Species Description

Tortoises can be observed on all major landmasses in the world except for Australia and Antarctica. The Gopher Tortoise (*Gopherus polyphemus*) is one of four species that lives only in North America. It has a large dark-brown to grayish shell, elephantine limbs and a large grayish-black rounded head. Its shovel-like forefeet are used to excavate burrows that provide shelter (Ernst et al., 1994).

The Gopher Tortoise can reach lengths of more than 35 centimeters and weigh over 10 kilograms, and there are physical differences between males and females. Female tortoises have a flattened bottom shell, or plastron, and a small tail whereas males exhibit a highly concave plastron and large tail. Male Gopher Tortoises also have two visible scent glands beneath the chin (Ernst et al., 1994).

Taxonomy

The generic name of the Gopher Tortoise, *Gopherus*, is derived from the word gopher that was used to describe the burrowing habits of this species. The species name *polyphemus* refers to a cave-dwelling mythical creature (Ashton and Ashton, 2008).

Daudin was the first to describe the Gopher Tortoise as *polyphemus* in 1802. Rafinesque used this species as the type or standard to define the features of *Gopherus* and assign this generic name to the North American tortoises (Schmidt, 1953). All four species in this genus exhibit adaptations for burrowing such as claws and flattened forelimbs. However, they can be distinguished based on anatomical features including limb-bone and skull structure (Ernst et al., 1994).

The Gopher Tortoise is most closely related to the larger Mexican or Bolson Tortoise (*G. flavomarginatus*) that is endemic to the Chihuahuan Desert that straddles the U.S./Mexico border (Ernst et al., 1994).

Distribution

The Gopher Tortoise inhabits the southeastern United States throughout Florida, southern Georgia, southern South Carolina, Mississippi, southern Alabama and southeastern Louisiana. High numbers of Gopher Tortoises
still remain in Florida, Georgia and parts of Alabama. However, few individuals exist in South Carolina and Mississippi. This species has been driven nearly to extinction in Louisiana (Ernst et al., 1994).

Gopher Tortoise density varies considerably among locations primarily due to differences in habitat type, quality and availability. The range of this species has been drastically reduced due to agriculture, forest management and mining processes. Predators such as raccoons, foxes and humans have also reduced tortoise numbers (Dodd, 1986).

**Habitat**

Gopher Tortoises usually occupy pine-oak, beach scrub, oak hammocks and pine flatwoods, though they can also be found in disturbed habitats. They are dependent on well-drained, deep sandy soils for burrowing and nesting. The amount of herbaceous vegetation present at a site affects population density and tortoise movements (Auffenberg and Franz, 1982). Tortoise activity such as grazing and burrow excavation has significant impacts on the environment in that it increases plant succession and moderation of soil temperature (Kaczor and Hartnett, 1990).

The Gopher Tortoise is considered to be a keystone species because it creates burrows that are used by many other species including small mammals, frogs and other endangered species like the Eastern Indigo Snake. A Gopher Tortoise will dig several burrows throughout its lifetime and will even use burrows that have been abandoned by other individuals. A burrow is usually a straight tunnel excavated in sandy soil that can be more than 6 meters long and nearly 3 meters deep. Tortoises are protected against unfavorable environmental conditions when they are in burrows because temperature and humidity remain relatively constant within them (Diemer, 1992a).

Natural, periodic wildfires play an important role in maintaining the Longleaf Pine sandhill habitat that is preferred by tortoises. Fire suppression promotes the growth of dense vegetation that is unsuitable to eat and that shade areas that tortoises require for thermoregulation and nesting. Prescribed burns are used to maintain canopy openings and herbaceous food plants for tortoises (Russel et al., 1999).

**Movement and Home Range**

The Gopher Tortoise can be active throughout the year depending on location. It seeks shelter in its burrow during periods of inclement weather. Tortoises are most active during the warmest part of the day and can often be seen basking at the burrow entrance. Individuals have well-defined home ranges that can vary from less than 0.5 hectares to more than 3 hectares. Several burrows may be located within an individual’s home range (Diemer, 1992b).

**Diet**

The Gopher Tortoise is primarily herbivorous and consumes grass and grass-like plants, broad-leaved plants and fruit. Dissected tortoise scats have contained bone, charcoal and insects, and individuals have been observed eating carrion. This species may play an important role in seed dispersal for some plants (Auffenberg, 1969).
Reproduction

Male and female Gopher Tortoises reach sexual maturity between 10 and 20 years old and at 220 to 265 millimeters (Iverson, 1980). Mating occurs mainly in the spring, though it has been observed at other times of the year. Multiple males may pursue a single female at the same time. Males periodically bob their heads and bite their potential mates on the forelegs during courtship. If the female is receptive, she will stretch her legs and allow the male to mount her shell in preparation for copulation (Auffenberg, 1969).

