

31st Annual Gopher Tortoise Council Meeting
October 2-3, 2009
Gainesville, FL
Paramount Conference Center



Schedule

THURSDAY - October 1, 2009

Time	Event
6:30-8:30	GTC Business Meeting - Merlion Restaurant 3610 SW 13th St Gainesville, FL 32608-3506 0.4 miles south of Paramount

FRIDAY - October 2, 2009

Time	Event/Title	Presenter(s)
7:30-8:30	Registration and Breakfast in Bivens South Ballroom	
8:30-8:45	Introduction	Christian Newman
8:45-9:25	Urban Wildlife? Thoughts, Policies, and Research on Developing and Maintaining Green Communities	Mark Hostetler, University of Florida hostetm@ufl.edu
9:25-9:45	Integrating Rural Land Use With Upland Habitat Conservation	Marc C. Dick, Landscape Architect marccdick@gmail.com
9:45-10:05	Scrub Management Guidelines for Peninsular Florida: Using the Scrub-Jay as an Umbrella Species	Adam Kent, FWC Adam.Kent@MyFWC.com
10:05-10:25	Evaluation of the Potential for Public Lands to Become Recipient Sites for the State-Listed Gopher Tortoise (<i>Gopherus polyphemus</i>): A Case Study in Orange County, Florida	Kelley Peterman, Glatting Jackson Kercher Anglin kpeterman@glatting.com
10:25-10:40	Break	
10:40-11:00	Gopher Tortoise Candidate Conservation Agreement: Where Are We Now?	Hal Balbach, US Army ERDC hal.e.balbach@usace.army.mil
11:00-11:20	Separating Fact From Fiction - Clarifying the Federal Listing Process of the Gopher Tortoise	Annie Dziergowski, USFWS annie_dziergowski@fws.gov
11:20-11:40	Development of a CCAA for the Gopher Tortoise on Plant Vogtle, Burke Co., GA	John B. Jensen, Georgia DNR john.jensen@gadnr.org
11:40-12:00	Increasing Public Awareness of Gopher Tortoise Conservation and Permitting Requirements	Tera Meeks, FWC Tera.Meeks@MyFWC.com
12:00-1:00	Lunch in Ballroom C	
1:00-1:20	Local Government's Role in Advancing Gopher Tortoise Protection	Steve Hofstetter, Alachua County Env. Protection Department shofstetter@alachuacounty.us
1:20-1:40	Ensuring Proper Management of Florida's Ecosystems: Natural Areas Training Academy	Linda Demetropoulos, UF Natural Areas Training Academy demetrop@ufl.edu
1:40-2:00	Turtles for Tomorrow	Kelly O'Keefe, Georgia Sea Turtle Center kokeefe@jekyllisland.com

Time	Event/Title	Presenter(s)
2:00-2:20	Developing Stewards for Biological Diversity Through Gopher Tortoise Conservation Research	Pamela L. Pannoizzo, Palm Beach Community College pannozzp@pbcc.edu
2:20-2:40	Creating Advocates for Imperiled Species Through Art	Brett Miley, ecoRidge longleaves@gmail.com
2:40-3:00	Break	
3:00-3:20	Educating for Upland Conservation: Social Marketing as a Tool for Success	Pete Colverson, Pandion Systems, Inc. pcolverson@pandionsystems.com
3:20-3:40	Effective Evaluation Is Key to Program Success	Christine Denny, Pandion Systems, Inc. cdenny@pandionsystems.com
3:40-5:00	Group Activity	Christian Newman
5:00-5:30	Wrap Up	Christian Newman
5:30-7:00	Cocktail Hour at the Gazebo	

SATURDAY- October 3, 2009

Time	Event/Title	Presenter(s)
7:00-8:00	Registration and Breakfast in Bivens South Ballroom	
8:00-8:15	Introduction & Announcements	Christian Newman
8:15-8:35	A New Conservation Banking Program for the Federally Listed Gopher Tortoise	Shauna M. Ginger, USFWS shauna_ginger@fws.gov
8:35-8:55	Innovative Wound Care in Chelonians	Terry M. Norton, Georgia Sea Turtle Center tmynahvet@aol.com
8:55-9:15	Restoring the Florida Red Oak Woods	Linda Conway Duever, Conway Conservation, LLC ConwayConservation@conway.com
9:15-9:35	Multistate Sandhill Restoration Project	Anna Farmer, FWC & Justin Jones, TNC Anna.Farmer@myfwc.com
9:35-9:55	An Experimental Habitat Restoration for the Management of Gopher Tortoises (<i>Gopherus polyphemus</i>) in Pumpkin Hill Creek Preserve State Park, Duval County, Florida	Katya Schuster-Barber, University of North Florida katya.schuster@unf.edu
9:55-10:15	Effect of a Summer Prescription Burn on the Community Structure of Gopher Tortoise Forage	Russell J. Ingram, Augusta State University dwear@agug.edu
10:15-10:30	Break	
10:30-10:50	An Investigation of Imazapyr in Gopher Tortoise (<i>Gopherus polyphemus</i>) Apron Soils	Vicki Underwood, University of Florida anurians@ufl.edu
10:50-11:10	Effects of Age, Size, and Burrow Quality on Survivability of Head-Started	Matt Hinderliter, TNC

Time	Event/Title	Presenter(s)
	Gopher Tortoises	mhinderliter@tnc.org
11:10-11:30	Effects of Habitat Quality on Reproduction in Two Georgia Populations of <i>Gopherus polyphemus</i>	Jackie Entz, Georgia Southern University jentz-gw@georgiasouthern.edu
11:30-11:50	William Bartram's "Gopher" or "Great Land Tortoise"	Rick Schaffer, Stanton College Preparatory School Accipender@aol.com
11:50-1:00	Lunch in Ballroom C	
1:00-1:20	Den Site Selection of Radio-Tagged Eastern Indigo Snakes in East Central Florida, and Implications for Habitat and Management	M. Rebecca Bolt, NASA mary.r.bolt@nasa.gov
1:20-1:40	Snakes in the Grass: Cryptic Natural Histories Defy Abundance and Species Richness Estimates	David A. Steen, Auburn University davidasteen@gmail.com
1:40-2:00	Ecology of the Eastern Kingsnake (<i>Lampropeltis getula getula</i>) Within Longleaf Pine (<i>Pinus palustris</i>) Forests in Southwestern Georgia	Jennifer M. Linehan, Joseph W. Jones Ecological Research Center jennifer.linehan@jonesctr.org
2:00-2:20	Tracking Hatchling and Adult Gopher Tortoises in South Georgia	J. Mitchell Lockhart, Valdosta State University jmlockha@valdosta.edu
2:20-2:40	An Evaluation of Distance Sampling for Large-Scale Gopher Tortoise Surveys in Georgia	Lora L. Smith, Joseph W. Jones Ecological Research Center lora.smith@jonesctr.org
2:40-3:00	Assessment of Line Transect Distance Sampling (LTDS) for Estimating Gopher Tortoise Densities	Traci Castellon, Archbold Biological Station tcastellon@archbold-station.org
3:00-3:20	Break	
3:20-3:40	A Reassessment of the Phylogeography of <i>Gopherus polyphemus</i>	Joshua R. Ennen, University of Southern Mississippi joshua.ennen@usm.edu
3:40-4:00	Life History of the Marco Island Gopher Tortoise	Julie Ross, Florida Gulf Coast University jlross@eagle.fgcu.edu
4:00-4:20	Activity, Thermoregulation, Digestion Rate, and Growth of Mississippi Gopher Tortoise Hatchlings	Carl Qualls, University of Southern Mississippi Carl.Qualls@usm.edu
4:20-4:40	Temporal Patterns of Use of Burrows by Gopher Tortoises	Forest P Hayes, New College of Florida forest.hayes@ncf.edu
4:40-5:00	Population Summary of Gopher Tortoises on the University of North Florida Campus, Duval County, Florida	William Mailand, University of North Florida n00154467@unf.edu
5:00-5:20	Three Decades of Trapping Tortoises: Is It Long Enough to Understand "Long-Term" Population Dynamics and Habitat Use?	Joan Berish, FWC Joan.Berish@MyFWC.com
5:20-5:30	Wrap Up	Christian Newman

Time	Event/Title	Presenter(s)
6:30-9:30	Dinner and Music at Austin Cary Memorial Forest	

