Greetings GTC-ers,

My space in this issue is devoted to updates on various research, conservation, and education happenings. With so much active research on gopher tortoises occurring throughout the Southeast, it can be hard to stay current with new information. GTC is here to help! Our Website Manager, Jen Howze, does a great job keeping the Gopher Tortoise Bibliography up-to-date, so I recommend that as a starting point. In 2018 alone, there were 13 new publications on topics ranging from immunogenetics to movement ecology and head-starting. In addition, recordings of talks given at GTC’s 40th Annual Meeting are available on Archbold’s YouTube channel and abstracts of all the 2018 presentations are posted on the GTC website. Finally, be sure to mark your calendars and join us for another information-packed meeting this fall! See page 2 for details.

One important piece of news is that U.S. Fish & Wildlife Service (USFWS) is beginning a year-long process of completing a Species Status Assessment (SSA) that will inform their decision regarding federal listing of gopher tortoises throughout their range. How this unfolds will obviously have huge ramifications for gopher tortoise conservation and management. My understanding of the timeline and process is that USFWS expects to complete a draft of the SSA by Fall 2020, with a listing determination to follow in 2021. If USFWS decides listing is warranted, a rule proposing to list the species as either threatened or endangered and designation of critical habitat will be submitted to the Federal Register for publication. This would then be followed by a public comment period, and a final listing determination would be made (by 2023). If USFWS decides that listing is not warranted, that determination will also be published in the Federal Register. Many of us will be submitting data to USFWS to aid them in making a decision grounded in the best available scientific information.

Notwithstanding the question of legal status, the future of gopher tortoises and other upland species depends greatly on public awareness and support for conservation. Toward that end, Education Co-Chairs Jess McGuire and Rachael Sulkers made sure GTC was well-represented at the Claxton Rattlesnake & Wildlife Festival in southeastern Georgia, held March 9-10. Jess brought Georgia DNR’s traveling tortoise burrow display, the creation of which was funded in part by a GTC environmental education grant in 2017. For those of you not familiar with the history of this event, for more than four decades prior to 2012, the annual Claxton Roundup was one of the country’s last remaining rattlesnake roundup events. Conservation entities – and herp lovers throughout the country – rejoiced when the organizers...
Message From a Co-Chair continued...

opted to convert it to a celebration of Coastal Plain wildlife, replacing the glorification of cruel and harmful cultural practices with educational programs promoting appreciation of reptiles. Since then, the event has attracted big crowds annually. Fortunately (but still disappointing...), only two events in the southeastern U.S. – the Opp Rattlesnake Rodeo in Alabama and the Whigham Rattlesnake Roundup in Georgia – still revolve around collecting and removing eastern diamondback rattlesnakes from the wild. Be sure to check out the new diamondback factsheet at the end of this issue and help spread the love for this magnificent animal!

— Betsie

ANNOUNCEMENTS

2019 Annual Meeting

Mark your calendars for the 41st Annual Meeting of the Gopher Tortoise Council

November 15-17, 2019

This year’s meeting will be held at

The Lodge at Gulf State Park in Gulf Shores, AL

As discussed at our October 2018 business meeting, we are shifting the meeting date several weeks later in hopes of avoiding further hurricane-related disruptions.

See you on the beach!

Photos provided by the Alabama Department of Conservation and Natural Resources.

Stay tuned for more details on our website: www.gophertortoisecouncil.org, or follow us on Facebook.

“Like” us on Facebook to get more gopher tortoise news and Council updates!
ANNOUNCEMENTS

Donna J. Heinrich Environmental Education Grant

The **GTC 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.

**Deadline for submission of this year’s proposals is August 31st, 2019.** Applications may be downloaded from our website at [http://www.gophertortoisecouncil.org/who/Donna_J._Heinrich_environmental_grant.pdf](http://www.gophertortoisecouncil.org/who/Donna_J._Heinrich_environmental_grant.pdf).

Applications which contain the following will be given preference:

- Projects that reach diverse and new audiences
- Projects that focus on the importance of the conservation of intact upland ecosystems
- Projects that encourage community involvement
- Projects that have matching funds

Please follow the instructions on the grants program page noting the requirements.

For questions, contact Cyndi Gates at cyndi@fgates.com. Proposals should be submitted to the same email address.

