I am excited and honored to be hosting next year’s Gopher Tortoise Council meeting in Alabama! Alabama ranks fourth in biodiversity in the nation and I look forward to showcasing a portion of “Alabama the Beautiful” with you at the 2019 meeting. I have worked for the Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries for almost 17 years as a Certified Wildlife Biologist®. Three years ago, I transferred to the Nongame Wildlife Program. The mission of the Alabama Nongame Wildlife Program is to manage, protect, and enhance wildlife populations as well as their associated habitats to ensure healthy and sustainable populations for all Alabamians to enjoy. I serve many roles in my current position, one being the Gopher Tortoise State Lead. Over ninety-five percent of the gopher tortoise habitat in Alabama is privately owned. Strong partnerships with state and federal agencies, tribes, NGOs, industrial landowners and private landowners are key to conserving at-risk species in Alabama. As the Gopher Tortoise State Lead, I coordinate and facilitate gopher tortoise conservation strategies throughout the range working passionately to conserve this amazing species and the many other species associated with the longleaf pine ecosystem.

The 40th Annual GTC meeting took place at Archbold Biological Station in south-central Florida this past October. Hurricane Michael made landfall in the Florida Panhandle and wiregrass region of southern Alabama and up through Georgia the day before the meeting was set to begin. Meeting planners carefully monitored the forecast to determine whether to postpone the meeting. After much discussion, it was decided to continue forth as planned. While our thoughts were with and continue to be with those who were severely impacted by the hurricane, it seems most registrants were still in attendance. We enjoyed a keynote presentation by Dr. Hilary Swain, Director of Archbold Biological Station, highlighting the unique history and diversity of the Florida scrub. Participants also had the opportunity to attend one of four scrub immersion nature walks to learn about this unique area. Meeting participants gained important updates and information from 21 oral and 21 poster presentations. A huge thank you to Betsie Rothermel, meeting Co-Chair, Archbold staff and other GTC officers and volunteers for their meeting planning and organization, and for providing logistical support throughout the meeting. The awards banquet was held at the Barn at Paso Fino, a beautiful and rustic venue, and the tortoise cake and cupcakes will always be remembered! Thank you to all who contributed and purchased items to make the silent auction (GTC’s largest fundraiser) a success! Congratulations to the student and education award winners for their dedication and commitment to conserving this amazing species. Lastly on Sunday, the meeting concluded with the Red Hill Tortoise Trot 5K, an informal and fun run/walk around Archbold Biological Station.

Keep an eye out for a save the date announcement for the location of next year’s GTC meeting. Happy holidays to you and your families!

Sincerely, Ericha Nix
2018 Annual Meeting Highlights

Thank you to all who attended the 40th Annual Gopher Tortoise Council Meeting at Archbold Biological Station, held October 12-14 in Lake Placid, Florida! More than 130 attendees from all six states within the gopher tortoise’s range were in attendance. Also, thank you to all the presenters who shared their research findings via oral and poster presentations at this year’s meeting.

Scrub Immersion Nature Walks

GTC meeting attendees were able to participate in one of four nature walks on Friday morning. Walks included a hike through Archbold’s scrub habitat in search of Florida Scrub Jays, a walk through a rosemary bald to learn about the endemic plants and insects in xeric scrub communities, a trip to seasonal wetlands in hopes of finding sirens and other aquatic vertebrates, and last but not least, a visit to Archbold’s famous tortoise colony on Red Hill to learn about Archbold’s long-term gopher tortoise demography study.

Florida Scrub Jay (left) observed during GTC nature walk at Archbold Biological Station. Multiple groups observed scrub jays on their nature walks. Photo by Brad O’Hanlon.

Kelly O’Connor with a gopher frog (right) captured during the field trip to the Red Hill. Photo by Deb Burr.

Presentations

As usual, GTC’s annual meeting was accompanied by many great talks on current research and topics related to gopher tortoise conservation. We also had a special evening presentation to learn about George Heinrich’s “Big Turtle Year”. Learn more at TheBigTurtleYear.org.

George Heinrich with his first chelonian encountered during his Big Turtle Year. Photo by Andrew Farren.

Saturday Dinner and Social

Special thanks to Archbold interns Madison Harman and Ann Dunn on creating/painting the amazing gopher tortoise and upland ecosystem cornhole boards for GTC’s awards dinner and social, and Michelle Dent, an Archbold FL Scrub Jay researcher, for the adorable and delicious gopher tortoise cake and cupcakes!

Photos by Kelly O’Connor.
2018 Annual Meeting Highlights... continued

**Student Presentation Awards** were presented to:

1st place: Ivana Lezcano, Florida Gulf Coast University
2nd place: Rebecca McKee, University of Georgia
3rd place: Thomas Prebyl, University of Georgia

From left to right: Will Dillman, Ivana Lezcano, Rebecca McKee, Thomas Prebyl, and Betsie Rothermel. Photo courtesy of Kimberly Buchheit.

**Bob Herrington Student Travel Grants** provide financial assistance to students who present their research at GTC’s annual meeting. Recipients are selected randomly among students attending who submit grant applications. This year’s recipients were **Heather Gaya** (University of Georgia) and **Caitlin Jones** (Florida State University).

Heather Gaya presenting her research. Photo by Clint Moore.

Caitlin Jones presenting her research. Photo by Deb Burr.

**The J. Larry Landers Student Research Award** is a competitive grant program for undergraduate and graduate students conducting research on gopher tortoise biology or other relevant aspects of upland habitat conservation and management in the Southeast. The Research Advisory Committee, chaired by Jeff Goessling, reviews submissions and awards funds to multiple projects annually. This year’s winners were:

**Christopher Murphy**, University of Georgia. Chris will be comparing refuge use of stumpholes versus tortoise burrows by gopher tortoise commensal species.

**Allison Kelley**, Marshall University. Allison will be examining patterns of survival and movement in eastern diamondback rattlesnakes (*Crotalus adamanteus*) in coastal South Carolina.

Congratulations to all of this year’s GTC student award winners!

“Student Spotlight”: GTC wishes to highlight students who are actively involved in upland conservation projects within the gopher tortoise’s range in the GTC newsletter. The purpose of this feature is to encourage greater student participation in the organization and bring recognition to students and their projects. Projects pertaining to research, management, or policy will be considered. Please submit a brief description of the project and any findings to date. Submissions should be 500 words or less and may be accompanied by photographs. Please send to: [Michelina.Dziadzio@MyFWC.com](mailto:Michelina.Dziadzio@MyFWC.com)
2018 Annual Meeting Highlights... continued

GTC Distinguished Service Awards were presented to:

Deborah Burr, GTC Florida State Representative
Keri (Landry) Lejeune, Louisiana State Representative and past Co-Chair

The Conservation Education Award was awarded to Edie Driest of North Port Friends of Wildlife. Edie is active in environmental education at the community level and played a key role in the establishment of Florida’s annual Gopher Tortoise Day, during which awareness and appreciation of gopher tortoises is promoted state-wide. Since its inception in Florida, April 10th has officially been adopted by GTC as Gopher Tortoise Day and has been celebrated range-wide!

Are you interested in participating in Gopher Tortoise Day 2019? Check out https://www.outdooralabama.com/conservation-education/gopher-tortoise-day and GopherTortoiseDayFL.com for resources on how to adopt a resolution in your community, host a Gopher Tortoise Day event, and find printable fact sheets and brochures that can be distributed during events year-round!

The Auffenberg & Franz Conservation Award is presented to individuals and organizations with long-term commitments to furthering conservation of gopher tortoises and their upland ecosystems. This year’s award went to Rick McCann!

Rick recently retired from the Florida Fish and Wildlife Conservation Commission (FWC) after more than 30 years of service. Rick played important roles in establishing gopher tortoise mitigation parks in Florida and had a direct hand in the protection of >25,000 acres through acquisitions (mitigation parks), additions to other public lands, and conservation easements. Rick also coordinated an effort to translocate Incidental Take Permitted tortoises to Eglin Air Force Base in the Panhandle to help initiate restocking efforts—a long-term goal of the FWC to restore tortoises to an area where populations have been depleted.

