

Recommended Habitat Management Guidelines for the Gopher Tortoise in Longleaf Pine Habitat

This document was prepared by the U.S. Fish and Wildlife Service, in cooperation with and input from the States of Alabama, Georgia, Louisiana, Mississippi, Florida and South Carolina; and Gopher Tortoise Council committee members.

Although gopher tortoises may be found in many types of habitat, including scrub, xeric hammock, pine flatwoods, dry prairie, coastal grasslands and dunes, mixed hardwood-pine communities, and ruderal habitats, this document represents information gathered from multiple sources on how to restore, enhance, and maintain gopher tortoise habitat in the species' most widely-used habitat type: the upland longleaf pine ecosystem.*

Prescribed burning

Fire is by far the most important tool in restoring and maintaining gopher tortoise habitat and should be the base management activity around which all other activities are planned and implemented. The overall goal in longleaf pine forests is to restore natural fire frequency, seasonality, and (where feasible) intensity. Growing season burns mimic lightning-caused spring and summer fires that historically occurred under natural conditions. Frequent fire helps maintain open canopy conditions and promote growth and survival of herbaceous ground cover, and wiregrass requires growing season fires for successful reproduction (see Table 1 for suggested forest cover metrics in gopher tortoise habitat). Scrub oaks, shrubs, and undesirable hardwoods are more effectively controlled by growing season burns (April - July), and wildlife species that occur in pine-dominated habitats are adapted to periodic growing season fires. Burning should be implemented on a one to three year cycle on most soils, but poorer sites that naturally have extensive areas of bare sand (*i.e.*, sandhills) might only carry fire on a three- or four-year rotation. High fuel loads may dictate the use of cooler dormant season burns initially, at sites where fire has been excluded and there is heavy shrub encroachment and poor ground fuels. However, the long-term goal should be to incorporate mostly growing season burns to more accurately simulate a natural fire pattern and enhance forage plant diversity. In areas that have lost their dry fine fuels (e.g., grasses, forbs, pine needles, and leaves), summer burns may not be an option. These areas respond well to winter burns, where the dormant biomass provides adequate fuels.

Longleaf vs. other pine species

Gopher tortoises are believed to respond to habitat structure rather than any specific plant community types, and tortoise management can be successfully integrated with forestry practices using several southern pine species. However, longleaf pine is much better suited for sustaining the fire regime necessary to maintain the desired groundcover and wildlife communities that support the tortoise and is the preferred canopy species for the long-term conservation of the gopher tortoise. Longleaf pine is well suited in a significant portion of the tortoise's range for several reasons: it has open crowns that allow more sunlight to reach the ground; trees can be burned at younger ages and can be managed on longer rotations; it is more

disease- and insect-resistant when compared to loblolly pines; and more resistant to wind damage due to the deep taproot and smaller crown density than other southern pine species. Longleaf grows well on sandy soils and is tolerant of wildfires. While it is possible for loblolly or slash pine stands to have the characteristics of suitable tortoise habitat, these stands often exhibit earlier and more drastic canopy closure, primarily due to limitations on how early and often fire is used as a management tool.

Site Preparation

When establishing pine stands, protecting tortoise burrows and maintaining forage plants are important considerations. Heavy mechanical site preparation such as shearing, root-raking, bedding, disking, and piling should be avoided in occupied areas because these practices can damage the soil structure, collapse burrows, and negatively impact groundcover plants. Broadcast applications of a broad-spectrum herbicide that reduce grass and forb diversity and abundance can significantly reduce forage availability for tortoises, at least in the near term. In contrast, use of selective herbicides can offer good control of weedy plants that compete with pine seedlings without significantly disrupting the herbaceous seed bank. On dry sites, pine seedlings usually have very little competition, so herbicide treatment might not be needed or spot treatment of specific problem areas might be sufficient. Normally, a broadcast application is the only practical way to treat mesic (wetter) sites where pine seedlings might face heavy competition. To ensure tree survival and minimal impact on gopher tortoise forage, consult a professional with advanced knowledge of herbicides regarding the type and rate of chemical to use.

Planting

Hand-planting is preferred because it creates less disturbance to the site. Bare-root seedlings are less expensive than containerized seedlings, but survival and growth rates are better for containerized seedlings. If thick brush is present it might be necessary to use a mechanical planter behind a V-blade tractor. If so, the blade should be set to barely skim the soil surface. Avoid the immediate vicinity of burrow entrances and aprons (sandy soil area immediately in front of entrance) with all heavy equipment.