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The J. Larry Landers Student Research Award

The **J. Larry Landers Student Research Award** is a GTC competitive grant program for undergraduate and graduate students. Proposals can address research concerning gopher tortoise biology or any other relevant aspect of upland habitat conservation and management. The amount of the award is variable but has averaged $1,000 over the last few years. The proposal should be limited to four pages in length and include a description of the project, a concise budget, requested grant amount, and a brief resume of the student. This is an excellent opportunity for undergraduate and graduate students to access funding for their projects!

The deadline for grant proposals each year is the **15th of September**. Proposals should be submitted electronically in a Microsoft Word document to Jeff Goessling at jeff.goessling@gmail.com. For more information, visit our website at [www.gophertortoisecouncil.org](http://www.gophertortoisecouncil.org).
ANNOUNCEMENTS

JOIN US IN CELEBRATING GOPHER TORTOISE DAY!

Gopher Tortoise Day was designated to increase awareness of this fascinating creature and the need to protect its habitat throughout its range in Louisiana, Mississippi, Alabama, Georgia, Florida and South Carolina. Are you interested in participating in Gopher Tortoise Day 2019? Check out OutdoorAlabama.com 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 that can be distributed during events year-round!

Use #GopherTortoiseDay on Instagram and Twitter to let others know how you’re celebrating Gopher Tortoise Day 2019!

Gopher Tortoise Species Status Assessment — Data Request

The U.S. Fish and Wildlife Service (USFWS) is requesting data from gopher tortoise biologists for inclusion in the Species Status Assessment (SSA), which is being initiated this year. The SSA will be the biological underpinning of the USFWS’s decision on whether the gopher tortoise may warrant protection under the Endangered Species Act.

To ensure USFWS has the most current and best available information, they are requesting specific information on the gopher tortoise, including:

a) Species' distribution, taxonomy, ecology, and life history;
b) Positive and negative survey data;
c) Stressors to the species or its habitat; and,
d) Conservation actions that may benefit the species or its habitat.

Information from any portion of the tortoise’s range is being requested. The USFWS will accept information in any format, which may include spatial data and/or tabular data, unpublished reports, and habitat-related publications; data that have not been included in peer-reviewed literature will also be accepted.

The USFWS’s response deadline is April 15th, 2019, but will accept data after this date. Send information to the gopher tortoise review team at gophertortoise@fws.gov. All data and information submitted, including names and addresses, would become part of the administrative record.
An Interview with a Herpetologist featuring Michelle Hoffman

The Gopher Tortoise Council’s Upland Snake Conservation Committee is excited to present an “interview with a herpetologist” article. The goal of these articles is to highlight ongoing research and conservation actions, present readers with a look behind the scenes, and help students gain a better understanding of herpetology as a career.

This issue, we are joined by Michelle Hoffman, the Director of the Orianne Center for Indigo Conservation, located in Sanford, FL.

Gopher Tortoise Council (GTC): Thank you for joining us Michelle. Can you start off by telling us a little about the Orianne Center for Indigo Conservation?

Michelle Hoffman (MH): The Orianne Center for Indigo Conservation (OCIC) is the captive propagation center for eastern indigo snakes (Drymarchon couperi) used in reintroduction efforts. The OCIC was founded by the Orianne Society who purchased the property, built all of the facilities and operated the center until 2014. In 2014, the Orianne Society and Central Florida Zoo partnered to operate the center which is now funded by the Central Florida Zoo (CFZ).

GTC: How did you come to work with eastern indigo snakes?

MH: I remember being enthralled with animals as a kid. I didn’t know that I would become so passionate about snakes until I was able to work with them directly. My parents were always afraid of snakes and growing up, I was taught to avoid them or call for an adult to kill them if any were spotted. Usually my dad would make belts and hat bands out of their skins. It was difficult for me to understand why it was okay to treat snakes with disdain while I was taught to be so compassionate for other wildlife. I think that these experiences at a young age sparked my interest in herpetofauna and encouraged me to learn as much as I could.

I first worked with an eastern indigo snake professionally in 2010 when, after accepting a position in the guest services department of the CFZ, I signed up to become a docent. I grew even more captivated by this species when I became a full-time reptile keeper at the zoo in 2012. Working in the herpetology department at the CFZ allowed me to gain experience with both native and exotic species and helped to provide a framework to focus on conservation, specifically local conservation efforts that were happening right in my backyard. My enthusiasm to become involved in these endeavors eventually led me serve as the Eastern Indigo Snake Species Survival Plan Coordinator and Studbook Keeper for the Association of Zoos and Aquariums.

