

Herpetology in Bogey Creek

Florida is home to a wide variety of unique reptiles and amphibians, some of which call Bogey Creek Preserve their home. These trails pass through several habitats which are prime for different species of animals. These animals, colloquially referred to as “herps” (as in herpetology), take full advantage of each of them. They often go unnoticed and unappreciated, but they serve important roles in their environment and are very diverse indeed. To learn more about notable “herps” that inhabit the area and how to identify them, take a search through NFLT’s Bogey Creek Herpetology Field Guide!



WELCOME

Be sure to take photos of any species you find at Bogey Creek Preserve and tag #bogeycreekpreserve.

BARKING TREE FROG

Hyla gratiosa



FWC photo by Kevin Enge



METAMORPH
Photo by John P. Friel



DESCRIPTION

Barking treefrogs are quite large and range from 2-3 in (5-7 cm). In fact, they are the largest species of treefrog in the southeastern corner of the country and among the largest species in the United States. They are known for their large toepads. Coloration varies radically, although they generally have earth-tone pigments. They can change the color of their skin in a similar manner to chameleons. They may be a lime green color, dark brown, gray, or even have a slight purplish hue. Large and bold spots adorn their backs and legs with dark borders, and gold dots may be scattered across the body, but these patterns usually are faded when they are bright green. A white stripe covers the frog's lips and extends at least halfway down the sides of its body. Their underbellies are also a stark white, and the throats of males are usually the same color or light green. Their tympanum (eardrum) is usually very apparent, resembling a shallow bowl-shape and often (though not always) brownish. A barking treefrog song consists of 9 or 10 bark-like calls.

Tadpoles are easy to identify based on their proportionally large body and tall tail fin. This fin is notable for how far it extends anteriorly, occurring as far forward as where the eyes are located. This fin is also translucent in the sunlight, but in hours without exposure to the Sun, they become opaque and black. Colors are just as variable among different individuals, often resulting from factors such as age. Smaller individuals are overall very translucent and bear a black spot on their tail.

HABITAT & RANGE

This species extends West into Louisiana and as far North as Maryland. Barking treefrogs may be found across most of Florida, although they are not located in the Everglades or the Keys, and encompass counties surrounding these areas. They are specialized to take advantage of slightly drier habitats than some other frogs, commonly inhabiting scrublands, sandhills, and pine flatwoods and hardwood forests. They may also be found in mesic and xeric hammocks but relocate to wetter environments once it is time to reproduce.

LIFESTYLE, BEHAVIOR, & ECOLOGY

When weather conditions are warm and humid, adults will spend their time in the canopy. To aid in reducing the loss of water, they will maintain a dormant posture and tuck their limbs close against their body and close their eyes; they stroke their heads and bodies with their arms for the same purpose as well, as this helps to coat their skin with an added layer of both lipids and mucus. This gives them an edge for the dry environments that they are often found in, making them far more durable than most other treefrogs. However, when exposed to colder climates, they seek shelter in other animal burrows, such as those of the gopher tortoise, or various cavities in wood or substrate. They may be found as deep as 4 ft (2.4 m) below the surface of the forest floor. This species is exclusively insectivorous, feeding on a variety of small insects, especially beetles.

Younger tadpoles have a black smudge on their tail fin that aids in camouflage, and predators find it more difficult to spot them because the larvae's outline is broken. To further aid in avoiding detection, they remain immobile in a vertical position, head facing towards the surface. When adults are engaged with a threat, they will make themselves appear large by inflating themselves with air. This has the combined effect of making them more intimidating to predators and preventing snakes from ingesting them.

REPRODUCTION

When it is time to breed between February and September, barking treefrogs will seek out semipermanent or ephemeral bodies of water, such as swamps, marshes, or sinkhole ponds, which have ample grassy vegetation and a lack of predators under the surface. This is where their eggs will incubate.

Mating calls resemble a boonk-boonk-boonk that occurs once every second or two, a chorus of eager males can be heard over a mile and a half away (2.5 km). These choruses can consist of over 100 males a night. These bouts of vocalizations are very demanding on the energy of a male, and thus serve as a demonstration of fitness and vigor for potential mates. Males will seek out multiple females in a given breeding season. When a female is receptive, she will nudge her choice of mate to begin the process of amplexus. Clutches are created consisting of 557 – 4,034 individual eggs and are excreted as a simple film. They hatch in a week and maintain their state as larvae between 40 and 60 days.



SIMILAR ANIMALS

From a distance, it can be difficult to properly distinguish barking treefrogs from other green subspecies, such as green treefrogs (*Hyla cineria*) and squirrel treefrogs (*Hyla squirella*). In fact, green treefrogs have been known to physically engage with female barking treefrogs when they are on the move to a breeding site. These other animals are typically much less elaborate than barking treefrogs, although dorsal stripes have been observed in green treefrogs. Through close examination, green treefrogs lack any spots on the rear ends of their thighs, and both squirrel and green treefrogs have a different texture. These species are smooth and have very fine skin, but the barking treefrog has comparably granular skin. They can also be distinguished by their general body shape, which is much more plump than other treefrogs. Squirrel treefrogs usually grow to smaller maximum lengths than both species, and they lack the bold white stripe extending along the sides of the body as seen in green treefrogs. Squirrel treefrogs also typically have a dark, brownish tympanum, while those of green treefrogs are usually the same color as the majority of their bodies.



GREEN TREEFROG
Photo by Judy Gallagher



SQUIRREL TREEFROG
Photo by Judy Gallagher

TIES TO HUMANS

Barking treefrogs are attractive for customers of the pet trade due to their large size. Their insectivorous diet also makes them useful as natural pest control for arboreal and flying insects.

CONSERVATION STATUS: **LEAST CONCERN**

This species is very widely distributed and successful. Adults are rarely seen, but they are heard across most of the state. The only locations where populations have dwindled are those that are overtaken by urbanization and agricultural activity. Their heavy reliance on gopher tortoise burrows during winter makes the preservation of this keystone species vital for the survival of these treefrogs. The availability of preserves such as Bogey Creek are beneficial in this regard, as it guarantees a safe locale for species that are not currently at risk of becoming extinct but may become vulnerable many years later due to environmental damage and the loss of other important animals.



Resources

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BROAD-HEADED SKINK

Plestiodon laticeps



MALE
Photo by Dani Thinker



FEMALE
Photo by Robert Nunnally



DESCRIPTION

A bulky lizard that ranges from 6-13 in (15-33 cm) in length. They have short limbs and large heads when mature. Their bodies are mostly uniform in color, either brown or tan overall. Sexual dimorphism is very prominent, and males develop a red or orange-colored head that only becomes bigger and more vivid as breeding season occurs. Females bear faded stripes along their sides; a wide black stripe extends from behind the eye to the front-half of their tail and is bordered by two, thinner white stripes.

Immature broad-headed skinks range in color from brown to black. They have a vibrant blue tail and 5-7 yellow stripes along the length of their sides. These vibrant colors often lead them to be confused with other species of skink, but they eventually fade away as they become sexually mature. However, the blue tail takes the longest to fade as an individual grows.

HABITAT & RANGE

Broadhead skinks are incredibly widespread, occurring as far North as Pennsylvania and Iowa and West into Texas. In Florida, they are common in the Panhandle and have reached as far South as Brevard county. They typically prefer swampy areas but may also occur in sandhills, pine flatwoods, and other mixed pine hardwood forests with hollow logs and trees. They are as flexible as they are abundant.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Broad-headed skinks are a semiarborescent species, meaning they frequent both the trees and ground-level habitats. They typically bask on pieces of wood such as stumps. Males are more arboreal and will use trees constantly as a shelter. Otherwise, rotten stumps, holes at the base of hardwood trees, and even saw palmettos may act as brumation and refuge sites.

This is an omnivorous species, and they primarily forage in the leaf litter or on large tree limbs for invertebrates such as spiders and isopods. They may also feed on other lizards and small fruit. They hunt by picking up chemical pheromones, which allow them to avoid distasteful prey items such as millipedes and red velvet ants. Their large heads offer an advantage of power that allows them to subdue smaller and weaker prey items. It also gives them a slightly painful, if harmless, defense when handled by humans.

REPRODUCTION

Males rely on the release of pheromones by a female to track down a mate. Females possess a urodaeal gland that allows them to secrete their pheromone trail, meant to attract as large and vivid a male as possible. A vibrant head on an adult male is a sign of strength and a showcase of success, a trait that implies that it can acquire enough resources to grow this large, maintain a colorful display, and succeed in a competitive habitat all at the same time. This is very similar to the basic purpose of mammalian structures such as antlers. Males will fiercely guard the right to mate from rivals, and while smaller

males usually avoid confrontations, individuals of equal size may engage in a chase and head-biting fights. The purpose of these conflicts may be to defend their breeding site, a female, or their own turf.

When mating, males will grasp the neck of the female with their jaws to hold on. After a week of defending her, he will move on to attempt to mate with other females. Clutches are laid between May and July, and between 6-22 eggs may be laid by a single female. Nests are made in decomposing tree or log material as well as moist soil. The mother will oversee her brood until they hatch, which usually takes up to 48 days.

SIMILAR ANIMALS

Identifying skinks in Florida is quite difficult to accomplish. Juveniles of three species, the broad-headed skink, the common five-lined skink (*Plestiodon fasciatus*), and the southeastern five-lined skink (*Plestiodon inexpectatus*) appear nearly identical from a distance. Males are the most distinct among the different broad-headed morphs, but even mature females are very similar to their peers. One way to distinguish them is that broad-headed skinks have thinner stripes than the common and wider stripes than the southeastern five-lined species. However, a closer look at the head and tail gives a clearer answer. If the row of scales in the center of the underside along the tail are wider than the surrounding row, it is either a common five-lined or broad-headed skink. Broad-headed skinks have five labial scales, or the large scales that occur on the lips, whilst five-lined skinks only have four.



COMMON FIVE-LINED SKINK
Photo by Vicki DeLoach

TIES TO HUMANS

Due to their exotic and wildly varying colors throughout their lives, broad-headed skinks have become popular in the reptile pet trade. People may find them exotic due to their spontaneous appearance, filling a desire for change without the struggle of keeping multiple pets.

CONSERVATION STATUS: LEAST CONCERN

Populations of this species of skink are in healthy conditions. Their hardwood habitats are susceptible to human activity such as logging, but the broadhead skink is a highly adaptable animal that can thrive in most circumstances. Even in locations where forests have been struck down, they can efficiently seek shelter in debris or fallen wood, as well as suburban locales. Their ability to inhabit areas that dry or wet is a contributing factor to their success.

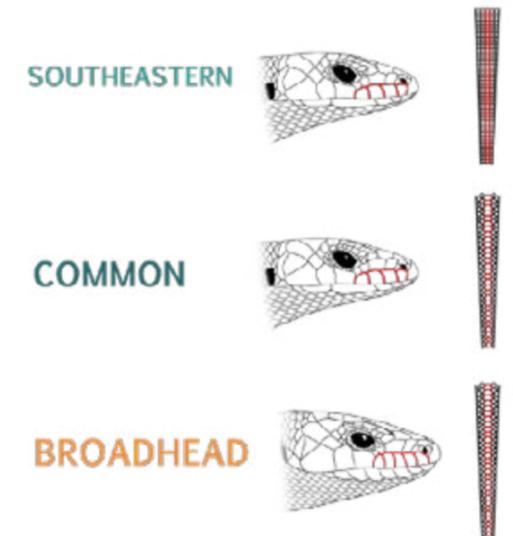


Illustration by Noah Riccio

Resources

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BROWN ANOLE AND GREEN ANOLE

Anolis sagrei & *Anolis carolinensis*



BROWN ANOLE

Photo by Karyn Honor

GREEN ANOLE



DESCRIPTION

These smaller lizards are famous for their vibrant dewlaps. Both species average around the same length of 5-8.5 in (12.5 – 21.6 cm). Green anoles are mostly uniform in color, although females and immature anoles have a white middorsal stripe. Very rare individuals may be baby-blue in color due to a mutation that causes them to lack pigment genes that produce xanthophores. They have a pointed snout, and their dewlap is usually pinkish in color. They have a white underbelly and lips as well. Brown anoles may come in a variety of colors such as black or orange but generally are a grayish brown. Males are adorned with light lateral stripes, spots, and may form crests on their dorsal, caudal, and nuchal regions. Females and juveniles have a distinct middorsal stripe or diamond-shaped spots on their back. They also have a comparatively more rounded and blunt head shape than green anoles and have a more reddish-yellow dewlap. Green anoles are also able to slowly turn brown, an adaptation which brown anoles lack that may make them difficult to identify from a distance.

HABITAT & RANGE

Green anoles are native to the southeastern United States and are especially frequent in areas bordering the Gulf of Mexico and the Atlantic Ocean. In Florida, they are located in every county from the panhandle all the way down to Key West. The brown anole is a recent inhabitant of the United States, initially endemic to Cuba, the Bahamas, and the Caiman Islands. However, they have been introduced several different times and since have spread substantially throughout Florida and the Keys. Their distribution is sparser throughout the rest of the United States and the Florida panhandle.

Green anoles have very flexible habitat preferences and can be found most anywhere with dense vegetation or infrastructure. They often clamber on trees, along tall plants, and on the sides of buildings. Invasive brown anoles are similarly mal-leable but prefer the outskirts of dense forests, scrublands, pinelands, and hammock environments with little canopy-cover.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Both species are naturally diurnal, meaning that much of their activity takes place in daylight. They are known as trunk-ground ectomorphs, which refers to where they are commonly located in a given environment. Brown anoles are generalists, having a diet consisting of vegetation, invertebrates, and other lizards (sometimes even practicing cannibalism). Green anoles will eat most things smaller than their heads but are primarily insectivorous and even feed on nectar. To catch their prey, they may either ambush larger food items or simply wait by a perch until food is within their grasp. Activity is most common during the Spring and Autumn, and Winter activity varies based on the climate.

Male anoles are quick to defend their territory against individuals of the same sex. Confrontations begin with an intricate display, where they will flatten their bodies, inflate the ridge on their backs (only seen in brown anoles), bob their heads, and extend their dewlap. This showcases the individual's strength and health and serves as a warning to the other individual. The owner will then chase the intruder away. If that does not work and the rival continues to stand their ground, they will brawl using their jaws and clawed digits.

