warnell School of Forestry and Natural Resources, Southeastern Cooperative Wildlife Disease Study, University of Georgia, 589 D.W. Brooks Drive, Wildlife Health Building, Athens,

GA. 30602

The gopher tortoise is threatened or endangered throughout its range in the US. Although at least ten parasites have been reported from this host, little is known about their distribution and prevalence. One parasite of interest is the gopher tortoise tick (*Amblyomma tuberculatum*). Currently, little is known about its natural history or potential pathogens it may transmit. During the summers of 2009, 2010 and 2011, health exams were performed on gopher tortoises throughout southern Georgia. Ticks were found on tortoises at four of seven sites. To date, 86% of 22 ticks were PCR positive for a novel spotted fever group *Rickettsia* spp. A blood sample of 1 of 75 tortoises was PCR positive for the same *Rickettsia* sp. Interestingly, *A. tuberculatum* was not detected at all sites, suggesting that the range of the tick could be more restricted than that of its principal host. Additional studies on the novel *Rickettsia* are needed given the potential pathogenic nature of some *Rickettsia*.

11:15 – 11:35 a.m.
THE GENETIC STRUCTURE AMONG SUBSPECIES OF EASTERN PINE SNAKES (*PITUOPHIS MELANOLEUCUS*)

A. H. GETZ, B. R. KREISER, and C. P. QUALLS, Department of Biological Sciences, University of Southern Mississippi, 118 College Drive # 5018, Hattiesburg, MS 39406

D. BAXLEY, Kentucky Department of Fish and Wildlife Resources, #1 Sportsman's Lane, Frankfort, KY 40601

The *Pituophis melanoleucus* clade consists of three subspecies, *P. m. melanoleucus*, *P.m. lodingi*, and *P.m. mugitus* (northern pine snakes, black pine snakes, and Florida pine snakes, respectively). Members of this clade have been declining drastically across much of their range, and those remaining are found in disjunct populations across the eastern to southeastern US. Population declines of eastern pine snakes are closely associated to longleaf pine habitat loss and fragmentation. Although these taxa are of conservation concern, there is still a lack of knowledge of their genetic relationships. The phylogeny of the eastern clade is unresolved and the validity of subspecies designation has been disputed. A previous study in our lab utilized two mitochondrial genes, ND4 and ND2, to assess the relationships within the *Pituophis* clade. However, the three subspecies were not monophyletic in the phylogenetic analysis. In an attempt to determine if there is meaningful genetic differentiation, we used microsatellite loci to assess geographic patterns of genetic variation among the eastern pine snakes. DNA samples from 75 eastern pine snakes from 4 states across their range were analyzed using 8 microsatellite loci characterized for *P. ruthveni.* The results of a Bayesian analysis did not support the delineation of our specimens into three distinct groups. However, F_{ST} values did indicate some differentiation between subspecies. Our results may not fully support the current taxonomy, but their disjunct, patchy distribution and the presence of some genetic differentiation suggest that these groups have independent evolutionary trajectories and represent incipient species. Considering this as well as the morphological and ecological distinctiveness of these three groups, we propose that their subspecies designation be retained, and a broader, regional approach should be considered when making management and regulatory decisions for these taxa.

11:35 – 12:00 p.m. Break & Silent Auction Review

12:00 – 1:30 p.m. Lunch

1:30 – 1:50 p.m.
POPULATION DECLINES OF EASTERN INDIGO SNAKES (*DRYMARCHON COUPERI*) OVER THREE DECADES IN THE GULF HAMMOCK WILDLIFE MANAGEMENT AREA, FLORIDA

STEVE GODLEY, Biological Research Associates, a Division of ENTRIX, 3910 US Highway 301 North, Suite 180, Tampa, Florida 33619.

PAUL MOLER, Florida Fish and Wildlife Conservation Commission, 4005 S. Main St. Gainesville, FL 32601

Habitat loss, degradation and fragmentation are thought to be the primary causes of declines in the distribution and abundance of the Eastern Indigo Snake (*Drymarchon couperi*) throughout its range, although no long-term studies have documented these effects. We report changes in the relative abundance of this species in the Gulf Hammock of Levy County, Florida, where the entire road network was constructed and most of the native hydric hardwood hammock was clearcut and converted to commercial pine plantations prior to our studies. Radio-tracking of *D. couperi* in a 8,628-ha portion of the Gulf Hammock Wildlife Management Area from 1981 – 1985 documented catch-per-unit-effort, habitat conditions and use by snakes. Using similar sampling methods (road cruising and visual encounter surveys), an intensive survey on the same study area from 2005 -2009 indicated that the number of individual indigo snakes observed per field day and per field hour had declined by 92.9% and 98.6%, respectively. Potential indigo snake habitat did not become more fragmented, decrease in total amount, or substantially change in cover types in our study area or regionally over these three decades. We infer that changes in habitat quality alone cannot account for the population declines. While essentially no primary (paved) roads exist within a 433 km² region surrounding our study area, secondary (limestone) roads were commonly used by vehicles and indigo snakes (60% of total initial snake observations were on roads), and such roads occurred at a density that likely over-lapped the home ranges of most adult male snakes. We suspect that cumulative, unsustainable mortality from vehicle traffic, intentional killing and intensive forestry operations is the primary cause of the population crash. The effects of introduced invasive species, environmental pollution, disease and climate change seem to be insignificant or discountable at this site. Similar environmental conditions may be present over much of the remaining range of this threatened species.