In 2014, when the Orianne Society partnered with the CFZ to operate the OCIC, I saw an opportunity to focus on conservation as my career. This partnership allowed me to begin working at the OCIC, where I would study and work almost exclusively with eastern indigo snakes from 2015 to present.

GTC: Were you able to change your parent’s minds about the value of snakes?

MH: Yes, my mom refuses to kill them now, but they still make her a bit nervous. You wouldn’t catch her with a pet snake or anything, but she does find them alluring. My dad has always thought they were beautiful animals. I just don’t think he quite appreciated their role in the environment as a necessity for a functioning ecosystem. He doesn’t kill them anymore and he has come around to understand that they too have their place on this planet.

Continued on next page...
An Interview with a Herpetologist continued...

GTC: How many eastern indigo snakes are housed at the OCIC annually?

MH: The OCIC houses anywhere from 50-250 indigo snakes depending on the time of year. During hatching season (June-September) our numbers increase between 30 and 70 animals depending on the success of the breeding and egg-laying season. After a release, numbers can decrease by as many as 60 animals. Additionally, partner facilities like Zoo Atlanta, the Welaka National Fish Hatchery, and Zoo Tampa help to head-start the young snakes prior to release which helps to maximize space for breeding efforts at the OCIC.

GTC: What goes into feeding and caring for all of those indigo snakes?

MH: Indigo snakes are a very active species and use a lot of space. They are strongly associated with the longleaf pine ecosystem where gopher tortoises are present and possess one of the largest home ranges when compared to other species in North America. This means that we must try to provide enough space to encourage natural behaviors and try to mimic their environment, while also making the housing practical for completing husbandry and maintenance. Many of our snakes are kept outdoors in large enclosures designed specifically with these things in mind.

Indigo snakes are known to be ophiophagous, or snake-eaters. This can pose some challenges when keeping them in a laboratory or captive setting. Ideally, we would feed the indigo snakes at the OCIC a diet that is as close to natural as possible. Unfortunately, feeding snakes to snakes can be risky because of pathogen transmission. Typical food storage methods, such as freezing, will not kill off everything that could potentially cause issues for the colony (Cryptosporidium serpentis is a perfect example). With that being said, we still aim to give the indigo snakes a varied diet which includes: fish, chicken chicks, quail chicks, mice, and rats. They are fed 2-3 times per week which averages about 2 hours of staff time each day. Because indigo snakes are extremely active and eat a lot of food, they require a significant amount of cleaning. Every snake at the OCIC is seen and their enclosures cleaned by staff every day!

From October to January, OCIC staff must pair animals for breeding based on what we know about their histories. During this time, we allow some of the males to engage in combat, a natural behavior in which two males will compete with one another to establish dominance. Combat requires a significant amount of monitoring to watch for signs of excessive aggression. We allow combat to continue from 5-30 minutes (one pair at a time) and collect data throughout the process. Once the males are separated, we will pair each one with a female for breeding which also requires substantial monitoring. Pairs are left together anywhere from 10 minutes to 24 hours.

During the spring, females that have bred are expected to lay between 5 to 10 eggs, but we’ve seen as many as 14 eggs in a clutch. We provide appropriate nesting sites for each female to ensure comfort and security during this process. Females are monitored during this time and the eggs are collected upon being laid. If we do not collect the eggs, they are at risk of being destroyed by fire ants.

Incubation typically lasts from 90 to 110 days. In June, hatchlings will begin to pip and emerge from their eggs. Hatchlings are weighed, measured, and placed in individual enclosures where they will be raised in preparation for release. Hatching season typically ends by September at the OCIC which brings us right back into breeding season!

Continued on next page...
An Interview with a Herpetologist continued...

GTC: Where do the indigo snakes go after they are raised?

MH: Most of the snakes raised at the OCIC and our partner head-start facilities are released at one of two reintroduction sites. One release site is in the Conecuh National Forest in southern Alabama where 154 eastern indigo snakes have been released since 2010. The other release site is The Nature Conservancy’s Apalachicola Bluffs and Ravines Preserve where 32 eastern indigo snakes have been released since 2017. Both of these release sites are in areas where the eastern indigo snake has been extirpated and the sites restored to once again support eastern indigo snake populations.

MH: Due to the decline of the striped newt in the Apalachicola National Forest, partners came together to establish a breeding and repatriation program. In 2010, The Coastal Plains Institute, the Memphis Zoo, and other partners worked together to begin the program which would evolve into multiple captive propagation facilities and thousands of newts to release into the Apalachicola National Forest over the next 9 years.