The pigmentation of green anoles consists of cells called chromatophores. These cells allow this species to change color as a reaction to their surroundings, much like how chameleons will do the same based on temperature and their contentment. Green anoles that have a cold internal temperature, or become stressed, will slowly lose their green hue and become overlaid with a brown color, similar to a dying leaf. Although these color morphs may be useful in making these animals more cryptic, it is likely not an adaptation specifically meant for camouflage. Brown anoles showcase a similar adaptation, but it is far more subtle in comparison.

REPRODUCTION

Breeding season is an important time for anoles to showcase their fitness to interested females. This is when confrontations between males is most common, as not only are viable habitats at stake, but also the opportunity to mate. A stronger and healthier male with access to a turf rich with resources can potentially produce more successful young than those that lack these qualities.

For green anoles, reproduction may occur between March and October, and brown anoles reproduce between February and August. They are polygynous, although they are restricted to mating within their own turfs. A male will patrol the edge of his mates' territories to prevent other males from intruding. However, females will usually only mate with one male, unless another manages to sneak into her turf.

Females will only lay one egg at a time. In a given year, they may lay up to 10 in separate clutches. Green anole hatchlings are anywhere from 2-2.6 in (5.2-6.7 cm), and brown anoles are considerably smaller once they hatch, being less than an inch in length. It only takes roughly half a year for them to reach maturity.

TIES TO HUMANS

Green anoles used to be a popular species in the pet-trade. Their vibrant colors and ability to shift their pigmentation has given them a reputation as an exotic species. Those which have a blue background are especially popular due to their rarity. Brown anoles are also relatively common for lizard enthusiasts who wish to own one of their own.

Anoles generally exhibit no negative impacts towards humans and can actually be very beneficial to have in the garden. As creatures that feed on insects, they can take care of animals that many people may find to be a nuisance or a pest, such as spiders and roaches. The worst-case scenario is that their numbers may explode, and they may be seen as a local nuisance as a result.

CONSERVATION STATUS: **LEAST CONCERN**

The population count for green anoles has decreased since the brown anole has become a part of Florida's ecosystems. This has forced the native species to adjust their niche to avoid competition when they occupy the same range. Green anoles will stick to higher perches, typically further from the sight of observers who may be used to finding them closer to the ground. Green anoles are the only anole species native to the United States, which makes them especially valuable when populations are at risk of substantial population decline. However, neither species is endangered, and they are of least concern as of now. Even the pet-trade has lost much interest in these species compared to years prior. Population count is especially enormous in preserves and protected lands. Anoles in Jacksonville benefit from organizations such as the North Florida Land Trust, which continue to conserve the habitats both species are known to frequent.

Resources

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COMMON RAINBOW SNAKE

Farancia erytrogramma



Photo by Charles Baker



DESCRIPTION

A large snake that ranges between 1-2 feet in length, specifically 27-48 in (70-122 cm). They are a very vibrant species, covered in iridescent scales, either black or violet in background color, bearing a red or reddish yellow underbelly with black spots occurring in three rows, and yielding three red stripes that run from the back of the head to the tip of their tail. Their undersides also have bold bars, pinkish and black in color that occur in an alternating pattern. Their dorsal head scales bear red borders, and their scales along the labial region and the throat are a bold lemon yellow. Much of their body scales are smooth and rounded, but their tail ends in a single horn-like scale. Females grow larger on average than males and have a stouter build. Both sexes have a thick body shape, and juveniles are not too dissimilar from their mature counterparts. Characteristic of other nonvenomous snakes, they bear round pupils.

HABITAT & RANGE

Florida populations of rainbow snakes are limited in range. They may be found in much of the northwest corner of the panhandle and in habitats bordering the Gulf of Mexico south to Suwannee. This species also inhabits the eastern half of North Florida and occur further South into Ocala and northern Lake County. They can be found in various freshwater and brackish environments such as marshes, rivers, tidal mudflats, and streams. Salt marshes along the Gulf of Mexico may also be occupied by this species.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Rainbow snakes are semi-aquatic species and rely on bodies of water for their primary food source. American eels are a preferred prey item, but younger snakes feed on earthworms and tadpoles. On occasion, they also will hunt down salamanders and amphiumas. To subdue a target, they swallow their prey while its still alive head-first without first constricting it. They often drag eels to shore so that they may have the advantage and exhaust the fish. Their role as eel hunters has given them the title of “eel moccasin.”

These snakes are extremely docile. In the presence of a threat, they will either slowly move away or lie completely motionless. Even when handled, they will not bite in defense. Instead, they attempt to press the sharp tip of their tail against their handler, although it does not cause any harm by doing so. They will also release a musk with a foul odor.

This species can be found year-round, although they are most active between March and June and during October. They are nocturnal, and thus only search for food at night. During the day, they can be found secluding themselves in logs, stones, amid structures such as docks, or under other cover objects along the edge of the water.

REPRODUCTION

There is not much information regarding how rainbow snakes mate, but they are a polygynandrous species, meaning that both males and females mate with several individuals during their breeding season. Mating can occur for 3 months in late

spring and summer. Males will combat each other to showcase their strength to receptive females. Females may lay clutches with anywhere between 10 and 52 eggs, and it takes 60 to 80 days from June to August to gestate their young. The mother may maintain guard over her clutch until they hatch in 75-80 days. Afterwards, the female departs, and the young will stay secluded beneath the soil to avoid the Winter cold. Once Spring arrives, they leave the proximity of their nest and begin occupying their semi-aquatic niche.

SIMILAR ANIMALS

Red-bellied mudsnakes (*Farancia abacura*) and black swampsnakes (*Liodytes pygaea*) both bear distinct red colorations across their bellies, and thus may be easily confused with rainbow snakes. The mudsnake has red or pinkish bars that extend from their undersides of the same color, and they cross up across the flanks of the snake. Swampsnakes lack the striking yellow colors found on the underside of the rainbow snake's head, as well as the reddish stripes that run longitudinally across the body.

There are two subspecies of rainbow snake found in this state. The southern Florida rainbow snake (*Farancia Seminole*) is only found in Glades County, but common rainbow snakes occur in counties farther North.



RED-BELLIED MUDSNAKE

Photo by John Sullivan



BLACK SWAMPSNAKE

Photo by Peter Paplanus

TIES TO HUMANS

Rainbow snakes are an illegal commodity in the pet trade, but within Florida have only been sold once between 1990 and 1994.

CONSERVATION STATUS: LEAST CONCERN

Although they are officially designated as a species of least concern via the IUCN Red List and lack a federal status, population conservation in Florida is still an unknown. However, rainbow snake numbers have been impacted by the loss in American eel populations in specific locales. This, in combination with their popularity in the pet trade, has led to a decline in populations. Urbanization and the draining of wetland environments can also leave these animals without a viable habitat, forcing them to relocate and become roadkill. They may also be impacted by the spread of *Ophiomyces ophioidicola*, a snake fungal disease. North Florida Land Trust harbors a wide variety of environments that the rainbow snake may rely on for survival, and we aid in the prevention of the draining of marshes and other wetland habitats.

Resources

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CUBAN TREEFROG & GREENHOUSE FROG

Osteopilus septentrionalis & *Eleutherodactylus planirostris*



CUBAN TREEFROG
Photo by Pierre Fidenci



GREENHOUSE FROG
Photo by Pierre Fidenci



DESCRIPTION

Cuban treefrogs are relatively large; females are bigger at roughly 2.6 in (6.5 cm) and males only average at 1.8 in (4.6 cm). They differ from other species in that their toepads are enormous, often the size of their own eye. They have warty skin and a head that feels like sandpaper due to how the skin fuses to the skull. That texture is absent on juveniles and their eyes are a vivid orange instead of yellowish. Their bodies can be light or reddish brown, light green, or gray, and a portion of the underbelly by the hind limbs is yellow. Tadpoles are dark in coloration and can be identified by their transparent belly (which makes its intestinal coil visible), light colors on the front of the body, and dark specks on the tail fin. Metamorphs have a distinct light stripe that is lost with age, as well as orange eyes that become more yellowish as they mature. The call of a Cuban treefrog is reminiscent to that of a leopard frog and may resemble a snarl, squawk, or rubbery snore; this may be followed by many clicks as well.

Greenhouse frogs are a type of rainfrog; females grow up to 0.8-1 in (2-2.5 cm) whilst males average at 0.6-0.7 in (1.5-1.75 cm). Their dorsal coloration is bronze, brown, or reddish brown, and they have a gray or white underbelly. Their underside is covered in dark spots. Individuals come in two different forms: a striped phase that only consists of two bright-colored stripes that run along the back, and a mottled phase that includes both dark and lighter patterning, including bands shaped like a chevron that occur on the head between the eyes and the on back. They have a bumpy texture, red eyes, and their toes lack webbing. Because they hatch underground and immediately become froglets, they do not have an aquatic tadpole stage. Greenhouse frog calls resemble the chirps of an insect and occur in 4-5 chirps at a time.

HABITAT & RANGE

Greenhouse frogs and Cuban treefrogs are endemic to several islands in the Caribbean Sea. Cuban treefrogs were brought here accidentally as stowaways prior to the 1930s, and by the 1970s, they became widespread throughout southern Florida. They have been spotted as far as eastern Texas and North Carolina in much smaller quantities. Habitat preferences differ based on where in Florida they are. Everglades populations are frequent to locations with mangrove trees, sloughs, pine rockland, prairies, tropical hammocks, and canals, but prefer pine forests, swamps, and hardwood hammocks in North Florida.

Greenhouse frogs arrived at the Florida Keys through natural means. However, they have since widely dispersed up through most of the state via human intervention and occur in sparse populations as far West as southwestern Louisiana and along the Atlantic coast of Georgia. Although they are capable of being found in every terrestrial environment, even during times of drought, they are much more frequent in scrubland, sandhill, and mesic or tropical hammock habitats.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Cuban treefrogs are generalists, a trait that makes them successful colonizers. They occupy a flexible niche where they may thrive in foliage closer to the ground or in the canopies and will keep themselves moist during the day by staying in wet, secluded alcoves. Both adults and juveniles have a diet that consists of other amphibians. Greenhouse frogs are insectivorous and feed entirely on invertebrates along the forest floor. They also prefer to seek shelter near the ground in low-lying vegetation or gopher tortoise burrows. Both species are primarily nocturnal.

Toxins in the Cuban treefrog's epidermis are a successful deterrent for mammals that may seek them out for food. However, when seized by a predator, they will inflate, scream, kick, and release a slimy residue which can harm their attacker if it gets in their eyes.

REPRODUCTION

Cuban treefrog calls are emitted from shallow waters and 10 ft high vegetation. They are a year-round occurrence but are most frequent between March and October. When rainfall has occurred, temperatures are warm, and humidity is high, calls are bound to be heard. Females will migrate to ephemeral marshes that are shallow and dense in grassy vegetation to avoid predation of their eggs. However, bird baths, swimming pools, and other manmade bodies of water may be used instead. These locations are often sought out on warm nights with rainfall, and any one female will lay 4,000 eggs in total, with 100-1,000 in any given clutch connected via surface film. Males take less time to mature than females, only 3 months in comparison to the average 7 for a female.

Greenhouse frog calls are most frequent between April and September in the northern reaches of the state, but they also occur for a much wider span of time in Miami-Dade County. In the North, reproduction takes place entirely during summer and frogs will engage in axillary amplexus to produce an average of 16 eggs in damp soil. They lay so few eggs as part of an adaptation to effectively skip the tadpole stage in their development, with some females producing as little as only 3 in a given clutch. Potted plants may be used as cover along with leaf litter or the soil underneath detritus. Northern populations take less than a year to mature, but those which occur deeper south only take 6-8 months to do so.

TIES TO HUMANS

Cuban treefrogs are potentially dangerous for humans and pets who handle them, only because the poisonous mucus they secrete can burn the handler's mucous membranes and eyes. They also frequently find themselves causing clogs in plumbing systems, and thus are considered pests.

Greenhouse frogs have a very pleasing call to many listeners and are moved into gardens so that they may be heard more clearly. Their ability to make themselves at home in manmade structures makes them a pest they often gather in pools. They are detrimental to trading practices as they often lay their eggs within landscape materials. The process of removing them and sanitizing the materials afterwards only increases the cost and difficulties of initiating trade.

CONSERVATION STATUS: LEAST CONCERN

Both species are invasive species in Florida. They are highly competitive and dangerous for other frogs. Squirrel and green treefrog populations diminish considerably once Cuban treefrogs become a part of the same ecosystem because they seek them out for food. Cuban treefrogs are the largest species of treefrog in Florida, so they are especially ravenous.

The pet-trade is a common way for non-native animals to make their way to new locations. People with an interest in herpetology may keep these animals and later release them into the wild. To control their populations, efforts have been made to destroy their nesting sites and to remove them and their egg clusters whenever spotted. With a continued negligence for climate change, Cuban treefrogs are likely to become acclimated to new environments along a broader range.

Greenhouse frogs are much more beneficial to the ecosystems in Florida, due in part to their natural introduction to the Southern tip of the state. They inhabit areas where other frogs and toads do not occur and are a very important source of food for birds, snakes, and other carnivores. However, they may still compete with insectivorous reptiles or amphibians like the reef gecko, and their quick dispersal still should be kept in check in case they do negatively impact insect populations.

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EASTERN GLASS LIZARD

Ophisaurus ventralis



Photos by Philippe Blais



DESCRIPTION

The body plan of glass lizards is artificially similar to snakes, but in reality, they are close relatives to alligator lizards. Anguillidae (the family of animals in which glass lizards are categorized) bear osteoderms underneath their external scales, and the eastern glass lizard has one concealed underneath each individual scale. Glass lizards have extremely long tails, comprising roughly two-thirds of their body. They bear a lateral fold that stretches from the neck region to the vent. Unlike snakes, these reptiles have eyelids that can move and close around the eye like a regular lizard. They also lack the flexible jaw characteristic of serpents and have external ear openings. A glossy sheen reflects off their smooth, overlapping scales, which have a rhomboid or squarish geometry.