POSTERS - October 2-3, 2009

Research Activities Related to Gopher Tortoise Population Health in Southwestern Georgia	Jessica L. Gonynor, University of Georgia jgonynor@uga.edu
URTD in a South Florida Gopher Tortoise Population	Jon A. Moore, Florida Atlantic University jmoore@fau.edu
Monitoring Winter-Breeding Amphibians in Upland Ecosystems at St. Marks National Wildlife Refuge, Florida	Susan C. Walls, USGS swalls@usgs.gov
Surveillance for the Amphibian Chytrid Fungus in the Southeastern U.S.: Implications for Environmental Monitoring of a Disease Pathogen in Upland Ecosystems	William J Barichivich, USGS swalls@usgs.gov
Wildlife Assemblage Response to Longleaf Pine Restoration: Year One	David A. Steen, Auburn University davidasteen@gmail.com
Color Coded: Looking Into the Dietary Habits of the Red Foot Tortoise (<i>Geochelone carbonaria</i>) in Captivity	Lauren Schaffer, Darnell Cookman Middle School Chelonian1@aol.com
Status of the Eastern Indigo Snake (<i>Drymarchon couperi</i>) in Florida	Kevin M. Enge, FWC kevin.enge@myfwc.com

Optional Weekend Activities and Field Trips

Friday - 10/2/2009

Field Trip: Moonlight Paddle (Santa Fe River to Lily Springs)

Be at Adventure Outpost at 7:00 PM (<http://www.adventureoutpost.net>, 18238 NW Hwy 441, High Springs, FL). It will entail about 1 - 1.5 hours of paddling down to Lily Springs where there will be a small campfire and swimming before shuttling back to vehicles. You should be back to your cars by 10:30 - 11:00 PM. The cost is \$32 per person. Group capacity is 26 people and it is open to public. To guarantee your space, make reservations at (386) 454-0611 or riverguide2000@yahoo.com. *NOTE: Friday GTC Cocktail Hour ends at 7 PM. It takes approximately 45 min-1 hr to get to High Springs...but it is fun.*

Florida Ornithological Society Social Event

6:30-9:30 pm –Audubon Society’s Rex Rowan will present “235 Years of Birdwatching in Alachua County.” The Bird Division of the Florida Museum of Natural History will provide an overview of their research, complete with specimens. Light refreshments and beverages will be served. \$10 per person can be paid at the door. Please email elena.sachs@MyFWC.com if you are interested in attending to help them plan. *NOTE: Starts during Friday GTC Cocktail Hour. GTC and FOS have been trying to promote each other’s events.*

Other Events

“Free Friday” Concert

8:00 p.m. to 10:00 p.m.

Gainesville Downtown Community Plaza

UF Volleyball vs. Kentucky

7:00 p.m.

Stephen C. O’Connell Center

University of Florida Campus

Clayton Bush, Acoustic Music

10:00 p.m.

The Backstage Lounge, Gainesville

Gainesville Comedy Showcase

Live stand-up comedy show

9:00 p.m.

Clarion Inn & Conference Center, Gainesville

Sunday - 10/4/2009

Field Trip: Paynes Prairie Hike

Led by Lars Anderson, author of *Paynes Prairie: The Great Savanna: A History and Guide* (2004) Pineapple Press. 9:00 AM. \$10 per person. Short hike of only a few miles that will take 2 - 3 hours.

Other Potential Sunday Morning Field Trips TBD.

Other Events

Art Festival at Thornebrook Village

140 fine artists and crafts persons
10:00 a.m. to 5:00 p.m.
Thornebrook Village, Gainesville

Amazon Voyage: The Treasures That Surround the Widest River on Earth!
10:00 a.m. to 5:00 p.m.
Florida Museum of Natural History, Gainesville

Florida Museum Exhibit: "Butterflies and Moths in Contemporary Zuni Art"
10:00 a.m. to 5:00 p.m.
Florida Museum of Natural History, Gainesville

UF Volleyball vs. Tennessee
1:30 p.m.
Stephen C. O'Connell Center
University of Florida Campus

Historic Haile Homestead Tours
12:00 p.m. to 4:00 p.m.
The restored Historic Haile Homestead is unique in the nation for its "Talking Walls."
Historic Haile Homestead, Gainesville

Abstracts

Friday

7:30-8:30 REGISTRATION AND BREAKFAST in Bivens South Ballroom

8:30-8:45 INTRODUCTION

8:45-9:25

Urban Wildlife? Thoughts, Policies, and Research on Developing and Maintaining Green Communities

Mark Hostetler, Presenter and Author

hostetm@ufl.edu

Associate Professor, Extension Wildlife Specialist

Department of Wildlife Ecology & Conservation, IFAS, University of Florida

Sustainable or “green” communities are being built across the globe, and one goal is to conserve urban biodiversity. Decisions made by policymakers, planners, developers, and homeowners interact in unique ways, affecting the functionality of any community. For example, with one stroke of a pen, policymakers/planners can encourage or discourage green designs or management practices.

Once it has been decided to create a green community, developers must consider the potential impacts of the three phases of development: design, construction, and post-construction. Often the design phase is addressed, but the construction and post-construction phases are left out. During the construction phase, contractors implement the design, and their actions can have negative consequences for the long-term viability of a community. In addition, the decisions made by homeowners will influence whether a community functions as originally intended. Reaching these diverse audiences is difficult but necessary to create resource efficient communities.

This talk will present some efforts through the University of Florida’s Program for Resource Efficient Communities (PREC). PREC has been actively partnering with several developers and cities to create “model” resource efficient communities. Working with master planned Florida communities, we have encountered both successes and failures. We will explore and exchange ideas about how one can partner with and engage developers, contractors, policymakers, planners, and homeowners.

9:25-9:45

Integrating Rural Land Use With Upland Habitat Conservation

Marc C. Dick, Presenter and Author

marccdick@gmail.com

Landscape Architect

Most discussions of upland habitat management focus on practices applicable to large conservation areas on public lands, whereas much of the potential for preservation and restoration of such habitat lies in the management and interconnection of small patches on private lands. This presentation draws on the principles of holistic landscape architecture to focus on approaches applicable to private lands. It addresses strategies for designing and managing residential, agricultural, and recreational facilities to protect and enhance associated upland habitat. It also examines ways lands valuable for upland habitat

conservation can be selected, designed, and managed so that the services and benefits they provide can support such human uses. Particular emphasis will be placed on the selection and design of rural home sites to facilitate the construction and maintenance of “green buildings,” integration of equestrian facilities into upland habitats, and determination of ways trails can be managed to protect trailside vegetation, minimize maintenance, and enhance landscape aesthetics.

9:45-10:05

Scrub Management Guidelines for Peninsular Florida: Using the Scrub-Jay as an Umbrella Species

Adam Kent, Presenter and Author

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Florida Fish and Wildlife Conservation Commission

The Florida scrub-jay can serve as an umbrella species for Florida’s peninsular scrub because the scrub-jay’s habitat requirements encompass those of a majority of scrub-specialized plants and animals that require a patchy mosaic of low vegetation heights and open patches of bare sand. If followed, these guidelines should benefit most scrub plant and animal species. Many scrub habitats in Florida have experienced fire exclusion or unnaturally infrequent fire regimes. Restoration of scrub habitats to a condition most beneficial to scrub-jays and most other scrub plants and animals will require re-establishment of the historical fire regime.

10:05-10:25

Evaluation of the Potential for Public Lands to Become Recipient Sites for the State-Listed Gopher Tortoise (*Gopherus polyphemus*): A Case Study in Orange County, Florida

Kelley Peterman, Presenter

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Glatting Jackson Kercher Anglin

Authors: Kelley Peterman, Jay Exum, and Julia Noran

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 to this species. A part of that system included the establishment of methods to review and approve a gopher tortoise recipient site. Recipient sites can be established on either public or private lands that meet criteria described in the Gopher Tortoise Permitting Guidelines (FFWCC 2008).

Many local governments hold fee simple title to large, contiguous tracts of land that could be ideal recipient sites for gopher tortoises. Local governments may benefit from establishing recipient sites on their landholdings for several reasons, including that they may be compensated for managing their lands in a manner that is beneficial to tortoises. This may fund management aimed at specific habitat requirements for the species that would not have been otherwise implemented.