1:50 – 2:10 p.m.
"THE INSECT GUESTS OF THE FLORIDA LAND TORTOISE": 1890's TO PRESENT

DON STILLWAUGH 604-D Summerhill Ct. Safety Harbor, FL 34695 don.stillwaugh7@verizon.net

DAVID ALMQUIST Florida Natural Areas Inventory 1018 Thomasville Rd, Suite 200-C
Tallahassee, FL 32303 DAlmquist@admin.fsu.edu

It has long been known that many other creatures often occupy gopher tortoise burrows. Discoveries of species new to science began with the pioneering work of Henry Hubbard who grabbed a shovel and rolled up his sleeves in the 1890's determined to find out what was down there. Some of the species encountered are presumed to be "accidentals" or occasionals", others deemed "frequent" or "facultative" and still others may be true "obligates" which depend on the gopher tortoise and its burrow. Many of these specialized obligates belong to an intricate community based on the gopher tortoise dung deposited at the end of the burrow. Our growth in knowledge of this community has come sporadically and there is still much to be discovered concerning the life histories and habitat requirements of these commensal species. Preliminary results of the testing of a new "gopher tortoise burrow façade trap" will be discussed. Some species may be in decline along with the chelonian they depend on and more attention should be paid to this component of the ecosystem when relocating tortoises.

2:10 – 2:30 p.m.
A FIVE-YEAR REVIEW OF THE JUVENILE GOPHER TORTOISE HEAD-STARTING STUDY AT CAMP SHELBY

MATTHEW G. HINDERLITER, The Nature Conservancy, Camp Shelby Field Office, CSJFTC-ENV Building 622, Camp Shelby, MS 39407

Gopher Tortoise burrow surveys on Camp Shelby have repeatedly shown a disproportionately small number of juvenile burrows over the years, and telemetry studies of hatchling tortoises have shown that 90-100% of the animals are dead within two years. To address this apparent recruitment deficit and to see if larger, older tortoises have better survival rates, a head-starting study was begun on the base in 2006. Each year for the last five years, hatchlings were obtained from natural nests or incubated eggs. Some of the hatchlings went into a predator-proof pen; others were released back to their natal burrow with radio-transmitters, along with older head-started tortoises that had been living in the pen. Objectives of the study are to compare cause and extent of mortality, growth, home range, burrow use and construction, and movement patterns. By monitoring juveniles over several years, we have begun to see trends concerning how old tortoises must be to become less susceptible to certain types of predation. Preliminary results show that predation rates are only slightly higher in hatchlings compared to one and two-year-old tortoises, and access to a starter burrow may have a great impact on survival. Information will be presented detailing release methods, habitat management recommendations, and interesting behavioral observations from the last five years.

2:30 – 2:45 p.m. Break

2:45 – 3:05 p.m.
IS THE GOPHER TORTOISE COMPATIBLE WITH COWS?

THOMAS W. "Bill" HENTGES, Research Assistant, Department of Integrative Biology, University of South Florida, 4202 E. Fowler Ave, SCA 110, Tampa, FL 33620

ANNA L. HATHAWAY, Teaching Assistant, Department of Integrative Biology, University of South Florida, 4202 E. Fowler Ave, SCA 110, Tampa, FL 33620

HENRY R. MUSHINSKY, PhD., Professor and Graduate Director, Department of Integrative Biology, University of South Florida, 4202 E. Fowler Ave, SCA 110, Tampa, FL 33620

EARL E. McCOY, PhD., Professor and Associate Chair, Department of Integrative Biology, University of South Florida, 4202 E. Fowler Ave, SCA 110, Tampa, FL 33620

Current regulations in Florida require that Gopher Tortoises (*Gopherus polyphemus*) to be moved out of harms ways in the midst of land development. Sufficiently large parcels of land suitable to support a sustainable tortoise population are vanishing rapidly, especially lands to be conserved in perpetuity. One possible solution is to use privately owned cattle ranchlands as recipient sites for translocated tortoises. Large landowners willing to accept transient tortoises are perhaps the key to stabilizing this species. But, are translocated Gopher Tortoises compatible with cows? Past research suggests that there are no negative interactions other than the occasional burrow occlusion. We began to address this question in August 2009 by establishing a recipient site on a working cattle ranch in Pasco County, Florida. Seven treatment plots, the largest being 80 acres, in improved pastures were established on a ranch actively grazed by cattle. We did nothing to alter the normal cattle grazing patten used by the ranchers. Three 10-acre cattle enclosures were constructed within three of the seven treatment plots to provide a safe haven for Gopher Tortoises wanting to flee cattle. Gopher Tortoises were released into the treatment plots as they arrived at the ranch. Body condition, growth rates, placement and frequency of burrow relocation, cattle impacts, and vegetation composition were monitored. Although the project is ongoing, we will discuss the challenges associated with working around cattle and provide our current findings. A second talk, presented by Anna Hathaway will discuss these same treatment plots.

3:05 – 3:25 p.m.
RELOCATING GOPHER TORTOISES TO A CATTLE RANCH. HOW DOES REPRODUCTIVE OUTPUT VARY BETWEEN YEARS AND RESIDENT AND RELOCATED FEMALES?

ANNA L. HATHAWAY, Teaching Assistant, Department of Integrative Biology, University of South Florida, 4202 E. Fowler Ave, SCA 110, Tampa, FL 33620

THOMAS W. "Bill" HENTGES, Research Assistant, Department of Integrative Biology, University of South Florida, 4202 E. Fowler Ave, SCA 110, Tampa, FL 33620

EARL E. McCOY, PhD., Professor and Associate Chair, Department of Integrative Biology, University of South Florida, 4202 E. Fowler Ave, SCA 110, Tampa, FL 33620

HENRY R. MUSHINSKY, PhD., Professor and Graduate Director, Department of Integrative Biology, University of South Florida, 4202 E. Fowler Ave, SCA 110, Tampa, FL 33620.