The eastern glass lizard is capable of growing rather long and may reach between 18-42.6 in (45.7-42.6 cm) when skeletally mature. They are far larger than any other glass lizard that overlaps with their geological range. Primary coloration varies among adults, and individuals may be greenish, yellowish, or brownish on their dorsum. The underside, throat, and chin of eastern glass lizards are a bold yellow color. Along the dorsum of younger individuals, they have a wide brown stripe which may bear no additional patterning or small, thin lines along the length of the body. A subadult will also have a black stripe stretched above the lateral fold and along the tail, but between the fold and the yellow belly, there are few if any markings. When adults age, they develop greenish spots along the top half of their entire bodies. This gives them a far more speckled appearance than younger glass lizards, which have more distinct patterns.

HABITAT & RANGE

This species of glass lizard occurs between Georgia and South Carolina, and typically is not found too far inland from many of these states. In Florida, however, they may be found anywhere besides the Keys. They inhabit a plethora of environments but typically can be found in mesic flatwoods or locations that are damp and covered in grass. The soft substrate of dunes and areas surrounding wetland habitats are prime for digging, and glass lizards may be found occupying debris and foliage that occurs near the tide line. Open canopies provide more sunspots which are an important source of warmth for a reptile that spends much of its life near the ground.

LIFESTYLE, BEHAVIOR, & ECOLOGY

The legless anatomy of glass lizards is the result of years of evolution to specialize as burrowers. Many lizards retain rather long limbs that aid in locomotion in the trees, and ancestors of the glass lizard may have resembled creatures similar to skinks, a family of digging reptiles with reduced functional limbs that spend most of their time near the forest floor. The eastern glass lizard uses the soft sands of the dunes as burrow material, and they rely on vegetation and debris extensively as cover. They occupy a carnivorous niche and have been known to eat other reptiles (including snakes) and smaller mammals (such as immature rodents) on occasion. They primarily feed on arthropods and earthworms however, and they seem to particularly prefer

caterpillars. Foraging is usually a diurnal activity, although glass lizards may also be active in the early evening or at night. They may forage underground as well.

Like many of their legged relatives, the eastern glass lizard can employ autotomy, the deliberate breaking-off action of their tail, to escape a threat. The fact that their tail may consist of over half of their overall length makes this an especially tantalizing distraction. It may be more energy efficient for a predator to focus on the wriggling tail than the one-third of a lizard that is running away. However, autotomy usually occurs in pieces, and thus the tail almost “shatters” when broken off. This fragile and chaotic disconnection is what garnered the name of the glass lizard.

REPRODUCTION

This is an oviparous animal, meaning that they lay eggs to incubate the embryos of their young. Clutches of 5-15 may be laid in the Summer in soft soil. Depressions are formed out of sand or loam to serve as nests, and while the young continue to develop until August or September, their mother will stay with her brood to tend to them. Although they are not known to actively defend their eggs from predators, they will ensure that they are placed back within the nest if they are displaced for any reason.



ISLAND GLASS LIZARD

Photo by Bruce Ripley



MIMIC GLASS LIZARD

Photo by mkosiewski



EASTERN SLENDER GLASS LIZARD

Photo by Eric Soehren

SIMILAR ANIMALS

Aside from the eastern glass lizard, there are three species of glass lizard in the state of Florida. There is the island glass lizard (*Ophisaurus compressus*), the mimic glass lizard (*Ophisaurus mimicus*), and the eastern slender glass lizard (*Ophisaurus attenuates longicaudus*). Although they are now considered to be their own species, all these animals used to be considered as members of *O. ventralis*.

The eastern glass lizard is heavier and longer than all these related subspecies. Their snout is comparatively more blunt, closer to resembling an equilateral triangle. The lateral fold of an eastern glass lizard consists of 99-109 individual scales, which in comparison to other species, is rather substantial. In younger individuals, the lack of patterning between the lateral fold and the stomach are also an easy distinguishing characteristic from other glass lizards. They are most easily confused with the eastern slender, which has bold stripes that occur between the belly and the lateral groove, and smaller adults may have dashes or a stripe in the middorsal region. The eastern slender also retains many of their stripes when they become elders, a characteristic that is absent in most fully mature eastern glass lizards.

CONSERVATION STATUS: LEAST CONCERN

Eastern glass lizards are more frequently occurring than other members of Anguillidae in Florida. They are not of special concern in terms of their conservation and populations continue to do rather well. However, in the event of a fire, this species of reptile may be especially vulnerable, as there have been 24 dead individuals located within 100 feet of distance after a burn in Miami-Dade. Their susceptibility to wildfires makes them one of 360 species that rely heavily on the gopher tortoise for shelter if their own burrows are not a sufficient safeguard. For this reason, it is likely that population wellness in many environments is at least partially determined by the frequency of gopher tortoises, which are currently listed as a vulnerable species.

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EASTERN INDIGO SNAKE

Drymarchon couperi



Photos from U.S. Fish and Wildlife Services



DESCRIPTION

A large, jet black or bluish-black snake that ranges between 60-82 in (152-213 cm) in length. They have a prominent iridescence to their scales that gives much of their body a bright blue or purple sheen when exposed to light. Pigmentation on the sides and underside of their head and neck may range from red to cream in color, although some individuals may be completely black or bear a simple patch of white on the throat. Their bodies are stout and heavy, and their neck is roughly the same height and width as the head. Males are, on average, a foot longer than females, and they bear middorsal scales that are slightly keeled. Speckling on the front half of the body or faint crossbands can be seen in hatchlings.

HABITAT & RANGE

Indigo snakes inhabit states that border the Atlantic and Gulf coasts but are most widespread in Florida and do not extend further than Mississippi or South Carolina. Upland habitats are their preferred habitat near the Suwannee River, and they may also appear in areas that are poorly drained. Scrubland environments, tropical hardwood hammocks, pine rocklands, coastal dunes, and other relatively dry locations such as the edges of marshes are prime habitat for these snakes. They may also be found in mangrove swamps and environments that are anthropogenic in origin, such as citrus groves. Individual snakes will usually cycle between these different habitats throughout the year.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Indigos are unusual among other species of snake. In contrast to the norm for most reptiles, they are most active during the Winter. Because their native range includes a temperate climate, they don't need to hibernate for an extended period of time, and it only lasts for a few weeks. They are diurnal, and thus typically only move around in their territory before daylight falls to twilight. True migration does not occur among this species, even if they do travel to different environments each year. For instance, in Summer, they usually relocate to wetter environments further downhill where prey items may be more bountiful. They are capable of traversing 4 miles in between regular foraging activity and when they need to retreat for winter. Indigo snakes rely on hollowed logs or animal burrows as a refuge. When in xeric habitats, gopher tortoise burrows are a vital source of shelter for this species.

Many snakes usually take up a specific niche with a small selection of prey items. Indigos are an exception to this and have one of the most varied diets relative to other snakes. They may eat any animal small enough to grapple, including mammals, fish, birds, eggs, and even venomous snakes. In fact, they are resistant to venom from snakes that occupy the same range, leaving animals such as dusky pygmy rattlesnakes especially vulnerable. Although they usually consume their prey while still

alive, they have been known to bash their prey against objects to subdue them. They do not constrict like pythons or boas do; instead, their jaws are powerful enough to hold onto and pin prey items to better manipulate them.

To defend themselves, indigo snakes rarely will bite when handled. They have a variety of ways of presenting aggression, however, as they may hiss, flare their necks, shake their tails, and musk.

REPRODUCTION

Breeding season in northern Florida takes place between November and March. This species is polygynandrous, which means that members of both sexes may mate with multiple individuals in a given period of time. Females will often garner the attention of a male by releasing special pheromones. The scent is picked up by a male, which then follows the trail until he can engage directly with the female. To compete for the right to mate, males will engage in combat rituals which may be very brutal and result in gash wounds across the neck. They intertwine their torsos, twist around their opponent and attempt to push their rival's head to the ground.

A clutch of 4-14 eggs is laid 130 days after copulation between May and June. Indigos are reliant on the empty burrows of other animals such as gopher tortoises as incubation sites for their clutches. They provide a steady internal climate and cover from predators. In August and September, the brood will hatch, eventually becoming sexually mature after 2 years if male and 3 years if female.

SIMILAR ANIMALS

Misidentification occurs regularly in areas where indigo and black racer populations overlap. They both bear a similar general coloration, but aside from this are very different appearance-wise. Black racers are much lither and have a longer body with a more angular head-shape than indigo snakes. Racers are considerably smaller in length, weight, and width. They also have a much duller black coloration on average and may even be gray. If they are not uniform in color, racers may have brownish or white splashes of color on their throat. When observing one in the wild, a startled racer will also be considerably faster in its attempt to escape than an indigo.



BLACK RACER

Photo by Gareth Raspberry

TIES TO HUMANS

Indigo snakes used to be legally available for purchase in the commercial pet trade and were generally well-favored for being docile and persistent animals. As natural predators for rodents and other creatures that may be considered pests, they play a role that may be considered beneficial for many people. This is in direct contrast to the usual perception of snakes as dangerous or nuisance animals.

CONSERVATION STATUS: LEAST CONCERN

The greatest threat to the indigo snake is human encroachment. The negative impact that we have on their populations shows through habitat loss and fragmentation, popularity in the pet trade, and deliberate attempts to reduce rattlesnake populations. Increased construction in the state of Florida is harmful to a wide variety of upland and wet environments that indigo snakes are accustomed to thriving in. Because indigos are so reliant on gopher tortoise activity to survive, a drop in local gopher tortoise populations only makes survival conditions worse for the snakes. Rattlesnake poachers will often gas the burrows of gopher tortoises by accident, as well.

For these reasons, the indigo snake became state protected in 1971 and federally threatened by 1978. Their conservation status on the IUCN Red List is least concern, but on the US Federal List, they are still endangered. Now, it is illegal to harass or possess this species (without the license to do so). Indigo snakes are still scarce, and much of it is due to the declining range of the gopher tortoise. The North Florida Land Trust plays its part in keeping habitats commonly used by both species intact, and locations such as Bogey Creek Preserve may harbor a prime environment for them to thrive.

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EASTERN NARROWMOUTH FROG/TOAD

Gastrophryne carolinensis



Photo by Matt Whitbeck



Photo by James Ferebee



TADPOLE
Photo by Ty Smith



DESCRIPTION

An exceptionally tiny species, the eastern narrowmouth only reaches between 0.9-1.5 in (2.2-3.9 cm) when fully grown, with females reaching larger sizes. Their general body-plan resembles a flattened teardrop, with their posterior half reaching a greater width than their triangular snout. They lack a tympanum and have smooth skin, although they still possess warts. A fold of skin forms a crease behind the eyes and they lack webbing between their toes. Body color varies even within the same individual based on their mood, but it usually ranges from gray to tan to chestnut (although some specimens have been observed with black dorsal colors instead). A dark middorsal region consists of light strips that are overlain with mottling that could either be dark or light, and their stomachs are usually gray and mottled in white. Males have a throat with a darker coloration compared to females. Vocalizations of the narrowmouth resemble a high-pitched, nasal “waaaaah”, resembling a buzz or the bleat of a sheep. For unknown reasons, a chorus may include individuals that will release shorter, guttural “waahs” in up to 5 instances in the middle of their performance.

Tadpoles have a very distinctive appearance. They are even more flattened, their head is rather wide, and their eyes stick directly off to the sides of that broad head. Their skin is black but bears speckles of deep blue, and the tailfin is transparent with dark speckles. A tan lateral line occurs on the front half of the tail as well. Unlike many frogs, tadpoles of this species also lack horn-like mandibles.

HABITAT & RANGE

The eastern narrowmouth is widely distributed across the entirety of North America’s Southeast, appearing in Oklahoma and eastern Texas. In Florida, they are almost everywhere and can even be found in the Keys. Any terrestrial habitat in the state is prime location for narrowmouth habitation. Their tendency to burrow means that they could be in a given area and not be detectable on the surface in any way. The only locations they may be absent from are the mountains of other southeastern states due to the climate associated with a high elevation.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Due to their small size, narrowmouth frogs need to feed on extremely tiny sources of protein. Roughly 95% of their diet consists of ants and they have been observed foraging directly at the entrances of anthills. They are nocturnal animals, burrowing under soil or detritus during the day for shelter and to retain moisture. The fold of skin that occurs on the back of the head serves a functional purpose, as it can be folded forward and deter insects that are pestering the creature’s vulnerable eyes. They also need protection from predators and the ants that they feed on (as they may retaliate in groups when encountered). To ensure their safety, they have evolved skin secretions with noxious material.

Metamorphosis among larvae narrowmouth frogs takes between 23 and 67 days, and males become sexually mature in only a year while females take roughly a year-and-a-half. In captivity, these amphibians only live for roughly 6 years.

REPRODUCTION

When the Florida climate is at its warmest and rainfall begins in March, the eastern narrowmouth frog will seek out mates until mid-summer. Narrowmouth eggs are the same as most other terrestrial amphibians, so they are required to return to sources of water to mate. Some individuals seem to travel quite extensively to accomplish this, as they may be located about 3,000 feet away from the closest available source of water that would serve as a reliable breeding site. Breeding ponds can be in shallow or deep water and can take the form of semipermanent or permanent freshwater bodies or manmade ditches and agricultural areas. Deeper pools are only used for this purpose if vegetation covers the surface.

The call of a male eastern narrowmouth is typically made while they are covered by substrate, vegetation, or detritus that surrounds the pool. Rare instances include males in the water with their snouts above the surface. When two frogs begin to breed, the male holds onto the female’s back to engage in axillary amplexus; the mating process is aided by the production of adhesives from the dermal glands on the male’s belly. When the 1,000 eggs produced are ready to be laid, females will release them as clusters floating at the water’s surface.



CONSERVATION STATUS: LEAST CONCERN

The eastern narrowmouth frog is not at risk of endangerment or extinction in the state of Florida. Because they are known in every corner of the state and may be found in any nonmarine habitat, it is likely that they will not be as greatly impacted by the effects of development as many other species. It is a secretive species, and even if they may not be very easily seen on the surface, the number of individuals hiding under the soil could be enormous. They are highly adaptive animals and are not known to be negatively impacted by any environmental factors.