Continued on next page...
2018 Annual Meeting Highlights... continued

Joan Berish commented “Although the term “tirelessly” is often used these days, Rick truly embodied that steadfast determination to mitigate for the inevitable habitat loss in Florida’s uplands. I marveled at his steel-trap brain, i.e., his ability to recall the most minute details about a specific development site, recipient site, or mitigation park. His dedication, knowledge, and collegiality made him a highly regarded member of the GFC/FWC tortoise teams.”

Thank you, Rick, for your countless years of dedication to gopher tortoise conservation, and Happy Retirement!

The Gopher Tortoise Council’s Donna J. Heinrich Environmental Education Grant was established to support educators and organizations committed to developing educational projects about the gopher tortoise and the fascinating world in which it lives. The grant also honors Donna June Heinrich, an environmental educator, whose life was dedicated to conserving wildlife and their associated habitats. The Council is interested in projects that will reach diverse and new audiences, focus on the importance of the conservation of intact upland ecosystems, encourage community involvement, and have matching funds. This year’s winners were:

**Flint RiverQuarium** — Gopher Tortoise enclosure in concert with sustainable gardening to feed exhibit animals-$2,000.

**Manatee County** — Crawl-through fabric tortoise burrow and tortoise and commensal puppets-$1,200.

Thank you to everyone who submitted proposals. The deadline for 2019 applications is August 31st.

Tortoise Trot 5K

This year’s annual meeting concluded with the Tortoise Trot 5K, a fun run up to the Red Hill. Tortoise trotters were rewarded with a special guest appearance by an eastern indigo snake!

Tortoise Trot 5K participants at the starting line. Photo by Cyndi Gates.

Betsie holding the eastern indigo found during the tortoise trot. Thank you, Eric Sievers and Kodiak Hengstebeck for spotting the snake!
STATE REPORTS

Alabama

Alabama Division of Wildlife and Freshwater Fisheries (DWFF) continues work towards determining a more accurate gopher tortoise population estimate and distribution in Alabama. Line Transect Distance Sampling (LTDS) continued on public lands and surveys were completed in October 2017. To date, there is one viable gopher tortoise population at one site on the Conecuh National Forest. Public lands surveyed include Fred T. Stimpson and Upper Place Sanctuaries, Perdido River Wildlife Management Area (WMA), Geneva WMA, Geneva State Forest, and AU Solon Dixon Center, all of which are currently support populations (AL Gopher Tortoise Surveys on Public Lands SWG Final Report, 2017).

In Alabama, roughly ninety-five percent of the gopher tortoise habitat is in private ownership. The remaining percentage of land holdings are owned by state or federal agencies. Private land surveys are needed to determine an accurate gopher tortoise population estimate and distribution in Alabama. Ongoing efforts are taking place to gain access to private lands for these surveys; however, access to private lands has been difficult mostly due to the misperceptions of information needed and data protection concerns. Several targeted landowner meetings took place throughout the fiscal year educating landowners on the status of the tortoise in Alabama and throughout its range. DWFF and partners conducted a gopher tortoise baseline LTDS survey on 96.3 ha within the Coastal Headwaters Forest Partnership, in Bay Minette, Alabama. This survey was completed by collaborating with many personnel from state, federal and private entities involved with the Coastal Headwaters Forest Partnership, including Alabama Department of Conservation and Natural Resources (ADCNR), Natural Resource Conservation Service (NRCS), United States Department of Agriculture (USDA), Alabama Forestry Commission (AFC), and Alabama Power Company (APC).

Calls have increased relating to gopher tortoise impacts from commercial or residential development originating from the unlisted portion of the range, and DWFF has worked with developers and consultants on relocation efforts to permanently protected conservation lands. State regulation only precludes the direct killing or possession of the gopher tortoise and unlike the federal regulation, does not consider the gopher tortoise burrow or the degradation of the habitat surrounding the animal. Landowners and/or developers in the unlisted range likely realize they are less constrained by the presence of gopher tortoises and simply work around the animals. DWFF staff is currently pursuing a regulation that would protect the intentional destruction of gopher tortoise burrows.

There have been no targeted relocation efforts from private lands this year. To date, four waif gopher tortoises were placed in an enclosure built on public land. Two tortoises were relocated due to illegal possession by a landowner and were also placed in the existing enclosure. All tortoises were soft released and will remain in the enclosure for 12 months, at which time the enclosure will be removed. In 2016, DWFF partnered with The Nature Conservancy (TNC) and a wildlife consultant to relocate nine tortoises from a development site to an enclosure established on TNC property (permanently protected conservation lands); enclosure costs and labor were provided by the consultant. During this fiscal year, the enclosure was removed.

In December 2017, DWFF staff organized and facilitated the first Alabama Tortoise Alliance (ALTA) meeting, hosted by the Poarch Band of Creek Indians in Atmore, Alabama. There were over 50 participants representing 23 organizations at the first meeting. ALTA is a partnership that includes private landowners, state, tribal and federal agencies, local governments, organizations and businesses. The purpose of the ALTA is to foster an increased level of communication, collaboration and conservation among the stakeholders to actively manage and conserve gopher tortoise populations and habitat in Alabama so that the species no longer warrants state or federal protection. Conservation and recovery of the gopher tortoise through the implementation of this alliance will require the cooperation of non-industrial private landowners; local governments; state, tribal and federal agencies; non-governmental organizations; and business interests. In July 2018, the second ALTA meeting was held at Fort Rucker in Ozark, AL. There were 60 participants representing 25 organizations. The next ALTA meeting will be scheduled sometime in February 2019.

Continued on next page...
Alabama continued...

DWFF WMAs within the tortoise range have continued management activities beneficial to gopher tortoises. Management activities include prescribed burning with an emphasis on summer burns, when applicable, invasive plant control, feral hog management, and mulching activities to control hardwood species. Longleaf pine restoration work was completed under the Multi-state Sandhill/Longleaf Pine Ecosystem Restoration State Wildlife Grant. Roughly 425 acres were reforested to longleaf pine and 40 acres of ecological mulching to remove hardwood midstory was completed on the Geneva WMA.

The DWFF increased education and outreach opportunities to the public promoting gopher tortoise conservation in Alabama. In April, Governor Ivey signed a proclamation declaring April 10th as Gopher Tortoise Day in Alabama. Gopher Tortoise Day was celebrated across the state and five events took place. Partners included Birmingham Zoo, Alabama Wildlife Federation, Auburn University Natural History Museum, Auburn University Veterinary School, and Straughn Elementary School. A live tortoise was usually on-site at each event which provided participants the opportunity to see up close this incredible animal and learn about its biology and importance as a keystone species. Alabama citizens and youths participated in several hands-on activities that further demonstrated the importance of the tortoise to the longleaf pine ecosystem. Thousands of participants took advantage of learning about the gopher tortoise and its habitat during Gopher Tortoise Day events.

Several presentations and workshops were conducted by nongame staff throughout the year. Presentations included a variety of topics from tortoise biology, protection status, and best management practices to enhance gopher tortoise habitat. Many workshops were given to loggers, foresters, private landowners and other agencies that provided education on the importance of gopher tortoise surveys and why they are needed to assist the U. S. Fish and Wildlife Service (USFWS) with the upcoming listing decision.