Activities around gopher tortoise burrows

Locate heavy equipment operations away from known and visibly apparent burrows, and always be cautious of tortoises that may be above ground (especially near burrows). Removing and reducing woody and invasive vegetation from around burrows is encouraged, but take care to avoid damaging the burrow entrance or the apron with heavy machinery or by felling and dragging trees. Marking burrows with stakes or flagging before timber operations, firebreak installation, road construction, and loading dock establishment, and instructing crews to maintain a buffer around the entrances will minimize the chance that burrows collapse and eggs (which are often laid in the apron) get crushed. Heavy equipment (including mowers) should stay at least 4 meters (13 feet) from known gopher tortoise burrow entrances. Heavy equipment includes (but is not limited to): agricultural tractors, crawler loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, motor grader, skid steer, forklift (P.I.T.), hydraulic excavator, and specialty tracked equipment. Do not place logging slash within this burrow buffer. Felling of trees and brush, cutting by hand, hack-and-squirt, backpack application, or use

of herbicide pellets is recommended within this buffer. When practical, minimize use of heavy equipment during September and October since hatchlings may be more numerous and may be located near adult tortoise burrows.

Mid-story hardwood control and invasive species control

On sites with advanced hardwood encroachment, prescribed fire might not be a sufficient control tool. Mechanical or chemical treatments may be needed to knock back hardwood competition to a level where it can be controlled with fire. For chemical treatments, use a selective herbicide that will control the woody competition while having minimal impact on groundcover plants. Application rates should be the minimum labeled rate required to control the target plants. For larger trees, herbicide application by stem injection (e.g. hack-and-squirt) is recommended. Spraying or other control of undesirable species should be done on a “spot” or rotational basis to protect grasses, forbs, and legumes that benefit gopher tortoises, native pollinators, and other wildlife. For foliar herbicide application to control shrubs and small hardwoods, use imazapyr, glyphosate, and/or triclopyr by directed ground spray if prescribed fire is not feasible or is ineffective due to inadequate fuel loads, unmanageable smoke hazards, prescribed fire permit bans and restrictions, or low expected mortality due to the size, density, and cover of shrubs and hardwoods.

Herbicides can be used to treat and control invasive plants such as kudzu (*Pueraria montana var. lobata*) and cogongrass (*Imperata cylindrica*). These plants left untreated can reduce native plant abundance and diversity, restrict gopher tortoise movement, or interfere with other habitat management practices. Herbicides should be chosen that will target selected invasive, exotic plants but not significantly reduce native soft stemmed plants. In order to successfully restore and maintain a suitable herbaceous layer for gopher tortoises, cogongrass infestations will need to be monitored and controlled with a target for reduction. Any equipment used in areas that have cogongrass should be cleaned before moving to other areas to prevent its spread. A pressure washer is the best tool for cleaning cogongrass seeds or rhizome material off of vehicles and equipment but should be done at the infested site and not in an area where water runoff could reach a stream. Other exotic and highly invasive plants, such as Brazilian peppertree (*Schinus terebinthifolius*), glossy and Chinese privet (*Ligustrum* spp.), Japanese climbing fern (*Lygodium japonicum*), Chinese tallow tree (*Triadica sebifera*), shrub lespedeza (*Lespedeza bicolor*), tungoil tree (*Vernicia fordii*), and kudzu should be suppressed through a combination of chemical and mechanical control measures. Overall, exotic plant species should not comprise more than 10% of the entire site. All herbicide applications must be conducted in a manner consistent with Federal law, including Environmental Protection Agency label restrictions; applicable State laws; and application guidelines as prescribed by herbicide manufacturers. Once habitat is restored by mechanical and/or chemical methods, habitat should then be maintained by prescribed fire.

Timber thinning

To remain suitable for use by tortoises, pine stands should be kept open enough to allow sunlight to reach the ground. As a rule of thumb, about half of the ground should be lit during the middle of the day, and this will require periodically thinning pines. Canopy openings and frequent fire are both vital to the health and survival of herbaceous groundcover. Grasses and forbs are

important wildlife food sources in most pine forests. When possible, harvest during drier periods and/or use low-pressure tires – which minimizes rutting and disturbance to soil structure.