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EASTERN SPADEFOOT

Scaphiopus holbrookii



Photo by Kevin Enge



DESCRIPTION

A medium-sized frog that grows between 2-3.5 in (5-9 cm) in length, with females being larger on average. They have a relatively lithe body plan, a narrow head, and webbing between their toes, making them effective swimmers. Coloration varies between different shades of earth tones, and the top of their bodies may either be brown, green, or tan. Their bodies are covered in large brown spots (for which they are named). These are oval shaped and transition into long bars or longer spots along their hind legs. Bright dorsolateral ridges extend from the back of their eyes to their hips, and another similarly colored stripe extends along the lip. The tympanum is roughly the size of the eye and has a white dot in the center that superficially resembles a bullseye. Their underbellies are white, giving them a countershaded appearance. Populations in the Lower Keys develop darker colors and mottled undersides. A male bears one vocal sac exterior to each side of the neck that expands and inflates when calling. Their song is comprised of guttural croaking sounds and a wide variety of other vocalizations, including chuckling and similar noises to the sound of a finger rubbing against a balloon.

Tadpoles range from dark brown to green in normal circumstances, but when viewed from above in waters with sandy substrate, they artificially appear golden. Their tail fins are adorned with dark, small spots or speckles, and a distinguishing trait is their bright “mustache” that occurs at the corners of their jaw.

HABITAT & RANGE

These are the only species of spadefoot native to Florida. Eastern spadefoots occur up North in New York and as far west as Missouri, Arkansas, and Louisiana. They may be found throughout most of the northern half of the state and are stretched across the entire border of the Atlantic coast. They used to be found on Key West. The south-central locales of Florida, as well as most of the Keys, are absent from spadefoot activity.

Their preferred habitat are hardwood or mesic and xeric pine forests. Locations with sandy soil are prime habitat, and if the climate is prone to consistent rainfall, it is even more beneficial. The soft soils of their territories are important because of this species’ tendency to burrow.

LIFESTYLE, BEHAVIOR, & ECOLOGY

These are a fossorial species of anuran, specially adapted to burrow into the soil using their spades. For this reason, they must burrow facing backwards. They are efficient shelter, as the loose sediment that they dig through quickly covers the hole that they dig. Here, they may lay dormant for extended periods of time, with some individuals remaining this way for a few months. When they are active, they usually reserve their time on the surface when there are humid nights, although they primarily forage for small arthropods (especially lepidopteran larvae and beetles) during the day.

This species remains in their territories in solitude. When they cross paths with members of the same sex, they may become aggressive; otherwise, they refrain from interacting with each other. The home range of individual spadefoots is not very extensive, and outside of breeding, they usually do not traverse much further than 30 feet on average. However, the extent to which they exploit their environment varies. Some frogs maintain a healthy lifestyle with only 1 den, but others have been known to create as many as 5, hardly more than 10 feet away from each other. Following breeding events, which often take place several hundred meters away, they often return to the same burrow.

When handled, spadefoots release a foul, peanut-butter or pepper-like smelling must. This is meant to deter predators not just because of the sensory effect but also because it can incur an allergic reaction.

Tadpoles tend to congregate in groups of over 10,000 individuals for protection. They feed primarily on algae once they hatch but will quickly be able to feed on drowned invertebrates once their mouth forms.

REPRODUCTION

Spadefoot toads are exceptional migrators when the time comes to mate. The nearest body of water may be up to 914 meters away from their burrows, and they are capable of travelling that distance to engage in courtship. However, these congregations only occur as a response to strong rainfall or storm activity throughout the year (although March to August seems to be the time of peak activity), which increases the number of available bodies of water to breed in. Males will float while calling to attract a mate, but females are often rushed into inguinal amplexus by males prior to reaching the water. After breeding, the female will produce anywhere from 1,000 to 4,000 eggs and lay them on the parts of vegetation in an almost cylindrical shape. 200 eggs may occur in a single clutch. Hatching may be as quick as half a day in warm conditions or may be a two-week long process. It takes 15-30 days before the tadpoles metamorphose into toadlets. Sexual maturation takes way longer, usually between 2 and 4 years, and they may live over 7 years in natural conditions.

TIES TO HUMANS

The musty smell released by an agitated spadefoot may cause allergic reactions in people that handle them. This makes it crucial for those affected by it to not rub their eyes after touching these animals.

CONSERVATION STATUS: **LEAST CONCERN**

Due to their reclusive lifestyles, they often go unnoticed in smaller-scale regions where human development has taken place, such as suburbs or rural areas. Their widespread populations and preferences for fragile soil allows them to thrive in disturbed areas as well. Window wells, agricultural fields, and backyards may find themselves occupied by large groups of these animals following a rainy night. However, this does not necessarily ensure their protection, as upland habitats are frequently damaged or destroyed entirely due to a rise in development. Florida populations are still healthy and well, but in their northern reach, eastern spadefoots are experiencing much more severe population declines.



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FLORIDA COTTONMOUTH

Agkistrodon piscivorus conanti



ADULT



JUVENILE

Photos from U.S. Fish and Wildlife Services



DESCRIPTION

Venomous vipers with a broad, triangular head that can range from 30-48 in (76-122 cm). The name “cottonmouth” was given to them due to the bright coloration of the inside of their mouths. They are covered in rough, keeled scales and have heat-sensing pits right in front of their eyes. Coloration varies between individuals, although they usually have a black, brown, or olive colored back and a brighter underside, a natural phenomenon known as “countershading” that aids in blending into their environment. At the tip of their lower jaw and on the cheeks, two dark stripes may be seen, and the snout ends with two more vertical stripes. They may have bold crossbands or none at all.

Young cottonmouths are between 8-13 in (20-33 cm). They are usually much more vivid than adults, often colored in various shades of dark red, brown, and tan and covered in bold dark bands with white outlines. Juveniles have a distinct yellow tinge at the tip of their tail as well. Although Eastern cottonmouth (*Agkistrodon piscivorus piscivorus*) adults usually lack stripes and banding on the head, the Florida cottonmouth retains these bands into maturity. Banding throughout the rest of the body, however, slowly disappears with age.

HABITAT & RANGE

Cottonmouths are well-known inhabitants of many wetland regions in Florida. They may be found in floodplains, cypress swamps, and other regions with abundant freshwater. This species is known to inhabit various regions from northern Florida to the upper Keys but also has been sighted in the southeastern corners of Georgia. They are well-adept for these environments and are known to swim at the surface of water. For this reason, cottonmouths are also known as water moccasins. However, cottonmouths are known to disperse from wet habitats to migrate to a new territory.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Cottonmouths may be active throughout the day and often come out in the sunlight when temperatures are cooler, but they primarily hunt for food at night. The species name “*piscivorus*” translates to “fish-eating”. Their carnivorous diet is very broad and water moccasins are known to eat most everything they can find, including fish, frogs, birds, and even baby alligators. Being well-adept to habitats with plenty of water and terrestrial ground, cottonmouths will forage for prey in both settings. They are ambush predators, and from a young age have been known to use their yellow-tipped tails as a lure for lizards and frogs, who possibly mistaken these parts of their body for worms or grubs. Juveniles are also known to feed on invertebrates.

To defend themselves, they will tighten their bodies into a coil and open their jaws wide towards the potential threat. This is in stark contrast to other wetland snakes that lack venom, as their only defense strategy against a predator is to submerge under the water’s surface. They are also known to vibrate their tails against the ground as a defense mechanism.

REPRODUCTION

The early summer is when mating season begins for cottonmouths. They are ovoviviparous, which means pregnant females will incubate eggs in her body until they hatch, afterwards releasing live young. Up to 20 individuals can be born in a single litter, and the mother will breed again every 2 or 3 years (unless food is abundant, in which case they may reproduce yearly).

SIMILAR ANIMALS

Florida cottonmouths are often confused with the similarly colored southern copperhead (*Agkistrodon contortrix*). Copperheads are usually lighter in color, coming in shades of tan and red. They also retain distinct crossbands that are shaped like hourglasses into adulthood, and a dark line encompasses the eye.

Unfortunately, nonvenomous snakes that reside near swamps and marshes are often confused with cottonmouths. This leads to many harmless species to being referred to as nuisances or threats. To tell the difference, cottonmouths have triangular-shaped heads, but those of watersnakes are more elliptical. The neck of a cottonmouth tapers more than a watersnake, and their body region is considerably thicker. Watersnakes also lack the slit pupils and facial pits that are characteristic of a viper. Typically, these nonvenomous snakes will not defend themselves like a cottonmouth when confronted, and instead will flee from the situation. They also will not vibrate their tail like a cottonmouth. If they are swimming, watersnakes also will typically do so with only their head and a small part of their body sticking out of the water, in contrast to cottonmouths which swim with their bodies entirely at the surface.

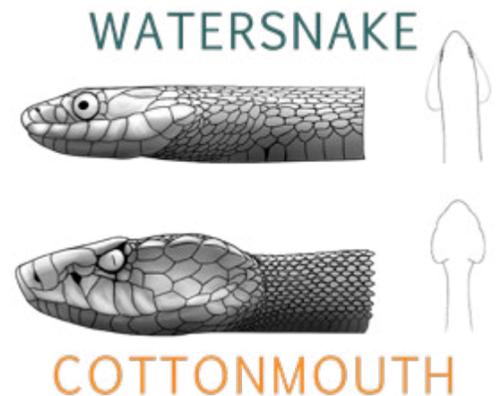


Illustration by Noah Riccio

CONSERVATION STATUS: LEAST CONCERN

Cottonmouths are of least concern in terms of their conservation status. Although water moccasins are not listed as threatened or endangered, the effects of habitat loss can have a negative impact on their survival. During warmer seasons when there is a drought, cottonmouths may move between habitats in response. As a result, they are vulnerable to habitat fragmentation, the effect of separating plots of wilderness through construction and other activities. Prolonged droughts can be particularly dangerous to a snake population’s well-being, especially considering the fact that these animals are so reliant on bodies of water for their survival. Preserving these environments is a major goal for conservation agencies and doing so is useful in preventing development which may directly contribute to drought duration and habitat fragmentation. Being venomous animals, they have a notoriety that leads many of them to being exterminated as well.

Cottonmouths have very slight but noticeable variations in color, ranging from having a black, olive, or brown dorsal coloration. The bold patterning seen in juveniles typically fades with age but may be more apparent in some individuals.



Illustration by Noah Riccio

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FLORIDA MUD TURTLE & EASTERN MUSK TURTLE

Kinosternon steindachneri & *Sternotherus odoratus*



FLORIDA MUD TURTLE

Photo by Janson Jones



EASTERN MUSK TURTLE

Photo by Grover Brown



DESCRIPTION

Florida mud turtles range from 1.8-5 in (7-12.7 cm) in length. Their heads may either be plain or bear yellow mottling. This species of mud turtle bears a smooth, low-domed carapace, ranging in hue from black to olive. Their plastron is large and double-hinged, either yellow or brown in coloration. A long rear lobe occurs on the plastron, as well. Mature males form a claw-like structure at the tip of their tail and have a proportionally larger head. Younger turtles have a plastron with more varied colors and yellow to red mottling; their carapace is also notably rough in texture. Hatchling carapaces also have two lateral keels, a vertebral keel, and bright spots that trace the marginals.

Eastern musk turtles grow between 2.4-4.2 in (6-10.7 cm). They possess barbels on their chin and neck. Their carapace ranges from black to olive-brown in coloration, and their head is marked with two bright, yellowish white stripes that extend from the tip of the snout and along the neck. The central seams of the plastron have less exposed skin in females than adult males.

Mud and musk turtles are difficult to distinguish from a distance. Musk turtles lack the double-hinged plastron and the triangle-shaped pectoral scutes of mud turtles. Instead, they have a single-hinged plastron with 4-sided scutes. Mud turtles also have a plastron that covers a much greater portion of the belly, looking more elliptical in shape than that of a musk turtle. Females of both species are considerably bigger than their male counterparts.

HABITAT & RANGE

Florida mud turtles are found throughout much of the peninsula. They do not occur West or North of the Suwannee River and thus are not found in the panhandle. Shallow bodies of water with dense vegetation are their ideal habitat, and they favor swamps with sandy substrate. The eastern musk turtle is prevalent throughout the vast majority of Florida, only being absent from the Keys due to their intolerance to brackish water. They prefer freshwater environments with minimal water movement and can be found in a wide variety of areas such as canals, ponds, and marshes.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Florida mud turtles are more aquatic than other members of their genus and may be active during daytime or nighttime hours. Musk turtles can be found throughout the year and primarily appear during twilight. This is known as a crepuscular lifestyle, although warmer waters may facilitate nocturnal activity. Aerial basking is a rare occurrence for both species, and this

behavior may act as a repellent for algae and parasites that rely on moist firmament to thrive in. Mud and musk turtles may live at least 50 years in the wild. Although mud turtles are more aquatic than other subspecies, the eastern musk turtle is even more tied to the calm wetlands that they inhabit. Terrestrial relocation is a rare activity for the eastern musk turtle.

They are omnivorous animals, feeding on a variety of invertebrates and vegetation. Mud turtles feed on aquatic crustaceans and mollusks. Musk turtles have a wider appetite, and may be found dining on carrion, fishes, tadpoles, algae, and leeches found near the substrate. Mud turtles are more well-adapted for protecting their vulnerable skin than musk turtles as their double-hinged plastron flexes both near the anterior and posterior ends of the body, covering up much more of their softer skin. The beaks of these turtles are powerful for a creature of that size, and sharp claws can tear at their handler if they are not held correctly. Musk turtles are named after the particularly foul-smelling secretions they release when stressed or handled.

REPRODUCTION

For musk turtles, breeding is an event that could occur throughout the entirety of the year. Mud turtles breed during a limited range of time in the Spring, between March and May. Mating is an underwater process for both animals.

Florida mud turtles may nest in one of two very different locations. Open, sandy locales that have close access to a body of water are usually where eggs may be laid, but their clutch may also be found residing in the nests of alligators to defend the developing young from predators such as raccoons. After 90 to 100 days, the eggs will hatch, and males usually mature after 4 or 5 years, whilst females take longer to grow to greater sizes and mature within 6 to 8 years.

Female musk turtles create shallow nests by the shore of the water with some form of cover nearby, typically in the form of dead leaves or logs. Nesting may also be a communal event, and this takes place usually between February and August. Up to nine eggs may be laid beginning in February, and it takes between 60 and 84 days for the young to hatch. In only 3-and-a-half years, young turtles become sexually mature.

