

The Gopher tortoise: An ancient yet vulnerable genus

Article by Julia Jorgensen, South Texas Border Chapter

Tortoises are land turtles (excluding terrapins) of the family *Testudinidae*. There are approximately fifty-five extant species, and North America has six, all in genus *Gopherus*. The largest of these, the endangered Bolson's tortoise, lives in Northern Mexico. The other five inhabit the southern United States from the Mojave and Sonoran deserts, through South Texas, and into southern Alabama and across Florida. Our own South Texas tortoise, who roams the Tamaulipan Biotic Province, is the Texas tortoise, *Gopherus berlandieri*.



Tortoises intrigue people—they look resilient, and they are both charismatic and edible—but their appeal has a dark side.

Gopher tortoise (*Gopherus polyphemus*) in Florida—photo by Julia Jorgensen

Hiding inside an armored shell would seem an almost unbeatable defense, and the tortoise lineage is indeed very long. The earliest known turtle lived around 260 million years ago.¹ The turtle ancestor itself was one of the minority of species that survived the great end-Permian extinction; a 230 million year old turtle fossil was discovered in 2018.² The fossil record also suggests that tortoises in general were more widespread in the past than they are today.

The earliest North American tortoise, an ancestor of the genus *Gopherus*, dates from the early Eocene, about 58 million years ago (mya), in New Mexico, before it was a desert.³ *Gopherus* fossils dating to the Pliocene, about 10 mya, have been found in Central Texas.

The appearance of impermeable toughness may disguise the tortoise's vulnerability to recent rapid changes in climate and habitat, along with road accidents.

Tortoises (especially the famous large species) are charismatic. Humans often view them as nonthreatening and cute because of their high sculptural carapaces, elephantine back legs, and slow way of trundling from place to place. Their ability to retreat into a shell—and to “carry their home on their backs”—is unusual, interesting behavior. But these characteristics have led to exploitation by the pet and souvenir trades.⁴

Although tortoises cannot swim, they can survive long periods adrift at sea with no food or water. Hence, they were able to populate the Galapagos Islands.

Wild tortoises have been a convenient source of food for humans, and this has led to the near extirpation of several species since Europeans arrived in North America. From the 17th through the 19th centuries, ships habitually stopped at the Galapagos Islands to capture tortoises, which could weigh up to 500 pounds (and be up to 175 years old). Galapagos tortoises can survive up to year without eating or drinking, and could actually be stacked, live, in the holds of ships,

making them the perfect fresh food (and oil) storage system for sea voyages. As many as 200,000 Galapagos tortoises died in this manner.⁵ Today nonnative species such as pigs, dogs, cats, donkeys, goats, and rats prey on tortoise eggs or compete with them for food.

Hunting has also impacted turtle populations in the United States. The Texas tortoise, named by Berlandier during the Mier y Teran expedition, was eaten by soldiers and explorers who roamed across early Texas. Turtles in general were considered a culinary delicacy in the Southeastern United States, and they were collected to feed slaves. A craze for sherry-laced terrapin soup was cut short by Prohibition in the 1920s.⁶

The lives of gopher tortoises



A gopher tortoise bowled me over during a 2014 Florida vacation. It had the wonderful name of *Gopherus polyphemus*, to indicate that it was fossorial (burrowing) and large. Indeed, this was the largest tortoise I had ever seen, and my husband and I were thrilled by his/her lack of shyness. He/she ignored us and went about the business of foraging, probably because it was about to be a very hot day, and a cool burrow beckoned.

Author's husband admires Gopher tortoise (*Gopherus polyphemus*) in Florida—photo by Julia Jorgensen

G. polyphemus enjoys quite a varied diet including herbs, fruits, fungi, and cactus to support a carapace length of up to fifteen inches and has been known to live up to 86 years. As photographer Mark Lotterhand demonstrates in a short film,⁷ this animal's natural curiosity and fearlessness can readily lead it to try new foods, even cameras.

It is worth noting that *G. polyphemus* is not only a popular favorite with Florida park-goers but has a brilliant reputation with wildlife biologists for its habit of sheltering other species in its capacious burrows. These average seven feet below ground and 15 feet long (although some have been recorded at 10/40 feet). *G. polyphemus* may be considered a keystone species as up to 360 other species may depend on the burrow, including a variety of snakes, frogs, small mammals, and invertebrates. As the burrows stay warm in winter (around 50 degrees) and cool in the summer (80 degrees) they are critical for survival in Florida's harsh climate. Unfortunately, it also turns out that burrows are quite dangerous during the flooding that comes with hurricanes. Gopher tortoises living on the Southwest coast of Florida were nearly wiped out during Hurricane Ian in 2022.⁸

Habitat loss, a crisis for turtles everywhere,⁹ is a tremendous problem in Florida, as are road accidents and capture for the pet trade. Predation by raccoons and upper respiratory tract disease are also threats. The wild population of *G. polyphemus* has declined 80 percent in the past

century, and is listed as Threatened under the Endangered Species Act. However, Florida takes its charismatic tortoise seriously, and state agencies generate a stream of educational material about the tortoise and its preservation.

