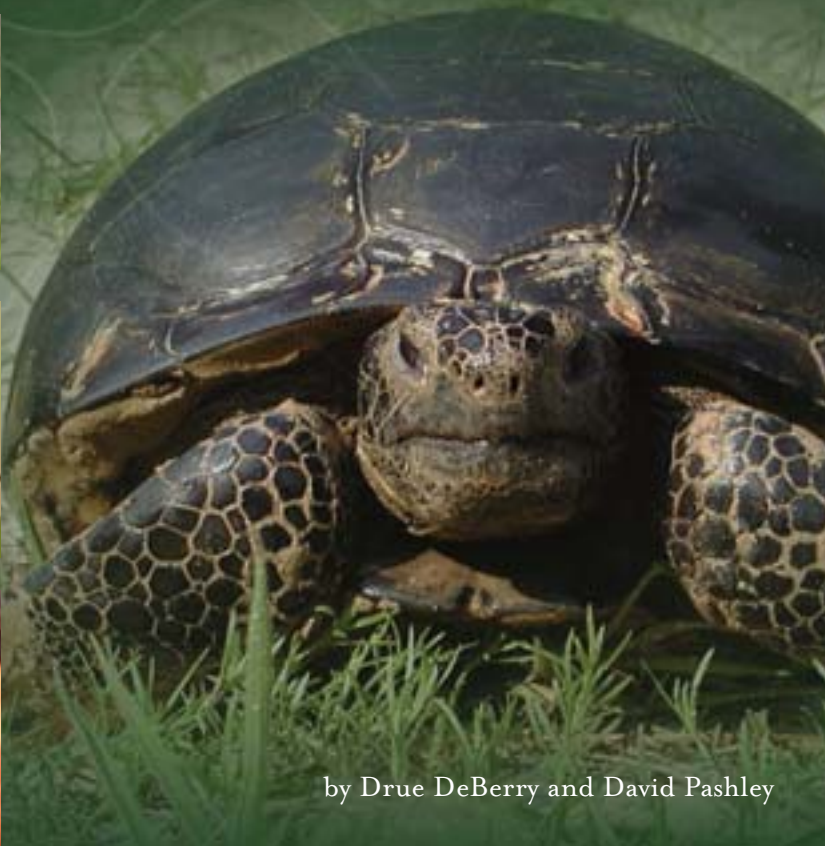


Pine Ecosystem

CONSERVATION HANDBOOK

for the Gopher Tortoise

A GUIDE FOR FAMILY FOREST OWNERS



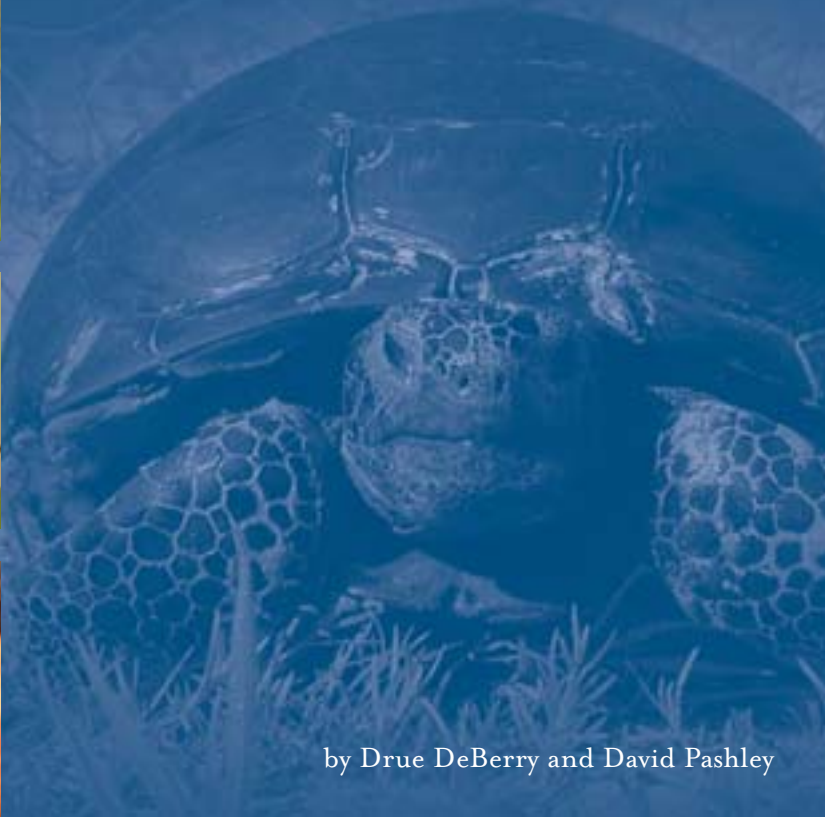
by Drue DeBerry and David Pashley

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Special thanks to those who reviewed and improved the drafts of this handbook including Robert Bonnie, Environmental Defense; Randy Browning, Mississippi Fish & Wildlife Foundation/U.S. Fish & Wildlife Service; Mark Hains, Longleaf Alliance; Dr. Glenn Hughes, MS State University Extension; Brigitte Johnson, APR American Forest Foundation; Dr. John Lambert, Tom Mann, MS Natural Heritage program; Will McDearman, U.S. Fish & Wildlife Service; Amanda Rudy, American Forest Foundation; Jenny Thompson, MS Museum of Natural Science.

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Family forest landowners attend a Forested Flyways Demonstration Field Day for gopher tortoise conservation. Families own 69 percent or 138 million acres of forestland in the South and will play an important role in the future of species like the gopher tortoise.

Introduction

“I have read many definitions of what is a conservationist, and written not a few myself, but I suspect the best one is written not with a pen, but with an ax... A conservationist is one who is humbly aware that with each stroke he is writing his signature on the face of his land. Signatures of course differ, whether written with axe or pen, and this is as it should be.”

Aldo Leopold, 1949

This “Pine Ecosystem Conservation Handbook” provides information on the plants and animals native to a functioning southern pine forest, and recommends management options to restore or conserve the woods.