SIMILAR ANIMALS

Southeastern mud turtles (*Kinosternon subrubrum subrubrum*) are very similar to the Florida mud turtle. They are frequent throughout the panhandle, however, and do not seem to overlap with the Florida subspecies. They are capable of growing larger, ranging from 2.8-4.8 in (7-12.1 cm). The easiest way to identify them is based on their plastron, as the Florida mud turtle has a rear lobe that is noticeably shorter than the anterior one, and the abdominal scute bears a plastral bridge that is much thinner in the Florida mud turtle in comparison to the southeastern.

The eastern loggerhead musk turtle (*Sternotherus minor minor*) overlaps considerably with the eastern musk turtle. It bears an olive brown or dark carapace, similarly to many mud and musk turtles, but there are very bold, darkened seams and blotching on the top of the shell, also. Their heads are also noticeably large in comparison, and they have gray skin and possess dark spots on the unarmored parts of the body.

The striped mud turtle (*Kinosternon baurii*) may be easily confused with the eastern musk turtle. Without getting a look at the plastron, the two may be distinguished based on the presence of 3 longitudinal yellow or light brown stripes along the head and neck, as opposed to the 2 that show up on the musk. Many populations also have carapacial stripes, usually the same color as those that appear on the head. Some individuals may not, however, which can make it difficult to distinguish from other local mud turtles.

CONSERVATION STATUS: LEAST CONCERN

The Florida mud turtle has recently experienced rapid population growth. The greatest concern regarding this species entails increased coastal development which is harmful to a wide variety of other turtles as well, including sea-faring species. Because mud turtles often travel to nest, activity that can lead to road mortality, such as fragmentation, can be especially impactful for a population's wellness. Eastern musk turtles are highly aquatic, even more so than mud turtles, and thus are more susceptible to changes in their habitat. Degradation of their environment and habitat loss means that the bodies of water that they rely on may become even more scarce or polluted. Preservation of sites like Bogey Creek, where mud turtles and musk turtles of many varieties may live, is a crucial factor to ensuring that Florida's ecosystems remain in healthy condition. Wetlands kept in good condition by the North Florida Land Trust, therefore, are crucial to ensuring the continued growth and stability of these animals.

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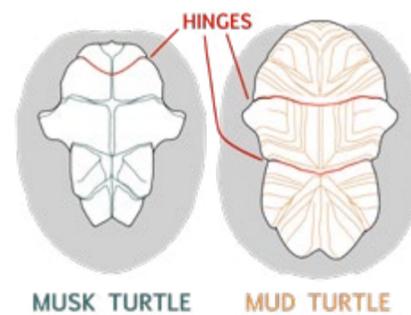


Illustration by Noah Riccio

FLORIDA SOFT SHELL TURTLE

Apalone ferox



Photo by Andrea Westmoreland



DESCRIPTION

A large species of turtle with a flat body shape; males grow between 6-12.8 in (15.2-32.4 cm) while females may be 11-26.5 in (28-67.3cm) in length. They are countershaded with a dark, brown dorsal coloration and a pale underside. Their carapace is leathery and soft, and it has an extensive reach along the length of the body. The skin surrounding their shell is so tight that the animals skeleton may be partially visible through the plastron. Rounded tubercles that resemble flattened hemispheres encompass the front margin of the carapace. Lacking a beak, this species has fleshy lips that cover the mouth and a cylindrical, pig-like snout shape. Webbing encompasses their digits very heavily, and their feet bear 3 sharp claws.

Immature softshell turtles are much more vibrant than their adult counterparts. The carapace is orange-colored and is adorned with giant ocellate spots and a lighter margin. Yellow blotches and stripes cover the limbs, neck, and mouth, and may be either subdued or absent in adults. They have a “mask” that extends from the eyes into the center of the nose, forming an orange Y-shaped splotch along the snout.

HABITAT & RANGE

The only place in Florida where this species of softshell turtle does not naturally occur is the Keys. However, Big Pine Key has been exposed to an introduced population. Due to their heavy reliance on water, the Florida softshell is known to inhabit manmade bodies of water and other permanent or semipermanent freshwater environments. They are especially frequent in most canals in the state. Brackish waters may also harbor some populations near the coast. This species also overlaps with a subspecies, the spiny softshell, which prefers flowing waters while the Florida softshell takes up a variety of still water marshes, lakes, and ponds.

LIFESTYLE, BEHAVIOR, & ECOLOGY

This species of turtle is semi-aquatic and spends much of its time in the water. When they are not active, they usually seclude themselves underneath the sediment of the waters that they inhabit. It is easiest to spot them basking on logs or on land. They are carnivorous and serve as important scavengers and predators in their aquatic communities. They are truly tenacious and have been known to feed on other turtles, snakes, and even aquatic fowl in the most extreme cases of predation. Primarily, however, they eat clams, crustaceans, fish and other aquatic vertebrates, snails, and palm seeds.

Their preferred temperatures range from 38.9-42.3 °C, and while they are generally active throughout the year, colder temperatures will force them to become inactive. Northern populations will hibernate when winter is at its coldest. Their ability to survive long periods of time underwater is aided by the fact that they can perform gas exchange through their own epidermis. Colder water also fosters water with more oxygen. When in need of better habitat conditions, they are prone to travelling to find a much more suitable environment. A close relative to this species, the spiny softshell, seems to be able to pick up solar cues to orient themselves for migratory purposes, and the Florida softshell may be capable of something similar.

Florida softshells are unique among turtles in that they are considerably more agile and fleet of foot. Their carapace and plastron are not as heavy and cumbersome, so when confronted by a predator, they remain vigilant and are quick to dash away into the water. They are not completely defenseless when caught however, and softshells can still deliver a nasty bite and scratches with their claws. Indeed, the name *ferox* means “ferocious”.

REPRODUCTION

Despite their frequency throughout Florida, the courting behaviors of this species are not formally described. Starting in late March and up to July, females will begin forming nests. They may use a wide variety of sources for protection, from well-drained soil to fresh alligator nests. This latter choice may seem dangerous, but it is likely highly beneficial to the turtle considering how fiercely defensive alligator mothers can be over their brood. Anywhere from 4-6 clutches with 9-38 eggs each will be produced in this span of time. The embryos will develop over 56-82 days, and the duration is highly dependent on their temperature. After hatching, parental nurturing ceases.

SIMILAR ANIMALS

Softshell turtles belong to a family of turtles referred to as Trionychidae. Within this family, three separate subspecies are known to occur in Florida. The Florida softshell is the most widespread, but in the panhandle, there are Gulf coast spiny (*Apalone spinifera aspera*) and Gulf coast smooth softshells (*Apalone mutica calvata*). The spiny softshell is the only one that overlaps with the Florida softshell, as the smooth species only inhabits a thin range in the Escambia River. The Florida softshell has tubercles on the front of their carapace that are rounded in shape, which differs from the cone-shaped tubercles seen on the spiny softshell. Smooth softshells lack prominent tubercles altogether.

TIES TO HUMANS

Softshell turtles used to be very prominent as targets for food trade, both domestic and for Asian markets. It was only near the end of the 20th century once their populations began to be exploited, but in a single year, thousands of individuals may have been purchased for consumption.

CONSERVATION STATUS: **LEAST CONCERN**

Although this species is generally widespread and is not considered to be at risk of extinction, local population numbers have dwindled since the end of the 1900s. They were a popular fishery target in the southern half of the state, and so many as 7,500 were reported to have been purchased for their meats. It was only in July 2009 that the Florida softshell was no longer designated as a harvestable species. However, their dispersal rate and ability to reproduce effectively has allowed them to maintain a solid status as a harvestable species in areas where they are still collected for food.

Accompanying the excessive hunting of local populations, they are susceptible to habitat degradation and destruction just as much as any other semi-aquatic species. Poisons such as rotenone can be released into their water via efforts to survey fish numbers. Road mortality is also a major concern, as this species will frequently travel to new bodies of water when conditions are unfavorable. The establishment of preserves, such as Bogey Creek, ensure that their bodies of water are protected by chemical interference, and the lands that they use to traverse between bodies of water are much more guarded and plentiful, thus making reducing the risk of increased mortality.

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FROSTED FLATWOODS SALAMANDER

Ambystoma cingulatum



ADULT

Photo from FWC



LARVAE

Photo from U.S. Geological Survey



DESCRIPTION

A species of mole salamander with a bold pattern, ranging from 2.5 – 5.3 in (9 – 13.5 cm) in length. Their bodies are generally black or blackish-brown, and they earn their name from the grayish or brown spots that give them a mottled or reticulated pattern. They are lithe in appearance and bear a tiny head relative to their body size as well as a rounded tail shape. Like most salamanders, their legs are very squat. Larvae flatwoods salamanders are adorned with external gills and have much broader heads, as well as a white underside, a dark brown line that passes from the nostril to the gills, as well as several, black to cream colored stripes running along the sides of their body.

HABITAT & RANGE

The distribution of frosted flatwoods salamanders in Florida is very minimal. They range as far East as Duval County and extend to Apalachicola River, but more populations have been observed further West between Alachua and Baker counties and Jefferson county. Outside of this state, they can be found along southern Georgia and the southern tip of South Carolina. Flatwoods salamanders thrive in mesic flatwood habitats covered in wiregrass and dropseed, typically with minimal shrub and palmetto growth due to fire activity.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Flatwoods salamanders are very shy animals and spend much of their time hiding. Larvae will of course reside near grassy vegetation in the bodies of water they are spawned in to avoid predation and when water levels recede, but adults are known to inhabit burrows as deep as 20 in (50cm). These dens are either dug out from scratch, or they may be adjusted from pre-built burrows made by crayfish. Once they are immature, these amphibians may also climb up vegetation to a similar distance, likely to avoid predation or to get their bearings on the surrounding landscape.

Larvae salamanders are known to feed on hard-shelled marine invertebrates, including isopods, amphipods, copepods, and crayfish. As they mature and take on a new lifestyle, flatwoods salamanders shift their diets to incorporate land-based invertebrates such as earthworms.

REPRODUCTION

When breeding, flatwoods salamanders relocate to dome swamps, shallow pits and roadside ditches, and depression marshes. The furthest they have been documented travelling between areas has been up 0.7 mi (1.7 km). These locales have firm substrate and a bounty of crayfish for food, and vegetation acts as a sufficient shelter against predators.

SIMILAR ANIMALS

Florida is home to another species of flatwoods salamander that appears very similar to those found in the Jacksonville area. The reticulated flatwoods salamander (*Ambystoma bishopi*) is found further West in Florida's Panhandle but also in southern portions of Alabama and Georgia. These species are segregated via the Apalachicola River, and the frosted subspecies has noticeably shorter limbs, a shorter tail, a stouter snout and less costal grooves. They are very similar ecologically, however, and are vulnerable to similar impacts caused by human activity.

CONSERVATION STATUS: VULNERABLE

In 1999, frosted flatwoods salamanders were federally considered a threatened species, and Florida populations were recognized by 2001 as a Species of Special Concern in Florida. Because of increased urban development, pine silviculture, fire suppression, and agriculture, the wiregrass environments that flatwoods salamanders occupy have been cut down extensively. Reproduction effectiveness may have been reduced due to extended periods of drought. Fire suppression is especially detrimental to the quality of the habitats that surround their breeding grounds.

Preserves such as those taken up by the North Florida Land Trust are very important to stabilizing the natural habitat of these animals. Only 20% of the original coverage of their habitat remains, so it is vital to conserve what little remains. Through prescribed fires, nature preserves can more aptly schedule when fires can occur to benefit the ecosystem. For wiregrass communities, these fires are scheduled to take place in the Winter and suppressed in the Summer. By claiming plots of land that flatwoods salamanders are located, it also ensures that their environment will not be converted for farms and housing.



Photo from Katie O'Donnell, USGS. Public domain.

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GOPHER FROG

Rana capito



ADULT

FWC photo by Kevin Enge

JUVENILE

Photo by Todd Pierson



DESCRIPTION

A member of the true frog family (Ranidae) that reaches only 2.5-4 in (7-9.5 cm) in length, although females are generally larger than males. Proportion-wise, they have a large head even for most frogs. Their base color ranges from tan or cream to gray, and they are adorned by brown spots on their torsos and stripes on their legs. Similar speckles decorate their head and yellowish lips. A key indicator that an observed frog is a gopher frog is the bronze fold of skin that extends from just behind the eye to above the waist.

The distinct brown markings on the adult's faces are absent in tadpoles. Early-stage gopher frogs have big but rather faint spots on their tail fin, and their color differs in that is goldish green instead of tan or grayish. Their call resembles a loud snore, usually lasting only a couple of seconds.

HABITAT & RANGE

This species occurs throughout most of Florida, although they are mostly absent South of Lake Okeechobee. Their range extends slightly West into southern Mississippi and North into Tennessee and North Carolina. The preferred environment for this species is implied by their name. They occur in areas with sandy soils, often in locations with longleaf pines or sandhills. Xeric hammocks, scrubby and mesic flatwoods, prairies, upland pine forests, and many other dry environments in Florida are host to gopher frogs. If a gopher tortoise can be found in the location, they are very likely to be residences of the same area. This is because they rely extensively on burrows of other animals as a source of shelter, including crayfish and pocket gophers, although they are not picky about inhabiting abandoned or empty stumps or logs, either.



LIFESTYLE, BEHAVIOR, & ECOLOGY

These frogs are most active at night when they feed on invertebrates and toads. However, they may still come out of their shelter during the day to forage as well. They spend much of their time during the day in their underground shelters because they are vulnerable to the hot conditions of Florida's climate. By being underground, they are able to absorb moisture in the soil from rainwater or surrounding wetlands. This is why gopher tortoises are vital to their survival, specifically. Burrows dug

by these reptiles are consistent in their temperature and remain humid annually. Outside of breeding season, these frogs will hardly travel more than 115 feet from their home.

When confronted by a potential threat, gopher frogs have a distinctive defense mechanism. They maintain a posture similar to the fetal position, with their back raised up and their head lowered as their hands are held above. This is referred to as the "unken reflex".

REPRODUCTION

It is usually between the months of January and April that gopher frogs will congregate at breeding ponds, usually if winter weather conditions are strong or following heavy rains. Florida individuals have been known to travel for over a mile in order to mate. These ponds are primarily occupied by males for a month, 4 times the length of time that a female will inhabit this location. They are polygynous, meaning that males may breed with multiple females in the same interval of time. To attract mates, gopher frogs will issue a call that sounds like a snore and lasts only a couple of seconds.