The CFZ became involved in the captive propagation of the striped newt in 2015. The Jacksonville Zoo, who had been collaborating with partners to receive animals for breeding since 2011, offered to send three breeding pairs to the CFZ. Soon after the animals were transferred to the CFZ, I accepted a position at the OCIC and my coworkers and I began building enclosures to house the striped newts at my new location. In 2016, the newts were transferred to the OCIC and immediately started laying eggs. Between 2016 and 2019, over 250 striped newts were released from the OCIC into the Apalachicola National Forest to assist with these repatriation efforts.

GTC: Do you take care of any other animals at the OCIC?

MH: We care for a handful of other Florida native species such as the eastern diamondback rattlesnake (Crotalus adamanteus), Florida cottonmouth (Agkistrodon contortrix), and Florida kingsnake (Lampropeltis getula). These animals serve as ambassadors for their species and attend events such as the Claxton Rattlesnake Festival where they are showcased in a safe environment for guests to appreciate. Having these native species alongside the indigo snakes encourages conversations about indigo snakes and their ophiophagous habits and the roles of all native species in the ecosystem.

The OCIC is also home to approximately 12 breeding pairs of striped newts (Notophthalmus perstriatus) which produce offspring for a repatriation program in the Florida Panhandle. During hatching season, the OCIC becomes home to a whole lot of striped newt larvae in addition to the adults.

GTC: Can you elaborate on the striped newt breeding program?

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An Interview with a Herpetologist continued...

GTC: What insights have you gained about indigo snakes from OCIC that may not be apparent when someone comes across an animal in the wild?

MH: A lot of people know that indigo snakes are big, strong, and impressive animals, but not everyone gets to experience these characteristics in the way that staff at the OCIC does. Many of our snakes are housed in outdoor enclosures where we are able to observe some interesting behaviors such as male combat, climbing, burrowing, and breeding.

One behavior that I have observed and find extremely interesting is the indigo snakes making their own holes with their heads in order to get underground. We see this burrowing behavior at the base of objects in their outdoor enclosures including planted vegetation, a large rock, or the cooler which the snakes use for overwintering. It would be easy to mistake these for rodent holes, and if I had not witnessed the behavior myself, I would’ve had a hard time believing these holes were made by an indigo snake.

GTC: In what ways have your captive snakes surprised you?

MH: One thing that I didn’t know about indigo snakes prior to working with them at the OCIC is how visual they are. They seem to be extremely interested in movements around them. Animals kept outdoors will bask during the day and if someone walks by their enclosures, they’ll enter a “periscoping” posture; this means they will lift their heads and necks off the ground to better observe their surroundings.

While indigo snakes are known to be docile animals, they are fairly aggressive eaters. We usually lure the snakes around their enclosures during feeding to encourage them to pursue their prey. Typically, the snakes are able to hone in on the prey item and chase it down until they are able to catch and eat it. Their sheer power is amazing.

GTC: Do you have a favorite animal you’ve cared for or currently care for, and why is it your favorite?

MH: Snake #29 is probably my “favorite”. She is the offspring of a female from Southeast Georgia and seems to be more assertive than some of the others. On occasion, we have noticed #29 attempting to combat the males she is paired with during breeding season. If she is not interested at the time or not interested in the male we paired her with, her behaviors will let us know. She is also just a beautiful snake!

GTC: From your perspective, what are the biggest hurdles for species recovery in the wild?

MH: Space. Safe places for indigo snakes are becoming few and far between. The animals are rarely far from a road, highway, or residence, all of which pose challenges to snakes of their size. These risks are much more prevalent for indigo snakes compared to other species because of their large home ranges and ability to make interpopulation movements. I know that there is no easy solution to end road mortality or development, but I do know that it is our duty to educate those around us. If I can convince one person to avoid snakes on the road rather than purposely run them over, or that it is important to support policies that will protect our natural lands, maybe that one person can help change the minds of others.

GTC: You spend most of your day working with animals; do you have any pets, scaly, furry, or otherwise, at home?

MH: I have an amazing dog named Gilly and a cat named Tink that’s... a cat. Tink doesn’t like attention and I understand that, so we coexist okay. Kudos to those that take care of hundreds of reptiles for work and then go home to take care of more reptiles. I love to travel and try to have as few things to hold me back as possible.