This handbook was written for landowners and foresters interested in improving and conserving southern pine habitat for wildlife. Any hope of ensuring long-term

gains from conservation strategies on private lands must balance economic challenges with ecological priorities. This handbook includes strategies to improve wildlife habitat while also maintaining economic productivity of your forestland, focusing on the gopher tortoise (*Gopherus Polyphemus*).

We focus on the gopher tortoise for two reasons: [1] If you create habitat that allows the gopher tortoise to thrive, you're creating habitat that will benefit up to 300 other species dependent on the same ecosystem, and [2] If you take up the



Pine Warbler
Photo courtesy of Cornell Lab of Ornithology, by Wilson Bloomer

noble cause of conserving wildlife habitat through your forest management, your efforts should be rewarded, not punished. A **Safe Harbor Agreement**, described on page 38, will provide regulatory assurances and protect your future management options. This tool is available to landowners in the 20 counties and three parishes where the gopher tortoise is currently listed by the federal government as a threatened species under the Endangered Species Act. Landowners outside of the listed range of the gopher tortoise who are managing to improve gopher tortoise habitat can seek regulatory assurances through a Candidate Conservation Agreement with Assurances from the U.S. Fish & Wildlife Service (USFWS).



Phlox Namlis, a spring flowering pine forest phlox Photo by Drue DeBerry

“...Everything affecting the gopher tortoise’s habitat affects the tortoise and ... eventually affects all other organisms in its ecosystem. Efforts to save the gopher tortoise are really a manifestation of our desire to preserve intact, significant pieces of the biosphere. ... We must preserve ... the gopher tortoise and other species in similar predicaments, for if we do not, we lose a part of our humanity, a part of our habitat, and ultimately our world.”

Dr. George W. Folkerts
Department of Biological Sciences
Auburn University, Alabama

Background on the Gopher Tortoise

Factors leading to the endangerment of the tortoise include loss of open, fire-maintained pine forests, habitat fragmentation, human predation, and a declining density in remaining populations. The tortoise is also now threatened by two invasive species: (1) cogongrass (*Imperata cylindrica*), which crowds out native plants and interferes with fire regimes, and (2) fire ants (*Solenopsis invicta*), which kill tortoise hatchlings.



Gopher tortoise emerging from burrow
Illustration by Carol Stix

The U.S. Fish & Wildlife Service's Gopher Tortoise Recovery Plan states:

“Private lands contain the vast majority of forest containing gopher tortoises. Accordingly, maintenance of the (gopher tortoise) population is not possible without some significant successes on privately-owned timberlands... Promoting protection of habitat on private lands is difficult because of the few legal responsibilities and the perceived economic interests of landowners. Therefore, special efforts are needed on private lands.”

As private forest owners and foresters you can join in a conservation effort that will help ensure that future generations experience the rich natural heritage that is unique to the South while helping the gopher tortoise. The southern natural heritage, from the massive live oak to the lesser known gopher frog, forms your experience of the place. It is this sense of place, with all of its subtle components, that creates a home that is different from any other and will always call to you. The future of southern forests and the wildlife species dependent on them rests in the hands of family forest landowners like you. Sixty-nine percent of all forestland in the South is in what is frequently described as non-industrial ownership, but which is more accurately referred to as family forest ownership. Habitat fragmentation due to urbanization or urban sprawl is the greatest threat to the fabric of the southern pine ecosystem. Intact family forests are its greatest hope.

Indigo Bunting

Photo courtesy of Cornell Lab of Ornithology,
by Carolyn Chatterton

Market Changes

The market for forest goods like wood fiber has declined in the U.S. in recent years. This has been sharply felt by southern landowners who adapted their management to take advantage of good pulp prices. The drop in prices to current low levels is a result of a number of factors, including new cheap sources from Latin American countries like Chile and Brazil.

Eucalyptus plantations in these countries manage on seven-year rotations and produce pulp so cheaply that transport costs to the U.S. do not diminish competitiveness with





Eucalyptus plantations in Brazil cover the high ground in former rainforest

domestic supplies. This does not mean the end of the pulp market in the U.S., but it does possibly spell the end of profitable, short-rotation pine plantations. Other factors that have influenced U.S. pulp prices include the relative strength of the dollar and densely planted pines planted under the Conservation Reserve Program.

Faced with these new market conditions, many landowners have decided to shift their management focus to the production of sawtimber and poles over longer rotations. Many say that they have stands that they need to thin, but cannot afford to at current price levels. If you consider

the potential income lost for every year of lost growth because a stand has not been thinned, the question arises: "Can you afford not to thin?" Management for sawtimber and poles should not affect revenue over the long-term, but it will require more careful planning, as income to support your forest will be spread out over a longer time period.

Which species of pine?

Historically, southern forests possessed a wealth of biodiversity, including several species of pines. While a major portion of this handbook focuses on longleaf pine, it is not the only species that you can manage to conserve wildlife dependent on pine ecosystems.

If you currently have stands of loblolly and slash that will not be ready for harvest in the near future, don't be discouraged. You can manage these species to provide significant wildlife benefits. However, you might bear in mind that on many sites longleaf will outperform loblolly and slash in terms of both timber production and benefits to wildlife. Longleaf requires more effort to establish, but the rewards go to the landowner who perseveres. The idea of converting to longleaf becomes even more attractive when you consider all the cost-share programs currently available.



Spread the word

Gifford Pinchot, an early U.S. forest conservationist and the first chief of the U.S. Forest Service, believed, “We must be more than careful stewards of the land; we must be constant catalysts for positive change.” As one of more than five million family forest owners in the South, you have the opportunity to multiply your own impact by encouraging other landowners to follow your lead. You can also help build public support for this style of management by explaining to neighbors and friends the reasoning behind what you are doing.