Each female that mates during a given breeding season will only lay one mass of eggs attached to neighboring vegetation and consisting of 1,200 to 2,000 eggs. It is only when the surface of the water warms that embryonic development continues, and young frogs stay in their larval form anywhere from 87 to 225 days.

SIMILAR ANIMALS

Identifying species based on their appearance as a tadpole can be difficult, as there are less well-defined features to aid in distinguishing them. For instance, gopher frogs and southern leopard frogs appear very similar before they mature. Because leopard frog tadpoles frequent the sandy floor of a clear body of water, they may take up a goldish coloration that gives them the superficial appearance of a gopher tadpole. Gopher frogs have faint spots on their tail fins, but those of the leopard frog are much bolder and are speckled and smaller. Usually, leopard frogs will have a light-colored spot or stripe on their snout, as well as a bright pattern that forms a "mustache" from the ends of their mouths.

CONSERVATION STATUS: VULNERABLE

Gopher frogs are at risk to much of the same human activity that jeopardizes gopher tortoise populations. With a general decrease in wetland and upland habitat, population decline of this species follows alongside it. Fire suppression, urban development, and agricultural expansion and activity are the leading causes of negative alterations to their environment, but the introduction of invasive predatory fish, especially mosquitofish, which are introduced specifically for mosquito control but also hunt tadpoles. Many frogs in Central Florida died because of a newfound pathogen in the mid 2000s, as well. For these reasons, gopher frogs are listed as a Species of Special Concern by the state of Florida. Fortunately, recent surveys have found that their populations have bounced back and breeding ponds have become significantly more numerous, so they were taken off of that list in 2017.



JUVENILE

Photo by Matt Greene

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GOPHER TORTOISE

Gopherus polyphemus



Illustration by Noah Riccio



Photo by Allison Cologne



DESCRIPTION

Medium-sized tortoises that range from 8-12 in (20-30 cm), weigh 32 pounds (14.5 kg). Gopher tortoise carapaces have a very fine carapace and a plastron with a distinct, extended gular scute. Males have an even more prominent gular scute and have a concave plastron (in contrast to the convex shape of a female's), as well as prominent mental glands beneath their chin. Adults are subdued in coloration, usually coming in shades of gray or brownish, but their plastron may be yellowish. They have distinct front legs that are long and shovel-shaped, and their hindlimbs are comparably shorter. Large scales protrude from their front legs as well, giving it a craggy and spiky appearance.

Juvenile tortoises are much more vibrant than their adult counterparts. Gopher tortoises begin life with shades of bright yellow on their skin and their carapace, with scute margins that are bordered with thick dark lines. The gular scute is reduced in younger individuals.

HABITAT & RANGE

Gopher tortoises are a staple of southeastern North America. Outside of this state, they are also rather prominent along the range of Louisiana to South Carolina. These animals are the only species of tortoise native to the state of Florida. They are well adept to survive in dry environmental conditions of various different types. Scrublands, various flatwoods, xeric hammocks, sandhills, and even beach dunes are common habitats which gopher tortoises inhabit. They prefer locations where the canopy is relatively open and thus allows for undergrowth which they seek out for food. Because of the prominent role that they play in the ecosystem, they are very widely dispersed across all of Florida's counties. However, southern regions of the state are inundated with more wetland and urban settings which tortoises cannot survive in or are driven away from.



LIFESTYLE, BEHAVIOR, & ECOLOGY

This species of tortoise has a very wide palette for an herbivore. They may consume up to 376 different plants from wiregrass to various species of fruits. They are also known to subsist off of carrion and even dung and detritivores such as mushrooms. As the name implies, gopher tortoises are able to dig and inhabit burrows in dry soil conditions. They are consistently ac-

tive annually but keep to their own dens when temperatures are low. As cold-blooded animals, they become more likely to be sighted during the times of day when the scrubland is at its warmest. Their burrows serve multiple purposes beyond insulation and can protect the animal from a myriad of natural catastrophes. These dens are also very extensive, reaching lengths of over 45 ft.

Gopher tortoises are immensely significant to the well-being of the ecosystems they occupy. As herbivores, they aid in spreading fermenting seeds from the vegetation that they eat. Furthermore, their burrows are crucial for the ecology of over 360 species of animals. During a fire, which is far more common in the dry habitats these reptiles inhabit, so many creatures will use neighboring burrows as a refuge. There are some species which are exclusively found in these alcoves and even snakes will hunker down with a tortoise currently occupying the space. This relationship is known as "commensalism", where a species benefits from another without causing any harm or providing any benefit itself to the other. Because their impact is so vast, gopher tortoises are widely regarded as a "keystone species" for much of Florida's ecosystems.



Illustration by Noah Riccio

REPRODUCTION

Mating season can range from January to November. When courting, both individuals will bob their heads at each other. A clutch of 5-25 eggs may be laid by a female anytime from April to mid-July, and young will emerge in the next 80-106 days. Both mating and nesting occurs at the opening (or "apron") of a burrow. Maturation is a long process that can occur between 1-2 decades.

SIMILAR ANIMALS

Although gopher tortoises are the only native species of tortoise, some exotic tortoises have been brought into the state as pets and later released or escaped into the wild. One similar species is the African spurred tortoise, which is similar in appearance. To tell the difference, a gopher tortoise has an extra scute on their carapace that appears just above its head called the nuchal scute.

CONSERVATION STATUS: VULNERABLE

In 2007, gopher tortoises were officially listed as a threatened species. The primary source of concern comes in the form of urbanization and development, which can lead to a host of problems including degradation. With a rise in population, Florida has been experiencing a boom in urban development. Heavy and widespread construction has caused much of the sandhill and scrubland environments that gopher tortoises occupy to be severely harmed and diminished. Many of these vast territories have been fragmented by the establishment of roads, as well. An increase in traffic activity means that tortoises and other wild creatures are highly vulnerable to roadkill, as they may need to cross these roads to access vital resources such as food or shelter. Fire suppression is another major consequence, and although fires can be potentially damaging, they are a vital source of life throughout many drier environments. Even in locations where gopher tortoise activity may be healthy, they may be accidentally killed by rattlesnake poachers who often gas the burrows.

Without natural fires, pine trees may occupy a wider spread over the canopy and choke out life that is closer to the ground, including the plants that tortoises rely on for food. Even when more tortoises hatch, it takes many years for them to become sexually mature and to be able to proliferate. Gopher tortoises are effectively the Achilles' heel throughout most of wild Florida and losing them only makes the rest of the natural environment less efficient and more at risk.

The efforts of the North Florida Land Trust are crucial to the well-being of gopher tortoises. Land that is purchased by the organization is carefully chosen and is commonly used by gopher tortoises as their home.

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PIG FROG

Rana grylio



Photo by Tom Spinker



FWC photo by Kevin Enge



DESCRIPTION

A true frog (member of family Ranidae) that grows between 2.8-6.5 in (7-16.5 cm) in length. They have an olive or dark green dorsal coloration with medium-sized spots along their back. Their undersides are of a light coloration, and the groin area is covered in black mottling. They are distinct for having webbing that reaches the very tip of the longest toe on their hind legs, a characteristic which most Florida frogs lack. Black and white “mime” striping on the rear of their thighs is another key identifier of this species. They also lack dorsolateral ridges. They earn their name from their characteristic vocalizations, which sound like the low grunt of a hog.

Tadpoles are black in coloration and have brass bands in front of and behind their eyes. Older tadpoles develop similar colors to their adult counterparts, with a spotted tail fin and a tail that becomes tapered. Immature frogs bear four dorsolateral stripes that are tan in color.

HABITAT & RANGE

This species is widespread throughout Florida and can be found elsewhere in the southern half of other states from South Carolina to eastern Texas. They occupy a wide range of habitats and are common to permanent freshwater bodies. Locales with abundant vegetation on the surface or near the banks of rivers, sloughs, cypress ponds, and other wetland environments are preferable for hiding and reproductive purposes. Plants that may be found in the same waters as pig frogs include pickerel weed, never wets, floating hearts, and waterlilies. Semipermanent bodies of water in xeric habitats may also be occupied by pig frogs, although far less frequently.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Pig frogs may be found year-round but are most active at night. They maintain a highly aquatic lifestyle, bolstered by their extensive webbing between their toes. Territories are vast and include a whole system of wetlands rather than just a single body of water. When confronted by drought and the loss of their wetland domain, pig frogs will relocate or bury themselves in the soil. This is usually the only time when they may be found in a terrestrial setting. Pig frogs have a fairly generalized diet which includes invertebrates (shrimps consisting of over half of their diet), fishes, and other amphibians and reptiles.

REPRODUCTION

Pig frogs are annual breeders, but there is a spike in reproductive behavior between March and September in southern Florida and between April to July or October in the northern portion of the states. Weather seems to be a major factor in their breeding activity, as rainy or overcast climate conditions with humid air are when they are known to be the most sexually active. Males will begin calling once they are on higher ground, usually at the surface of the water or while perched on floating vegetation.

Anywhere from 6,000-34,000 eggs may be laid in a single clutch, often attached to vegetation such as pickerel weeds or cypresses. These egg masses may be found at the surface of the water and will hatch within three days due to the active threat of receding water. Tadpoles only take three months to mature in southern Florida but may take as long as ten months in northern populations.

SIMILAR ANIMALS

Pig frogs are members of the same genus as carpenter frogs (*Rana/Lithobates*). Although they are very similar in appearance, the main distinguishing trait between these two species can be seen in their feet. The hind feet of a carpenter frog have a fourth toe that is far longer than what is seen in a pig frog, that is partially uncovered by the webbing that stretches across their digits. Bullfrogs are also commonly confused with this species, and that webbing, as well as the more angular snout shape, is what sets these two species apart.



BULLFROG

Photo by Carl D. Howe



CARPENTER FROG

Photo by Carl D. Howe

CONSERVATION STATUS: LEAST CONCERN

The pig frog is a species of minimal concern when it comes to conservation efforts. They are highly adaptable to many environments with ample water, including urban areas such as retention ponds (as long as pollution is kept to a minimum). The largest threat comes in the form of the Everglades population, which has been exposed to water draw-downs and thus less viable habitat for the species to thrive in. However, they are often exploited commercially as a source of food, and frog legs are commonly served as a local delicacy. Harvesting used to be much more common in prior decades, but as of now, there are no restrictions on this activity and there is even a festival centered around these frogs as a meal.

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SOUTHERN LEOPARD FROG

Rana (Lithobates) sphenocephala



Photo by Judy Gallagher



Photo by Greg Schechter



DESCRIPTION

A medium-sized frog that grows between 2-3.5 in (5-9 cm) in length, with females being larger on average. They have a relatively lithe body plan, a narrow head, and webbing between their toes, making them effective swimmers. Coloration varies between different shades of earth tones, and the top of their bodies may either be brown, green, or tan. Their bodies are covered in large brown spots (for which they are named). These are oval shaped and transition into long bars or longer spots along their hind legs. Bright dorsolateral ridges extend from the back of their eyes to their hips, and another similarly colored stripe extends along the lip. The tympanum is roughly the size of the eye and has a white dot in the center that superficially resembles a bullseye. Their underbellies are white, giving them a countershaded appearance. Populations in the Lower Keys develop darker colors and mottled undersides. A male bears one vocal sac exterior to each side of the neck that expands and inflates when calling. Their song is comprised of guttural croaking sounds and a wide variety of other vocalizations, including chuckling and similar noises to the sound of a finger rubbing against a balloon.

Tadpoles range from dark brown to green in normal circumstances, but when viewed from above in waters with sandy substrate, they artificially appear golden. Their tail fins are adorned with dark, small spots or speckles, and a distinguishing trait is their bright “mustache” that occurs at the corners of their jaw.

HABITAT & RANGE

Southern leopard frogs appear throughout the vast majority of the eastern United States and have been found in Texas and New York. In Florida, they are all over the place, even occurring in Key West. Typically, this species is found in freshwater bodies of water and wetland environments, such as marshes and hydric hammocks, but also frequent pine flatwoods. They may occasionally be found in scrubland habitats. They are tolerant of moderate concentrations of salt in the water, and thus are found in mangrove swamps as well. Permanent or ephemeral wetlands that are absent in predatory fishes are the prime ecosystems that leopard frogs prefer to settle down in.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Leopard frogs in Florida can be found throughout the year. They are active both in day and in night and will lie in wait for prey to wander by. Their diet primarily consists of invertebrates, but also includes other frogs and fishes. Although they are capable of venturing to dryer environments, they lose water incredibly quickly, and thus will be required to return to wetlands in times of drought. They may seek shelter in other animal burrows, such as those made by crayfish, or hollows in trees. To rehydrate, they have a specialized groin patch that allows them to soak up moisture from the substrate.

When startled, adults will locomote in different ways depending on their proximity to the water. At the water's edge, they will engage in a series of low leaps in a direction away from the water, zigzagging in their attempt to escape. However, when isolated from the water and on dry ground, the leopard frog will rely on their camouflage and hunker down to avoid being detected. A similar behavior occurs among tadpoles when in the presence of predators.

REPRODUCTION

Breeding may occur throughout the year, but it is typically during November up until February that mating season is at its peak. It is a nocturnal affair, and males will float in a manner that exposes at least half of their body while they unleash a barrage of calls. Low-lying vegetation in the vicinity is a common artifact where they typically begin calling. They are polygynous, meaning that males will attempt to mate with as many females as possible. Females produce up to 5 clutches, globular in appearance, which in total may include 1,000-5,000 individual eggs. The substrate of the water that they are laid in or aquatic vegetation is vital as an anchoring point, and water preference varies based on season. If the water is typically shallower in cooler climate conditions and vice-versa, that is the most preferable location for egg-laying. These locations are often congested with leopard frog eggs. It only takes between 70 and 90 days for tadpoles to become metamorphs.

SIMILAR ANIMALS

Tadpole leopard frogs may circumstantially resemble the larvae of other species. Minor details can be easily overlooked, but by inspecting the general shape, size, eyes, tail fin, and coloration, one can identify the species by effectively treating these characteristics as a checklist. However, this becomes a problem for identifying tadpoles in waters with sandy bottoms, especially for leopard frogs. When in lakes and ponds with plentiful sand, they typically reside by the bottom of the water and coat themselves in the grains, which muffles the patterns on the tail and makes them appear golden. This causes them to be frequently confused with gopher frog tadpoles in these habitats.