GTC: Can you share a memorable moment from your career?

MH: We have a small staff of five at the OCIC, so we have to be a little picky about which outreach events we participate in. There is one in particular that stands out to me.

I was contacted by a friend who asked if I would bring some snakes to an after school center for at-risk youth and

Continued on next page...
An Interview with a Herpetologist continued...

accepted the invitation. When I arrived and removed one of the snakes from its transport box, a lot of the kids screamed and some of them even ran into a different room. By the time I was done talking to them, almost all of them wanted to interact with the snake in some way. I ended up staying at the after school center for 2 hours, sitting with the kids and encouraging them to ask questions so they would be comfortable with them. Many of the kids at the center had never seen a snake or have been taught negative things about them from their parents and grandparents. This experience really encouraged me and reminded me how important it is to teach young people about nature and how to respect wildlife.

GTC: Do you have any advice for students or biologists early on in their career reading this?

MH: I would tell them to power through! There are times when you will be exhausted, and if you’re not exhausted at times, then you’re probably not doing enough. You must be willing to tackle tasks that you might not like with enthusiasm if you want to do the fun and exciting stuff. Be willing to work for free to build your experiences, meet new people, and always learn from those around you. Choose to surround yourself with passionate biologists and listen to them; when you show that you want to learn, they are almost always willing to teach you.

GTC: Where can GTC members go to learn more about the OCIC and their efforts to repatriate indigo snakes?

MH: Visit our page on the Central Florida Zoo’s website at https://www.centralfloridazoo.org/about-the-zoo/ocic/ or follow us on Facebook (www.facebook.com/wesaveindigos) and Instagram (@indigo_center)!

Who Was J. Larry Landers?

J. LARRY LANDERS
(1947-1993)

Larry Landers received his MS degree from the University of Georgia in 1976. After graduation, he became a Wildlife Biologist at International Paper Company’s Georgia experiment station, Bainbridge, GA (1976-1984). He served as the Director, then called the Director of Research, at Tall Timbers Research Station, located in Tallahassee, FL from 1984-1991, and was the Conservation Coordinator at the Jones Ecological Research Center at Ichauway, Newton, GA from 1991-1993. His life ended prematurely with a fatal heart attack on July 31st, 1993 at the age of 46.

Sampling of Landers' Publications

Landers, J. L. and A. S. Johnston. 1976. Bobwhite food habits in the southeastern United States with a seed key to important food. Tall Timbers Miscellaneous Publication (No. 4).


Awards & Honors

Larry received the Chairman’s Award of the Florida Chapter of The Nature Conservancy for his leadership in ecological research and conservation at Tall Timbers Research Station.
Who Was J. Larry Landers? continued...

To honor his life and contributions to gopher tortoise conservation, the Gopher Tortoise Council renamed the student research award after him following his passing, now the J. Larry Landers Student Research Award. This competitive grant program is awarded each year to selected undergraduate and graduate students studying gopher tortoise biology or other relevant aspect of southeastern upland habitat conservation and management. Seventy-five Larry Landers Student Research Awards have been awarded between 1980 and 2018, totaling more than $40,000. [Excerpts from “Tall Timbers History, The Legacy of a Red Hills Hunting Plantation”, communicated by Rose Rodriguez, Communications Director at Tall Timber Research Station.]

Reflections
Larry's deep affinity for the natural world and his endless fascination with how things work in nature were incredible. Such intense curiosity and tenacity are what make a stellar researcher. Larry was a wonderful mentor. “He was a superb woodsman and researcher with an innate curiosity about the natural world.” (comment extracted from Larry Landers' obituary, published 1993, in the Gopher Tortoise Council’s Newsletter)

— Joan Berish, FWC (retired)

When I think of Larry Landers, I always think of this comparison of his (my version may be paraphrased): "Taking fire out of a longleaf pine ecosystem is like taking the rain out of a rainforest."

— Jim Buckner, former student

Larry was my mentor as a student working part-time in wildlife; very patient and helpful. Years later while working for him, I became amazed by his craving for knowledge and always having an ear open for good ideas, no matter who thought of it. He was an incredibly productive professional, dedicated husband and father, a banjo picker who played with world class Bluegrass artists, a frog gigging guide extraordinaire, and grower of the consistently biggest, finest tomatoes I’ve ever tasted.