Case Study: Orange County, Florida has several tracts of land purchased for *conservation* that may or may not fit the criteria outlined by FFWCC for potential recipient sites. Ten (10) parcels scattered throughout the county were identified as potential recipient sites, and they will be systematically evaluated in the summer of 2009 to determine which property or properties are suitable for the establishment of a recipient site. Permitting an appropriate site(s) will generate funding for the county and provide suitable habitat for displaced tortoises that will be protected and managed in perpetuity.

10:25-10:40 BREAK

10:40-11:00

Gopher Tortoise Candidate Conservation Agreement: Where Are We Now?

Dr. Hal Balbach & Deborah Burr, Presenters

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U.S. Army & Florida Fish and Wildlife Conservation Commission

Authors: Hal Balbach, Deborah Burr, David Glass, Susan Gibson, and Jim McHugh

The Gopher Tortoise Candidate Conservation Agreement (CCA) originated in 2005, when an interagency group decided that they should work together to improve management of the tortoise. At a follow-up meeting, it was decided that a first step would be to create and circulate a Memorandum of Agreement (MOA) among interested parties. This MOA was developed in late 2005, and by the spring of 2006, it had been signed by 13 state, federal, and NGO partners. An important point of the MOA was that a more binding agreement was needed. The CCA was developed in 2007-2008 and finalized and signed in October 2008. Under the CCA, a management team was established, headed by people representing the state governmental partners. The first meeting of this team took place in May 2009 and resulted in agreement on how to report activities associated with gopher tortoise conservation by each of the partners in a consistent format. The first report will cover the Federal Fiscal Year 2009 and will be submitted in early 2010.

11:00-11:20

Separating Fact From Fiction: Clarifying the Federal Listing Process of the Gopher Tortoise

Annie Dziergowski, Presenter and Author

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U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service first received a petition to list the eastern portion of the gopher tortoise's range in January 2006. The next step was to determine if the petition provided the USFWS with substantial information. In this case, the USFWS found that the petitioners provided substantial information to move forward with a 12-month finding/status review. With the publication of the 90-day finding on September 9, 2009, the USFWS is requesting scientific and commercial data and other information regarding the status of and threats facing the gopher tortoise throughout all of its range. In the 12-month finding, we will determine whether the petitioned action is warranted after we have completed a thorough status review of the gopher tortoise.

11:20-11:40

Development of a CCAA for the Gopher Tortoise on Plant Vogtle, Burke Co., GA

John B. Jensen, Presenter

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Georgia DNR, Nongame Conservation Section

Authors: John B. Jensen, Bill Wikoff, Tony Dodd, and Jim Candler

Candidate Conservation Agreements with Assurances (CCAAs) are formal, legally binding agreements between one or more parties and the U.S. Fish and Wildlife Service intended to improve the conservation of a federal candidate species, while assuring the landowner of no further legal obligations if the species is later listed as threatened or endangered. Plant Vogtle, a nuclear power plant operated by Georgia Power in Burke County, Georgia, has nearly 900 acres of upland habitat surrounding the facilities that are

managed to maintain a relatively open canopy of longleaf pine and a diverse herbaceous groundcover. This habitat is seemingly ideal for gopher tortoises, yet no tortoises persist as a result of past human collection and consumption. Georgia Power and Georgia DNR would like to re-establish gopher tortoises at Plant Vogtle using animals displaced by development elsewhere. However, Georgia Power requested assurances that if the species is later listed, activities and operations at Plant Vogtle would not be further restricted beyond what was agreed upon in the CCAA. It is hoped that this CCAA can be used as a template for other landowners interested in conserving the tortoise on their lands, but who are uncomfortable with the uncertain ramifications that listing the species might entail.

11:40-12:00

Increasing Public Awareness of Gopher Tortoise Conservation and Permitting Requirements

Tera Meeks, Presenter

Tera.Meeks@MyFWC.com

Florida Fish and Wildlife Conservation Commission

Authors: Tera Meeks and Judy Gillan

The Florida Fish and Wildlife Conservation Commission approved a management plan for the gopher tortoise in 2007. The overall conservation goal of the management plan is to secure viable populations of gopher tortoises throughout the species' current range in Florida. The successful achievement of this goal depends heavily on outreach efforts and education programs that take a comprehensive approach to educating the public. FWC has developed specific education materials, including brochures, fact sheets, and presentations, to reach the different sectors of the public who may encounter gopher tortoises. The target audiences include homeowners, developers, horse owners, local governments, and grade school teachers. Outreach materials are distributed to the groups through a combination of electronic, direct, and indirect methods. This presentation will provide an overview of the role of outreach, the development of materials, and the distribution of materials in achievement of the conservation goals and objectives set forth by the FWC in the Gopher Tortoise Management Plan.

12:00-1:00 LUNCH in Ballroom C

1:00-1:20

Local Government's Role in Advancing Gopher Tortoise Protection

Steve Hofstetter, Presenter

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Alachua County Environmental Protection Department, Natural Resources Division

Authors: Steve Hofstetter and Eliana Bardi

Local government's land development regulations can assist in implementing gopher tortoise protection and education by raising awareness about the importance of wildlife species and their habitats. Land development regulations can also provide developers and homeowners opportunities to learn to coexist with species and appreciate their values and functions. In Alachua County, land development regulations require up to 25% of the upland portion of a property be set aside when listed species habitat is present. Both large-scale developments and individual properties are screened for listed species habitat during the permitting process, oftentimes resulting in gopher tortoise protection through habitat preservation and reduced permitting requirements for relocation. As part of the review and permitting process, an educational component is often required for all subdivisions containing listed species habitat to ensure long-term protection of the species, and outreach materials are provided to individual

landowners through the building permit preapplication screening process. Habitat set aside during the permitting process is protected in perpetuity via conservation easements and deed restrictions. This approach ensures that the species and its habitat are protected even at the smaller landowner scale. It also enables educational and outreach efforts to be concurrent with local government permitting.

1:20-1:40

Ensuring Proper Management of Florida's Ecosystems: Natural Areas Training Academy

Linda Demetropoulos, Presenter and Author

demetrop@ufl.edu

Manager, Natural Areas Training Academy

University of Florida, Department of Wildlife Ecology and Conservation

During the past 30 years, Florida has acquired and protected more than 2 million acres of Florida's most ecologically functional lands. Properly managing these sensitive and valuable lands requires an extensive breadth of expertise that is typically not acquired through formal academic education. The Natural Areas Training Academy (NATA) was conceived nearly a decade ago out of the recognized need for training opportunities for Florida's resource management professionals. Workshops were developed to target the set of skills that experienced land management professionals representing different agencies and organizations believe to be most crucial. Over the past decade, NATA training has become recognized as a valuable credential. The Florida Fish and Wildlife Conservation Commission and Florida's Water Management Districts support NATA and send their land management professionals to NATA workshops. The training has been adopted as a basic qualification for work by at least five Florida counties, has been endorsed by the Natural Areas Association and used as a template to develop nationwide standards for conservation land management training. To date, more than 1,200 individuals have taken workshops offered through NATA, and more than 100 individuals have earned a "Certificate in Natural Areas Management" (presented upon completion of a series of five specific workshops).

1:40-2:00

Turtles for Tomorrow

Kelly O'Keefe, Presenter

kokeefe@jekyllisland.com

Education Specialist

The Georgia Sea Turtle Center and The Jekyll Island Foundation

Authors: Kelly O'Keefe, Alicia Marin, Dr. Terry Norton, and Cindy McDonald

Turtles for Tomorrow, an event spear-headed by the Georgia Sea Turtle Center (GSTC), is a collaborative effort incorporating three environmental education facilities – the GSTC, Tidelands Nature Center, and the Jekyll Island 4-H Center – and the local scouting community. Supported by the Gopher Tortoise Council's Donna J. Heinrich Environmental Education Award, this program will serve as a platform to launch an annual Girl and Boy Scout event on Jekyll Island, GA, introducing participants to general and distinct differences of turtles, tortoises, and terrapins. Through formal presentations, hands-on activities, and live animal presentations, the goal is to increase awareness of habitat and conservation challenges, promote responsibility for ecosystem health, and inspire young minds to make educated and informed decisions to ensure the survival of turtles for tomorrow.