As part of a state-funded Gopher Tortoise (*Gopherus polyphemus*) translocation project, we are monitoring actively grazed pastures to determine if they can serve as suitable recipient sites for the Gopher Tortoise. For cattle ranches to be considered suitable recipient sites, numerous requirements must be met: two critical requirements are that females are able to acquire sufficient energy to produce a clutch of viable eggs and that sufficient high quality vegetation is available to support juvenile recruitment into the population. Vegetation surveys were conducted at a working cattle ranch in Pasco County, Florida, to determine the composition and frequency of plant species, especially those containing high amounts of nutrients, specifically nitrogen. Plants were sampled with half-meter quadrats in all 7 pastures. We radiographed resident and relocated females during the 2010 and 2011 nesting seasons (May – June) for the presence of shelled eggs. We were able to determine clutch size and egg diameter for both relocated and resident gravid females. The average clutch size for both the 2010 and 2011 nesting season was 8.1 +/- 3.3 and 2.5 eggs, respectively. The averages within both the resident and relocated female populations did differ between and among years, but not significantly. Burrow surveys indicate that at least some hatchlings are able to successfully leave the nest by the presence of hatchling size burrows scattered throughout the fields.

3:25 – 3:45 p.m.
VEGETATION ANALYSIS OF ACTIVE GOPHER TORTOISE (*Gopher polyphemus)* HABITAT AT WHITE OAK PLANTATION

NATALIA M. BAYONA, 11123 Oak Ridge Dr. S, Jacksonville, FL 32225
JOSEPH A. BUTLER, University of North Florida, Biology Department, 1 UNF Dr., Jacksonville, FL 32224

The density of tortoises and their burrows in an area is directly dependent upon the density of herbaceous plants at ground level, canopy coverage, and soil composition. This study involves an analysis of herbaceous plants available for two gopher tortoise colonies in three areas of high and low burrow activity at the White Oak Conservation Center, a long-leaf pine dominated ecosystem, over the course of one summer. I am testing the hypothesis that the high burrow areas are located in areas of high ground level herbaceous plant density, low canopy coverage, and deep, nutrient-rich soil. Conversely, the areas of low burrow density are expected to have fewer ground level herbaceous plants and high canopy coverage. Six 100 meter sample transects, marked by rebar stakes at every 10 meter point, have been set up within these areas. Plants within one square meter of each rebar stake have been identified and the canopy density has been measured using a densitometer. One soil sample has been taken at each transect and evaluated for color, pH, nitrogen and potassium concentrations. These findings will help explain the effect of the habitat on population density/structure and, possibly, indicate the need for improved tortoise management techniques and/or a controlled burn regime. As the tortoise habitat in White Oak has yet to be studied, the survey of vegetation there is critical to the tortoises' conservation. I have recorded a high diversity of ground level plants in high burrow density areas. Where there are fewer burrows, plants are less diverse and more dense (mainly gallberry). Approximately 24 plant species have been identified, among them a variety of trees, forbs,

weeds, and grasses. The most common species found are yellow jessamine (*Gelsemium sempervirens*), a high-climbing, woody vine and gallberry *(Illex glabra)*, a shrub found in acidic soil.

3:45 – 4:05 p.m.
CONTRASTING PATTERNS OF HABITAT USE BY GOPHER TORTOISES IN FLORIDA SCRUB AND MESIC PINE FLATWOODS

TRACI D. CASTELLÓN, Archbold Biological Station, Avon Park Air Force Range Office, 475 Easy Street, Avon Park, FL 33825

BETSIE B. ROTHERMEL, Archbold Biological Station, 123 Main Drive, Venus, FL 33960

Pine flatwoods and scrub dominate the uplands of peninsular Florida, but few data are available to evaluate the status of Gopher Tortoise (*Gopherus polyphemus*) populations occupying these habitat types. We surveyed burrow densities and assessed vegetation cover in scrub and flatwoods at Avon Park Air Force Range in south-central Florida, and initiated radio-telemetry monitoring and burrow mapping in two "reference" populations. Despite low food abundance, the density of active burrows and the tortoise-to-burrow ratio was higher in scrub than in flatwoods, where food was abundant but burrows were patchily distributed and often flooded. Burrow densities were comparable to other scrub and flatwoods sites in Florida, but generally lower than in sandhill. Low abundance of food may explain low population densities in scrub, via potential effects on clutch size, growth rate, age at first reproduction and/or juvenile survival. Our preliminary results suggest that tortoises in scrub tended to occupy the same burrows for longer periods, used fewer burrows overall, and had smaller home ranges than tortoises in flatwoods. Given the low abundance of food in scrub, it was surprising that home ranges were larger in flatwoods where forage is abundant. In flatwoods, tortoises switched burrows frequently and multiple tortoises used the same burrows, suggesting a potential limitation on appropriate burrow conditions, perhaps due to saturated soils and burrow flooding. Occasional inundation of flatwoods habitat during storms may also reduce nest success. In fact, the burrow-size distribution suggested little evidence of recent recruitment in our flatwoods monitoring site. Our preliminary results raise intriguing questions regarding tortoise ecology and source-sink dynamics in these sub-optimal and poorly studied habitats.

4:05 – 4:25 p.m.
POPULATION STRUCTURE AND NEST SUCCESS OF GOPHER TORTOISES (*GOPHERUS POLYPHEMUS)* AND VEGETATIVE RESPONSE TO PRESCRIBED BURNING IN NORTHEAST FLORIDA.