As southern forests come under increasing pressure from urban sprawl, crucial practices like prescribed burning will come under greater scrutiny. Most folks, being disconnected from the land, will only see controlled burns as a source of air pollution – causing smog and making it unpleasant to breathe. If you can increase public understanding of the many benefits to the pine ecosystem that come from controlled burns, you will garner supporters and defenders of sustainable forestry.

Overview of the Handbook

There are many sources of information on improving forest management for the gopher tortoise, but most are written by scientists for scientists. The partners in this initiative – American Bird Conservancy, the American Forest Foundation, the American Tree Farm System, Environmental Defense, the Mississippi Fish & Wildlife Foundation, and the U.S. Fish & Wildlife Service – recognize the need for more general guidance on the process of restoring and conserving habitat for the gopher tortoise and other species on family forestlands. This guide is the result.



Working with a forester can help make your management goals a reality.

No document can provide the answers for every situation, but this handbook offers a general framework that can be used to learn about species that depend on pine habitat and how management can benefit them. This guide will provide background and context as you work on your management plan with your forester.



A 300-400 year old stand of longleaf in Georgia
Photo by Drue DeBerry

The Longleaf System Prior to European Settlement

Almost five hundred years ago, Europeans first started to explore and settle in the southeastern U.S. The early explorers traveled through vast forests of longleaf pine inhabited by American Indians and a great number of wildlife species. Scientists estimate that the longleaf forests dominated the upland areas and wetlands, except for those associated with rivers. The longleaf pine ecosystem covered the Coastal Plain from southeast Virginia south to central Florida and west to east Texas, covering approximately 90 million acres until roughly 150 years ago.

Soon after American Indians had first contact with Europeans, their populations declined significantly throughout the Americas. The most popular theory holds that

the Europeans brought pathogens (such as smallpox and measles), previously unknown to indigenous immune systems. As a result, vast areas that had been manipulated by fires set by people were left fallow. By the time European settlers started to move inland, things had changed significantly since the peak of Indian influence (2002 Southern Forest Resource Assessment).

Walk back in time...

Today, it is hard to find a forest with conditions similar to what the American Indians lived in prior to the arrival of Europeans. To better understand the forest of the recent past and the potential of southern forests today you must use your imagination. Imagine for a moment that you could go back in

time and visit the great southern forest as it appeared when the first Europeans arrived. A hunter or an avid birder would think they were in heaven. Someone who imagined finding an idyllic place untouched by human activities would be surprised to observe that the American Indians played quite a role in maintaining the landscape. Compared to many modern southern forests, you would note that the forest looked like a well managed park with an unobstructed understory and many large trees, almost all of them longleaf pine. A casual observer might think the southern forests monotonously uniform, but a sharper eye would note great variations in habitat types on a large scale to a small scale, from wetter areas to drier areas. These unique forest conditions, combined with the great variation found within them, provide habitat without which many species would not survive today.

THE ROLE OF FIRE

What conditions allowed longleaf to dominate the forests of the Southeast?

The occurrence of annual fires large and small suggests that the importance of fire cannot be overestimated. It is worth noting that pre-European fires, for the most part, did not have fire lanes to constrain them. This allowed backing, heading, and

A visit to a coastal redwood grove today might give a similar sense of place. How, you ask, was the southern longleaf forest of yesterday similar to a redwood grove? First, both longleaf and redwood evolved to dominate the forest ecosystem by having individuals grow to very large sizes compared to other tree species found in the same ecosystem. Although more light reaches the forest floor in longleaf, both are so numerous and grow so large that they dominate the canopy, or overstory, of their respective ecosystems. By dominating the canopy the trees create unique habitat conditions for understory plants and animals.

flanking fires to generate a variety of forest canopy conditions. Head fires would often crown and kill older trees along with seedlings to create openings. Cooler back fires rarely harmed longleaf pines, but would weaken some competitors like woody understory plants and seedlings of other tree species.

Fires had two ignition sources – people and lightning. American Indians used fire extensively for up to 10,000 years prior to the arrival of Europeans and had a major impact managing the land. Fire was used to create optimal hunting conditions, to clear land for crops, and as a tactical weapon in warfare. Fires also started by lightning when conditions were right. Every year, the pines would drop dry needles



A lightning struck longleaf
Photo by Randy Browning, MFWF/USFWS

to the ground, where they would build up a thick flammable layer. Needles falling onto grasses would dry even faster due to air circulation. Each spring, early in the growing season, before wet, lush growth would tend to inhibit fire, lightning strikes would occur. When strikes occurred during storms that did not include heavy rains, fires started. To have a ground fire would require the build-up of sufficient fuel, dry conditions, and a lightning strike. Fires in this ecosystem substantially increased the protein content, nutrients, and palatability of forage for game species. Longleaf pine seeds that became more plentiful as a result of fire also provided excellent forage.

Where fires reached streams and rivers, damp soil conditions often stopped them. Therefore, zones paralleling waterways – from a few dozen feet in width around small streams, to many miles surrounding a river like the Mississippi – did not burn, and provided a refuge for longleaf’s competitors. Longleaf did not tend to grow well in these zones, and therefore contributed little to fuel buildup, further reducing the likelihood of subsequent fires. These bottomlands were dominated by various hardwoods (oaks, ash, sweetgum, etc.) and loblolly pine, a species less tolerant of fires and less likely to contribute to conditions that encourage them.

The passage of a fire would leave the ground bare and blackened, with many woody competitors of longleaf killed or weakened. Seeds of competing trees continued to disperse from the bottomlands into the longleaf forest every year. Although they often germinated and began to grow, the fires burned frequently enough that many competitors were killed before they could grow large enough to withstand them. Notably, some hardwoods withstood fires and resprouted. Longleaf pine forests were remarkable in that their composition was almost all longleaf with other tree species relegated to the wet bottomlands or small patches.