Turtles for Tomorrow compares and contrasts turtles, tortoises, and terrapins by highlighting four specific species – the loggerhead sea turtle, eastern box turtle, diamondback terrapin, and gopher tortoise – with a strong emphasis on the importance of the gopher tortoise as a keystone species of its upland ecosystem

habitat. Participants will have the opportunity to learn about the four species of turtles on a “station rotation” between the aforementioned facilities. A final wrap-up activity will visually reinforce the information covered throughout the event and stress the importance of making positive choices to support the future of wildlife.

2:00-2:20

Developing Stewards for Biological Diversity Through Gopher Tortoise Conservation Research

Pamela L. Pannozzo, Presenter
pannozzp@pbcc.edu
Professor of Biological Sciences
Palm Beach Community College

Authors: Pamela L. Pannozzo and Reed Noss

Approach: This project is a partnership between Palm Beach County Department of Parks and Recreation, Palm Beach Community College (PBCC), and the University of Central Florida. PBCC offers a course involving honors students in conservation research. The course examines the success of a 1985 translocation of gopher tortoises to Okeehetee Park Nature Center (ONC). ONC will highlight the research in education programs to raise public awareness about tortoises. This study is part of a doctoral project evaluating the long-term success of tortoise translocations and the factors that affect success.

Methods: Students will apply concepts learned in environmental conservation and biology classes. They will be actively involved in all aspects of the study and thereby gain research experience uncommon for undergraduates. The study will (a) provide information on population structure, (b) determine the number of reproducing females, (c) quantify the number of hatchlings leaving nests, and (d) determine the identity and number of nest predators through digital video.

Results: This study follows a 2002 study that evaluated success of the 1985 translocation and found a shift in population structure toward adults. Park managers suspect high predation limits hatchling success. We anticipate our results will help ONC sustain the existing population of tortoises. Information gained in this study will be applied to the larger objective of identifying factors that determine the success of translocations. Exposing students to wildlife research through experiential learning is key to cultivating the next generation of conservation stewards.

2:20-2:40

Creating Advocates for Imperiled Species Through Art

Brett Miley, Presenter and Author
longleafs@gmail.com
ecoRidge

Species throughout the world are becoming imperiled at an alarming rate. One of the main reasons for imperilment is development and other human impacts. People need to be made aware of these species and their plights. An emotional connection is one of the best ways to create advocates for a cause. Therefore, I have been creating artwork (mandalas) from my images of imperiled species to reach people emotionally and, in the process, educate the general public about these species. The mandala art form is a very emotional art form. With every mandala comes the original image and a species information sheet. My efforts merge art and ecology to create advocates for these imperiled species. Several examples will be given.

2:40-3:00 BREAK

3:00-3:20

Educating for Upland Conservation: Social Marketing as a Tool for Success

Pete Colverson, Presenter

pcolverson@pandionsystems.com

Communications Specialists

Pandion Systems, Inc.

Social Marketing provides additional capabilities over traditional outreach programs to not only reach a targeted audience with specific messages, but also to generate behavior change that will benefit the resource that you are trying to protect. This program will focus on what social marketing is and provide some suggestions as to how it might be used to promote conservation of gopher tortoises and the upland habitat upon which they depend. The session will be evenly split between presentation and discussion in an effort to provide some consensus on two or three ways that social marketing may assist people attempting to improve public outreach about gopher tortoise conservation.

3:20-3:40

Effective Evaluation Is Key to Program Success

Christine Denny, Presenter

cdenny@pandionsystems.com

Vice President and Director of Communications

Pandion Systems, Inc.

How do you know if your audience is getting the message you intended? How can you improve your program? How do you know if your program is meeting its objectives? Program evaluation provides information you can use to plan and improve your outreach program. Using evaluation will help you better understand your program, and it does not need to be a budget-breaking or time-consuming undertaking. The problem with evaluation is that although it is recognized as a valuable tool, it is often overlooked due to lack of time for busy staff, lack of knowledge about how to conduct evaluation, and funding shortfalls that make evaluation low on the priority list. The fact is that using evaluation can actually help you increase program effectiveness, support, and funding. All phases of a program can be evaluated, and there are many tools to collect the information you need. This presentation will provide an overview of the benefits of evaluation and an introduction to some evaluative tools and methods you can use to assess all aspects of your program.

3:40-5:00 GROUP ACTIVITY

5:00-5:30 WRAP UP

5:30-7:00 COCKTAIL HOUR at the Gazebo

Saturday

7:00-8:00 REGISTRATION AND BREAKFAST in Bivens South Ballroom

8:00-8:15 INTRODUCTION AND ANNOUNCEMENTS

8:15-8:35

A New Conservation Banking Program for the Federally Listed Gopher Tortoise

Shauna M. Ginger, Presenter and Author

shauna_ginger@fws.gov

U.S. Fish and Wildlife Service

The gopher tortoise (*Gopherus polyphemus*) is currently listed by the U.S. Fish and Wildlife Service as threatened in accordance with the Endangered Species Act for populations occurring west of the Mobile and Tombigbee Rivers in Alabama, Mississippi, and Louisiana. The decline of the gopher tortoise has been linked to the decline of open, fire-maintained longleaf pine forest ecosystem, of which it is considered a keystone species.

The USFWS's recovery plan for the gopher tortoise establishes short-term and long-term criteria involving public and private lands. One mechanism for assisting the goal of creating self-sustaining gopher tortoise populations on private lands is to establish conservation banks that can serve as mitigation sites for loss of tortoise habitat as well as relocation sites for the tortoises themselves. These programs are proving effective at mitigating losses of species habitat and providing regulatory certainty for all involved. Conservation banking also reduces the piecemeal approach to conservation efforts that can result from individual projects by establishing larger, strategically located reserves for potentially viable populations. This form of conservation banking is a relatively new concept in the Southeast. The need for and implementation of a banking program for the gopher tortoise is explored, as well as some of the unique issues (e.g., relocation of animals) that have surfaced while creating banking guidelines that balance feasibility with the biological needs of the species.

8:35-8:55

Innovative Wound Care in Chelonians

Terry M. Norton, Presenter

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DVM, Diplomate ACZM

Georgia Sea Turtle Center

Authors: Terry M. Norton, Erika Kemler, Michelle Kaylor, and Jeannie Miller

Traumatic injuries caused by boat propellers, automobile collisions, mowers, and a variety of predators are common in chelonians. The incidence of boat strike injuries in sea turtles in Georgia has increased over the last decade and now accounts for 15-20% of strandings. As coastal development increases, we expect to see an increasing level of interaction between boats and sea turtles. Several treatment modalities have proven useful for traumatic injuries encountered in a variety of turtle species, including:

1) A skull fracture caused by boat propeller strikes was repaired with a movable external fixator. This device allowed the infected bone to be cleaned and debrided daily while slowly closing the fractured

skull.

2) Deep shell wounds have been treated with heavy debridement and cleaning followed by packing the wound with honey and honey comb. Wound healing properties of honey include high osmolality, low concentration hydrogen peroxide activity, antibacterial phytochemicals, and stimulation of the immune system.

3) Vacuum-assisted wound care has been used successfully on a number of turtle patients. Aquatic turtles present challenges with this method of therapy because they must be kept out of water when the suction is on.

4) Bacterial osteomyelitis (bone infections) cases have been treated with bone cement impregnated with antibiotics and doxirobe gel (Pharmacia & Upjohn Co, Division of Pfizer Inc, NY, NY 10017) placed directly on the wounds. Both products protect the site being treated and provide very high concentrations of antibiotics directly on the wound over an extended period of time.

8:55-9:15

Restoring the Florida Red Oak Woods

Linda Conway Duever, Presenter and Author

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Red oak woods are park-like open woodlands with a canopy dominated by southern red oak, mockernut hickory, and longleaf pine; a midstory with post oaks and dogwoods; and a diverse patchy understory characterized by flammable grasses, copicing shrubs, and a rich array of showy wildflowers. They occur in the Panhandle and in North Central Florida, where they are found on clayey sands overlying limestone between xeric scrub/sandhill communities and downslope hardwoods.

These woodlands were a prominent feature of the 1800s landscape, but agricultural and residential land conversion and fire suppression had whittled them down to little overgrown scraps by the late 1900s. As remnants became so fragmented and overgrown that they were difficult to recognize, the red oak woods were all but forgotten. The Florida Natural Areas Inventory will soon draw attention to this conservation problem by removing red oak woods from upland pine forest and describing them as a separate pine-oak-hickory natural community.