KRISTIE AMATULI AND J.A. BUTLER

A gopher tortoise population on the University of North Florida campus is part of a study initiated during the early 1990s, and I will present data on this population collected during the 2009-2011 field seasons. The project has three objectives: 1) to capture as many tortoises in this population as possible in order to compare current population structure to that in the early 1990s and calculate growth rates of some tortoises over a 20 year period, 2) to assess the successional changes in the vegetation after the area was burned in 2009-2010, and 3) to evaluate reproductive effort and success. Tortoises were trapped or captured by hand when encountered outside their burrows. In total, 129 individuals were caught from 2009-2011: 29 adult females, 25 adult males and 75 juveniles. Of these, 34 are recaptures from the research performed in the early 1990s. Six 100m transects, four experimental and two controls, were established before prescribed burning began. Vegetation analyses are done bi-monthly and all plants are recorded as well as their percent of each plot. The most abundant plant is milkpea. Preliminary analysis of post-burn response has indicated increased groundcover in all burned transects. Adult burrow aprons were probed using a wire survey flag in an attempt to locate nests. In 2010 we found two intact nests with this technique and recorded two other depredated nests that were unassociated with any burrow. So far in 2011 we have only found one nest that was laid on the ground with the closest adult burrow being about two meters away.

5:30 – 6:45 p.m. Plated Dinner, Awards Ceremony & GTC Business Update

Saturday, October 15, 2011

8:00 – 8:45 a.m. Registration & Continental Breakfast

8:45 – 9:05 a.m. Welcome/Introduction of Main Session by Ron Concoby, CoChair
"Gopher Tortoise Conservation: Yesterday, Today and Tomorrow"

FORMAL PRESENTATION ABSTRACTS

9:05 – 9:25 a.m.
LOOKING FOR LINKS BETWEEN BONE-DENSITY AND "YELLOW-SPOT" AND SOIL TYPE AND BURROWING BEHAVIOR IN THE GOPHER TORTOISE (*GOPHERUS POLYPHEMUS*).

DANIEL GAILLARD and CARL QUALLS. University of Southern Mississippi, Department of Biological Sciences, 118 College Dr. Box # 5018 Hattiesburg, MS. 39406

Matt Hinderliter. Gopher Tortoise Biologist, The Nature Conservancy. Camp Shelby Field Office CSJFTC-ENV Building 622, Camp Shelby, MS. 39407

The Gopher Tortoise (*Gopherus polyphemus)* has undergone a range-wide population decline over the past century. Despite ongoing management efforts, tortoises are still in decline even within protected areas. Reasons for this decline could be intrinsic, extrinsic or both. In this study, we focused on one intrinsic (calcium homeostasis) and one extrinsic (soil type & burrowing by juveniles) factor that may be influencing survival and recruitment. Calcium homeostasis is important for proper growth, bone density and muscular function in tortoises. A deficiency in calcium can lead to a suite of health complications. Within the western portion of the range, we find "yellow-spot", which is a softening of the center of the plastron in adults. We also find juveniles that do not have proper hardening of their shells and are lethargic. Both of these findings suggest a possible deficiency in calcium. We performed bone-density scans on hatchling tortoises raised in the laboratory throughout their first year and on wild tortoises of varying age classes with and without yellow spot. Our investigation of the extrinsic factor of soil type and burrowing behavior of hatchlings was driven by the observation of high densities of juvenile and hatchling burrows in sandy (priority) soils and low densities in clayey (suitable). We compared length, depth and number of burrows a hatchling tortoise excavated within a two-week period in both priority soils and suitable soils.

9:25 – 9:45 a.m.
DETERMINING GOPHER TORTOISE BURROW OCCUPACY USING A ROBOTIC CAMERA

ALEXANDRA A. LEGEZA, University of North Florida, 1 UNF Drive, Jacksonville, FL 32224

KEVIN D. NGUYEN, University of North Florida, 1 UNF Drive, Jacksonville, FL 32224

ALAN HARRIS, University of North Florida, 1 UNF Drive, Jacksonville, FL 32224

JOSEPH A. BUTLER, University of North Florida, 1 UNF Drive, Jacksonville, FL 32224

In the past, fiber optic cameras have been used to explore gopher tortoise burrows. However, a variety of problems were encountered using these systems. Due to the nature of these cameras if there were burrow turns, the end of the burrow could not be reached. We have developed a robotic camera to explore gopher tortoise burrows which overcomes this problem as well as others encountered by earlier methods. Fifty burrows were searched with an equal number of active, and inactive. We found tortoises in 21 burrows with 95% residing in those classified as active. The robotic camera allowed us to determine some physical characteristics of the burrow including the number, type, distance, and direction of turns within the burrow in addition to the length of the burrow. We were also able to gain insight into the reliability of the classification

of burrows when using external features. We were unable to complete 11 of the burrows due to obstructions within the burrow cavity. Obstructions were recognized mainly as roots and debris. We plan to overcome this by refitting components within the robot to allow for an overall smaller unit. This robot is best suited for a two-person team allowing an average time for completion of a burrow at approximately 12 minutes (24 person/minutes). The practical applications for this robotic camera include use by environmental consulting firms, the forestry industry, surveying, and research. This robot uses two CCD cameras, and DC spurred-gear-head motors fitted within a plastic enclosure and moves via a tracked differential drive system. We estimate the cost to build such a unit at approximately $500.00. This robot presents a passive means of investigating tortoise burrows, providing insight into a relatively unexplored portion of the environment of the gopher tortoise.