Longleaf adapted well to frequent fires in other ways as well. Longleaf cones open and seeds germinate in response to fire. Young longleaf have a “grass” stage for a good reason – the long needles burn up quickly, directing the flames up and away from the protected terminal bud. So, longleaf pine creates conditions that increase the probability of fire through creation of fuel (some even speculate that adult trees attract lightning strikes), they withstand cool fires in almost all life stages, they depend on fire to free them of potentially competing tree species, and they require fire for successful reproduction. Such a species is termed “pyrogenic,” and few species of plant or animal are as effective and forceful in creating conditions conducive to their own survival and dominance as longleaf pine.

It is easy to see the essential role that fire plays in efforts to restore the forests of the South. Modern science and technology cannot improve or replace this ancient forest management tool. Without prescribed fire, the future of wildlife conservation in the South would be bleak indeed.




Longleaf in the grass stage and candelabra stage
Photo by Randy Browning, MFWF/USFWS



INHABITANTS OF THE LONGLEAF FOREST

Longleaf is not the only species that benefited from frequent fires and the type of habitat they created. Indeed, literally hundreds of plants and animals adapted to and depended on the fire regime for their continued existence. In sharp contrast to the near monoculture of the longleaf overstory, the diversity of the herbaceous understory of these forests was as great as or greater than that of any other forest ecosystem on the continent. All of these plants rebounded rapidly after fires. Like longleaf, the seeds of many of these were in the ground from previous seasons and stimulated to germinate by fire. The roots of others survived to resprout quickly post-burn. All benefited from increased access to sunlight with the removal of the incipient woody midstory species.

The animals of the longleaf forest adapted to fire by avoiding it – some ran and some chose to hide out of harms way. The gopher tortoise is the perfect example. Well-insulated burrows protected them against direct damage from fire. In addition, the almost instantaneous rebound of plants after fires provided abundant and nutritious food such as many legume species. Suppression of woody under and midstory plants also maintained the open habitat the tortoise requires. The burrows provided homes and refuge from fire not only for the gopher tortoise, but also an astonishing diversity of other animals. The only visitor that might receive an unfriendly welcome in a gopher tortoise hole is another gopher tortoise. Burrow disputes are sometimes settled through force, with the loser risking being flipped on their back. The gopher tortoise has been noted to act less territorially when it gets cold, sharing burrows to conserve heat.



Game species such as white-tailed deer, Wild Turkey, and Northern Bobwhite benefit from fire as well. Indeed, it is assumed that part of the reasoning behind setting fires by American Indians was to improve forage for these species of wildlife. Management for healthier game species through the use of fire remains as powerful a tool now as it was then.

The birds of longleaf forests grew equally dependent on and adapted to, habitat created by frequent fire. As we see in descriptions of some of the key species, all of the birds tied to this system depend on the physical structure of a functioning longleaf ecosystem - a low grass-sedge-herb understory and a missing or impoverished woody midstory. This type of physical structure could only be maintained with regular fires. A subset of this avifauna actually depended on the pine trees themselves, with the most specialized, the Red-cockaded Woodpecker, requiring not only an open midstory and longleaf pines, but old living trees as well, large enough to serve as sites in which to excavate roosts and nest cavities.

An abundance of upland game birds would have provided Native American hunters with reliable sources of food. Northern Bobwhite and Wild Turkey thrived in the pre-European forests of the South. Although these ground-nesting birds suffered occasional nest loss due to fires, they would not only renest (assuming the fire was early in their breeding season), but the young and adults would also flourish with the improved forage and open habitat created by the fires. Indeed, even today the healthiest populations of Bobwhite in the Southeast occur in fire-maintained longleaf habitat, often managed for hunting.

The longleaf forest was not monotonous, because soils, moisture, storms, and the behavior of fires created a mosaic of structural diversity. This is due in large part to the idiosyncratic nature of wildfire. A fire does not burn every square foot of a huge area in an identical manner. Winds, moisture, and fuel loads all cause a fire to meander, missing some spots altogether while violently scorching others. Gaps were easily created if areas had an inordinate buildup of woody fuel that allowed a fire to get hot enough to reach crowns and kill adult trees, or a windy storm threw down a few older individuals. There, young longleaf would thrive with access to sunlight, and grow into a dense stand of saplings, undergoing self-thinning as one tree outshaded another or as a result of fire. This would result in a new young stand in the midst of an older forest. The natural longleaf forest was a mosaic of patches of all different

sizes. It was not a static ecosystem, due not only to the changes wrought by frequent fire, but also because of the inherent dynamic nature of this patchwork.

While your tour through the ancient longleaf forest would have revealed diversity of structure, you also would have noted certain consistent qualities. The trees were almost all longleaf, and the majority of the forest was greatly thinned compared to modern standards, with trees spaced far enough apart to essentially create a feeling of savannah as well as forest. Early settlers wrote of their ability to see great distances in longleaf, and to easily drive wagons through them. There was little in the way of woody midstory to block views or movement. Those who looked down at the plants or observed the wildlife experienced an absolutely unique system, one of the most diverse and fascinating on earth.




Logging and skidding longleaf
Photo courtesy of USDA Forest Service

POST-EUROPEAN SETTLEMENT HISTORY

The first settlers on the coastal plain of Virginia quickly recognized the resource potential of longleaf forests and began to exploit them. Earliest uses were for “naval stores” used to build and maintain ships. These included tar, pitch, resin, and turpentine, as well as the tall poles for ships’ masts. Some goods were extracted from living trees, but others required harvest and burning in kilns for production. The naval stores industry, at least the portion involved in production of turpentine, persisted well into the 20th century. In the meantime, settlers cleared areas of longleaf forest for agriculture, but the forests remained healthy and widespread until a logging boom hit the Southeast in the 1870s. By the 1930s, nearly all of the longleaf throughout its range had been cut. Either through neglect or because of a poor understanding of the dynamics of longleaf, cut areas generally failed to regenerate back into longleaf, but rather converted to





other pines, notably loblolly and slash. This conversion was driven in part by a perception that these other species offered a more sound economic choice. Suppression of fire in the past century, either intentional or through creation of roads and other formidable fire breaks, kept these alternate pines on the landscape instead of longleaf. Now, longleaf dominates only approximately three percent of its original range, and only a tiny portion of that has never been cut. The longleaf pine woodland is one of the most heavily altered habitat types in North America, and it should come as no surprise that some of the creatures dependent on this system, like the gopher tortoise and Red-cockaded Woodpecker, are so endangered.