Georgia

Matthew Stoddard

The Gopher Tortoise Initiative

The Gopher Tortoise Initiative has continued to make outstanding progress in Georgia during the last year. This initiative is a coordinated effort to secure permanent protection for dozens of gopher tortoise populations located throughout the Georgia range of the species. Members include the Georgia Dept. of Natural Resources (DNR), the Georgia Forestry Commission, USFWS, NRCS, the U.S. Department of Defense, TNC, The Conservation Fund, Georgia Conservancy, The Orianne Society (TOS), Georgia Chamber of Commerce, Knobloch Family Foundation, Robert W. Woodruff Foundation, and the Bobolink Foundation. The initiative aims to protect at least 65 tortoise populations that meet or exceed the current USFWS standard for a minimum viable population (MVP). This would represent more than half of the known or presumed MVPs in the state. To ensure geographic representation, the initiative sub-divides the Georgia range of the gopher tortoise into thirteen conservation units and is working to protect populations distributed in all areas. When the initiative began, only about 36 protected gopher tortoise populations in Georgia were known to meet the MVP standards. As of this report, that number has grown to approximately 49, with efforts ongoing to secure permanent protection for a number of others. Initiative partners estimate that about $150 million will be needed to reach the conservation goals established, with equal shares of the funding coming from federal, state, and private sources. The hope is that these combined conservation efforts will help to make listing of the gopher tortoise under the U.S. Endangered Species Act unnecessary.

Gopher Tortoise Surveys

Knowing the location and size of current gopher tortoise populations is fundamental to conservation efforts. Since 2007, the LTDS survey method has been used in Georgia to obtain this critical information. As of this report, >100 LTDS surveys have been completed. For more than six years, the Wildlife Conservation Section of the DNR has employed a three-person crew year-round to do these surveys. During the last year, ten LTDS surveys were completed by the crew. These included surveys of newly acquired state properties, re-surveys of several WMAs, and Continued on next page...
Georgia continued...

surveys of several private tracts of conservation interest. Fourteen sites in Georgia have now been surveyed twice using the LTDS method. Of these, re-survey results indicated that the number of tortoises in the protected population was larger on all but one site. Reasons for these higher survey totals include: improved survey methodology, land acquisitions, population augmentation, and population growth due to improved habitat management.

Ongoing Research

Researchers and graduate students at the University of Georgia continued to do important gopher tortoise research this year in collaboration with Georgia DNR, the Joseph W. Jones Ecological Research Center, and others. Heather Gaya, a University of Georgia (UGA) graduate student under the direction of Dr. Clint Moore, continued work on refinements to the LTDS protocol aimed at better estimating the number of small tortoises in a population. Tom Prebyl collaborated with Dr. Jeff Hepinstall-Cymerman, Dr. Lora Smith, and others to improve understanding of how factors such as soil type, vegetation structure, and site history may interact to influence the probability that tortoises will use a site. Dr. Brian Nuse continues research into the demography of gopher tortoise populations and range-wide viability of the species.

Land Acquisitions

Recent land purchases by Georgia DNR have substantially contributed to gopher tortoise conservation in the state. Newly acquired tracts have more than doubled the size of Ohooppee Dunes WMA. Previously, the total protected tortoise population at this site did not reach the viability threshold of 250 adult tortoises. The expanded WMA supports MVP size populations both north and south of US Highway 80. Similarly, the West unit of Sandhills WMA was estimated to have just 35 tortoises when first checked using LTDS in 2013. The property has since been greatly expanded, and a re-survey suggests nearly 300 tortoises are now protected there. This has also become one of the few state-owned properties with a population of southeastern pocket gophers. At Chattahoochee Fall Line WMA, the newly acquired Hilliard tract hosts a substantial tortoise population likely to reach the MVP criteria with careful management. Land supporting tortoises has also been added to Altamaha WMA and Flat Tub WMA within the past year. A recently acquired conservation easement in Atkinson County protects key areas of a tract with more than 500 tortoises and eastern indigo snakes. Negotiations are in progress or nearing completion for other easement or fee-simple purchases that will protect several more viable tortoise populations.

Population Augmentation

One of the thirteen conservation units identified by the Gopher Tortoise Initiative has no known viable tortoise population. To establish one, population augmentation is now being used on the Lanahassee Tract, which DNR has leased and plans to acquire. This site had approximately 20 resident tortoises, but contains sufficient habitat for many more. Over the summer, 65 tortoises displaced by development were soft-released there. Releases of relocated tortoises or head-started juvenile tortoises have also augmented the populations of several other WMAs, such as Sansavilla, Flat Tub, and Yuchi.

Habitat Management

Active habitat management, such as prescribed burning and timber thinning, is critical to the health of Georgia's protected tortoise populations. Competitive State Wildlife Grants have helped provide funding for sandhills restoration in Georgia and neighboring states since 2009. The fourth such grant was recently awarded. Georgia DNR used funds from the previous grant to increase its prescribed burn capacity by hiring seasonal fire crews and by contracting with The Nature Conservancy to burn some key sites. Sandhills grant funding also helped plant longleaf pine seedlings on areas of Townsend and Alligator Creek WMAs where insufficient fuel made burning a challenge. Standardized monitoring of vegetation structure is done to ensure that management activities are improving conditions for gopher tortoises and other sandhill fauna and flora.
Timber thinning has also been recently completed on a number of state lands with gopher tortoises. Notably, hundreds of acres of dense planted pine stands were thinned at Alapaha River WMA. This property has more than 2,000 tortoises as well as indigo snakes, gopher frogs, and striped newts. Excessive shade had induced many tortoises to relocate to roadsides. It is anticipated that tortoises will now begin to disperse into the newly thinned stands, as they have following similar timber management elsewhere. This, in turn, may reduce the loss of tortoise nests to predation.

Following timber thinning and prescribed burning, gopher tortoises once crowded into an adjacent power line right-of-way have begun to burrow in this formerly unused stand at Moody Forest Wildlife Management Area. Photo by Matthew Stoddard.

South Carolina  
Will Dillman

Over the last year, South Carolina has seen significant activity with the gopher tortoise and associated upland species. South Carolina Department of Natural Resources (SCDNR) has continued several projects related to the tortoise as well as monitoring and surveys for other upland herps. SCDNR has recently hired Andrew Grosse as the Herpetologist as I have moved into the role of Assistant Chief of Wildlife. Andrew brings substantial experience with reptiles and amphibians including the gopher tortoise and we look forward to his development and guidance of the Herpetology Program.

Work by SCDNR and others at the Aiken Gopher Tortoise Heritage Preserve (AGTHP), site of last year’s annual meeting field trip, continues. We began following hatching and head-started tortoises in 2016 utilizing radio-telemetry and have instrumented and followed 71 tortoises to date. The goal of this effort is to learn more about survivorship and movements of young tortoises at this preserve and to assess head-starting as a conservation tool. University of Georgia student Rebecca McKee has concluded her field work this year having trapped all identified burrows at AGTHP to examine long-term site fidelity and disease status in this population of primarily waif tortoises. Additionally, this collaboration between Savannah River Ecology Lab (SREL) and SCDNR will examine the genetic integration of tortoises from different sources and release pen groups at this site. SREL has partnered with the Longleaf Alliance to collect eggs and head-start tortoises collected at the AGTHP for release. This year, they released the first batch of 68 head-started tortoises at AGTHP. As ever, our efforts to create an MVP from waif tortoises and tortoises from other locations continues; we have released more than 300 tortoises to date, though many of these are juveniles and we have not yet reached MVP status.

The population of tortoises at Tillman Sand Ridge Heritage Preserve is the highest density population in the state and occurs in some of the highest quality habitat we have surveyed. This tortoise population at this heritage preserve is an MVP, and the habitat may provide a refuge for tortoises in the surrounding landscape. As part of a Multi-State Competitive State Wildlife Grant, we have almost finished initial efforts to restore approximately 185 additional acres on this site. Our hope is that creating this additional habitat will increase its carrying capacity of tortoises and result in a larger, more secure population. Initial timber harvest and restoration activity began in early
South Carolina continued...

2017 and has been followed with targeted herbicide and prescribed fire. This year, we have planted both longleaf pine seedlings and a mix of native seed to establish a diverse herbaceous ground cover. We have observed 10 tortoises that have moved into, and began using, the restoration area.