The Texas tortoise

I first realized that we had a species of *Gopherus* in Texas when I came upon a small female *G. berlandierii* (Texas tortoise) at Santa Ana National Wildlife Refuge. She was in the last stages of covering a hole that likely contained eggs. I never would have imagined she was related to my Florida friend, but research told me that she was indeed a *Gopherus*, although *G. berlandierii* only grows to about eight and one-half inches in length. *G. berlandierii*'s range is roughly Texas south of San Antonio, specifically the thorn scrub communities. Its distribution in Mexico is not known. Its home range is typically less than a city block.

The Texas tortoise's nearest relative is *Gopherus agassizii*, who lives in the Mojave desert. Only Florida's own *G. polyphemus* is a spectacular burrower. The Mojave, Sonoran and Sinaloan species also burrow, but more shallowly, often under boulders. It would be interesting to know more about the evolution of and changes in the burrowing habits of the *Gopheri*. A 2016 research study suggests that turtle shells evolved for burrowing rather than as armor.¹⁰

The Texas tortoise is the smallest *Gopherus*, and it does not burrow much at all, but will sometimes dig a very shallow pallet to lie in if the soil is soft. At any time of the year, but particularly in winter when the tortoise is often inactive, it borrows a burrow from the Southern Plains woodrat (*Neotoma micropus*). The rat covers the burrow entrance with a large midden of cactus, thornscrub branches, and other material. In return for this service, the inactive tortoise endures the rat's gnawing, as its shell apparently provides needed calcium.



Texas tortoise (*Gopherus berlandierii*) in Ramsey Park—photo by Diane Hall

The Texas tortoise lives largely on prickly pear cactus pads, fruits, and flowers, and these are also significant in the wood rat's diet. Cactus seeds are ten times more likely to germinate after passing through the tortoise. Rattlesnakes also share the community and commonly eat wood rats although the wood rats have some immunity to their venom. Some other animals, including shrews and a variety of snakes and lizards, may be found in wood rat middens.

Our tortoise is equipped with a moderate sense of smell, color vision, and good depth perception and may perceive ground vibrations via a membrane over the ear. They are reported to make a hissing sound during courtship.

G. berlandieri does not reproduce until age 15 (and may live until 60) with females producing only three eggs at a time, in one to two clutches from June into late fall. The survival rate is low, particularly for hatchlings, due to predators, automobiles, fires, and some diseases, including ones that may be contracted from human touch. (Many of these tortoises also carry a keratin-eating fungus on their shells, so touching them is inadvisable in any case.) Commercial exploitation was a big problem in the past. *G. berlandieri* has lost more than 95 per cent of its habitat. It cannot survive in the wild if relocated out of its range, and it is listed as “threatened” by the state of Texas, although it appears as a species of “low concern” on the International Union for Conservation of Nature Red List.

I found it interesting that most of the limited literature on *G. berlandieri* is described in detail in only one monograph, *The Texas Tortoise* (2014), by Francis Rose and Frank Judd, who began their studies of the animal in the 1960s. Google Scholar currently shows very few related research studies. Should you wish to know more, UTRGV owns a copy of Rose and Judd’s interesting book, whose jacket blurb notes that the Texas tortoise is the tortoise “most neglected by wildlife personnel.”

1. Encyclopedia Britannica, “Turtles: Natural History”.
2. Jeremy Rehm, “230-million-year-old turtle fossil deepens mystery of reptile's origins,” *Nature News*. August 22, 2018.
3. Scholarly literature on Gopherus tortoises: <https://turtles.linnaeus.naturalis.nl/>
4. Bolson’s tortoise was exploited in the Mexican pet and souvenir trade: https://animaldiversity.org/accounts/Gopherus_flavomarginatus/
5. National Geographic, “Galapagos Tortoise” <https://www.nationalgeographic.com/animals/reptiles/facts/galapagos-tortoise>
6. Jordan Gray, “Turtle Survival”, Natural Habitat Adventures “Daily Dose of Nature” webinar.
7. YouTube: https://www.youtube.com/watch?v=h7g_Z25g6Nk
8. Andrea Stetson Dec 22, 2022 “Washed Away,” *Naples Daily News*, Dec. 22, 2022.
9. Mongabay News, “Turtles and tortoises in trouble,” July 2007. <https://news.mongabay.com/2020/07/turtles-and-tortoises-in-trouble-more-than-half-of-all-species-face-extinction/>
10. Lyson et al 2016 Fossorial origin of the turtle shell. *Current Biology*, 26, 1887-1894.

See also:

Francis L. Rose and Frank W. Judd, *The Texas Tortoise: A Natural History*. University of Oklahoma Press, 2014.

Carl Franklin’s talk, “Turtles of the RGV”, which was presented to the South Texas Border TMN chapter.