9:45 – 10:05 a.m.
THE EVALUATION OF THE POTENTIAL FOR PUBLIC LANDS TO BECOME RECIPIENT SITES FOR THE STATE LISTED GOPHER TORTOISE

KELLEY SAMUELS PETERMAN, AECOM Technical Services, Inc. 150 North Orange Ave. Orlando, FL 32801

The uplisting of the gopher tortoise (*Gopherus polyphemus*) to Threatened by the Florida Fish and Wildlife Conservation Commission (FFWCC) resulted in the development of a new permitting system to address impacts including the establishment of methods to review and approve a gopher tortoise recipient site. Local governments that hold fee simple title to large, contiguous tracts of land may benefit from establishing recipient sites for several reasons including that they may be compensated for managing their lands in a manner that is beneficial for tortoises. Orange County, Florida identified ten (10) tracts of land that had been previously purchased for conservation and that had potential for use as recipient sites and were scattered throughout the County. These tracts were systematically evaluated two years ago in accordance with the FFWCC criteria and it was determined that three (3) tracts were suitable for the establishment of a recipient site. These three (3) tracts were deemed suitable as a result of their condition relative to several habitat quality parameters in the management guidelines including: the extent of the parcel with optimum Depth to Water Table (DWT), the forested canopy to herbaceous vegetation ratios, the expected costs to manage, and the expected revenues generated. The remaining 7 parcels had scattered to extensive historical habitat, but lack of fire, changes in soils or vegetation, and/or the extent of exotic vegetation drastically diminished the current value as tortoise habitat. As a result of this analysis, we concluded that the current guidelines probably do not incentivize restoration of significantly altered habitat, but they do encourage management on tracts that can be relatively easily restored. Permits formalizing all three (3) tracts of land have been submitted to the FFWCC. Approval is imminent on two (2) of the tracts. Negotiating conservation easement language and providing financial assurance have proven to be the two most difficult obstacles for local governments to overcome.

10:05 – 10:20 a.m. Break

10:20 – 10:40 a.m. Poster Session Review & Field Trip Announcement

10:40 – 11:15 a.m. Introduction to Special Session by Deborah Burr, FWC GT Coordinator
"TORTOISES, COMMENSALS AND SPECIAL RESEARCH NEEDS"

11:15 – 12:00 p.m.
SPECIAL SESSION: MINIMUM PATCH SIZE/MINIMUM VIABLE POPULATION
**** Session followed by informal audience discussion period**

12:00 – 1:00 p.m. Lunch

1:00 – 2:10 p.m.
SPECIAL SESSION: RESTOCKING/RELOCATION
**** Session followed by informal audience discussion period**

2:10 – 2:50 p.m.
SPECIAL SESSION: JUVENILE NEEDS & SURVIVAL
**** Session followed by informal audience discussion period**

2:50 – 3:05 p.m. Break

3:05 – 3:45 p.m.
SPECIAL SESSION: LONG-TERM POPULATION DYNAMICS
**** Session followed by informal audience discussion period**

3:45 – 4:25 p.m.
SPECIAL PANEL & AUDIENCE DISCUSSION SESSION: WHAT ARE THE MAJOR RESEARCH/KNOWLEDGE GAPS AND HOW DO WE DRIVE FUTURE RESEARCH TO FILL THOSE GAPS?

5:00 – 6:30 p.m. Dinner – Poolside Texas Barbeque Buffet (Westside Pool Pavillion)

7:00 – 9:00 p.m. Poolside Social w/ Old Fashion Keg Party & Live Band

7:00 – 9:00 p.m. Poolside Ice Cream Social

POSTER PRESENTATION ABSTRACTS

Burrow Scoping Accuracy and Tracking Methods for Juvenile Gopher Tortoises

ASHLEY FREE, Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 30602; Joseph W. Jones Ecological Research Center, 3988 Jones Center Drive, Newton, GA 39870

LORA SMITH, Joseph W. Jones Ecological Research Center, 3988 Jones Center Drive
Newton, GA 39870

STEVEN CASTLEBERRY, Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 30602

The gopher tortoise (*Gopherus polyphemus*) is a species listed as threatened in Georgia due mostly to habitat loss and degradation. It is important to determine the status of tortoise populations throughout the state, as well as answer questions that will help with the management of this animal. I am involved in research that will estimate populations of gopher tortoises on various properties, both private and public, in Georgia. Work has been completed on eight sites to date, with several more to be completed within the next year. I am also looking at questions that will influence juvenile tortoise management. Specifically, I am working on methods to track juvenile tortoises, and I am looking at the accuracy of determining occupancy of juvenile burrows using two different burrow cameras. Initially, I have found fluorescent powder to be a better tracking method than thread trailers. I also found that the seven days I used for trapping the tortoises is not a long enough time to wait for a tortoise to leave its burrow. Since I did not leave traps out for long enough, I could not determine the accuracy of scoping the juvenile burrows.

Defining the Sampling Frame: Using Available GIS Data to Model Potential Gopher Tortoise Habitat for an Application of Line Transect Distance Sampling on a Large Managed Area

MICHAEL T. KEYS, U.S. Fish and Wildlife Service, St. Marks National Wildlife Refuge., 1255 Lighthouse Road, St. Marks, FL 32355

CHRISTINA H. LEGLEU, School of Renewable Natural Resources, Room 227, Renewable Natural Resources Bldg., Louisiana State University, Baton Rouge, LA 70803

Gopher Tortoises (*Gopherus polyphemus*) occur throughout upland sites within the 28,300 ha St. Marks National Wildlife Refuge. This area supports a heterogeneous matrix of upland pine ecotypes such as sandhill, scrubby flatwoods and mesic flatwoods interspersed with freshwater and brackish wetlands. Prior surveys for gopher tortoises conducted at St. Marks NWR in 1978 and 1988 estimated a wide range of between 2,266 ha and 728 ha of suitable habitat. No systematic surveys for this species were conducted on the refuge during the last two decades and objective, robust population estimate techniques were not employed during the 1978 and 1988 surveys. Line transect distance sampling (LTDS) provides an efficient and accurate method to develop a population estimate within known confidence intervals. An important first step in conducting LTDS is to define the search area, also known as the sampling frame, within which surveys will be conducted.