SCDNR has continued efforts to survey and monitor upland isolated ephemeral wetlands for gopher frogs, tiger salamanders, and flatwoods salamanders. Flatwoods salamanders have not been documented in SC since 2010 though surveys of historic sites have occurred in years where conditions were favorable. Gopher frog surveys have been conducted at historic locations and other areas of suitable habitat using automated recording, dip-net surveys, and egg mass surveys. Though gopher frogs appear to have been extirpated from a number of historic locations due to fire suppression, they still occur on two large publicly owned properties. Additionally, South Carolina representatives for SCDNR and the USFWS attended a week-long Structured Decision-Making workshop to address the conservation needs of gopher frogs.

SCDNR efforts to conduct surveys for pine snakes and southern hognose snakes in the coastal plain of SC over the last year have been successful. We began using the AHDriFT camera trap design outlined in Martin et al. (2017) and have had success in detecting pine snakes at a number of sites. Though this method has worked well for detecting pine snakes and a variety of other species, it has not detected any southern hognose snakes thus far. Of the two southern hognose snakes detected during survey efforts, both have been on roads, and only one was alive.

We are looking forward to a productive 2019!

Mississippi

Tom Mann

Status Overview

No major development threats surfaced this year in Mississippi’s tortoise habitat, but solar arrays have been installed near Hattiesburg. Therefore at some point, tortoise turf in Southeast MS will likely face challenges like those underway in Florida and Georgia. Tortoise surveys on priority soils on the DeSoto National Forest will be undertaken next year at the typical 5-year interval specified in the Tortoise Recovery Plan. Thus, we have no new information to report this FY from broad sampling regarding trends in the long-term and widespread recruitment deficit at most tortoise colonies in MS.

Tortoise Research

2018 Head-starting Project at Camp Shelby — Jim Lee (TNC, Camp Shelby Tortoise Biologist) Camp Shelby Field Office (CSFO), Camp Shelby Joint Forces Training Center

This is a significant elaboration of the project begun at Camp Shelby by Matt Hinderliter to rear juvenile tortoises to a size at which they become less vulnerable to mortality from various predators, since Camp Shelby has a long-term recruitment deficit.

In 2018, 44 tortoise nests were found at 19 different sites on the Camp Shelby Joint Forces Training Center, Forrest and Perry counties, MS. Nests were excavated, and eggs (N=220) were transported to the lab for incubation. A total of 205 eggs were incubated (two eggs were broken during nest excavation, 12 were cracked/broken, and one egg had been predated upon nest discovery). Twenty clutches containing 100 eggs were incubated at 31°C, 15 clutches containing 64 eggs were incubated at 28°C, and the remaining 9 clutches

Continued on next page...
Mississippi continued...

containing 46 eggs were incubated at 29.3 °C, incubation temperatures that are believed to have an increased likelihood of producing females, males, or an equal ratio of the sexes, respectively. The average number of eggs per clutch (including non-incubated eggs) was 5.0 (range: 2-10) and overall hatching success (excluding non-incubated eggs), 57.1% (117 of 205 eggs), was similar to that previously reported for lab-incubated eggs in southern MS (e.g., 58.8%, Noel et al. 2012; 59.2, 64.3, 42.1, 51.1%, Lyman and Lee 2014, 2015, 2016, 2017). Unlike in 2015, eggs incubated this year at higher temperatures, had a lower hatching success (54.7% at 31 °C, 56.2% at 29.3 °C), than eggs incubated at a lower temperature (60.1% at 28 °C). Of the 88 eggs that did not hatch, 71 (80.7%) showed no visual signs of embryonic development (presumably unfertilized), one (1.1%) exhibited partial development (i.e., embryo < the size of a nickel), and 16 (18.2%) eggs contained fully developed embryos that did not hatch. Microscopic examination of eggs was not conducted. The 117 hatchlings were placed into the indoor head-start facility where they will be raised at a constant temperature over the next two years.

No head-started tortoises were released this year. However, 50 2.5-year olds will be released in April 2019. The head-start facility currently contains 293 individuals (head-starts range in age from this year’s hatchlings to 4 years old). The average carapace length of the five tortoises that were randomly selected to retain from the initial year (2014), is 21.6 ±2.69 cm (range: 18.4-24.7). Minimum adult size (reported in the literature) can be achieved via 4 years of head-starting in the lab.

In addition to head-starting tortoises, Jim (lately in collaboration with Jaime Smith, Western Carolina University) has been head-starting dusky gopher frogs (state and federally endangered) for augmentation of the remaining natural population (Glen’s Pond) and to start new ones. Egg samples are removed from natural egg masses at Glen’s Pond, head-started in cattle tanks and aquaria, and metamorphs are distributed among recipient sites. In the good old days, dusky gopher frogs were often found associated with tortoise burrows in the vicinity of breeding ponds, but they aren’t obligate commensals. This year, some of the head-start metamorphs are being used in a study assessing the benefits (if any) of artificial burrows on growth and survivorship of frogs in fire-suppressed habitat.

Dr. Nicole Hodges is investigating possible environmental correlates of this condition (discussed in the past three MS State Reports to the GTC), comparing blood levels of calcium, phosphorus, and vitamin D between tortoises with and without yellow spot at 9 sites with different soil types and burning regimes in an 8-county area. She is also evaluating forage species composition and nutrient content at each of the study sites. Site-specific differences in calcium content of tortoise eggshells in MS and elsewhere will be examined as well.

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Mississippi continued...

A total of 56 tortoises were live-trapped to obtain blood samples this FY. Preliminary results indicate a significant difference in phosphorus and Vitamin D levels between tortoises with and without yellow spot, with greater levels of both nutrients in tortoises without yellow spot. Interestingly, there were no significant differences between tortoises with and without yellow spot with respect to blood calcium levels.

A total of 368 forage samples were collected near burrows from which tortoises were sampled. Samples have been submitted for nutrient analysis. Nicole was assisted by Nour Salam, Heather Sullivan, Aaron Holbrook, Kathy Shelton, and Katelin Cross of the Mississippi Museum of Natural Science, and Dr. Lisa Yager of the USFS.

The importance of fire season and deer competition on gopher tortoises — Dr. Marcus Lashley (Principle Investigator), Brandon Barton (Co-principal Investigator; Mississippi State University)

The interrelationship between different burning regimes, forage quality, and dietary overlap between gopher tortoises and white-tailed deer is being investigated, with a focus on the competitive impact of the latter on tortoises, and the degree to which this may be a density-dependent impact. Fire season treatments, plant sampling, camera trapping for tortoise and deer use, and fecal samples for diet analysis have been completed for the first season and samples are being analyzed.

Habitat usage and movement patterns on land managed primarily for timber production — Duston Duffie and Dr. Scott Rush (Mississippi State University)

Tortoises were tracked on Weyerhaeuser parcels in MS and in LA in 2018, and Duston presented results at the GTC Annual Meeting at Archbold.

Tortoise Surveys

Dr. Nicole Hodges (MDWFP/MS Museum of Natural Science (MMNS)) surveyed 9 colonies in conjunction with the yellow-spot research.

Tortoise Habitat Management

De Soto Ranger District (DRD) – Ed Moody (DRD Wildlife Biologist)

- 62,500 acres prescribe burned
- 3,317 acres surveyed for tortoises on land slated for future timber sales
- 2,882 acres thinned
- 435 acres restored to longleaf
- Treated 128 acres to eradicate cogon grass
- Collaborated with TNC on the Camp Shelby tortoise and dusky gopher frog head-start and release programs
- Partnered with the Land Trust of MS and the MDWFP for waif tortoise releases near Glen’s Pond

Camp Shelby — Melinda Lyman, Coordinator, Nature Conservancy Office at Camp Shelby

- Treated a total of 1,745 cogon grass patches comprising 87.7 acres during FY 17-18
- Worked with USFS and contractors to treat ~40 acres of cogon grass in T44 (gopher tortoise refuge)

Continued on next page...
Mississippi continued...