There are tremendous opportunities for restoring this scenic landscape on private lands in Alachua, Marion, and surrounding counties. This presentation will discuss strategies for restoring red oak woods on such properties.

9:15-9:35

Multistate Sandhill Restoration Project

Anna Farmer and Justin Jones, Presenters

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Florida Fish and Wildlife Conservation Commission & The Nature Conservancy

Authors: Anna Farmer, Justin Jones, Vernon Compton, Matt Elliott, Nicholas Sharp, and Stephen Bennett

In April 2009, Alabama, Florida, Georgia, and South Carolina received a \$1 million grant from the U.S. Fish and Wildlife Service's State Wildlife Grant Competitive Program for a cooperative effort to restore sandhill habitats at priority sites on public and private lands. By 2012, the project will significantly increase the quality and quantity of habitat for the gopher tortoise and other wildlife species on nearly

40,000 acres of sandhill across the four states through a combination of prescribed burning, hardwood and offsite pine removal, and the repatriation of longleaf pine. These ecosystem restoration activities are expected to be a kick-start toward longer-term efforts.

The multistate sandhills project contains a strong monitoring component. Baseline gopher tortoise population estimates will be collected at a subset of treatment sites. Because tortoise populations are not expected to respond significantly in three years, we will also monitor changes in breeding bird presence/absence and key vegetation components before and after treatments.

Partners in the project will include, besides the wildlife management agencies of the four states, The Nature Conservancy, Project Orianna, the Gopher Tortoise Council, the Joseph W. Jones Ecological Research Center, the U.S. Fish and Wildlife Service, and numerous private landowners.

9:35-9:55

An Experimental Habitat Restoration for the Management of Gopher Tortoises (*Gopherus polyphemus*) in Pumpkin Hill Creek Preserve State Park, Duval County, Florida

Katya Schuster-Barber, Presenter

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University of North Florida

Authors: Katya Schuster-Barber and Dr. Joseph Butler

Gopherus polyphemus has recently been elevated in Florida from a species of special concern to threatened status. Without a regular fire regime, tortoise habitat can become too overgrown and force individuals to abandon it in search of more suitable habitat. Due to logistical constraints of controlled burns, it could be beneficial to mechanically remove overgrown vegetation.

In this study at Pumpkin Hill Creek Preserve State Park, we have mechanically removed palmetto from six 10 m x 10 m sample plots. Four other equally sized plots were located within a controlled burn area. Finally, six more plots received no treatments. We monitored plant species diversity, soil cores, and percent cover (shrub, herbaceous, and canopy) along 100 m transects intersecting each plot. We also located and marked burrows within the park and conducted bucket trapping. A significant difference between treatments was detected for the frequency of palmetto presence. There was also a significant difference in shrub cover between control and cleared treatments. Significant negative correlations were detected between shrub cover and herbaceous cover and between shrub cover and species richness. A significant positive correlation was detected between herbaceous cover and the presence of wiregrass. The mechanical clearing was effective at removing shrub cover, including saw palmetto. The degree of disturbance and time needed for plant establishment is likely to prevent the use of this technique over large areas, but it could be useful for establishing foraging and nesting areas in order to improve habitat quality for gopher tortoises.

9:55-10:15

Effect of a Summer Prescription Burn on the Community Structure of Gopher Tortoise Forage

Russell J. Ingram, Presenter

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Augusta State University

Authors: Russell J. Ingram and Donna J. Wear

The community structure of longleaf pine habitat is fire dependent. Historically, fire occurred most often in summer months via lightning strikes. Many fire-dependent communities are now maintained by prescribed burning that is typically conducted in winter months to reduce the risk of fire outbreak. In June 2008, prescribed burning was conducted in the longleaf pine habitat at the McDuffie Public Fishing Area, McDuffie County, GA. This area is designated as the state's relocation site for waif tortoises. We examined the effect of fire on plant diversity with emphasis on forage for gopher tortoises. Overall diversity decreased after the burn in both sun and shade quadrants compared with controls.

10:15-10:30 BREAK

10:30-10:50

An Investigation of Imazapyr in Gopher Tortoise (*Gopherus polyphemus*) Apron Soils

Vicki Underwood, Presenter and Author
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University of Florida

We investigated how long imazapyr persists after being sprayed on the apron soil of gopher tortoise burrows to determine how long gopher tortoise eggs may be exposed to imazapyr during development. We sprayed imazapyr (Arsenal) at a concentration of 0.5 lbs. per acre on four burrows, at 1 lb. per acre on four burrows, and left four burrows untreated. We then conducted a bioassay experiment using brown-top millet and the soil samples collected to test the concentrations of imazapyr present at three different times after the herbicide experiment. The results are not what we predicted, but should prove useful in land management decisions.

10:50-11:10

Effects of Age, Size, and Burrow Quality on Survivability of Head-Started Gopher Tortoises

Matt Hinderliter, Presenter and Author
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The Nature Conservancy

Previous telemetry studies of hatchling gopher tortoises have shown that 90 - 100% of the animals die within two years. To investigate mortality in young juvenile tortoises, a head-starting study was begun in 2006 at Camp Shelby in southern Mississippi. Each year for the last four 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 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 should begin to determine if and when there are size thresholds that make tortoises less susceptible to certain types of predation, and if there are different behaviors that increase survivorship. Preliminary results show that predation rates are only slightly higher in hatchlings compared to one and two-year-old tortoises. Construction of better (i.e., longer) burrows may be a better indicator of survivability than either age or size, and this ability to construct quality burrows may be directly related to whether tortoises were provided with "starter" burrows.

11:10-11:30

Effects of Habitat Quality on Reproduction in Two Georgia Populations of *Gopherus polyphemus*

Jackie Entz, Presenter

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Wildlife Curator

GSU Wildlife Center

The purpose of this study was to examine differences in maternal investment by examining the habitat structure and reproductive parameters for two populations of *Gopherus polyphemus* in Southeast GA. This study addresses four main questions: (1) Has habitat quality changed in the past 10 years within and between population sites? (2) Was there an effect on female body size and reproductive parameters, and is it due to habitat? (3) Is female body size shaping egg size or clutch size? (4) If environment plays a large role in tortoises' growth rate and eventually reproduction, is habitat quality correlated with the observed differences in maternal investment?

11:30-11:50

William Bartram's "Gopher" or "Great-Land Tortoise"

Rick Schaffer, Presenter

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Stanton College Preparatory School, Turtle and Tortoise Newsletter

Authors: Rick Schaffer and Chuck Schaffer

William Bartram is widely known as an explorer, naturalist, artist, and author, but many chelonians received early or even first coverage in his writings and illustrations.

Bartram's entrée to this field opened through one of his father's English patrons, Peter Collinson. At Collinson's request, Bartram's father sent his son's illustrations of turtles, mollusks, and indigenous plants. A number of these were published by Collinson under a pseudonym in the *Gentleman's Magazine*. Collinson also shared Bartram's illustrations with Dr. John Fothergill, another prominent Quaker naturalist and collector, who would ultimately become Bartram's primary patron. Bartram's career as a commissioned naturalist and explorer began in 1772 with an annual stipend of 50 pounds from Fothergill. Under his patron's directive, Bartram left for Florida to gather natural history material and to document his travels with illustrations and written commentary. Letters to Collinson provided illustrations and descriptions of the spotted turtle and the mud turtle. Reports to Fothergill yielded images and information on the green sea turtle, the "Redbellied Turapin" (Florida redbelly cooter), "the little muskey Tortoise" (musk turtle), and the spotted turtle.

Travels (1791) has somewhat broader coverage and incorporates natural history, behavioral, and locality data on the large "fresh-water tortoise" (likely the Florida cooter), the small "fresh-water tortoises" (*Pseudemys* species or the chicken turtle - *Deirochelys reticularia*), the "small land tortoise" box turtle, the "Great soft shelled tortoise," the Florida softshell, and the "Gopher" or "Great land -tortoise." Numerous authors based their descriptions on Bartram, but some did not convey credit.