PITCHER PLANT BOGS

One of the most unique and fascinating of biotic communities within longleaf pine forests are pitcher plant bogs. These tend to occur in wet prairies in flat areas where water is retained near the surface atop a hard clay layer or hillsides where seepages mark spots where the water table hits the slope. Pitcher plants are carnivorous, attracting and consuming small insects to supplement what they receive from nutrient-poor bog soils. There are several species of pitcher plant in the Southeast, each with leaves modified to form hollow tubes (like a water pitcher). Insects attracted into these pitchers are trapped by downward-pointing hairs on the inside surface of the leaf and digested by enzymes pooled at the bottom. Other carnivorous plants, such as the tiny sundew, and a great variety of other specialized plants co-inhabit these bogs, including several species of orchids. The rather gruesome image of flesh-eating plants is overwhelmed by the exotic beauty and diversity of pitcher plant bogs. As with so many other features of these forests, the bogs depend on fire for their continued existence.



Sarracenia alata, Yellow Trumpet pitcher plant
Photo by Drue DeBerry



Longleaf growth from the grass stage to candle stage to poles
Photos by Drue DeBerry and Randy Browning, MFWF/USFWS

Longleaf Pine Ecosystem Conservation

ECONOMICS OF LONGLEAF PINE

A wise landowner will always factor economic considerations into their management decisions. Even if their primary reason for owning land is not generating income, it takes money to maintain the land and pay taxes. However, most landowners incorporate other values in addition to economics when forming management plans. Aesthetics, hunting and recreation opportunities, and leaving a remarkable legacy are often more important or as important as economics. Longleaf does not absolutely guarantee the highest economic return, but it does hold the greatest potential for realizing the maximum return on other values that may interest you.

“Economics is not my primary goal, but if it were I’d still grow and manage longleaf to produce poles and sawtimber.”

*Judd Brooke, Tree Farmer
Hancock County, Mississippi*

Landowners converted from longleaf to loblolly or slash pine in part due to economic assumptions. The forestry community perceived longleaf as difficult and therefore risky to establish. Today, after years of stand establishment, research, and trial and error, regeneration for longleaf is better understood. Using better seedlings and proven silvicultural methods, longleaf establishment is more successful today than even five years ago.

Other risk factors definitely favor longleaf over slash or loblolly. Once established, longleaf is less susceptible to loss by fire and more resistant to pine beetle infestations. Longleaf grown primarily for sawtimber or poles also offers flexibility in dealing with market conditions. A longleaf landowner who waits for improved market conditions will increase the value of his investment while he waits. A short rotation loblolly or slash landowner loses potential growth if he or she has to wait for more favorable market conditions before thinning.

During the heyday of the pulp market, longleaf could not compete with returns provided by loblolly or slash on short rotations. Recent studies by the Longleaf Alliance show that longleaf is more financially competitive than previously thought – over longer periods. Longleaf has several qualities that make it more competitive over a longer time frame – the wood is heavier and of higher quality and longleaf stands produce more high value poles. In a comparison of equal aged stands (each 39 years) only eight percent of the loblolly and 12 percent of the slash trees were graded as poles, compared with 72 percent of the longleaf, with very little difference in height or diameter. Another analysis done by the Longleaf Alliance compared the returns from longleaf grown for 66 years with two successive 33 year rotations of loblolly. The returns from longleaf were comparable and resulted in more frequent payments to the landowner.

Longleaf also has the potential to provide other sources of income beyond timber products. Many forest owners realize considerable income raking pine straw that is used for landscaping. Others have followed the model of hunt clubs and profited by leasing their forest to those seeking a high quality hunting experience.

Longleaf may appear slower growing initially, as it builds up reserves and develops its taproot while in the grass stage, but with the spurt of growth it has following the grass stage, it catches up with loblolly and slash. Its long-term health and the quality of its wood products make it an economically viable strategy for sustainable forestry.

THE LONGLEAF ALLIANCE

The Longleaf Alliance was established in 1995 to coordinate partnerships among private landowners, forest industries, state and federal agencies, conservation groups, researchers, and other enthusiasts interested in managing and restoring longleaf forests for their ecological and economic benefits. It encourages the establishment of functional longleaf forest ecosystems in today's Southern forest environment. The Alliance also serves as a clearinghouse of information on longleaf and the longleaf ecosystem. Membership is comprised of ecologists, foresters, wildlife biologists, land owners, and land managers. To learn more about The Longleaf Alliance, visit www.longleafalliance.org, email lngleaf@auburn.edu, or call 334-427-1029.



Prescribed Burn
Photo by Randy Browning, MFWF/USFWS

CHALLENGES TO ESTABLISHING LONGLEAF PINE

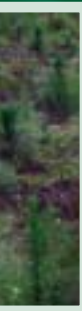
Great strides have been made in the last five to ten years to increase success rates for longleaf establishment. One thing is clear – longleaf requires very specific conditions during its early stages for successful establishment on a site. Researchers have worked diligently to refine management techniques that will increase success rates for longleaf. The following summarizes important considerations for establishing longleaf.

Competition

Planted longleaf pine seedlings are not good competitors for resources (light, waters, nutrients, etc.). Intense competition from hardwoods and other pines can lead to failure if not properly managed through fire and/or herbicidal treatments.

Site Preparation prior to Planting

If you plant a site where you have clearcut loblolly or slash pine, preparation is crucial. Loblolly and hardwoods will grow and compete for resources if not treated with a very hot fire and/or herbicides. If hardwoods are present in large numbers, both herbicide use and a very hot fire may be necessary for longleaf establishment. Herbicides work best when applied prior to a prescribed burn, as greater leaf area is available for absorption.