Chickasawhay Ranger District (CRD) – Jonathan Thomas (CRD Wildlife Biologist)
- 16,300 acres burned during growing season
- 16,300 acres burned during dormant season
- 1,600 acres surveyed for tortoises prior to future timber sales
- 12,000 acres thinned
- 109 acres restored to longleaf

Natural Resources Conservation Service (NRCS) – Glynda Clardy, State Wildlife Biologist, Jackson, MS

The NRCS administers programs offering assistance (technical, financial; easement agreements may also be involved) to landowners interested in restoration/proper management of longleaf pine habitat, many acres of which will also include areas occupied by tortoises or potentially inhabitable by tortoises.

For FY 2018:
1) Healthy Forest Reserve Program: 0 contracts (have 5 applications for 2019)
2) Environmental Quality Incentive Program:
   Longleaf Pine Initiative: 90 contracts, 6,441 acres
   Working Lands for Wildlife Initiative: 117 contracts, 19,216 acres

Mississippi Dept. of Wildlife, Fisheries, and Parks (MDWFP) – John Gruchy

The Fire on the Forty partnership with the Foundation for Mississippi Wildlife, Fisheries and Parks and the USFWS, which provides cost-share for prescribed burning on private lands, is entering its seventh year. Landowners in selected counties are reimbursed for up to 50% of costs for implementing and performing a prescribed burn. Within focal counties which also support tortoises for the 2017 funding cycle (2018 burning season), Fire on the Forty paid for 1,248 acres of burning on 29 different tracts. The cost to the grant was $15,600 and the landowner cost was $20,100. Additionally, the partnership was responsible for another 2,243 acres of prescribed fire that was not reimbursed, most of which was delivered on another grant from NFWF through MSU Extension. Landowners must submit an application to be considered for this cost-share program. Applications are competitively ranked based on potential habitat benefits; priority sites will be selected for funding by the MDWFP. To download an application, visit www.mdwfp.com/longleaf. For more information regarding the Longleaf Pine Restoration Program, contact the MDWFP: 601-432-2199.

U.S. Fish and Wildlife Service (USFWS) - Ecological Services — Randy Browning, Biologist
- Initiated and completed 13 longleaf pine restoration projects consisting of 754 acres within Simpson, Pearl River, Lamar, Stone, Clarke, Wayne, Greene and Marion counties
- Completed or entered 29 Fire on the Forty Agreements. These contributed to the enhancement of 3,050 acres of longleaf/mixed open pines and 863 acres of thinned loblolly and slash pine
- Initiated three understory (344 acres) and two invasive species control projects (110 acres) within longleaf pine stands this FY. One understory project (200 acres) was been completed this FY.

USFWS Tortoise Recovery Activities — David Felder, Matt Hinderliter
1. On the 15th of Nov. 2018 representatives of the USFWS (Matt Hinderliter); the MDWFP/MMNS (Nicole Hodges, Tom Mann, Kathy Shelton); TNC (James Lee); USFS (Lisa Yager); Louisiana Wildlife and Fisheries (Keri Lejeune); and the University of Southern Mississippi (USM) (Mike Davis, Carl Qualls, Brian Kreiser) will meet in Hattiesburg to discuss a number of issues of relevance to tortoise conservation in the listed portion of the range, including:
   - Waif tortoises – assessments & translocations
   - Enhancing populations – viable population discussion and if/where populations can be augmented
   - Identifying and translocating reproductively isolated tortoises – when and why?

Continued on next page...
Mississippi continued...

- Genetic mixing experiment: this has been proposed to determine if, in part, low hatching success and juvenile survivorship typical of MS tortoise populations may be a function of genetic impoverishment, and if so, can this be mitigated through outcrossing with tortoises from eastern populations (FL, for example)? Should we do this, and if so, how will this work logistically? USM’s Lake Thoreau property has been suggested as the site of such an experiment.

2. Updated physiographic province classification relative to viable population targets; ecoregional splits were based primarily on areas bounded by the major river drainages (Pearl, Pascagoula, Leaf, Chickasawhay).

3. The USFWS and the MDWFP/MMNS have worked with the USFS to prioritize tortoise sites for effective growing season burning to reach targets for viable populations on the De Soto NF. An expanded collaborative “fire team” began this year with personnel from aforementioned groups assisting with burns on National Forests, National Wildlife Refuges, and WMAs.

Relocations, Injured Tortoises, Waifs

Approximately 20 tortoises necessitating human assistance of some sort materialized in 2018; five were hit by cars, one was being harassed, one was stepped on by a horse, one was mauled by a dog, one was damaged by an unknown predator and fire, several turned up as waifs in non-tortoise habitat or in habitat no longer supporting other tortoises, and seven hatchlings of unknown provenance (somewhere in southern Harrison Co.) were left at a veterinary clinic in Saucer. The latter have been recruited into Jim Lee’s head-starting program at Camp Shelby. Two of the adults were relocated to Randy Browning’s property in Lamar Co., one to a TNC property, and approximately nine remain in rehabilitative care with the Central Mississippi Turtle Rescue facility or with Kathy Shelton (MDWFP/MMNS).

Dr. James Askew, Missy Dubisson, Christy and Luke Milbourne (Central Mississippi Turtle Rescue) and Kathy Shelton (MDWFP/MMNS) are thanked for long-term services in rehabilitative care of waif and injured tortoises, and for temporary care for other waifs.

Florida

The gopher tortoise is a State-threatened species in Florida. To conserve the species and its habitat, the Florida Fish and Wildlife Conservation Commission (FWC) published its first Gopher Tortoise Management Plan in 2007 (revised in 2012). This management plan is intended to guide gopher tortoise conservation in Florida through 2022 and places an emphasis on landowner incentives, habitat management, and maintaining the gopher tortoise as a keystone species through commensal species conservation. The FWC continues to coordinate with the stakeholder Gopher Tortoise Technical Assistance Group (GTTAG); the continued participation of stakeholders is vital to the long-term conservation of the gopher tortoise.

Research

A research study to assess the impacts of temporary exclusion on gopher tortoises from the Sabal Trail Natural Gas Pipeline project area in Central Florida was completed by the University of Central Florida researchers during FY 2017-18. Results indicate relocated male tortoises are more likely to return to their original locations than females. Temporary exclusion did not negatively impact overall health, disease prevalence, or immune response of relocated tortoises. Additional research is currently in progress by FWC staff, in partnership with the Southwest Florida Water Management District, to determine how readily gopher tortoises repatriate restored habitat along a pipeline right-of-way following temporary exclusion.

A year-round steroid hormone profile for the gopher tortoise was completed in Southwest Florida by researchers at Florida Gulf Coast University (FGCU). Results of this study indicate the reproductive schedule of tortoises in Southwest Florida is different than the northern portion of the tortoise’s range. FGCU researchers have also

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recently completed a project in Southwest Florida examining the seasonal distribution of gopher tortoises; research findings were presented during this year’s annual GTC meeting. Other studies currently being conducted in Florida include examining social clique structures of translocated tortoises, site fidelity of translocated tortoises in Apalachicola National Forest, habitat use by tortoises in urban ecosystems, impacts of Burmese pythons on gopher tortoises and their burrows, and quantifying critical habitat breadth (range) for tortoises.

**Education and Outreach**

Efforts have been consistently made to engage Florida residents in gopher tortoise conservation. FWC currently offers several opportunities for Florida residents to get involved and help conserve the gopher tortoise. These opportunities include submission of tortoise sightings in Florida, mortality data collection, waif tortoise (tortoises of unknown origin) transportation, silt fence installation, and conducting burrow surveys on recipient sites for the humane relocation of tortoises associated with incidental take permits.

Florida citizens are encouraged to assist in conservation efforts by submitting photos of their gopher tortoise sighting(s) to the “Florida Gopher Tortoise” smartphone app (http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/app/). The goal of this app is to increase public awareness of gopher tortoises and citizen participation in conservation at the local level. Citizens can use the app to learn more about the life history of the species, report potential wildlife violations, and test their gopher tortoise knowledge with a quiz. Citizens can view an interactive map online and on their mobile device that displays where tortoises have been documented by citizen scientists in Florida. A new interactive map was released in FY 2017-18; citizen scientists can now search by submitter name, location, and key word to find their favorite photo submissions across Florida. To date, over 2,732 gopher tortoise locations have been submitted, 794 of which were submitted during FY 2017-18.