Gopher Tortoises: Educational Programs at the Enchanted Forest Sanctuary

Joe Swingle, North Region Naturalist, Brevard County Environmentally Endangered Lands (EEL) Program, Enchanted Forest Sanctuary Management and Education Center, 444 Columbia Blvd, Titusville, FL 32780

A summary gopher tortoise programs provided by the Enchanted Forest Sanctuary.

Hatchling Behavoral Differences in High and Low Recruitment Populations of the Gopher Tortoise

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Federally threatened in Mississippi, the gopher tortoise *(Gopherus polyphemus)* populations there have strongly variable recruitment and are generally in decline. Hatching success is significantly lower in Mississippi than in any other part of the species' range and most hatchlings die within the first year. Burrowing is essential for protection from predation, however many hatchlings dig shallow burrows (or no burrows) that leave them exposed. Burrowing behavioral differences (interpreted as anti-predator behavior here) between high and low recruitment populations could be linked to altered corticosterone levels, both baseline and stress induced, leading to the development of behavioral syndromes. To begin testing this possibility, we determined baseline and stress-induced corticosterone levels via restraint stress and we will compare these to hatchling burrowing behavior (data currently being collected) from individuals collected from high and low recruitment sites and raised in a common garden environment.

Distribution and Habitat Use of the Gopher Tortoise in a Declining Southeast Florida Conservation Area

JOSHUA SCHOLL[1], EVELYN FRAZIER[1], and TOBIN HINDLE[2]
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Department of Geosciences, Florida Atlantic University, Boca Raton, Florida 33431, jscholl1@fau.edu

Gopher tortoises have been declining throughout their range over the last few decades due mostly to urbanization, which often leads to the creation of island habitats. This confines populations and eliminates natural management by wildfires resulting in degraded island habitats. To maximize conservation efforts in rapidly developing regions it is critically important to investigate not only the natural ecology of native species, but specifically how they are affected in confined and degraded habitats. We studied a gopher tortoise population to determine its status, distribution, and habitat use in a confined, degraded ecosystem on the Florida Atlantic University campus in Boca Raton, Florida. We conducted complete burrow surveys using belt transects, directly captured tortoises, and performed vegetation and soil analyses through aerial photos and United States Geological Survey data, respectively. The status of the population was assessed directly based on carapace length measurements and indirectly through ratios of active to abandoned burrow categories. Tortoises burrowed densely in areas of low vegetation and completely avoided areas with closed canopies, which comprised about 15% of the habitat. Soil types had a significant correlation to the spatial distribution of burrows. We found a high ratio of active to abandoned burrows, which could indicate an active and healthy population; however, demographic data compiled from captured tortoises revealed a lack of juveniles, suggesting an unsustainable population. We concluded that superficial burrow surveys may provide misleading results on the status of gopher tortoise populations in confined, degraded habitats and more direct population assessment methods such as tortoise captures or burrow measurements need to be used.

Gopher Tortoise Monitoring on Eglin Air Force Base, Florida

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CAROLA A. HAAS, Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia 24061

Understanding gopher tortoise distribution, abundance, and demographics through monitoring helps focus management to areas of greatest need. Eglin Air Force Base is an active military installation covering 180,000 ha. Eglin contains 100,000 ha of sandhill, upland pine, and mesic flatwood communities, much of which appear to be suitable tortoise habitat. Additionally, 45,000 ha of open range and pine plantation occur. Eglin has an active habitat management program, particularly prescribed burning with over 47,000 ha burned in 2010. Despite large expanses of suitable habitat and intensive habitat management, tortoises appear to occur at low densities. Cursory surveys at known occupied sites over the last decade suggest tortoise densities range from 0.02 to 0.94 tortoises/ha. Densities appear to be even lower in areas between known sites. The first goal of our monitoring strategy is to begin assessing population status across Eglin. We will monitor 6 to 10 known sites over a 10 year period (each site will be sampled on a 3-5 year rotation) and a single site will be monitored annually. The second goal is to survey areas of unknown status. We will select sites of equal size within 1.5 kilometers of each known site. These paired sites will have comparable habitat characteristics as determined by GIS analysis and groundtruthing. In year one, we used total count surveys to assess density of tortoise burrows at 4 sites (2 known and 2 paired sites) and we assessed detectability at 3

of 4 sites. The density of active plus inactive burrows/ha ranged from 0.28-1.84 at the 4 sites and our detection rate ranged from 0.85-0.93 at 3 of 4 sites. Information from these surveys will help make preliminary assessments of population status and distribution of the gopher tortoise across Eglin and will aid land managers in selecting areas for additional habitat management.