Photos by Randy Browning, MFWF/USFWS

After Planting

There are two things to watch for – competition and brown-spot needle blight. In most cases you will want to run a prescribed burn through the stand one year after planting. This will control competition from grasses and hardwoods while killing the blight. You should strip head (set a series of lines of fire upwind of a firebreak) fires to avoid holding heat on the buds of longleaf in the grass stage. In cases where herbaceous competition is intense, you may need to apply an herbicide treatment in addition to the prescribed burn.

Type of Seedlings Planted

Bare-root seedlings are less expensive than containerized seedlings, but survival and growth rates are better for containerized seedlings. Plant either as soon as possible after lifting from the nursery.

For more detailed information on challenges to establishing longleaf, refer to the “Landowners Handbook for the Restoration and Management of Longleaf Pine” published by the Mississippi Fish & Wildlife Foundation and the U.S. Fish & Wildlife Service (www.wildlifemiss.org or 662-686-3375).



Brown-spot needle blight on longleaf
Photo by Randy Browning, MFWF/USFWS



Uneven-aged management in a longleaf stand
Photo by Drue DeBerry



Pine Ecosystem Conservation Management

HARVEST OPTIONS

There are basically three long-term options available to a forest owner (of longleaf, loblolly, or slash) who wants to manage a stand to improve wildlife habitat. In rare cases, a stand could be left uncut, managed with fire and other treatments, and provide wildlife benefits. However, most stands can provide greater benefits if trees are thinned and selected to accelerate growth. One method is to impose an uneven aged harvest regime. Another is to manage on an even-aged schedule. Advantages and disadvantages exist for each choice.

The “no harvest” option might seem like the most beneficial to wildlife, but this would only hold true under ideal initial conditions (appropriate basal area, preferred

species composition, etc.) and for certain species. A major disadvantage of this option is that it does not provide much income to help with maintenance or burning costs. This makes it an unaffordable option to the majority of landowners.

Uneven-aged management involves selectively harvesting individual trees or groups of trees with some frequency over time, but always maintaining the overstory or forest canopy. This strategy produces high value products, and can maximize income over time while retaining a diversity of habitat for wildlife. The landowner relies on natural regeneration to replenish the forest as individual trees are removed over time. This avoids the expense of planting when done successfully. Although



Photos by Randy Browning, MFWF/USFWS

this allows flexibility in determining the timing and intensity of harvest, this method also calls for more sophisticated management techniques.

An even-aged management strategy entails either clearcutting, a seed-tree cut, or a shelterwood cut once market size is reached. Regeneration is achieved by planting trees after clearcuts, or naturally when doing a seed-tree or shelterwood cuts. For a landowner interested in maximizing profit this provides an opportunity to plant genetically improved trees. It also makes it easier to convert from loblolly or slash to longleaf. The long-term benefits to wildlife can be substantial from even-age management, and the early successional conditions post-harvest offer valuable habitat (albeit temporary) to an entirely different suite of important species.

Although clearcuts can have short-term detrimental impacts on certain wildlife species, the positive aspects should also be considered. This treatment maximizes fiber production (though not necessarily income) and is, in some ways, a simple management application. The challenges to the landowner lie primarily in successful regeneration of desired forest conditions.

Another option for converting loblolly and slash is under-planting longleaf in heavily thinned stands where fire has controlled hardwood competition. Leaving some larger non-longleaf pines will maintain diverse physical structure and aesthetic value.

IMPROVING WILDLIFE HABITAT IN AN EXISTING LONGLEAF STAND

Regardless of the harvest strategy chosen by a landowner, there are ways to improve most existing longleaf stands. Careful consideration of existing conditions and potential stand improvements at the beginning of any management regime can improve the trajectory of conditions over time. The overstory, midstory, and understory must all be examined in this process.

For the overstory, ask yourself whether the current tree species composition is what you ultimately want. Are there too many hardwoods? If so, and if they are too large to kill with a relatively cool ground fire, then consider mechanical removal. If you find the species composition acceptable, is the density of trees per acre (more commonly referred to as your basal area and expressed in ft^2/acre) in the right range for your stand? Basal area provides an easy way to understand how much competition exists for resources (light, water, nutrients, etc.) among trees within a given area. When basal area is lower you generally have fewer trees that grow faster. When basal area is higher trees tend to grow slowly. Important to wildlife, as basal area gets higher less light reaches the forest floor reducing or even eliminating ground cover. There is no ideal basal area; however you do want to keep it low enough so that enough sunlight is reaching the ground to allow

grasses and forbs to grow. These plants provide food for grasshoppers and other insects which are eaten in turn by Northern Bobwhite and Wild Turkey. The plants also provide cover to the Bobwhite in addition to providing forage for the gopher tortoise. The target basal area for your stand also depends on the site index of your site. Stands with higher site indexes can support higher basal areas and still remain very productive, with light being the limiting factor. As a general rule of thumb a basal area



Longleaf stand with a very high basal area — this limits understory growth and wildlife habitat quality
Photo by Drue DeBerry

range between 60 – 90 ft²/acre will provide good wildlife habitat. In comparison, longleaf pine stands managed for sawtimber production are usually kept in the 70 - 80 ft²/acre basal area range. Stands managed to maximize quail habitat usually range from 30 – 60 ft²/acre. Ultimately, you should consult with your forester to determine the ideal range for your management goals.

A midstory in a healthy longleaf pine forest should be essentially non-existent, save for occasional young longleaf trees. Controlled burns can reduce a moderate amount of woody growth, but dense growth has the potential to carry a fire hot enough to kill adult trees. In those situations, consider mechanical removal or use of herbicides.

You might be surprised to find out that the understory plays a major role in determining the quality of wildlife habitat in a forest. You can have the best stand of trees around, but without the right understory your efforts to create wildlife habitat will bear little fruit. An inventory of your understory will determine your conditions. Ideally you will have a diversity of native grasses, sedges, and forbs. If you find the understory dominated by woody seedlings or, worse, invasive non-native species such as cogongrass you will need to form a plan to change things. Woody seedlings will succumb to prescribed fire, but a serious invasion of undesirable species could require herbicide treatments before fire can adequately maintain conditions. As you will learn later in the handbook, the last thing you would want to do to cogongrass is burn it.