TIES TO HUMANS

This species is often raised for harvesting and experimental purposes. The rear legs of leopard frogs are a delicacy for humans, and it is commonplace for labs in schools to use these animals for dissection assignments. They are also widely used for bait.

CONSERVATION STATUS: LEAST CONCERN

Leopard frogs are incredibly widespread, especially in Florida. They are of “least concern” status, and there are many proposed populations of healthy and enormous sizes. However, with a rise in urbanization, especially in the sunshine state, there is a noticeable decline in populations in the area. Even in these circumstances, leopard frogs manage to thrive and make the most out of these changes; they usually will breed in artificial or manmade bodies of water.



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SPOTTED TURTLE

Clemmys guttata



Photo by Todd Pierson



Photo by Judy Baxter



DESCRIPTION

This is a medium-sized turtle, ranging from 3.5-4.5 in (9-11.5 cm). This species of turtle bears a smooth, dark-colored carapace, usually with a menagerie of spots that are either orange or yellow. These spots may fade as they age past maturity, and some may not even be born with the pattern on their carapace. Their plastron is orange in color, black blotches cover each individual scute, and it is also unhinged. Their head and neck are mostly black but are adorned with either yellow or orange spots and blotches. The tops of their legs and tail are black and covered with spots. The black background counter-shades with their orange-pink undersides. This species displays sexual dimorphism, as mature females have a more vibrant chin, being yellow or orange as opposed to the brown chin of males. Males also have a compressed and elongated carapace compared to females; their concave plastron combined with their larger tail is an adaptation for mating and for housing sexual organs, respectively. Females are usually larger than males as well. Hatchlings have an almost spherical shape to their carapace, and each scute only has one spot.

HABITAT & RANGE

Spotted turtles are not widely distributed in Florida. They are much more common in northern states that border the Atlantic coast, but in Florida, they do not extend further South than Polk County, and there are isolated populations halfway through the panhandle. They are generalists when it comes to their habitat range but prefer clear, shallow water with aquatic vegetation. Some populations are much more aquatic than others.

LIFESTYLE, BEHAVIOR, & ECOLOGY

This is an omnivorous species of turtle that feeds on most everything from algae and seeds to invertebrates, aquatic and semi-aquatic vertebrates, and even carrion. They actively hunt live prey by sticking their heads into the aquatic vegetation. Spotted turtles also will traverse onto land to find terrestrial prey such as millipedes and spiders.

They are most active during the spring but are not hindered by colder water temperatures. In fact, the times when they are least active are when the summer causes the water temperature to rise above 30 °C. When dormant, they may seek out burrows or leaf litter for shelter to prevent dehydration. They may also hibernate during either late summer or autumn, but usually after they go back to their aquatic home. This is referred to as their “winter” dormancy.

When confronted by a predator near a source of water, spotted turtles will dive to the substrate at the bottom of the water and bury themselves underneath the sediment. On land, they are extremely vulnerable. Mature individuals are typically decorated in wounds from past encounters, and the raccoon in particular is a common predator that specializes in hunting turtles with unhinged shells.

REPRODUCTION

After winter dormancy ends, courtship behavior starts. Males will compete for the right to mate with females and often directly fight each other. When they begin courting, males will pursue the female underwater and attempt to bite her limbs and shell. They breed in shallow water once he manages to secure a good grip by biting her head or neck.

The female will build her nest between May and June, which will be used to house 1-8 elliptical eggs. If she does produce another clutch, it will usually be only a few days later and will consist of fewer eggs. Sunny plots of land with moist, but not inundated, soils are prime nesting habitat, and the eggs will incubate anywhere between one-and-a-half to three months to hatch in August or September. Temperature is a key component in determining the sex of the hatchlings, as temperatures above 30 °C result in an entirely female clutch, but maintained temperatures between 22.5-27 °C will spawn a full batch of males. It takes 7-14 years before they are able to reproduce.

TIES TO HUMANS

The distinct coloration of spotted turtles has made them a very popular animal in the pet trade.

CONSERVATION STATUS: **ENDANGERED**

Certain biological and demographic characteristics of spotted turtles make them especially vulnerable to human interference. For instance, they do not reach sexual maturity until many years after hatching (often over a decade), the number of eggs produced by one female in a given year is minimal, and there is a high mortality rate for both eggs and hatchlings in natural circumstances. As a result, it is imperative that adult and subadult health and populations stay above a certain threshold to avoid population decline.

Now, populations are very sparse and fragmented, which causes an entirely separate issue regarding inbreeding. If they cannot breed with other individuals from a different gene pool, negative birth defects are bound to occur over time. Isolated populations are also far more vulnerable to predation from animals such as raccoons. The commercial pet trade usually popularizes reptiles and amphibians with exotic or vibrant coloration, and unfortunately, spotted turtles have become widely popular for reptile pet-owners. As a result, their numbers in the wild have been dwindling. They are one of the rarest species of turtle in Florida, yet they are not federally protected in this state.



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STRIPED NEWT

Notophthalmus perstriatus



JUVENILE
FWC photo by Kevin Enge



PAEDOMORPH
Photo by Todd Pierson



DESCRIPTION

Small aquatic salamanders that average 2-4 in (5-10.5 cm) in length when mature. Adults range from olive green to dark brown in coloration and bear a yellow underside sparsely decorated with tiny dark spots. Their sides have red markings and two narrow, red dorsolateral stripes running along the length of the body bordered by black lines.

Larvae striped newts retain six external gills. They have a high tail fin adorned in black molting, and black spots cover the underbelly, similar to their adult counterparts, as well as lighter specks that run along their lateral line. Red efts are the next stage in the newt's life cycle and are usually coated in a dull orange. Two red stripes run along the body, the tail is less laterally compressed compared to later stages, and their skin is less smooth than other stages. Paedomorphs occur as adults that retain their larval characteristics, particularly the external gills, and they tend to lack the red stripes of standard adults but otherwise bear similar colors as mature individuals. The retention of juvenile traits into adulthood as part of a species' anatomy is called "neoteny".

HABITAT & RANGE

Striped newts are distributed across the northern half of the state of Florida and extend into Georgia. In Florida, they can be found as far south as Volusia and Osceola. There is a gap between populations from West to East, but they are common along the northeastern coast of the state. Various xeric upland habitats are likely to have striped newts inhabiting them. They are partial to sandhill environments, but if these habitats are left uncharred by fire, they may be completely absent as hardwood vegetation invades. They may otherwise occupy mesic flatwoods, scrublands, or dry prairies. The specific habitat that they inhabit is highly influential in their reproductive process based on the local flora.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Striped newts are very reclusive animals, so much so that specific details of their life during their terrestrial phases is poorly known. As fossorial (burrowing) animals, adults are usually found hiding beneath logs to protect themselves from unfavorable climate conditions, and they can potentially be active throughout the year. Whether or not they possess and defend well-structured territories is unknown.

In the wild, there is even some uncertainty as to what this species feeds on in their younger stages. Captive larvae are known to feed on immature invertebrates that would normally inhabit their breeding ponds, such as mosquito larvae, and shrimp. It is presumed that they feed on invertebrates in the wild as well, just as their metamorphosed forms do. The lateral line of a striped newt functions in a similar manner to that of a shark's, allowing them to detect vibrations in the water to indicate moving

prey items. Mature aquatic newts are much more generalist, and their diet may consist of arthropods, worms, snails, and even amphibian eggs. It is likely that they do not rely heavily on sight for guidance when foraging, instead using their sense of smell to accomplish their goal. The diet of their terrestrial forms is less comprehensively understood.

Striped newts may be targets for carnivores such as birds, snakes, and mole salamanders. For defense, striped newts will take up an "unken" posture when handled or irritated. They tilt their head and neck vertically to expose their throat, arch their back in a U-shape, and curl their tail in the general direction of the head. They may possess skin glands that harbor tarichatoxin, a very strong neurotoxin known to occur in other members of the genus *Notophthalmus*. If the newt is ingested, it can lead to paralysis and death in extreme cases. This toxin serves the purpose of deterring predators and repelling parasites. Cryptic color patterns allow them to easily blend into their environment, so their chances of needing to rely on their toxin is reduced.

REPRODUCTION

Taking advantage of their terrestrial bodies, adult newts will travel to sinkhole ponds, dome swamps, or marshes to serve as breeding ponds following autumn or winter rains. These locations are important for the development of young as they are absent of aquatic predators and have plenty of vegetation for cover. The entire reproductive process occurs in these bodies of water, from breeding to the release of the eggs. Egg-laying may take place over the course of several months. Mothers will lay each egg individually, attaching them to a piece of vegetation or a sturdy underwater object.

Larvae take six months to reach the next stage in their development, and it can occur in one of two ways. Either they may remain in the pond and mature as a paedomorph or will become fully terrestrial as efts. These paedomorphs are unique in that they may breed one time before they become fully terrestrial. The general phenomenon of an adult animal maintaining features of their younger appearance is known as "neoteny", and striped newts can develop out of this stage as needed, such as when their ponds begin to dry up. They may live up to 15 years.

SIMILAR ANIMALS

The eastern newt (*Notophthalmus viridescens*) is often very easily confused with this particular species. Striped newt larvae can be distinguished by their tail fin, which raises up much higher and carries black mottling that the eastern newt lacks. Striped newts, as the name implies, also have those distinctive dorso-lateral stripes that the eastern newt lacks.



EASTERN NEWT
Photo by Patrick Coin

TIES TO HUMANS

For only 2 decades, from the 1970s to the 1980s, striped newts were common in Florida's pet trade. Now, the closest direct association they have with humans is their poisonous qualities. The ailments their tarichatoxin have on birds and snakes can also be dangerous for humans

CONSERVATION STATUS: NEAR THREATENED

Population declines have been ongoing in various counties where striped newts are known to occur. This is likely due to a combination of damages to upland habitats and wetlands, which can occur from anything as major to urban development to seemingly mundane actions such as off-road vehicle activity. A combination of fire suppression, persistent droughts, and, potentially, the spread of an unknown disease could all be responsible. One example of a loss in striped newt populations include that which appeared in Saint Marks National Wildlife Refuge; despite the status of a fit and healthy habitat, the striped newts have vanished in the late 1970s. Guana Tolomato Matanzas Research Reserve also used to have a population of striped newts, but in recent years have not been recorded in surveys, likely due to a lack of controlled fires in the area. It is important to keep their native habitat in mint condition so that these amphibians may proliferate and become easier to study and the protection of locales such as Bogey Creek are pertinent for their survival. For now, they stay on a candidate list for species that will be regarded as federally threatened.

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SOUTHEASTERN FIVE-LINED SKINK

Plestiodon inexpectatus



JUVENILE
WC Photo by Kevin Enge



ADULT



DESCRIPTION

Small lizards that are on average between 5-8.7 in (12.5-22 cm) in length. Skinks generally have shorter limbs than other lizards, and the same goes for the southeastern five-lined skink. Their body is snake-like, elongated and with a consistent shape between neck and torso. When mature, they are usually tannish or bronze in color and have faint, cream colored stripe markings, although as males age, these stripes disappear entirely. The heads of males widen as their temporal region swells and will also form a blush of red along the snout and neck when mating season occurs.

When they are juveniles, five-lined skinks have very bold horizontal stripes, three that start at the tip of the snout and two from the back of the head, that extend along to the tip of the tail. These stripes are yellow and stand in strong contrast to the near-black background of the body. These stripes become faded in adult females and their dorsal colors become brighter. A cream underbelly and a bright, blue-tipped tail also occur in juveniles.

HABITAT & RANGE

Five-lined skinks inhabit a wide range across the eastern United States, extending as far east as Louisiana, with some patches of populations occurring east of Dallas and Houston, Texas, and North into Maryland. They are especially widespread throughout Florida, occurring in most every county in the state. This species inhabits environments that are at least partially wooded, both with sufficient foliage to seclude themselves in and with enough clear space in the canopy to bask in the sun. They prefer dry environments with a bounty of stumps and debris. Habitats that fit these requirements may be coastal but are usually further inland, such as pine flatwoods, scrublands, and sandhill environments.

LIFESTYLE, BEHAVIOR, & ECOLOGY

These small reptiles are primarily insectivorous, feeding on a variety of arthropods, snails, and earthworms that litter the ground. However, five-lined skinks are also known to eat smaller vertebrates as well, such as frogs and other lizards. Usually, it is during the warmer conditions of daytime that they will be seen moving about in their habitat. Even then, they are typically very reclusive, preferring to stick to the trees or ground-level shelter such as logs and debris. Such shelters may also include the burrows of gopher tortoises. Male five-lined skinks are fiercely territorial towards other skinks of the same sex and age but are tolerant of juveniles and females. They are reliant on the use of pheromones to distinguish between members of the same species.

A defense mechanism that these skinks, as well as other lizards, rely on is a phenomenon known as “autotomy”, the disconnection of their tail from the rest of the body. After roughly 9 seconds, a grasped tail will break off and continue to squirm for over 50 seconds, acting as a distraction for a predator looking for an easy meal. In adults, these tails are prominent for reproductive purposes, as they contain almost half of the total lipid reserves in the lizard’s body. As an added benefit for juveniles, their vibrant tail can be waved back and forth to warn predators into leaving them alone.

REPRODUCTION

Breeding season takes place between April and June. When courting, a male will tentatively approach a female from their flanks, after which he will grab her neck with his mouth to hold on during copulation. Females will lay their eggs (roughly 3-8 in a single clutch) during the summer, typically covered by rotting logs or resting atop moist soil. Incubation periods vary greatly, being recorded to take place between 16-47 days, and during this timeframe, the mother will maintain vigil over her brood without eating. In fact, respiratory water loss seems to aid in providing her eggs with consistent moisture. She nurtures them until they hatch, and will often defecate to provide further moisture, roll them over for proper incubation, and sometimes eat eggs that are not in good health. If the nest floods, she will even take the eggs to a safer location. After hatching, baby skinks take 21 months to reach sexual maturity.