Haemogregarine infections in a translocated population of gopher tortoises (*Gopherus polyphemus*)

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TERRY M. NORTON, Georgia Sea Turtle Center, Jekyll Island, GA; St. Catherine's Island Wildlife Survival Center, 182 Camellia Rd, Midway, GA 31320-6731

MICHAEL J. YABSLEY, College of Veterinary Medicine, Southeast Cooperative of Wildlife Disease Study, University of Georgia, 589 D.W. Brooks Dr, Athens, GA 30602

Hemogregarines, apicomplexan intraerythrocyte parasites, are common in amphibians and reptiles, especially aquatic turtles. To date only a few species have been reported from tortoises and little is known about their life cycles. Recently, an undescribed haemogregarine was reported from gopher tortoises (*Gopherus polyphemus*). We have initiated at study to better understand this parasite, including morphologic characteristics, vector(s), and effect on host. In the current project, we are concentrating on a translocated population of gopher tortoises on St. Catherine's Island, Georgia (USA). Based on preliminary data, 75% of tortoises were positive for haemogregarines at the time of introduction on the island (1994). Examination of blood smears from the tortoises in 2006 and 2008 indicated that the tortoises were still infected. However, tortoises born on the island have thus far tested negative for haemogregarines. Interestingly, 100% of tortoises were infested with *Amblyomma tuberculatum*, the gopher tortoise tick, at introductions. Biologists removed all ticks and treated tortoises with acaricides. Since the introduction, only four tortoises infested with *A. tuberculatum* have been found on the island. These data suggest that gopher tortoises maintain long-term infection with this undescribed haemogregarine and that *A. tuberculatum* might be a vector. Future studies include repeated testing of tortoises that were introduced to the island, testing of tortoises from additional sites that do and don't have *A. tuberculatum*, and testing of ticks for developmental stages of the haemogregarine. These data will be combined with morphologic and genetic data to formally describe the gopher tortoise parasite.

Vegetation Analysis of Active Gopher Tortoise (*Gopher polyphemus)* Habitat at White Oak Plantation

NATALIA M. BAYONA, 11123 Oak Ridge Dr. S, Jacksonville, FL 32225
JOSEPH A. BUTLER, University of North Florida, Biology Department, 1 UNF Dr., Jacksonville, FL 32224

The density of tortoises and their burrows in an area is directly dependent upon the density of herbaceous plants at ground level, canopy coverage, and soil composition. This study involves an analysis of herbaceous plants available for two gopher tortoise colonies in three areas of high and low burrow activity at the White Oak Conservation Center, a long-leaf pine dominated ecosystem, over the course of one summer. I am testing the hypothesis that the high burrow areas are located in areas of high ground level herbaceous plant density, low canopy coverage, and deep, nutrient-rich soil. Conversely, the areas of low burrow density are expected to have fewer ground level herbaceous plants and high canopy coverage. Six 100 meter sample transects, marked by rebar stakes at every 10 meter point, have been set up within these areas. Plants within one square meter of each rebar stake have been identified and the canopy density has been measured using a densitometer. One soil sample has been taken at each transect and evaluated for color, pH, nitrogen and potassium concentrations. These findings will help explain the effect of the habitat on population density/structure and, possibly, indicate the need for improved tortoise management techniques and/or a controlled burn regime. As the tortoise habitat in White Oak has yet to be studied, the survey of vegetation there is critical to the tortoises' conservation. I have recorded a high diversity of ground level plants in high burrow density areas. Where there are fewer burrows, plants are less diverse and more dense (mainly gallberry). Approximately 24 plant species have been identified, among them a variety of trees, forbs,

weeds, and grasses. The most common species found are yellow jessamine (*Gelsemium sempervirens*), a high-climbing, woody vine and gallberry *(Illex glabra)*, a shrub found in acidic soil.

Genetic Variation at MHC Loci and Susceptibility to Mycoplasmal Upper Respiratory Tract Disease in Gopher Tortoises

JEAN P. ELBERS and SABRINA S. TAYLOR, School of Renewable Natural Resources, Louisiana State University, 227 RNR Bldg., Louisiana State University, Baton Rouge, LA 70803

What remains of historically dominant longleaf pine forest in the southeastern US is highly fragmented and degraded. Species associated with this habitat such as the gopher tortoise (*Gopherus polyphemus*), have declined dramatically and have highly fragmented distributions, two features that facilitate genetic drift and inbreeding. Genetic drift and inbreeding are known to decrease genetic variation, which typically decreases adaptive potential of populations. Already plagued by habitat loss and degradation, a contemporary issue with the potential to affect even protected populations of gopher tortoises is upper respiratory tract disease (URTD), which causes nasal discharge and tearing and can lead to dehydration, emaciation, and eventually mortality. While several pathogenic agents are thought to cause URTD, experimental inoculation of gopher tortoises with the microorganism, *Mycoplasma agassizii*, induces URTD. Recognition of foreign pathogens such as *M. agassizii* is accomplished by functional genes such as those of the major histocompatibility complex (*Mhc*), a family of highly variable genes which encode cell surface markers necessary for binding and identifying foreign pathogens. Variation at *Mhc* genes therefore influence the fitness of individuals and the long-term viability of populations. Because remaining populations of gopher tortoises are potentially at risk due to URTD, assessing *Mhc* variation in gopher tortoise populations would provide a framework for basing management decisions by elucidating which populations are at greatest risk and which would best be suited as "donor" populations to augment the genetic diversity of compromised populations based on observed levels of *Mhc* variation. We propose: 1) to examine whether small and isolated longleaf pine fragments are associated with reduced *Mhc* variation in gopher tortoises; 2) to assess whether *Mhc* variation affects susceptibility to mycoplasmal URTD; and, 3) to formulate management plans to increase gene flow among small and/or isolated forest fragments should *Mhc* variation have the potential to influence gopher tortoise population viability.