“I’ve really been able to see how burning and controlling hardwoods in the understory has increased wildlife, especially bobwhite quail.”

*Orby Wright, Tree Farmer
Lamar County, Mississippi*

IMPROVING AN EXISTING LOBLOLLY OR SLASH STAND

You may find it impractical to consider converting any of your stands to longleaf in the near future. As with most things, timing is essential. However, if you manage your stand by following the recommendations made in the longleaf pine section, you can provide very significant benefits to wildlife. In fact, the first landowner to enter into a Safe Harbor Agreement for the gopher tortoise provides significant benefits by adjusting the management of his loblolly.

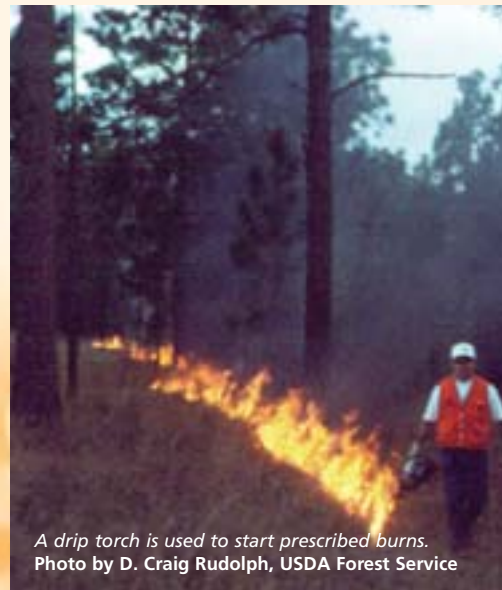
All of the species featured in this brochure can persist, and in some cases thrive, in well-managed stands of these other pine species. Even Red-cockaded Woodpeckers sometimes live and nest in loblolly woodlands. The principles of beneficial wildlife management are similar to those for longleaf. Maintenance of a low stocking density, elimination of a woody midstory, and use of fire (or in some cases herbicides) to maintain a healthy ground cover will improve wildlife habitat. Some details of application will differ from longleaf management, so you should seek the advice of a forester when modifying your management plan.

THE IMPORTANCE OF FIRE: Conducting a Prescribed Burn

As noted throughout this handbook, the most important force and management tool to create or maintain healthy pine conditions is fire. Most of the plants and animals unique to the southeastern forest require occasional hot (growing season) burns as well as cooler (dormant season) burns to control hardwoods and maintain the herbaceous layer. There are a number of considerations, however, in creating a useful fire management program. Remember there is an art to the science of prescribed burns. When you first start as a novice, talk with other landowners to learn from their experiences. When a seasoned veteran, share what you learned with your neighbors. A note of caution: stands that have been excluded from fire need to be eased into a prescribed fire regime slowly to avoid killing trees.

TIMING:

The first issue to consider is timing. The time of year you choose to burn influences the intensity and effectiveness of the burn. Winter fires tend to burn cooler and are easier to manage than growing season fires. However, studies indicate that plants, and therefore the animals, respond much more favorably to growing season burns. When you first start to incorporate prescribed burns in your management plans, you will often find too much woody



A drip torch is used to start prescribed burns.
Photo by D. Craig Rudolph, USDA Forest Service

fuel to allow for a safe growing season burn. In this case, one or more winter burns provide a reasonable way to begin a fire program. Once fuel conditions are under control the optimal timing for fires is generally early in the growing season. However, varying the precise time of application mimics natural conditions and is best for the plants and wildlife.

FREQUENCY:

Frequency is a second issue to consider. Some years you will miss a season because conditions are either too wet or too dry. Depending on conditions, you will usually have enough fuel built up to set a second burn three to four years after the previous burn. You need not burn at the first opportunity, but if you do not burn one year you may be unable to burn the following year due to unfavorable conditions. If you wait more than seven years, the fuel buildup can potentially accumulate enough to create a fire that is difficult to control – a dangerous situation. More productive sites require shorter burn intervals (2-3 yrs) while extremely xeric (dry) site can tolerate longer burn intervals (4-6 years). Consult with your forester to figure out the best plan for your forest.

COVERAGE:

Coverage is another important consideration. Natural fires do not burn an area evenly, but rather leave hot spots and unburned spots. The variation that results is an asset to a forest. For this reason you should avoid burning in wet draws and streamsidess. This will help to conserve patches or strips of hardwoods or loblolly that provide great benefits to wildlife.

SAFETY:

The final issue is the most important – safety. If a fire gets out of control it can destroy property or even worse threaten human lives. Safety is critically important, and landowners are very strongly advised to use the services of professional burn crews to keep a fire contained. Smoke threatens public safety by impacting visibility on roads and reducing air quality. Problems should be minimized, and the benefits of fire praised to the public to counter the potential negative results of its use.

PRESCRIBED BURN REGULATIONS

Most southern states have recognized through legislation the importance of prescribed burns to maintaining healthy forests and wildlife habitat. The public good outweighs the negative aspects, so legislation seeks to preserve a legal climate that will not discourage prescribed burning. The next section provides details for Alabama, Louisiana, and Mississippi. The acts are basically designed to limit burners' civil liability for damages or injuries resulting from fire or resultant smoke and to provide protection from spurious nuisance suits.

Three conditions must be met before burners can gain the liability protection established in these acts. The first condition is the presence of at least one certified burner at all times until the burn is completed. The second condition is the development of a written fire prescription or plan. The third is adherence to the rules and notification and permit procedures established under other laws (2002 Southern Forest Resource Assessment).

STATE PRESCRIBED BURNING REGULATIONS

Alabama

Permits are free of charge and can be obtained by calling the Alabama Forestry Commission's (AFC) toll free 1-800 number, located in the front cover of your local telephone directory. You will need to provide the AFC representative with basic information including the landowner and responsible party's name, telephone number, type of burn, number of acres, the section, township and range of the area to be burned, and the time and date the burning is to occur.