SIMILAR ANIMALS

Skinks are among some of the most difficult reptiles to distinguish in Florida. There are three species with very similar colors and patterns to neighboring species throughout their lives, and to identify them concretely, a closer examination is required. To distinguish them from the common five-lined skink (*Plestiodon fasciatus*), the giveaway is their scale arrangement on the belly. On the tail of the southeastern five-lined skink, their underside has a smaller set of scales in the middle, roughly the same size as the surrounding scales; common five-lined skinks have a much more pronounced middle row of scales in this area, being roughly twice the width of any row of the scales that surround it.

Broad-headed skinks (*Plestiodon laticeps*) also have the distinctive red-head that male five-lined skinks will form during mating season. To tell the difference, one can look at the head, which is proportionally bigger in the former. Broadheads lack the uniform scale arrangement seen in the southeastern species, but this is also a trait of the common five-lined skink. Broad headed skinks also have five labial scales along their lips, whilst the common five-lined skink has only four. They also have two postlabial scales in front of the ear, whilst broad-headed skinks lack them entirely.

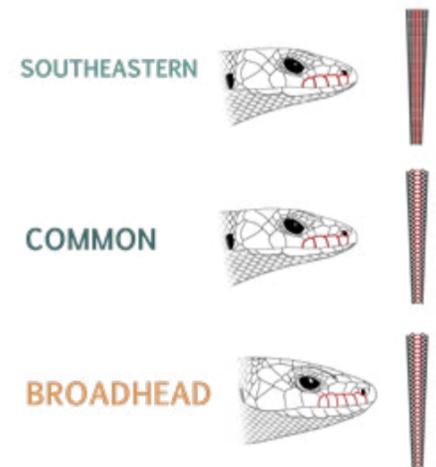


Illustration by Noah Riccio

Notably, southeastern five-lined skinks are considerably faster than both common five-lined skinks and broadhead skinks when temperatures are just right at roughly 77°F (25°C), and thus makes them more efficient at escaping predators or eager herpetologists out in the field. Common five-lined skinks also typically prefer much more moist, but not inundated habitats.

TIES TO HUMANS

As an insectivorous species, five-lined skinks provide a humble role in pest control. Assuming there are many in one’s backyard, they may cull the population count of nuisance insects. However, they may also provide their own nuisance to people in abundance, as they often carry chiggers, which may parasitize on any humans that come in contact with the lizard. A common misconception is that young skinks that still possess their blue tails are venomous, and can issue a deadly sting towards handlers. They cannot. However, there is the possibility that skinks possess a taste which many predators find foul.

CONSERVATION STATUS: LEAST CONCERN

Due to the very close resemblance to other species of skinks in Florida, southeastern five-lined skinks are not given a confident assessment in terms of their conservation status. Other species are more widespread, but it is likely that the difficulties involved in distinguishing between them means that the population count is greater than assumed. They typically are more abundant where burns occur intermittently, usually once every 5 years or so. Southeastern five-lined skinks are very widespread in habitats where pines can be found, and this includes environments that have detritus or were overtaken by agricultural use. Even if they are adept to dwell in areas with plenty of debris, too much can be harmful to the rest of the environment that they rely on to survive. Ensuring that there is still prime natural habitat to rely on is a major goal of the North Florida Land Trust and our efforts in conservation. Their reliance on gopher tortoise burrows for shelter also makes them a potentially vulnerable species in areas where the tortoise population is dwindling, and thus are another example of why sandhill environments where these keystone species thrive must be kept in healthy conditions.

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SOUTHEASTERN SLIMY SALAMANDER

Plethodon grobmani



JUVENILE

Photos by Stephen G. Tiley



ADULT

Photo by John Sullivan



DESCRIPTION

Small salamanders that grow up to 6 in (15.4 cm) in length. They are distinguished by their black dorsal coloration, large gray spots on their sides, and brass or white colored spots covering their body from the back of their head to the tip of their tail. These yellowish spots may be speckled heavily throughout the body or may be considerably less numerous. Lateral compression of the tail only occurs further along at the end. Their eyes protrude from the sides of their heads and the melon gland on the lower jaw is very distinct in males. They have no observable larval stage and are primarily a terrestrial species. Their name derives from the adhesive secretions that their skin glands constantly release.

HABITAT & RANGE

The range of the southeastern slimy salamander extends as far North as the halfway point of Georgia and Alabama and South to Orange county. They are widely distributed across the panhandle and northern Florida. As amphibians, they frequent wet environments such as floodplains, creek bottoms, and wet pinelands, but may also occur in hardwood forests and sandhill habitats.

LIFESTYLE, BEHAVIOR, & ECOLOGY

Unlike most other amphibians, the slimy salamander is not tightly bound to areas with plentiful water. Their ability to locomote on land from birth is an advantage that allows them to colonize habitats that other salamanders and newts may not survive in. However, they do not have a wide territory and individuals occupy a small home range. Particularly aggressive, male and female slimy salamanders will not tolerate the arrival of another salamander and will fight for their turf.

For shelter, moist debris or rotting wood typically suffices. To avoid desiccation, they are most common during the cooler winter months when the climate draws up less water. They are still active in Florida throughout the rest of the year. This species is insectivorous, primarily feeding on small arthropods such as millipedes, larvae, and most frequently, ants and beetles. Autopsies have found that they feed on snails as well. Snakes are their primary threat when it comes to predation.

REPRODUCTION

Mating takes place at the start of April. To court a potential mate, males will begin to blush their white spots, their chin, and their feet to pink and eventually to a vibrant red. Following this change in color, they will perform an elaborate dance to get the female's attention.

A very small number of eggs is laid in a single clutch, usually only 5-11 at a time by a given female. Eggs that are adapted for incubation on land typically are produced in fewer numbers than those designed to hatch in the water, like what is seen

in most amphibians. Their choice for a nesting site is usually the rotting logs commonly used for shelter. Here, the mother will guard her brood aggressively, even avoiding the urge to search for food. In fact, females may be subject to parasitism from nematodes as a result of their poor nutrition. It is only once they hatch or when the nest seems to have been disturbed that she will no longer maintain vigil.

Terrestrial young will hatch from their eggs in late October. Sexual maturity differs between sexes, with males being capable of breeding by their 2nd year of life whilst females breed after their 3rd year.

SIMILAR ANIMALS

Southeastern slimy salamanders used to be considered synonymous with the northern slimy salamander (*Plethodon glutinosus*). However, they have been separated into their own species based on genetic analysis. Within the genus *Plethodon*, there are now a total of 13 species recognized through isozyme data.

CONSERVATION STATUS: LEAST CONCERN

Southeastern slimy salamanders are a species with a solid conservation status. Any forest within their range that has moist substrate and rotting logs may host a large population of these animals. They are not considered to be in need of conservation concern. However, their habitats are still in need of preservation to avoid habitat loss and fragmentation, and other species in those same environments may not be in such fortunate circumstances. The preserved lands owned by the North Florida Land Trust harbor a wide variety of vulnerable species, and the southeastern slimy salamander may be found in the vast majority of them in large quantities.



Resources

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SOUTHERN TOAD & OAK TOAD

Anaxyrus terrestris & *Anaxyrus quercicus*



Photo by Tom Spinker



Photo by Andrew Block



TADPOLE
Photo by Andrew Block



Photo by Rob Van Epps



MALE (LEFT) AND FEMALE (RIGHT)
Photo by Eric Shashoua



TADPOLE
Photo by Eric Shashoua



DESCRIPTION

Southern toads are compact amphibians that can grow to lengths of 1.7-3 in (4.3-7.5 cm), with females averaging at larger size estimates more often than males. They are rotund animals with a squat form, their entire bodies are covered in small bumps and warts. Prominent cranial crests appear above their eyes; a knob extends from just behind the main portion of those crests, and a parotoid gland occurs at the back of the head behind the eyes. The tops of their bodies range from pale or gray to a vivid brick red. A key trait of their genus is the thin horizontal stripe in the middle of the spinal column. They are also covered in dark spots and bars, the latter of which adorn their limbs, that form a chaotic pattern of dark brown mottling across the body. Underbellies are white or cream colored but may have tiny spots scattered about. Males also tend to have darker throats compared to females. Southern toad tadpoles are primarily black in coloration. Distinctive bands curve from behind the eye and become perpendicular to the spine, they do not connect to each other in the middle. Their tail fins are also transparent. It is difficult to identify them without close examination due to their tiny size. Their call resembles a high-pitched trill.

The oak toad bears a similar skin texture and body shape, and a prominent bright stripe occurs along the middle of the back in this species as well. However, oak toads grow to considerably smaller sizes, only reaching 0.8-1.4 in (1.9-3.5 cm) in length. Females are larger than males and are considerably rounder. Their background color is usually grayish with some white highlights along the snout, torso, and limbs. The oak toad is more vivid than the southern toad, bearing irregular, blotchy patterning that occurs in bold black colors, and they usually have red warts scattered across their dorsal region as well. Their bellies are white or cream-colored and may or may not be caked in black spots/mottling. Cranial crests are also nowhere near as prominent and may be difficult to notice without close inspection, and they also have parotoid glands behind their eyes. Their vocal sac inflates into an oblong shape, often described as “sausage-like”. Oak toad calls resemble a high-pitched chirp. They are much less vibrant as tadpoles, though their skin still bears dark mottling, dark saddle-like stripes stretch along the tail, and the transparent tail fin has dark speckles.

HABITAT & RANGE

Southern toads may be found as far north as North Carolina and West along the length of the Mississippi River. However, they are most frequent in states that border the coasts and are especially prevalent in Florida. Even the Keys maintain a healthy population count of these toads. They are so widespread that they may be found in any terrestrial habitat, although they usually are located within hides such as burrows or hollow logs. Pine barrens, hammocks, and locations with sandy substrate are often occupied by these animals.

Oak toads occupy a similar range, although they extend slightly further North into Virginia. They overlap with populations of southern toads throughout Florida. Despite their name, oak toads are found in habitats where oak trees may not be present or in the immediate vicinity. They occupy upland pine communities, flatwoods, and the margins of open fields with uncovered sand.

LIFESTYLE, BEHAVIOR, & ECOLOGY

The southern toad is primarily insectivorous with a diet consisting of a menagerie of small invertebrates. They are nocturnal animals and are frequently observed during and following twilight. Typically, southern toads seclude themselves in burrows or other shelters to avoid predation. Tadpoles may not harness poisons like their adult counterparts, but they are generally distasteful. This, combined with their ability to form great congregations in their ponds, allows this species to increase their odds of survival from a young age.

Oak toads are ambush predators that feed on invertebrates, primarily ants. Unlike the southern toad, they typically are active and forage during the day, although choruses are at their most vocal at night. They heavily rely on tactile and chemical senses to perceive their environment, although they are also highly visual and acoustic-based animals as well. In their day-to-day lives, they maintain a solitary lifestyle, secluding themselves under debris or sand when they are not in the process of foraging.

The parotoid glands are filled with a poisonous and unsavory fluid. Southern toads will inflate their bodies to make themselves more imposing, and this behavior, combined with the arching of their backs, makes it more likely for the parotoid glands to secrete poisons at the potential threat. Natural threats for both species primarily consist of snakes such as hognoses and garters, which are not deterred by the poisons produced by their parotoid glands. Gopher frogs are also known to feed on oak toads specifically.

REPRODUCTION

Usually, the first cases of breeding are sparked by the onset of warm rains. For oak toads, their breeding calls take place most frequently between April and October. Breeding usually happens in shallow bodies of water such as flooded fields, ephemeral pools, or grassy ditches. Males become highly territorial and set up boundaries prior to vocalizing to females. Once it is time to lay her eggs, a female will release 2-6 at a time in short strings but will release a total of 300-700 eggs. It only takes 3-4 days for the tadpoles to hatch.

February tends to be the beginning of the breeding season for southern toads, and this lasts until September; breeding events do not take place in an organized fashion but are a sporadically occurring activity. South Florida populations are much more flexible in terms of when they breed, and amplexus may be observed at any time in the year. Southern toad breeding takes place along the margins of shallow water, whether they be flooded pools or ponds, and it is from within the water itself or along the edges that a male will call out to females. Creeks or rivers are never used as a mating site, likely due to the ever-flowing currents which make amplexus difficult to accomplish. Females will lay roughly 2,500-3,000 eggs in stringy coils, secreted in a layer of jelly. It only takes between 2 and 4 days for these eggs to hatch into independent tadpoles.

CONSERVATION STATUS: LEAST CONCERN

Southern toads are incredibly widespread throughout the southeastern United States. They are highly adaptive and are nowhere near as unaffected by development and construction as other amphibians. In fact, many people in Florida suburbs can easily find these animals in the middle of the night. However, oak toads are not as fortunate. Their choice of habitat makes them extremely vulnerable to urbanization and agricultural activity. It is not as easy for the oak toad to leave and make a new home out of changing environmental conditions. Even in locations where their habitat persists, fire suppression has led to the overgrowth of canopy foliage and has resulted in the loss of many oak toads locally. Preserving these habitats is an important task of organizations such as the North Florida Land Trust, but even conservation sites such as Bogey Creek need to facilitate healthy change and fire activity to maintain a healthy population of all native fauna.

Resources

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MEET THE AUTHOR

Noah Riccio • NFLT Stewardship Intern

Noah Riccio joined NFLT in 2021 as an Intern of the Stewardship Program. He has been involved in research and conservation work over the past three years through the University of North Florida and the Guana Tolomato Matanzas Research Reserve. In December of 2020, Noah graduated from the University of North Florida with a bachelor's degree in Coastal Biology. He plans to pursuing a master's degree in Ecology and Evolutionary Biology.

This field guide project is an exercise in education, in providing information about the smallest animals in our ecosystem.

Creatures such as frogs and lizards are tiny and easy to overlook, but the roles that they play in their community and the sheer diversity of their lifestyles is staggering. Every species plays a crucial role, and the absence of one can lead to a less healthy environment. It is important that we appreciate all inhabitants of the wild for the purpose they serve and for how distinct they truly are from one another, how they solve similar problems in different ways, and how they set themselves apart from their neighbors. Establishing this appreciation and recognition in the public is the ultimate goal of a field guide such as this, and with it, hopefully, blossoms a successful effort in conservation.

Support Bogey Creek Preserve and future NFLT preserves with a donation by visiting support.nflt.org



North Florida Land Trust is a non-profit organization committed to protecting and preserving the natural heritage of North Florida. We work to ensure our region's treasured lands will be protected and enjoyed by future generations.