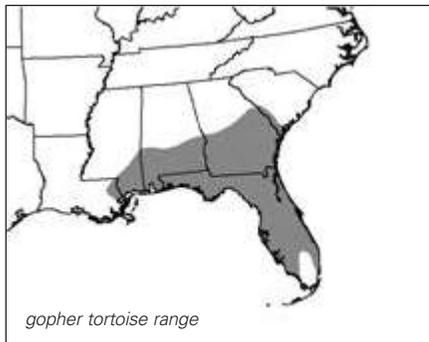


## Case Study: Fire and the Gopher Tortoise

The gopher tortoise provides a clear example of the relationships between forest species and fire. This native species of the southeastern United States—including Alabama, Florida, Georgia, Louisiana, Mississippi, and South Carolina—has been on the decline in recent years. One way in which scientists are hoping to save the gopher tortoise is through the use of prescribed or planned fires in the forests they inhabit.



A descendant of North American tortoises that roamed the continent for millions of years, the gopher tortoise gets its name from its burrowing habits. This tortoise uses its shovel-shaped front legs to dig extensive below-ground burrows, often 10 feet (3.05 meters) deep and 25–35 feet (7.6–10.7 meters) long. The burrows provide protection from extreme heat, cold winters, drought, fire, and predators. The burrows also provide shelter to more than 350 other animal species, including gopher frogs, burrowing owls, indigo snakes, and small invertebrates. Because so many animals depend on the burrows to survive, the gopher tortoise is considered a keystone species. Declines in the numbers of gopher tortoises and their burrows affect many other populations.

Gopher tortoises prefer the open understory forest ecosystem of the longleaf pine forest, which for millennia has been maintained through periodic fires. There the tortoises primarily occupy dry sandhills that allow for easier excavation of their burrows. In longleaf pine forests, abundant sunlight can reach the floor, thus providing sunny spots for the tortoises to lay eggs and to regulate their



*Gopher tortoise. Photo by by Randy Browning, MFWF/USFWS.*

body temperature through basking. The sunlight also promotes the grazing plants the tortoises eat. Longleaf pine forests once covered some 90 million acres in the Southeastern United States, but more than 97 percent of the original forest has now been lost. Most of the forest has been converted to agriculture, to housing and human development, or to tree plantations.

Much of the remaining forest has not been allowed to burn as it would naturally do. Before people settled the area, surface fires were frequent across this landscape and would burn over thousands of acres every 2 to 10 years. Without fire, longleaf pines are gradually choked out by other species, causing woody shrubs and densely spaced trees to take over. This overgrowth reduces the amount of sunlight that can reach the ground and diminishes gopher tortoises' ability to control their body temperature and to find suitable nesting spots. The overgrowth also decreases the grasses and vegetation relied on by tortoises for food.

The loss and degradation of longleaf pine forests have led to a major decline in gopher tortoises throughout their range. In fact, the current tortoise population is estimated to be just 20 percent of what it was 100 years ago. The lack of fire has changed the forests so that they are no longer suitable habitats for gopher tortoises.

## Case Study: Fire and the Gopher Tortoise (cont.)

### Using Prescribed Fire

In Florida and other states, forest managers and owners are now using prescribed fires to prevent further declines in the numbers of gopher tortoises. Fire opens up the canopy and controls the growth of woody shrubs. Fire allows more sunlight to reach the forest floor, thus encouraging the growth of grasses, forbs, and other food plants as well as increasing areas for basking and nesting.

People are often concerned about the dangers of prescribed fires to the animal inhabitants of an ecosystem, especially dangers to the gopher tortoise. It is important to remember that gopher tortoises and other animals have survived for millennia with frequent fires and, in fact, rely on the fires to endure. Their deep burrows shelter the tortoise, along with many other species, from fire. At times, however, young hatchlings and tortoises far away from their burrows may be vulnerable to fire. For this reason, the timing of prescribed fires is very important. It is best to avoid the times of year when gopher tortoises are most active, when young hatchlings are emerging from their nests, and when the tortoises need food to prepare for their winter dormancy.

Groups such as the American Forest Foundation provide education and assistance to landowners on how to increase longleaf pine habitat for gopher tortoises through prescribed burns. In addition to teaching prescribed burning techniques, the groups also encourage landowners to replant longleaf pine trees where they once existed.

### Sources

Adapted from *Pine Ecosystem Conservation Handbook for the Gopher Tortoise in Florida*. American Forest Foundation. 2008.

Innes, Robin J. 2009. "Gopherus polyphemus." In *Fire Effects Information System*, [Online]. USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). <http://www.fs.fed.us/database/feis/>.

### Longleaf Pine Adaptations to Fire



A containerized longleaf seedling. Photo by Randy Browning, MFWF/USFWS.

- Longleaf pine seedlings have a unique grass-stage growth form that is resistant to fire. If top-killed, a seedling can sprout from the root collar again.
- The terminal bud, once developed, is protected by a moist, dense tuft of needles. When it heats up, the water vaporizes and puts out any close flames. The bud also has scales for protection and a silvery pubescence, or hairy film, that reflects heat.
- During the grass-stage, the seedling focuses most of its energy on growing a good tap root. Immediately after a fire, the seedling can use its stored reserves to quickly grow tall and above the height level of the next surface fire. The seedling usually produces no side branches until it grows above that fire height.
- The bark becomes thick with age and insulates the tree's cambium layer from heat.