11:50-1:00 LUNCH in Ballroom C

1:00-1:20

Den Site Selection of Radio-Tagged Eastern Indigo Snakes in East Central Florida, and Implications for Habitat and Management

M. Rebecca Bolt, Presenter

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NASA

Authors: M. Rebecca Bolt and Stephanie K. Weiss

The eastern indigo snake (*Drymarchon couperi*) is one of the largest snakes in the U.S. Home ranges exceeding 580 ha are documented, and there is an apparent preference for a heterogeneous matrix of habitat types, including uplands and wetlands. Indigos use dens as nighttime refuge, during inclement weather, after feeding, and during shedding events. Between 1998 and 2002, 83 indigos in Brevard County, Florida, were radio tracked twice per week. Location, habitat type, activity, and den site information was recorded. Den sites were classified into five general types. Gopher tortoise burrows are typically considered to be the den site of choice, but nearly one fourth of the indigos were never found using tortoise burrows. Some indigos used tortoise burrows occasionally, but more often chose one of the other four den types. While the presence of gopher tortoises and their burrows on a site may indicate the potential of occupancy by indigos, the absence of tortoises does not mean that indigos do not or cannot occur. Habitat management for gopher tortoises and indigos can be complementary; however, the size of an area and degree of habitat fragmentation should be the primary considerations when land acquisition and management decisions for indigos are being made.

1:20-1:40

Snakes in the Grass: Cryptic Natural Histories Defy Abundance and Species Richness Estimates

David A. Steen, Presenter

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Department of Biological Sciences, Auburn University

Joseph W. Jones Ecological Research Center

Authors: David A. Steen, Craig Guyer, Lora L. Smith

Snakes are cryptic and often defy controlled study. Due to low recapture rates, raw counts are often used to compare abundances among populations. Lists of species captured are occasionally used to represent species richness at a particular site. In the course of examining three long-term snake capture datasets from longleaf pine forests in Alabama and Georgia, we identified some of the difficulties of working with upland snake data and the pitfalls of ignoring their low capture probability. We calculated abundance estimates using a model that incorporated detection probabilities. We identified a trend that indicated higher sample sizes may result in higher detection probabilities, but considerable uncertainty surrounded all estimates. Despite a level of effort and time that exceeded that which is typical of most studies of snakes, we could generate statistically defensible estimates of abundance for only one of 28 snake species. But, even for this species, confidence intervals for relevant estimates were exceedingly wide. We also showed that the species accumulation curve for snakes in a longleaf pine forest reached an asymptote only after 16 months of active season trapping with seven snake trap arrays. Although we demonstrated that snake trap arrays allowed us to estimate species richness of large snakes with extremely narrow confidence intervals, relatively intensive sampling was required. We conclude that the effort associated with the vast majority of snake studies is insufficient to detect statistically significant changes in abundance or accurately characterize species richness between areas or over time.

1:40-2:00

Ecology of the Eastern Kingsnake (*Lampropeltis getula getula*) Within Longleaf Pine (*Pinus palustris*) Forests in Southwestern Georgia

Jennifer M. Linehan, Presenter

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Joseph W. Jones Ecological Research Center

Authors: Jennifer M. Linehan, Lora L. Smith, and David A. Steen

We examined demography, activity patterns, and spatial ecology of the eastern kingsnake (*Lampropeltis getula getula*) on a protected area in southwestern Georgia from 2002 to 2008. Twelve adult kingsnakes (10 males and 2 females) were radio tracked for periods ranging from 221 to 1,043 days. We recorded 198 kingsnakes (including 19 recaptures) captured with drift fence arrays, snake trap arrays, and incidental hand collection. Sex ratio was strongly biased toward males ($\chi^2 = 32.5$, $P < 0.0001$), and age structure was skewed toward adults ($\chi^2 = 21.8$, $P < 0.0001$). Most snakes were captured in April and May (42%), and radio-telemetered snakes were most active (% above ground observations) from March through June (46%). Average 100% minimum convex polygon (MCP) home range size for adult males and females was 49.54 ± 11.4 ha and 49.43 ± 16.1 ha, respectively. Average fixed local convex hull (LoCoH) 100% isopleths yielded smaller home range estimates than MCPs (male: 42.13 ± 8.6 ha; female: 36.07 ± 10.0 ha). Mean LoCoH high-density core areas (50% isopleths) were similar for males and females (male: 8.53 ± 1.5 ha; female: 9.58 ± 3.2 ha). The number of days a snake was tracked was significantly correlated with the number of locations to which a snake returned ($n = 12$, $R^2 = 0.85$, $P < 0.0001$), suggesting that kingsnakes have site fidelity. Understanding the ecological requirements of the eastern kingsnake is imperative to managing and conserving a species that is facing population declines in parts of its range.

2:00-2:20

Tracking Hatchling and Adult Gopher Tortoises in South Georgia

J. Mitchell Lockhart, Presenter

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Department of Biology, Valdosta State University

Authors: J. Mitchell Lockhart, Christine M. Chessler, and Amy C. Watts

For the last four years, we have monitored adult gopher tortoise movements at Moody Air Force Base (MAFB) in Lowndes and Lanier counties and have recently begun to monitor hatching conditions and hatchling dispersal with the Reed Bingham State Park (RBSP) Gopher Tortoise Hatchling Project. For adult studies, 20 remote frequency identification units designed to recognize 134 kHz passive integrated transponder (PIT) tags were built and placed around burrows in two areas of MAFB, varying distances from routine military operations. Data have been collected intermittently for the last four years, and the technique and preliminary results will be discussed. For RBSP hatchling studies, 91 hatchlings were implanted with 125 kHz PIT tags and released at point of egg-laying in 2008. Seventeen recaptures representing 15 animals were recorded from October 2008 to September 2009. Preliminary results for this study will also be presented.

2:20-2:40

An Evaluation of Distance Sampling for Large-Scale Gopher Tortoise Surveys in Georgia

Lora L. Smith, Presenter

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Joseph W. Jones Ecological Research Center

Authors: Lora L. Smith, Jennifer M. Linehan, Jonathan M. Stober, Matt J. Elliott, and John B. Jensen

Management and conservation of gopher tortoises has been hindered by the lack of population monitoring data. Recent studies have demonstrated that line transect distance sampling (LTDS) is efficient for estimating population parameters for gopher tortoises, yet this method has not gained widespread acceptance. We attempted to use LTDS to survey gopher tortoise populations on 20 protected areas across southern Georgia. We used a camera system to determine burrow occupancy at each site. The survey data were used to compare population estimates derived using LTDS (with burrow scoping) to estimates obtained with survey methods recommended in the 2007 Florida Gopher Tortoise Management Plan: area-constrained surveys of 15% of suitable habitat and a standard 50% burrow occupancy. LTDS estimates of tortoise population density ranged from 0.21 ± 0.04 tortoises/ha at Ochoopee Dunes Natural Area to 1.65 ± 0.37 tortoises/ha at General Coffee State Park. Distance sampling was generally very efficient (on average, our survey rate was 0.88 km/hour), and we obtained estimates of population size and density at 13 of the 20 sites. The method was much less efficient at sites with extremely low tortoise densities and at sites where the survey area was poorly defined. Under the former circumstance, LTDS sampling would have required 88-1,318 km of transect per site, which was beyond the scope of our overall project. In the latter circumstance, additional ground-truthing of the habitat would have been necessary. Hence, we reported only the tortoise encounter rate and burrow occupancy estimates for these sites. Population estimates obtained with area-constrained surveys and a 50 % burrow occupancy rate differed by as much as 114 % from those obtained with LTDS and occupancy estimates based on burrow scoping.

2:40-3:00

Assessment of Line Transect Distance Sampling (LTDS) for Estimating Gopher Tortoise Densities

Traci Castellon, Presenter

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Archbold Biological Station

We are conducting a baseline survey of gopher tortoise densities at the Avon Park Air Force Range in South Central Florida using Line Transect Distance Sampling (LTDS) and scoping of burrows to determine occupancy. However, there are several possible approaches for conducting LTDS sampling and for estimating tortoise densities. Under one approach, each burrow encountered along a transect is scoped to determine occupancy, and population densities are estimated based on actual detection of tortoises. An alternative approach combines LTDS and occupancy modeling to estimate the occupancy rates of burrows, including burrows that cannot be scoped effectively (e.g., due to tortuous architecture). Burrow occupancy can also be modeled independently based on burrow activity status, classified by visual assessment of the burrow mouth and apron. Further, to increase the numbers of burrows detected along transects and improve precision of estimates, LTDS is sometimes implemented with one observer searching for burrows along the center line, while two additional observers search on either side of the line, to a defined maximum distance. To determine the most statistically robust and cost-effective strategy for conducting long-term monitoring at our study area, we implemented our baseline survey in such a way that data could be analyzed following each of the protocols described above. Having nearly completed

data collection, we will present preliminary results that illustrate the magnitude of differences among density estimates (and coefficients of variation) generated by the various approaches.