Ground cover restoration

For altered lands, such as pastures, agricultural fields, or off-site pine plantations, ground cover restoration can be used to reestablish a natural plant community and create suitable gopher tortoise habitat with sufficient forage. The ground cover should include a diverse selection of native forbs and grasses. Successful regeneration of ground cover prior to longleaf pine restoration will create land that can be easily managed using prescribed burns. Native species should be used wherever possible to meet practice objectives and gopher tortoise needs. Seed mixes should be State-certified, meeting the appropriate State certification criteria as being free of state declared noxious and invasive material.

Roller chopping, mulching, and shredding

Managers can consider roller chopping for lands with excessive shrubs, palmettos, or other heavy fuels that create unsafe conditions for prescribed burns. Chopping may be preferable over mulching or shredding, which leave a dense mat of mulch that may hamper desirable ground cover response. Roller chopping should be limited to single pass with single roller. Whenever possible, a prescribed burn should follow on lands that have been roller chopped. Mulching or shredding may be used to reduce excessive shrubs, palmettos, and young undesirable hardwoods. Following this technique with a prescribed burn will promote the growth of soft stemmed plants and reduce the risk of accumulating a thick mulch-like material. Mulching or shredding may be used as a pre-treatment to areas being planted to restore native ground cover.

Mowing

Lands dominated by large pastures and fields can be maintained by mowing or bush hogging, and these activities are alternative management tools when fire cannot be used. To avoid injuring gopher tortoises, the mower blades should be at least 18 inches above the ground. In the vicinity of burrows, stay at least 4 meters (13 feet) from known gopher tortoise burrow entrances. Smaller hand mowers can be pulled or backed up to cut vegetation near the burrow as long as the burrow entrance and apron are not disturbed.

**** Information Sources:***

1. *A landowner's guide to managing habitat for gopher tortoises [FL FWCC]*
(<http://myfwc.com/media/2703292/LAP-Guide-Managing-Habitat-Gopher.pdf>);
2. *Forest management practices to enhance habitat for the gopher tortoise [GA DNR]*
(<http://www.gophertortoisecouncil.org/edu/pdf/forest-mgt-practices-gt.pdf>)
3. *Habitat management guidelines for amphibians and reptiles of the SE U.S. [SE PARC]*
(<https://docs.google.com/file/d/0B0Rlvato4N7pbkhqSUhHOXIZOVU/view>)
4. *Gopher tortoise conservation & forest management [ALDCNR]*
(<http://www.sfiprogram.org/files/pdf/gopher-tortoise-brochure/>)
5. *Department of Defense Gopher Tortoise Conservation and Crediting Strategy [USFWS]*
(<https://www.fws.gov/southeast/pdf/strategy/gopher-tortoise-conservation-and-crediting-strategy-department-of-defense.pdf>)
6. *Additional information from The Jones Center, Tall Timbers Research Station, and American Forest Foundation.*

Table 1. Suggested metrics for quality of two common habitat types occupied by gopher tortoises. Taken from: "White, R., C. Nordman and J. Rocchio. 2016. Field Manual for Rapid Assessment Metrics for Wildlife and Biodiversity in Southern Open Pine Ecosystems. NatureServe and U.S. Fish and Wildlife Service, for the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative. May 6, 2016. 36 pp."

Dry & Mesic Longleaf Pine Woodlands Metrics				
Metric	Excellent	Good	Fair	Poor
Pine Basal Area (ft ² /acre)	30-80	20 to <30 or >80 to 90	10 to <20 or >90 to 105	<10 or >105
Pine Canopy Cover	30-65%	>20 to <30% or >65 to 75%	10-20% or >75 to 85%	<10% or >85%
Midstory Cover	<20%	20 to <30%	30-40%	>40%
Native Herbaceous Ground Cover	40-98%	30 to <40% or >98%	20 to <30%	<20%
Invasive Non-native Plant Cover	very low (≤1% cover)	sporadic (1-5% cover)	uncommon (5-10% cover)	common (>10% cover)

Xeric Longleaf Pine Barrens Metrics				
	Excellent	Good	Fair	Poor
Pine Basal Area (ft ² /acre)	25-80	>15 to <25 or >80 to 90	10 to 15 or >90 to <100	<10 or >100
Pine Canopy Cover	>20 to 55%	>15 to 20% or >55 to 70%	5-15% or >70 to 80%	<5% or >80%
Midstory Cover	<20%	20 to <30%	30-40%	>40%
Native Herbaceous Ground Cover	40-100%	>25 to <40%	>15 to 25%	0-15%
Invasive Non-native Plant Cover	very low (≤1% cover)	sporadic (1-5% cover)	uncommon (5-10% cover)	common (>10% cover)