— Jim Garner, NRCS, USDA, Jackson, MS

Recent Research Citations

Below are a few recently published articles pertaining to gopher tortoises and upland communities in the southeast, and some relevant desert tortoise research! An updated gopher tortoise bibliography is available in the Education & Outreach section of our website.


Student Spotlight

Chris Murphy

I am currently a second-year master’s student at the University of Georgia co-advised by Drs. Lora L. Smith and Steven B. Castleberry. I have a broad interest in herpetology, but I am especially interested in how natural history research can inform management strategies for at-risk herpetofauna. I am currently conducting my master’s research at The Jones Center at Ichauway. I have two main objectives for my master’s research: quantify vertebrate use of pine stump holes relative to gopher tortoise burrows (Gopherus polyphemus) and further investigate refugia selection of the eastern diamondback rattlesnake (Crotalus adamanteus).

Gopher tortoise burrows are widely recognized for their value as refugia for a variety of vertebrate species in the longleaf pine ecosystem. However, other habitat features may also be important as vertebrate refugia in this ecosystem, especially in areas where gopher tortoises are less abundant or absent. Current evidence suggests that stump holes, subterranean openings in the decaying bases of trees, are used by a variety of species and may be especially important for some snakes including the black pine snake (Pituophis melanoleucus lodingi) and eastern diamondback rattlesnake.

From September 2016 to August 2017, I conducted a pilot study monitoring 10 stump holes with motion sensor trail cameras. During that year-long study, I documented at least 29 vertebrate species including eastern kingsnakes (Lampropeltis getula getula), Bachman’s Sparrows (Peucaea aestivalis), and gray rat snakes (Pantherophis spiloides). A similar study conducted on Ichauway by Dziadzio and Smith (2016, Southeastern Naturalist 15(4): 586-594) documented 36 vertebrate species using gopher tortoise burrows. However, only 16 of those species overlapped with those that I documented at stump holes. I am currently conducting a larger-scale camera study where I have identified 36 plots across my study site that each contain a tortoise burrow and a pine stump hole that will be monitored with time-lapse enabled trail cameras over the course of a year. With this study, I hope to directly compare vertebrate use and species composition between pine stump holes and gopher tortoise burrows.

To more closely investigate refugia selection of a species known to use both gopher tortoise burrows and stump holes, I am currently conducting an overwinter telemetry study on eastern diamondback rattlesnakes. Using VHF transmitters attached externally using the subdermal stitch method (Riley et al. 2016, Wildlife Society Bulletin 41(1): 132-139), I tracked 14 eastern diamondback rattlesnakes to their winter refugia. I now plan to conduct line transect distance surveys for the various refugia types used by the snakes in this study. With these data I hope to compare use of the various refugia types with their availability in a snake’s winter home range.

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

Trail camera photos of an eastern kingsnake (*Lampropeltis getula getula*) exiting a stump hole (left) and a Florida pine snake (*Pituophis melanoleucus mugitus*) entering a tortoise burrow (right). Photos provided by Chris Murphy.

“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 include photographs. Please send to: [Michelina.Dziadzio@MyFWC.com](mailto:Michelina.Dziadzio@MyFWC.com)

Breathing new life into gopher tortoise education at Tree Hill Nature Center

By Mark Mummaw

Since 1971, Tree Hill Nature Center in Jacksonville, Florida, has been creating environmental stewards through hands-on educational programming and low-cost access to natural areas. The center comprises 50 acres of broadleaf evergreen forest, southern mixed-hardwood forest, mixed-hardwood swamp, freshwater stream, and previously disturbed upland habitats. With such diverse natural communities in a semi-urban setting, the preserve is an ideal resource for environmental education programming. The center includes a live animal collection, natural history museum, nature trails, and many educational outdoor animal exhibits. One such exhibit consists of five captive gopher tortoises with interpretive signage. Tree Hill uses this exhibit to educate visitors about keystone species and the importance of commensalism in tortoise burrows. Tortoises are used during our programs by our Environmental Educators.

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Breathing new life into gopher tortoise education at Tree Hill Nature Center continued...

Tree Hill hosts thousands of elementary-age students each year through partnerships with Duval County Public Schools, surrounding school districts, home school groups, and private schools. The preserve provides a resource for teachers by assisting with science objectives that may be challenging to cover in a traditional classroom environment. All classes take place in an informal outdoor setting. Outdoor exhibits are a critical teaching tool. Due to harsh weather conditions at the preserve, our gopher tortoise exhibit needed extensive repair. Tree Hill used funds provided by the Gopher Tortoise Council’s Donna J. Heinrich Grant to begin repairs in early 2018.