3:00-3:20 BREAK

3:20-3:40

A Reassessment of the Phylogeography of *Gopherus polyphemus*

Joshua R. Ennen, Presenter

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University of Southern Mississippi

Authors: Joshua R. Ennen, Brian R. Kreiser, and Carl P. Qualls

The importance of identifying geographic barriers that restrict gene flow and fashion genetic structure within a species is paramount in formulating a management strategy. Considering the species as a whole and the failure to separately manage genetically unique populations or regions could precipitate the loss of genetic diversity and local adaptations. Since *Gopherus polyphemus* has historically been declining range-wide, the identification of evolutionary significant units and management units is critical for the protection and recovery of the species. Previous molecular work makes it clear that there are distinct population assemblages across the geographic range of *G. polyphemus*. However, given limitations in sampling and the techniques used in these studies, the identification of geographical barriers contributing to the genetic structure has been limited. The goal of this study was to more fully sample across the western portion of the range (i.e., west of the Tombigbee and Mobile rivers) by including populations from Mississippi and western Alabama in order to reassess the phylogeography of *G. polyphemus*. These data allow us to more explicitly evaluate the extent of genetic isolation/divergence and the geographic barriers associated with them throughout the range, but in particular the western portion of the range (i.e., west of the Tombigbee and Mobile rivers). Our preliminary findings (i.e., mitochondrial gene - ND4) are mostly congruent with the previous phylogeographic studies and suggest the existence of three assemblages (Western, Eastern, and Central Florida).

3:40-4:00

Life History of the Marco Island Gopher Tortoise

Julie Ross, Presenter

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Florida Gulf Coast University

Authors: Julie Ross and Dr. Phil Allman

Species existing in discrete populations over a broad geographic range often display variations in life history patterns due to local adaptations in response to different environmental conditions. Variations in life history traits have been documented in gopher tortoises and are typically explained by environmental features associated with habitat quality (Ashton et al. 2008). In this study, we report demographic data from a native island population from the southwestern tip of the gopher tortoise range in Florida. The mean adult female carapace length is 290 mm with a mass of 5.15 kg. The mean male adult carapace length is 298 mm with a mass of 5.34 kg. In areas of which gopher tortoises are found, they exist in high densities from 24.4 per hectare to 82.3 per hectare. Recapture data indicate some individuals are moving through developed properties to reach more suitable habitats that may contain necessary resources such as foraging material and mates. Future studies of this population will include analyzing the population

structure using microsatellite markers from the scute shavings to look at the genetic variability of this population.

4:00-4:20

Activity, Thermoregulation, Digestion Rate, and Growth of Mississippi Gopher Tortoise Hatchlings

Carl P. Qualls, Presenter

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Department of Biological Sciences, University of Southern Mississippi

Authors: Joshua R. Ennen, Jennifer Lamb, Carl P. Qualls, and Thomas Smith

We recently found that gopher tortoise populations in the DeSoto National Forest (MS) exhibit significantly lower allelic diversity than studied eastern populations. Reduced genetic diversity can negatively impact reproductive success as well as the fitness of resulting offspring. Therefore, we reared hatchling gopher tortoises from these low-variability populations in captivity to assess their activity levels, thermoregulatory behavior, digestion rate, and growth rates. One group of hatchlings was inoculated with gut microflora by including fresh fecal material from wild adults in their food, while a control group received no inoculant. All were housed individually in identical enclosures with a native soil substrate, artificial burrow (plastic cup), one quadrant of the enclosure on a heating pad (24 hour), and full spectrum light for 12 hours per day. Each was given *ad libitum* food and water for 30 weeks to record their change in body mass; observations of activity, basking, defecation frequency, and gut passage time were also recorded. Growth did not differ among the inoculated and uninoculated groups, but growth varied more than four-fold among individuals. Significant correlations indicated that the slower growing individuals had more rapid gut passage, defecated more frequently, spent more time in the burrow, and basked less frequently.

4:20-4:40

Temporal Patterns of Use of Burrows by Gopher Tortoises

Forest P. Hayes, Presenter

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Department of Biology, New College of Florida

Authors: Forest P. Hayes and John P. Hayes

Gopher tortoise burrows are used by a multitude of different species and are key resources in structuring the ecosystems in which they are found. However, temporal patterns of use of burrows, even by gopher tortoises, are not well understood. We monitored nine burrows periodically from June 16, 2009 to August 13, 2009 at the Ordway-Swisher Biological Station in Putnam County, Florida, to ascertain temporal patterns of use. We used 6 TrailMaster active infrared triggers (models TM1550 and TM1500) and Canon digital SLR cameras (Digital Rebel XT and XTi), shifting the camera traps among the monitored burrows. Every other day we checked the cameras, downloaded data, and performed necessary maintenance. We observed 12 species using the burrows, but the vast majority of photos were of gopher tortoises. They were active almost exclusively during daylight hours, with >95% of gopher tortoise observations falling between 1100h and 2000h. Mean length of time out of the burrow (between exit and return) was 24.67 minutes and mean length of time between exits during the day was 64.63 minutes. We plan to continue monitoring these sites throughout the year to gauge seasonal activity patterns, and eventually to examine the influences of habitat condition on activity patterns.

4:40-5:00

Population Summary of Gopher Tortoises on the University of North Florida Campus, Duval County, Florida

William Mailand, Presenter
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University of North Florida

Authors: William Mailand and Joseph Butler

Gopher tortoises dig burrows in which to sleep, hibernate, and avoid predators, desiccation, and high temperatures. Gopher tortoise population numbers can be measured in several ways, but most are very costly and/or time consuming. We used a cost-effective population estimation method based on burrow number and activity, supplemented by pitfall traps at tortoise burrow mouths. Using both methods, a minimum tortoise quantity and population estimate was obtained. The study area is located on the southwest quadrant of the University of North Florida (Jacksonville, Duval County, Florida) campus and is bordered by two major roadways. The campus is fenced, creating a border between the preserve and roadways. We surveyed the area between 18 January and 1 March 2009 and recorded 150 burrows; 9 were active, 134 were inactive, and 7 were abandoned. From these, we estimated a tortoise population of 87. A follow-up study was conducted between 1 March and 10 September. Trapping took place during the second study, when tortoises are most active. We trapped 48 tortoises; 14 were male, 17 were female, and 17 were juveniles. We located 209 burrows; 148 were active, 32 were inactive, and 29 were abandoned. The current estimated population is 110 tortoises.

5:00-5:20

Three Decades of Trapping Tortoises: Is It Long Enough to Understand “Long-Term” Population Dynamics and Habitat Use?

Joan Berish, Presenter and Author
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Florida Fish and Wildlife Conservation Commission

A follow-up study was conducted to gather information on long-term gopher tortoise (*Gopherus polyphemus*) population dynamics, burrow distribution, and habitat use on a planted pine site near Cross Creek, Florida. Previous multiyear, mark-recapture surveys were conducted on this site during the 1980s, and a single-year follow-up survey was undertaken in 1992. The 66 ha study area is a mosaic of moderately well-drained and poorly drained soils and has had a history of clear cuts and replantings since tortoises were first captured in 1981-82. Recent beneficial management included a 2008 thinning and a winter 2009 prescribed burn. Gopher tortoise burrows were located during late April to early May 2009, and tortoises were captured in pitfall or wire traps during May, June, and July. Unseasonably heavy rains during May flooded portions of the study site and made trapping tortoises a challenge. Fifty-two tortoises were captured on the study site, and four additional tortoises were captured in an adjacent pine plantation across a paved rural road. Seventeen tortoises had been previously marked; three were former radio-instrumented individuals, including a male that had been initially marked as a mature adult in 1982. Most marked individuals were in the same approximate location as during earlier surveys, despite the silvicultural-related habitat changes over time. Drill marks held up relatively well in adult tortoises, but were very difficult to discern in some individuals marked as juveniles.