The mortality data collection program engages Florida residents in conservation efforts by asking citizens to notify FWC if they encounter a deceased or injured gopher tortoise. Mortality data is submitted to FWC via an online web form that may be accessed at https://public.myfwc.com/HSC/GopherTortoise/GTMortality.aspx, or via the Florida Gopher Tortoise smartphone app. These data allow biologists in Florida to determine gopher tortoise mortality “hotspots” throughout the state. During FY 2017-18, 123 gopher tortoises were reported as sick or dead and vehicles were the leading cause of mortality. Citizens that reported an injured or ill tortoise were provided with contact information for a nearby licensed wildlife rehabilitator to provide the tortoise with prompt medical attention.

The Incidental Take Permit (ITP) gopher tortoise volunteer relocation program mobilizes volunteers to conduct burrow surveys at development sites permitted for incidental take. During FY 2017-18, FWC staff trained eighteen new volunteers and used six existing volunteers for the ITP relocation program. Volunteers conducted gopher tortoise surveys on properties with active ITPs in Plantation Palms (Hernando County) and Oakleaf Plantation (Clay County). A total of 61 acres were surveyed and 214 burrows were recorded across the two properties. The use of volunteers helps reduce the cost of gopher tortoise relocation, recognizing that the developer has previously paid mitigation and is not required to relocate the tortoises under these formerly-issued permits. FWC’s Gopher Tortoise...
program has also used student interns from Florida State University since 2011 who help implement gopher tortoise conservation actions. Many of these actions may not have otherwise been accomplished with existing staff resources. This also benefits interns by providing professional experience in wildlife conservation and work in a government agency. Projects completed over the years by student interns are featured online at [http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/internship/](http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/internship/). Gopher Tortoise Day outreach in 2018 resulted in the adoption of 21 resolutions proclaiming April 10th as Gopher Tortoise Day in counties and municipalities throughout Florida (see [http://www.GopherTortoiseDayFL.com](http://www.GopherTortoiseDayFL.com)). A resolution was also adopted by the Central Florida Zoo & Gardens, and Governor Rick Scott extended greetings and best wishes to all observing April 10th, 2018, as Florida Gopher Tortoise Day.

Fact sheets and brochures were distributed to increase knowledge of gopher tortoises in Florida. Approximately 9,329 gopher tortoise brochures and fact sheets have been distributed, including 4,429 “A Guide to Living with Gopher Tortoises” brochures that were distributed to local governments, schools, nature centers, and Florida residents. The poster “Got Gophers, Get Permits” is continuously distributed to planning councils, county and city building departments, and local permitting offices. More than 1,322 “Safe Roads for People and Tortoises” placards have been distributed and are available at Florida visitor centers, State and local parks, and highway rest stops. Over 1,897 children’s publications have been distributed. Additionally, 15,428 “Slow Down for Gopher Tortoise” and “Keep Gopher Tortoises Wild” decals and Gopher Tortoise Day tattoos were distributed at various events. All publications are also available at each of FWC’s regional offices, and electronic versions are available for download at [www.MyFWC.com/GopherTortoise](http://www.MyFWC.com/GopherTortoise).

The FWC and representatives to the Gopher Tortoise Council hosted and/or participated in 47 outreach events in FY 2017-18 including: five local government workshops; several Gopher Tortoise Day events; multiple elementary school presentations; county 4-H events; festivals including the Palm Beach County Natural Areas Festival, St. Marks Stone Crab Festival, and Taloofa Fest; and a World Turtle Day event at Marineland St. Augustine.

**Permitting**

Since implementation of the recipient site permit program in 2008 (a voluntary program in which landowners may use their lands with suitable habitat to receive gopher tortoises from development sites), 19,975 acres of gopher tortoise habitat have been protected through permanent conservation easements. Under these permits, private landowners can accept gopher tortoises relocated from development sites and assess a monetary charge to the developer for accepting the tortoise(s). In exchange, the recipient site landowners agree to manage and protect the habitat for gopher tortoises in perpetuity. Currently, 42 recipient sites with an available capacity of 12,624 tortoises are permitted. Seven additional recipient site permit applications are currently under review with potential available capacity for 5,813 tortoises on 2,887 acres of gopher tortoise habitat. During FY 2017-18, 7,472 tortoises were relocated under FWC-issued permits.

To humanely relocate tortoises from incidental take permitted development sites and restock tortoises on conservation lands where tortoise populations have been depleted, FWC has approved ITP recipient sites on several properties in northern Florida. FWC has partnered with Nokuse Plantation, Avalon Plantation and most recently Eglin Air Force Base to approve ITP recipient sites on each of these three sites. Each recipient site contains at least 250 acres of suitable tortoise habitat and can accept at least 250 adult gopher tortoises, criteria required to establish a viable population. During FY 2017-18, 713 tortoises were relocated to Eglin AFB, 57 to Nokuse Plantation, and 40 to Avalon Plantation. To address special situations that provide more flexibility and further the objectives of the gopher tortoise management plan, the FWC has entered into two MOAs. Under an MOA with FWC, the Florida Forest Service established a 53.9-acre recipient site within the Croom Tract of the Withlacoochee State Forest in Hernando County. This public conservation land recipient site was established to receive gopher tortoises from the adjacent Good Neighbor-Phase 4 public recreational trail project site, thereby maintaining the resident gopher tortoise population on public lands. St. Lucie County established a 232.5-acre recipient site within the Indrio Savannas Preserve site in St. Lucie County to receive gopher tortoises from any...
project that is located on a property owned or managed by St. Lucie County, thereby maintaining the regional
gopher tortoise population.

Population Restoration and Monitoring

To better understand gopher tortoise population distribution and monitor trends in Florida, five public
conservation lands were surveyed via LTDS in FY 2017-18 by the Florida Natural Areas Inventory (FNAI). Two
additional conservation lands, Rainbow Springs State Park and Withlacoochee West Conservation Area Quail
Farms Tract, were surveyed by FWC Gopher Tortoise program staff between January and May 2018. Ralph E.
Simmons State Forest in Nassau County contained the highest population density (1.5 tortoises/acre), and Twin
Rivers State Forest Blue Springs Tract in Hamilton County had the largest population estimate (2,498 tortoises).
Of the seven conservation lands monitored during FY 2017-18, five sites met the criteria for a viable population
(at least 250 adult tortoises, at least 0.16 tortoises/acre, and at least 250 acres of continuous gopher tortoise
habitat). Future monitoring will focus on surveying additional public conservation lands to locate viable
populations statewide, as well as locate populations that may become viable with increased management.

Waif Tortoises

During FY 2017-18, FWC continued efforts to identify solutions for waif tortoises. One solution includes identifying
willing landowners to care for waifs on their property, designating the land as a “waif tortoise recipient site.” One
new waif site was established at the St. Petersburg College Bay Pines STEM Center in Pinellas County, FL, and has
capacity for 10 tortoises. Fifty waif gopher tortoises were released at permitted waif recipient sites in Florida last
year. FWC is currently in the process of developing additional waif sites by working with the Florida Park Service
and private landowners to establish sites in Walton and Pasco counties, respectively. Under a Memorandum of
Agreement with the South Carolina Department of Natural Resources (SCDNR), there is also an ongoing effort to
restock depleted gopher tortoise populations on public lands in South Carolina through the FWC waif program.
Seven tortoises were relocated to Aiken Gopher Tortoise Heritage Preserve during FY 2017-18; to date, 130
tortoises have been relocated to South Carolina under this Agreement. The goal of this Agreement is to restock
200 gopher tortoises at Aiken Gopher Tortoise Heritage Preserve, leaving a remaining capacity of 70 tortoises. The
FWC is also working with wildlife rehabilitators to place waifs at designated recipient sites or release them back to
their origin, if known. Decals encouraging citizens to “Keep Gopher Tortoises Wild” were created and distributed in
Florida and serve as a reminder to leave tortoises where they were found rather than remove them from the wild.