Tortoises were moved to a secure temporary enclosure during these repairs. The project was labor intensive and took several weeks to complete. Repairs began by removing old wooden fencing and digging up wire fencing that extended three feet underground. Fencing had corroded over time and could have led to tortoise escape in the future. The above-ground wooden barrier was mostly rotten and was demolished by Tree Hill’s Director. Treated timber was installed with new wire fencing attached. It took considerable labor to hand-dig a 100-foot, three-foot-deep trench around the enclosure. Heavy equipment would create a safety hazard and could not be used. After fencing was installed, new signage was created and placed near the enclosure. We also created a new brochure for visitors. All work except printing of the large sign was done in-house.

Our charge has always been to allow visitors to discover the natural world around them by using hands-on educational programming. As habitat loss and fragmentation continue across Florida, it is more important now than ever to teach our children to respect the world around them. With support from the Gopher Tortoise Council, Tree Hill was able to repair a critical educational exhibit at the center and continue much-needed gopher tortoise and environmental conservation.
Name Game

The genus, *Drymarchon*, roughly translates to “lord of the forest” or “forest ruler”. The species epithet, *couperi*, was named for James Hamilton Couper who collected the type specimen.

**Natural History:** Indigo snakes are generalist apex predators that have voracious appetites and can consume nearly any appropriately-sized animal they come across including: small mammals, rabbits, toads, turtles, and even small alligators. They are also ophiophagus, which means that they will eat other snakes, including venomous species, such as eastern diamondback rattlesnakes and copperheads. Eastern indigo snakes may live more than 20 years in the wild. This snake has few natural predators once it reaches an adult size with the exception of alligators, large raptors, bobcats, and coyotes. This species is active during the daytime and some studies have documented large home ranges (>4,000 acres). Seasonal movements vary latitudinally. In summer, northern populations use floodplains as they search for prey. In winter, they travel to dry, upland pine/oak sandhills to shelter in refugia, including stump holes and gopher tortoise burrows. Northern populations may make long-distance movements of over 4 miles between seasons. Indigo snakes in Peninsular Florida do not share this pattern and typically remain in uplands year-round.

**Range and Appearance:** The eastern indigo snake is a Federally Threatened species that is endemic to the southeastern Coastal Plain. It is the longest snake species in North America and can reach a length of over 8 feet; hatchling snakes are roughly 2 feet long. Although the base color of the animal is black, their scales are iridescent, giving the snake a deep blue hue. Indigo snakes often have orange-to-reddish nasal, labial, chin, and throat scales, but this characteristic is variable and may be brownish, cream, or black. These snakes were historically found in Alabama, Mississippi, Georgia, and Florida; however, natural populations are currently only known in the latter two states. Repatriation projects have reintroduced this snake into extirpated sites in Alabama and Florida.

Breeding also takes place in winter and large eggs are laid in the late spring and hatch about 3 months later in late summer.

**Snake Vocabulary**

Repatriation: Returning captive-raised animals to a portion of their historic range where they no longer occur.
Eastern Indigo Snake  
*Drymarchon couperi*

**Conservation Challenges:** Despite being listed under the Endangered Species Act, the eastern indigo snake still appears to be in decline throughout its range. Many factors contribute to their decline, including the loss of large, intact habitat that snakes need to successfully forage, reproduce, and overwinter. Habitat fragmentation from development may negatively impact eastern indigo snakes due to increased road mortality because snakes often cross roads when travelling long distances. Fire suppression may lead to habitat degradation and the loss of open-canopied pine habitats used by these snakes.

**What You Can Do To Help:** You can help protect the eastern indigo snake by being a proponent of prescribed fire. Healthy landscapes are important to many reptile and amphibian species, and many are declining due to a lack of suitable habitat. Because of its federally protected status, wild eastern indigo snakes should never be handled. If you see an eastern indigo snake, you can contact your state wildlife agency with its location (many state agencies have smartphone apps that aid in citizen science). GPS coordinates and photographs are very helpful to biologists who monitor species occurrence data.

Eastern indigo snakes require large tracts of native habitat, including pine oak sandhills (pictured above).