5:20-5:30 WRAP UP

6:30-9:30 DINNER AND MUSIC at Austin Cary Memorial Forest

Posters

Research Activities Related to Gopher Tortoise Population Health in Southwestern Georgia

Jessica L. Gonynor, Presenter

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D. B. Warnell School of Forestry and Natural Resources, University of Georgia

Southeastern Cooperative Wildlife Disease Study

Joseph W. Jones Ecological Research Center

Authors: Jessica L. Gonynor, Lora L. Smith, Sonia Hernandez, and Michael J. Yabsley

Pathogen surveillance is an important aspect in understanding disease. However, understanding the impact of the disease in a free-ranging population is important to the management and conservation of a species and can aid in the response to events such as an outbreak or mitigation activities. *Mycoplasma* related upper respiratory tract disease (URTD) has been documented to impact gopher tortoise populations in Florida. Although tortoises in some Georgia populations have tested positive for *Mycoplasma*, the impacts of URTD on populations throughout the state are not known. It is unclear what specific factors predispose a tortoise to the development of clinical disease following infection with *Mycoplasma*. Some populations have many individuals with clinical signs, while other populations have a high prevalence of antibodies suggesting that exposure has occurred, yet clinical disease is rare. This dichotomy has led researchers to speculate that clinical illness is triggered by other factors such as drought, habitat change, stress, or co-infection with other pathogens. The overall goal of this study is to determine the impact of land use and management activities on gopher tortoise populations and how this might relate to *Mycoplasma* prevalence. A second goal of the study is to examine the genetic structure of tortoise populations as this relates to URTD status. Preliminary results of a sampling effort at Ichauway in southwestern Georgia will be presented and future project goals will be outlined.

URTD in a South Florida Gopher Tortoise Population

Jon A. Moore, Presenter

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Upper Respiratory Tract Disease (URTD) is a highly contagious illness caused by *Mycoplasma* bacteria. For several years, we have monitored how URTD has affected members of the gopher tortoise population in the Abacoa Greenway system in Jupiter, Florida. Testing and retesting of several individuals has demonstrated occurrences of infection. Our results show that several individuals have gone from testing seropositive to seronegative, suggesting the ability to recover from this disease. Other tortoises have continued to test seropositive for several years straight, suggesting that either these tortoises can live in a chronic state of infection or they have experienced re-infection over that timeframe. Our study also demonstrates zero mortality of infected individuals over a 6-year period.

Monitoring Winter-Breeding Amphibians in Upland Ecosystems at St. Marks National Wildlife Refuge, Florida

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In the last three decades, the average annual temperature in the southeastern U.S. has risen approximately 1.1°C, with the greatest seasonal increase occurring in winter. During this same time, precipitation has decreased, primarily in winter (-9.6%) and spring (-29.2%). Continuation of these trends could negatively impact pond-breeding amphibians that rely on winter and spring rains to fill seasonal wetlands, trigger breeding, and ensure reproductive success. In 2009, we monitored two winter-breeding amphibians (the ornate chorus frog [*Pseudacris ornate*] and the mole salamander [*Ambystoma talpoideum*]) at St. Marks National Wildlife Refuge, FL. We deployed automated recorders to monitor calling activity of chorus frogs and used crayfish traps to capture salamanders at upland ponds. Chorus frogs were recorded at 7 of 12 sites, and mole salamanders were detected at 9 of 45 sites. For both species, we detected individuals at sites from which they were historically absent, suggesting that dispersal and colonization events could have occurred. Our results support the hypothesis that, under drought conditions, these two species disperse to and colonize more suitable habitat. This characteristic may enable metapopulation persistence that could be adaptive in the face of future climate change.

Surveillance for the Amphibian Chytrid Fungus in the Southeastern U.S.: Implications for Environmental Monitoring of a Disease Pathogen in Upland Ecosystems

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Worldwide, population declines and extinctions of amphibians have been attributed to the pathogenic amphibian chytrid fungus, *Batrachochytrium dendrobatidis* (Bd), which causes chytridiomycosis. Considerable effort has focused on the detection of Bd in its amphibian host, but, until recently, little was known about the temporal and spatial distribution of this pathogen in the environment. We sampled both amphibians and their aquatic habitat for Bd on public lands from the coastal plain and peninsular Florida of the southeastern U.S. In 2008, we swabbed 279 individual amphibians (3 salamanders and 276 anurans) and filtered water (132 samples) from 30 wetlands. Polymerase Chain Reaction (PCR) yielded only one positive result from amphibian swabs but revealed the presence of Bd (29.3 and 35.8 zoospore equivalents l⁻¹) in water filters from two of the three coastal plain refuges sampled. Our results are the second report of Bd from Florida. The discordance between water and biological samples underscores the need to conduct both environmental and biological sampling to elucidate the distribution of this pathogen in the environment and its potential to infect amphibians. The lack of detection of Bd on amphibians does not imply an absence of this pathogen in the environment.

Wildlife Assemblage Response to Longleaf Pine Restoration: Year One

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Due to the conservation status of the imperiled longleaf pine ecosystem, there is considerable interest in appropriate restoration and management techniques. The long-term effects of these strategies on wildlife assemblages are infrequently quantified. Over 10 years ago, studies were completed on Eglin Air Force Base, Okaloosa County, Florida, aiming to determine how prescribed burning, herbicide application, and mechanical hardwood removal influenced amphibian, bird, and reptile assemblages. We are currently replicating their study, with the addition of small mammal sampling, and are nearing completion of the first year of field work. We have detected 11, 23, and 40 species of amphibians, reptiles, and birds, respectively (small mammal sampling will commence this fall). Gopher frogs and gopher tortoises, species of conservation concern closely linked to the longleaf pine ecosystem, have been detected only in reference plots, which represent the historical condition. Future analyses will include examination of wildlife assemblage trajectories, comparison of six-lined racerunner survival rates in varying treatments, and construction of species accumulation curves.

Color Coded: Looking Into the Dietary Habits of the Red Foot Tortoise (*Geochelone carbonaria*) in Captivity

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This project researched what color food the red foot tortoise (*Geochelone carbonaria*) preferred in an effort to help captive facilities feed tortoises that are not eating well.

The hypothesis is that red will be chosen the most. The six tortoises studied ranged from one to eight years old, three each from hatchling and juvenile age groups. The 84 individual trials consisted of putting tortoises on a clean gray platform with food three carapace lengths away. Food was separated in piles one carapace length apart of orange, red, and green, or in a pile of mixed colors when there was only one pile of fruit. To test color preference and not smell, food was kept mixed together so that it would smell the same. This same format was followed three times a week, but the order of the food was changed. It was done until all combinations of color order and mixed colors occurred twice. Tortoises were timed until one color was chosen or until two minutes had passed.

Results showed that red was chosen the most often (49%) with orange (26%), green (12%), and no choice (13%) following. Color choice varied among tortoises, with four choosing red most often. One chose red the same number of times as it chose orange, and only one chose another color (orange) most. Tortoises that chose red chose it faster than other colors. Average times for food choices in seconds were red (26.56), orange (51.82), and green (51.80), with a total average of 62.54. The tortoises chose red almost twice as often and almost twice as quickly as any other color that was offered.

Status of the Eastern Indigo Snake (*Drymarchon couperi*) in Florida

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We assessed the status of the eastern indigo snake (*Drymarchon couperi*) in Florida by developing a GIS-based potential habitat map and collecting recent occurrence information. For the map, we considered SSURGO soils data, suitable landcover classes, and patch sizes ≥ 1000 ha that were not fragmented by major roads. We included all suitable landcover classes within 2400 m of upland habitat patches >1 ha in size. We calculated that ca. 42% of Florida's land area provides potential habitat, with 25% of potential habitat occurring in the panhandle. Conservation lands contain 41% of potential habitat, and 69 conservation lands contain ≥ 4050 ha (10,000 acres) of potential habitat. We obtained recent sightings of indigo snakes from existing databases and by contacting people. Sightings since 2000 with precise locality information were used to test the potential habitat map. Indigos have been sighted on 117 conservation lands since 2000 and are still common in parts of the peninsula, but only two sightings have occurred in the panhandle. The scarcity of indigo snakes in the Panhandle is probably due primarily to depletion of gopher tortoise (*Gopherus polyphemus*) populations, whereas habitat destruction and fragmentation are probably responsible for no sightings from the Keys since 1998.

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.