Habitat Management

During FY 2017-18, the Habitat Management Assistance Funding (HMAF) program provided $97,639 in funding to
assist local governments with gopher tortoise habitat management activities on more than 450 acres of their
conservation lands. The HMAF program continues to offer a reimbursement for the installation of silt fencing,
intended for the soft release of gopher tortoises on public lands that have agreed to receive tortoises from
previously-permitted ITP development sites. No new ITP recipient sites were funded through HMAF in FY 2017-18.
Some habitat management and improvement activities conducted through the HMAF program included fire line
management, prescribed burns, selective tree reduction, mowing and grinding, roller chopping, mulching, the
control of exotic and invasive plants via the utilization of herbicide applications, and the planting of herbaceous
groundcover.

Law Enforcement

To enhance the protection and conservation of gopher tortoises and their habitat statewide, Gopher Tortoise
program staff conducts training for FWC Law Enforcement officer recruits. While working with law enforcement and
FWC’s legal office, a field guide for conducting investigations of gopher tortoise incidents and violations was
distributed to all FWC officers in Florida. The field guide is intended to aid the officers in responding to gopher

Continued on next page...
Florida continued...

tortoise violations. FWC Law Enforcement frequently investigates potential gopher tortoise violations and verifies permitting compliance on development sites by conducting site visits. In FY 2017-18, Law Enforcement investigated several cases of painted gopher tortoises and illegal harvest. Most notably, a gopher tortoise in Montverde, Florida was discovered painted red with concrete on its limbs. This case generated significant support from the public, and an arrest was made with multiple charges filed in relation to this crime. The paint was safely removed from the tortoise, and it has since been released at a waif recipient site.

Commensals

The FWC, Central Florida Zoo’s Orianne Center for Indigo Conservation (OCIC), Auburn University, and USFWS have continued efforts to reintroduce the federally threatened eastern indigo snake to The Nature Conservancy’s Apalachicola Bluffs and Ravines Preserve in Bristol. Twenty progeny from captive-raised indigo snakes (10 males, 10 females) were released and will be monitored on a 10-year commitment. In conjunction with this project, there is an opportunity to answer a timely conservation and species management question relevant to successful repatriation – how prevalent is Cryptosporidium serpentisens (Crypto) among native snakes at the repatriation site. Understanding the prevalence of Crypto among wild snake populations will allow the Eastern Indigo Snake Repatriation Committee and OCIC to make informed adaptive management decisions about the release of known Crypto-positive animals as part of repatriation efforts. This Crypto research will occur in FY 2018-19 and is funded by a Conserve Wildlife Tag grant.

A 2-year telemetry study was initiated by FWC biologist Blair Hayman in northern Florida examining the effects of the mosaic of public and private lands on Florida pine snake (Pituophis melanoleucus mugitus) habitat use, movement patterns, and survival. Telemetry work is ongoing, but this study has documented snakes exhibiting site fidelity to winter refugia after a sudden temperature drop in the spring, enforcing the supposition that warm climate snakes may still be aware of refuge areas for use during cooler time periods.

There are a number of research projects currently in progress investigating gopher tortoise burrow use by commensal species in South Florida. These studies include research focused on invertebrate commensals, and tortoise burrow use by vertebrate species in different habitat types. Students presented their preliminary findings for these research studies during the 40th Annual Gopher Tortoise Council Meeting in Lake Placid, FL.

Louisiana

Keri Lejeune

Louisiana Department of Wildlife and Fisheries Wildlife Diversity Program (LWDP), formerly the “Natural Heritage Program” has been working towards having Line Transect Distance Sampling (LTDS) surveys on over 3,300 acres on Sandy Hollow Wildlife Management Area (SHWMA), Lee Memorial Forest (LSU), and several private lands in Washington, St. Tammany, and Tangipahoa parishes completed in Spring of 2019 through funding dedicated to assist WDP staff with obtaining updated population and distribution data for Louisiana. The LWDP has also finalized plans to conduct prescribed burning in 2019 on those lands prepared for LTDS surveys prior to surveys being conducted to aid in greater detection of burrows. LWDP staff will assess historical burrow records in 2019 for activity status and tortoise presence.

In cooperation with other state partners, LWDP was awarded Round 4 of the Multi-state Sandhills/Upland Pine Restoration Grant and has finalized plans to conduct prescribed burning on approximately 2,500 acres surrounding SHWMA in Tangipahoa parish and longleaf planting on 260 acres of private land in St. Tammany parish. LWDP will continue to work with private landowners interested in habitat and longleaf restoration within the gopher tortoise range in Louisiana as well as assessing tortoise presence and status on private lands.

LNHP has constructed the fourth release pen for waif tortoises on SHWMA and received five waif tortoises during
Recent Research

Did you know the Gopher Tortoise Council keeps an updated bibliography in the Education & Outreach section of our website? Our bibliography currently contains citations for >900 published articles on gopher tortoises. Below are a few recently published articles pertaining to gopher tortoises and upland communities in the southeast, and some relevant desert tortoise research!


New Officers and Co-Chair

Ericha Shelton-Nix was chosen as our new GTC Co-Chair! Ericha currently serves as GTC’s Alabama State Representative, and is a former chair of the Public Information and Education Committee. Stay tuned for information from Ericha about GTC 2019!

Eric Sievers will serve a second term as Membership Secretary.

A big thank you to Cyndi Gates, newsletter editor of GTC's The Tortoise Burrow since 2012. Cyndi has done a phenomenal job on the newsletter throughout her tenure, and we are grateful for her time and service. Michelina Dziadzio will assume the role of newsletter editor.

Recent Research

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Student Spotlight

Caitlin Jones

This past summer, I had the opportunity to intern with Florida Fish and Wildlife Conservation Commission’s (FWC) Gopher Tortoise Conservation Program. During my internship, I participated in a research project to evaluate the repatriation rate of gopher tortoises (Gopherus polyphemus) following temporary exclusion. I also presented preliminary results of this project at my first Gopher Tortoise Council meeting this past October.

Temporary exclusion is an on-site relocation permit option in Florida which is primarily issued for the installation and maintenance of linear transmission projects. A condition of this permit is that habitat is restored post-installation, but little is known about how readily gopher tortoises repatriate these areas following temporary exclusion. In 2016, gopher tortoises were temporarily excluded from a section of the Sabal Trail pipeline right-of-way, which passes through the Halpata Tastanaki Preserve and the Marjorie Harris Carr Cross Florida Greenway in Marion County, Florida. This project provided FWC and partnering agencies (including Southwest Florida Water Management District) an opportunity to evaluate gopher tortoise repatriation following exclusion and restoration of habitat.

The objectives of this study were to: 1) compare tortoise and burrow densities pre- and post- temporary exclusion, and 2) examine habitat suitability following restoration. Methods of the study included a comprehensive burrow survey and both qualitative and quantitative vegetation sampling.

As part of my internship, I participated in a 100% gopher tortoise burrow survey along the Halpata Tastanaki and Cross Florida Greenway sections of the Sabal Trail pipeline right-of-way following habitat restoration. We only found five burrows within the project right-of-way during our survey, which was conducted one year after habitat was restored, as opposed to the 80 potentially occupied burrows that were excavated prior to clearing and pipeline construction. As this is a multi-year study, FWC plans to repeat this burrow survey next year, and capture tortoises within the right-of-way to determine age/size class, sex, and whether the tortoises taking up residency in the right-of-way were previously excluded or new individuals. Vegetation will also be re-sampled next year to evaluate if habitat suitability for tortoises is increasing or decreasing over time.

Not only was this my first time conducting a burrow survey, but it was also my first fieldwork experience. The survey was conducted in July 2018 and despite the heat and many miles of walking, it was an amazing experience and I’m glad to have been able to participate in the study. I was able to learn how to measure burrow widths, scope burrows to confer occupancy, and operate a remote GPS unit.