*Eastern indigo snakes (top photo) are often confused with black racers (bottom photo). Although similar in appearance, black racers only reach ~4 feet in length. Black racers typically have a brown nose and white chin, while eastern indigo snakes typically have a reddish-orange chin and nose.*

**For More Information:**


Orianne Center for Indigo Conservation.  
[www.centralfloridazoo.org/about-the-zoo/ocic](http://www.centralfloridazoo.org/about-the-zoo/ocic)

The Orianne Society. [www.oriannesociety.org](http://www.oriannesociety.org)

Created by Bradley O’Hanlon and Jennifer Howze  
Eastern indigo snake photos provided by Dirk Stevenson  
Other photographs provided by Bradley O’Hanlon  
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Name Game

Natural History: Eastern diamondback rattlesnakes are habitat specialists that are dependent on longleaf pine forests in Coastal Plain landscapes. These snakes use habitat with an open-canopy, limited midstory, and grassy groundcover. Eastern diamondback rattlesnakes are in the pit viper family. The loreal pit is a specialized organ that allows vipers to detect infrared radiation and ambush warm-blooded prey in low-light conditions. As with all pit vipers, this species uses a potent venom to disable its prey. Adults typically feed on squirrels, rabbits, and cotton rats; young snakes eat smaller rodents. These rattlesnakes are most active during their fall mating season when males move long distances to seek mating opportunities. Female rattlesnakes can store sperm for several years, and most do not eat when gravid (pregnant). Because the birthing process is energetically costly, females only reproduce every 2-3 years. As ectotherms, or cold-blooded animals, eastern diamondback rattlesnakes must rely on their environment to regulate their body temperature. During times of inclement weather, these snakes seek shelter underground in rotted stump holes and tortoise burrows, which maintain a constant moderate temperature year-round.

Range and Appearance: Eastern diamondback rattlesnakes have historically occurred in the Coastal Plain from North Carolina through Louisiana. They have a pattern of dark brown diamonds outlined by yellowish scales on their backs. This pattern is amazingly cryptic; eastern diamondback rattlesnakes easily blend in with fallen pine needles, wiregrass, and charred remnants from fires in their natural habitat. The hard and brittle rattle is made of keratin and can easily break if snagged on an object. The size of a newborn snake is around 6 inches, a typical adult is 4-6 feet, and remarkably large individuals may approach 8 feet. These are the heaviest native snakes in North America; adults weigh between 6 and 15 pounds.

Rattlesnake Myth
Rattlesnakes do not always rattle when a human is near. In many cases, rattlesnakes will rely on their camouflage to silently blend into the environment, remaining undetected.

Upland Snake Conservation Initiative
www.gophertortoiseCouncil.org

Continued on next page...
**Eastern Diamondback Rattlesnake**  
* *Crotalus adamanteus*

**Conservation Challenges:** Eastern diamondback rattlesnakes rely on high-quality Coastal Plain habitat. The role of fire, a historically naturally occurring phenomena, is essential to the persistence of this species in the wild. Without fire as a disturbance mechanism, open pine habitat will convert to closed-canopy hardwood forest, rendering the habitat unsuitable for eastern diamondback rattlesnakes, gopher tortoises, and several other longleaf pine endemic species. Large eastern diamondback rattlesnakes are highly prized at rattlesnake roundup events. Thankfully, these roundups are diminishing in popularity, yet rattlesnakes are still often killed on sight due to misunderstandings and fear of the species. The practice of “gassing” gopher tortoise burrows to drive out snakes has been outlawed throughout the southeast to the benefit of tortoises, rattlesnakes, and other tortoise burrow commensal species. Eastern diamondback rattlesnakes are a Candidate for federal protection and are state protected in North Carolina, a state where they unfortunately may no longer occur.

**Snake Vocabulary**  
Cryptic: Coloration, markings, or patterning that camouflages an animal within its natural environment.

The rattle of an adult snake (top photo) will have many segments of the same length. The rattle of a young snake (bottom photo) quickly narrows to a point.

**What You Can Do To Help:** Sharing the value of prescribed fire and proper habitat management will not only benefit the eastern diamondback rattlesnake but many other species in the southeastern Coastal Plain.

**For More Information:**  


What You Can Do To Help: Sharing the value of prescribed fire and proper habitat management will not only benefit the eastern diamondback rattlesnake but many other species in the southeastern Coastal Plain.

Rattlesnakes spend most of their lives coiled up waiting to ambush potential prey. Rattlesnakes rarely strike at humans unless harassed and should never be handled. These animals pose no threat when viewed from a distance.

For More Information:


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