Nesting occurs mainly in May and June. Eggs are often deposited at the burrow entrance or nearby. A female lays one clutch containing up to 25 eggs each year. Hatchling tortoises emerge from the nest about 90 days following egg deposition, sometime between August and October (Iverson, 1980).

Conservation

The mission of the Gopher Tortoise Conservation Program within the Fire Forest Initiative is to monitor and maintain the health of Gopher Tortoise populations on the Orianne Indigo Snake Preserve (OISP). The Gopher Tortoise is one of the most important species of the Longleaf Pine ecosystem of the southeastern U.S. Coastal Plain, and the species is critical to the survival of the Eastern Indigo Snake. Gopher Tortoises dig extensive burrows in sandy soil which offer refuge to Eastern Indigo Snakes and over 300 other species, including many species of insects, quail, mice (including the rare Florida mouse), rabbits, burrowing owls, Florida Pine Snakes and the elusive Gopher Frog. These burrows typically reach 15 to 30 feet in length and 6 to 10 feet in depth, although some burrows may be up to 40 feet long. Because of the vast array of cohabitants that use the burrows, the Gopher Tortoise has earned the title of “Keystone Species.”

Gopher Tortoise populations are declining throughout much of the species’ range. The Gopher Tortoise is federally listed as Threatened in western Alabama, Mississippi and Louisiana, and it is currently under review for federal listing in eastern Alabama, Georgia, Florida and South Carolina.

Gopher Tortoises attain sexual maturity late in life, at around 12 to 20 years of age, with maturity reached more rapidly at more southerly latitudes (e.g., south Florida) compared to sites in the northern portion of the species’ range (e.g., South Carolina, Alabama, Georgia). Females deposit small clutches of eggs (six to 14), and typically, high nest and hatchling mortality result in low recruitment into the population. Low reproductive output combined with extensive habitat loss have had a considerable negative effect on the population, and in turn, has also affected the many species that rely on Gopher Tortoise burrows for habitat and refuge, including the Eastern Indigo Snake.

Because of the importance of the Gopher Tortoises to the health of the Longleaf Pine ecosystem—and the Eastern Indigo Snake in particular—the Orianne Society has placed a high priority on ensuring the health and well-being of Gopher Tortoise populations on the OISP in Telfair County, Georgia. The Preserve is a very significant site with respect to the conservation of Gopher Tortoises, as it protects a series of extensive dry sandhill habitats adjacent to Horse Creek which provide prime Gopher Tortoise habitat.

Gopher Tortoise Monitoring
In 2011, we conducted our first preserve-wide surveys for Gopher Tortoises to estimate tortoise density and population size. We surveyed using line transect distance sampling methodology, as tortoise specialists have done elsewhere in Georgia. Our results showed that the preserve supports a sizable tortoise population of almost 500 individuals. To monitor the status of our tortoise populations, we will initiate a long-term
monitoring project by repeating these surveys at five-year intervals. This will allow us to detect any changes in our population status and will also allow us to determine how our Gopher Tortoise population responds to habitat management actions on the preserve. Data from these surveys will also provide information on the age class distribution within our population and a rough estimate of the amount of recruitment occurring in the population.

Because Gopher Tortoise recruitment into the population is typically low, we need to ensure that our Gopher Tortoise population is growing. To better accomplish this, we will begin developing a field protocol that will allow us to better estimate the amount of recruitment within our populations. The results from this study will help us determine if active measures need to be taken to improve Gopher Tortoise survival within the preserve, particularly nest and hatchling survival.

**Gopher Tortoise Translocation**

Even though the Orianne Indigo Snake Preserve supports a sizable Gopher Tortoise population, portions of the preserve contain very few tortoises. To enhance tortoise populations in one of these areas, we translocated 16 adult Gopher Tortoises in September 2011 from a nearby private property to a two-and-a-half acre enclosure on our preserve. In conservation biology, this approach to translocation is called a ”soft release,” which allows the animals a period of adjustment to their new surroundings. Soft releases generally are more successful than hard releases (where the animal is immediately released into a new area), so we kept the tortoises in their enclosure until May 2012. In order to determine the success of our translocation, we used radio telemetry to monitor the survival, movement patterns, home range size and habitat use of eight translocated adult tortoises and eight resident adult tortoises (equal numbers of each sex were radio-transmittered) both at our preserve and also at Yuchi Wildlife Management Area in Burke County, Georgia. Thus, we tracked a total of 32 Gopher Tortoises for one year following the release of the translocated animals from their penned enclosures. This project was a notable success, as all of the translocated tortoises survived, excavated new burrows, established territories and maintained healthy body weights.

**Literature Cited**