Continued on next page...
Student Spotlight continued...

In addition, participation in this project helped me learn basic fieldwork skills, such as the importance of staying hydrated (which is something I still fail to do on almost a daily basis), how to avoid ticks, and how to choose appropriate field clothing (I was glad I wore thicker pants on the day that half of the burrows were under blackberry bushes!).

Taking part in this research project has sparked a strong interest in both gopher tortoises and conservation. I plan to continue assisting with this gopher tortoise temporary exclusion study next year and will pursue a career in conservation after finishing my M.S. in Geography from Florida State University.

Caitlin scoping a burrow in the pipeline right-of-way. Samantha Cobble (FWC) is providing scoping advice. Photo by Michelina Dziadzio.

News from the Gopher Pen

Many of you were introduced to the three female waif gopher tortoises at the luncheon held at Water Works Environmental Education Center during the Annual Gopher Tortoise Council meeting in Palatka, Florida, in January 2017. We wanted to provide you with some news concerning events since your visit. The most significant was that WE BURNED this half acre enclosure in May with the assistance of the Palatka Fire Department and University of Florida’s Urban Forester. We had an amazing plant response with help from a wet summer and fall. Wiregrass, Lopsided Indiangrass, Blackseed Indiangrass, several species of Blazing Star, Silkweed, Garberia and many other grasses and herbs sprang into full bloom, ultimately producing an abundance of seeds. Harvester ants, burrowing beetles, six-lined racerunners, and lots of pollinators have also invaded the enclosure. The tortoises responded as well. We are finding an abundance of fresh tortoise scats scattered around the enclosure. Probably one of the more interesting events happened in early November. All three waif tortoises had converged on the apron at one of the original burrows, we suspect discussing the election prospects. Converting bahia and lawn grasses into a small-scale sandhill habitat in a urban neighborhood setting is not only possible but WE DID IT! It's a real pleasure now to walk through splendid 3-foot tall clumps of seeded wiregrass plants and dozens of other upland species.

Enclosure at Water Works Environmental Education Center post-burn.

Prescribed fire at Water Works Environmental Education Center, May 2018.

Waif gopher tortoises at Water Works Environmental Education Center.
Gopher Tortoise Education at Jonathan Dickinson State Park

Gopher tortoises are an integral part of Jonathan Dickinson State Park. With more than 3,000 acres of scrub community and 6,000 acres of flatwoods, these incredible animals have a wide variety of habitats to thrive and be very happy tortoises! To discover more about how these animals are living in the park, we acquired a burrow camera scope with funds through the Donna J. Heinrich Grant and the Friends of Jonathan Dickinson State Park. With these funds, we purchased the scope and more fun projects!

The Kimbell Education Center partnered with students from the Samaritan Center school in Stuart, FL to begin looking at the burrows in specific areas of the park and specifically focus on gopher frogs. With the use of the camera scope, students are collecting data on species in the burrows. We will use this data to look at overall usage of gopher frogs relative to distance from wetlands and freshwater sources that are known gopher frog habitat. The videos and data collected will be exhibited in the education center’s new gopher tortoise display – coming next year! This project also includes collaboration with a Florida Atlantic University research project studying the diversity of species using burrows in the park.

Our other project was to build a mobile gopher tortoise display to use in a variety of programs. In April of this year, the display was part of Gopher Tortoise Day at Jonathan Dickinson and Savannas Preserve State Park. The display was also part of park programs with schools and the general public, school outreach programs, and a temporary display in the center. This display has reached almost 900 students and many more park visitors! At the Kimbell Education Center, we are looking forward to many more interactions with this mobile display and can’t wait to incorporate our camera scope data into our new permanent display. Stop by and see us at the center! We are located in the river area of the park and open every day from 9:00 – 5:00. For more information, visit the park at floridastateparks.org or contact Libby at libby.reinert@floridadep.gov, or 561-745-5551.

Above. Mobile gopher tortoise display and education table at Jonathan Dickinson State Park.

Left. Park Services Specialist Phyllis Mills teaching kids how to record collected data.

Volunteer Brodie Atwater showing kids Jonathan Dickinson State Park’s gopher tortoise burrow camera.
Name Game

Natural History: Canebrake rattlesnakes are pit-vipers that belong to the family Viperidae. They are ambush predators and may spend several weeks in the same location waiting to strike at a potential meal. Adults typically feed on rodents, such as chipmunks, rats, mice, voles, and squirrels. In addition to sight and smell, rattlesnakes have a loreal pit that allows them to detect infrared radiation which is useful in locating warm-blooded prey in low light conditions. Rattlesnakes use their potent venom when they strike and release prey, and their forked-tongue to follow envenomated prey. Canebrake rattlesnakes are most frequently observed during mating season in the fall. Females exhibit delayed fertilization and will give birth to 6 to 18 live young during the following summer. In the Southeastern Coastal Plain, canebrakes may go into torpor for several weeks in the winter, but generally do not follow the overwintering denning and hibernation behavior of northern populations.

Range and Appearance: This species ranges from New England through North Florida, and westward to central Texas and southern Minnesota. In the northern portion of their range, they are referred to as timber rattlesnakes and in the southern portion of the range they are often called canebrake rattlesnakes. Both names refer to the same species, although there are color differences that vary latitudinally. With the exception of nearly jet-black animals which occur in the Northeast, this species has a series of brown chevrons that extend the length of the body. They have keeled scales and the base color can be brown, greenish-gray, or creamy-yellow. Individuals in the southeast may have a pink hue. Canebrakes often have a brown stripe that runs down the middle of their back, a characteristic not present in northern populations. Neonates (newborn snakes) have similar color patterns as adults. Exceptionally large canebrakes can measure over 8 feet, but most adult animals range between 4 to 6 feet in length.

Rattlesnake Myth
Rattlesnakes grow a new rattle segment during each shed cycle. Counting the number of rattles will tell you how many times a snake has shed, not how old the snake is.
Canebrake (a.k.a. Timber) Rattlesnake
*Crotalus horridus*

**Conservation Challenges and Threats:**
Rattlesnakes are often killed on sight and historically dens have been gassed and systematically wiped out. This has resulted in their decline, especially in the northern portion of their range. Canebrake rattlesnakes are habitat generalists but are still vulnerable to habitat loss and degradation. As a migratory species, timber rattlesnakes are highly susceptible to road mortality.

**Snake Vocabulary**
Loreal pit: An organ located between the eye and nostril (see picture below) that allows rattlesnakes to view their surroundings and prey in infrared.

**Venom:** Rattlesnake venom is used for feeding and defense. Canebrake rattlesnake venom is highly evolved and varies extensively throughout the species range. There are multiple types of venom patterns associated with this species: Type A is neurotoxic and can lead to nervous system failure, Type B is hemorrhagic and can cause severe bleeding and tissue scarring, Type C is the least common and is the least potent. Some canebrake populations have a combination of Type A and B venoms. Venom has several benefits in the biomedical field; venom research has led to medical uses to treat cancer, high blood pressure, kidney stones, strokes, and diabetes.

For More Information:


This rattlesnake (pictured above) has 9 rattle segments. The tip of the rattle is often missing on older animals.

Rattlesnake Safety: Snakes should never be handled if the species cannot be positively identified. Most snake bites occur when individuals attempt to harass or kill a venomous snake. When hiking in potential rattlesnake habitat, stay on trails, wear closed-toe boots, and always keep dogs on a leash. A cell phone and car keys are the best “snake bite kit” – dial 911 and seek immediate medical assistance. Never attempt to suck the venom from a bite or attempt to tie a tourniquet around the affected area. A manicured lawn and tidy yard will reduce the chances of encountering a rattlesnake around a home. If a rattlesnake is encountered in a yard, and is not posing an immediate risk to family or pets, the best solution is to let the snake leave on its own.

Created by Bradley O’Hanlon and Jennifer Howze
Photographs provided by Jennifer Howze and Bradley O’Hanlon
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