The Influence of Gopher Polyphemus on Non-Avian Vertebrate Diversity in Sandhill Habitat

CHRISTOPHER P. CATANO, Department of Biology, University of Central Florida, 4000 Central Florida Blvd., Orlando. FL 32816

I. JACK STOUT, Department of Biology, University of Central Florida, 4000 Central Florida Blvd., Orlando. FL 32816

It is imperative that we understand species-species and species-habitat interactions to predict ecological change and identify conservation needs. It has been hypothesized that some species have a disproportionately greater effect, relative to their abundance, on ecosystem function and overall species diversity than others (Power et al. 1996). Loss or decline of these 'keystone species' can result in severe, negative effects on community structure including loss of function or diversity. The gopher tortoise is a keystone species throughout longleaf pine forests on the Southeastern Coastal Plain and often the target of management. This project will be the first to quantify and build descriptive models to explain the influence of the gopher tortoise on vertebrate diversity as well as its relative role compared to other ecological forces. In the summer of 2011, over 1600 gopher tortoise burrows were located and recorded via GPS during surveys in sandhill habitat at Wekiwa Springs State Park, Florida. Sixteen sample units were chosen via stratified random sampling based on burrow densities. Species richness and abundances are being determined for each sample unit to assess how diversity is influenced by changes in burrow density. In addition, other habitat characteristics are being measured within each sample unit including vegetation structure, diversity, and disturbance history. LiDAR (Light Detection and Ranging) technology has been employed to collect data on vegetation structure. By estimating the interaction of ecological functions such as fire and vegetation structure with tortoises this study will allow us to better combine the advantages of

single species conservation with the benefits of ecosystem management.

Optional Field Trips

Sunday – October 16, 2011
Field Trip: Wekiva Springs State Park Gopher Tortoise Walk - 10:00 a.m. – 12:00 p.m.

Directions to Wekiva Springs State Park: From the Wyndham Orlando Resort, go toward Sand Lake Road. Turn left on Sand Lake Road West (SR 482 W)-go 0.1 miles. Take the ramp onto I4 East toward Orlando-go 19.8 miles. Take exit #94 (SR 434-Longwood/Winter Springs). At the bottom of the ramp, turn left onto west SR 434-go approximately 1 mile. Turn right onto Wekiva Springs Road and go a little more than 4 miles. Turn right into Wekiwa Springs State Park. When you get to the ranger station, let them know you're there for the GTC field trip; just after you clear the ranger station, turn left into the overflow parking lot. The field trip leaders will meet everybody there. Alice Bard's cell phone number is (407) 832-6262 and her email address is alice.bard@dep.state.fl.us. Field trip participants need to provide their own transportation to Wekiwa Springs State Park. Distance to Wekiwa Springs State Park-approx. 25.6 miles.

Field Trip: Merritt Island National Wildlife Refuge Tour - 10:00 a.m. – 12:00 p.m

Directions to Merritt Island National Wildlife Refuge: From the Wyndham Orlando Resort, take Sand Lake Road (east) toward SR 528 (Beachline). Take SR 528 (Beachline) then merge onto SR 407 (Challenger Memorial Hwy) via Exit 37 on the left toward I-95N (Nasa Kennedy Space Center/Titusville). Take I-95N to SR 406, Exit 220 to Titusville Historic District. Then turn right onto SR 406 East/Garden Street. Continue to follow Garden Street (Garden Street becomes A Max Brewer Memorial Pky). Stay straight to go onto Playlinda Beach Road. Stop at the Ranger Station. When you get to the ranger station, let them know you're there for the GTC field trip. Stan Howarter's cell phone number is (321) 863-6208 and his email address is Stanley_Howarter@fws.gov. Field trip participants need to provide their own transportation to Merritt Island National Wildlife Refuge. Distance to Merritt Island National Wildlife Refuge - approx. 57.7 miles.

Field Trip: Savage Christmas Creek Preserve Proposed GT Recipient Site - 10:00 a.m. – 12:00 p.m
Directions to Savage Christmas Creek Preserve: Drive time is approximately 40 minutes. Start out going north on International Dr toward Sand Lake Rd. Take the 1st right onto Sand Lake Rd. Golden Corral Buffet & Grill is on the left. If you reach Carrier Dr you've gone about 0.4 miles too far. Stay straight to go onto Boggy Creek Rd. Turn slight left onto Jetport Dr. Merge onto SR-528-TOLL E via the ramp on the left (Portions toll). Take the SR-520 W exit, EXIT 31, toward Orlando. Turn left onto SR-520 W. Merge onto SR-50 E. and go approximately one mile to the entrance on the north side of the road. Contact: Kelley Peterman 407-468-3465 (blackberry mobile) Kelley.peterman@aecom.com. Distance to Savage Christmas Creek Preserve - approx. 33 miles.

Special Meeting Instructions:

The 33rd Annual Gopher Tortoise Council Meeting is being held at the Wyndham Orlando Resort, Orlando, Florida. The GTC Annual Meeting, all presentations, coffee breaks, and the poster session will take place in the Jasmine/Magnolia Room. Meals will be served and/or provided in the Oleander A, Oleander B and/or Orange Rooms (adjacent to the Jasmine/Magnolia Room). Menu(s) and Meal Location(s) will be announced at appropriate times throughout the Annual Meeting.

GOPHER TORTOISE COUNCIL

ARTICLE II. Goal and Objectives

Section 1. The goal of the Gopher Tortoise Council is to assure the continued survival of viable populations of the gopher tortoise, *Gopherus polyphemus*, throughout its existing range.

Section 2. The objectives of the Gopher Tortoise Council (hereafter referred to as the Council) are:

a. To serve in a professional advisory manner, where appropriate, on matters involving management and conservation of gopher tortoises, associated species, and upland habitats.
b. To support such measures as shall work to insure the continued survival of gopher tortoises, associated species, and the maintenance of their habitats in a natural state.
c. To stimulate and encourage studies on the status, life history, biology, physiology, and management of gopher tortoises and associated upland species.
d. To maintain an active public information and conservation education program.
e. To commend outstanding action and dedication by individuals and organizations fostering the objectives of the Council.
f. To promote conservation of upland habitats through land acquisition and management.