The Alabama Prescribed Burning Act - No property owner conducting a prescribed burn in compliance with this article, will be liable for damage or injury caused by fire or resulting smoke unless it is shown that the property failed to act within that degree of care required of others similarly situated.

Mississippi

In conjunction with the Department of Environmental Quality, the Mississippi Forestry Commission issues burning permits based on the daily fire weather forecast. Permits are required for any fires set for a recognized agricultural and/or forestry purpose.

The Mississippi Prescribed Burning Act - States that no property owner or agent conducting a prescribed burn pursuant to the requirements of this section will be liable for damage or injury caused by fire or the resulting smoke unless negligence is proven.

Louisiana

The Office of Forestry administers the Certified Prescribed Burn Manager Program, which is designed to promote the safe and effective use of prescribed fire in the management of natural resources. Contact your Louisiana Office of Forestry District Office for more information.

La. Rev. Stat. Ann. § 3:17 (2002) - States that prescribed burning is a land management tool that benefits the safety of the public, the environment, and the economy of Louisiana. Authorizes the practice of prescribed burning and provides definitions.

LANDSCAPE CONSIDERATIONS

While management of an individual stand can have huge impacts on the well-being of key wildlife species, animals also respond to conditions over a much greater area. "Landscape considerations" is the ecology phrase used to describe this situation. Smaller stands support smaller populations, which are then more at risk than larger populations. Every landowner who decides to modify their management to improve wildlife conditions makes a great contribution. But the greatest benefit comes from landowners' efforts as a community. For this reason, you will greatly multiply the impact of your efforts if you interest your neighbors and friends to consider the conservation management strategies in this handbook.

You can raise awareness of this conservation initiative by following the directions at the end of the handbook and applying for the Gopher Tortoise Habitat Conservation sign.



A Common Yellowthroat has been duped into raising a Cowbird. Cowbirds, an edge species, replace the Common Yellowthroat's eggs with their own.

Photo courtesy of Cornell Lab of Ornithology, by John Gavin

An isolated stand, one surrounded by conditions such as pasture, row crops, or semi-urban conditions, is less likely to be colonized by desired animals and can suffer higher predation rates from animals such as raccoons, feral cats, or crows that are common in those surrounding conditions, than would be a stand embedded within a largely forested situation.

NON-NATIVE INVASIVE SPECIES

Non-native invasive species frequently cause economic and ecological harm. For landowners, eradication of invasive species requires precious time and resources. For the biodiversity of an ecosystem, invasive species are a threat second only to habitat loss. In this handbook, we mention only two common and damaging invasive species, although there are more. The state or federal offices that you contact to learn about cost-share assistance programs will also provide valuable information on eradicating invasive species. Invasive species pose such a threat that there are often special technical and cost-share assistance programs set up to fight them.

Cogongrass is considered one of the top ten worst weeds in the world. It grows in full sunlight to partial shade, and, thus, can invade a range of sites. It often grows in circular infestations with rapidly growing and branching rhizomes forming a dense mat to exclude most other vegetation. Cogongrass aggressively invades right-of-ways, new forest plantations, open forests, old fields, and pastures. It is absent in areas with frequent tillage. It colonizes by rhizomes, spreads by wind-dispersed seeds, and is promoted by burning. Cogongrass is highly flammable and a severe fire hazard, burning extremely hot especially in winter. Cogongrass actually burns 20 degrees hotter than plants



Trees damaged by burning Cogongrass
Photo by James H. Miller, USDA Forest Service

usually found under pines, hot enough to kill even longleaf pine. Treatment with herbicides, though not cheap, is the best way to get rid of Cogongrass before it spreads rapidly and becomes a more expensive problem.

Kudzu also known as The Vine That Ate the South, has unfortunately become a common fixture in many places. It occurs in places previously infested, along right-of-ways and stream banks. Kudzu forms dense mats over the ground, debris, shrubs, and mature trees by twining on objects less than 4 inches (10 cm) in diameter. It colonizes by vines rooting at nodes and spreads by wind-, animal-, and water-dispersed seeds.



Cogon bloom
Photo by Randy Browning,
MFWF/USFWS

ERADICATING AND CONTROLLING INVASIVE SPECIES

The best defense against invasive species is constant surveillance of right-of-ways, streambanks, and roads and trails combined with effective control measures at the first appearance of new arrivals. Early detection and treatment will minimize efforts and costs that come with treating well-established plants or full-blown infestations.

Herbicides are generally accepted as the most effective way to control and eradicate Cogongrass and Kudzu. Herbicides used improperly can be injurious to humans, animals, and plants. Follow the directions and heed all precautions for herbicides.

For more detailed information on invasive species visit www.invasive.org



Gopher Tortoise
Photos by Randy Browning, MFWF/USFWS



Wildlife in the Pines

GOPHER TORTOISE

The gopher tortoise is a southeastern pine species that faces an uncertain future, as reflected by its status as a threatened species in part of its range (southern Mississippi, southwestern Alabama, and the Florida parishes of Louisiana) under the Endangered Species Act. The gopher tortoise range extends as far east as Florida and north to South Carolina where populations are also under pressure due to habitat loss.

The gopher tortoise prefers open, frequently burned longleaf pine forests, but is also found in loblolly or slash pine habitat, when conditions are appropriate. These conditions include a low basal area, an absence of a dominant woody mid-story (hardwoods and shrubs), and a lush and diverse grass and forb (non-woody plant other than grass) understory. These conditions can be achieved through thinning and burning, although use of herbicides may be necessary if hardwood

STATE	STATUS
GEORGIA	state listed Gopher Tortoise as a Threatened Species
FLORIDA	state listed as a Species of Special Concern
SOUTH CAROLINA	state listed as an Endangered Species
MISSISSIPPI	state listed as a Threatened Species; federally Threatened
ALABAMA	protected non-game species; populations west of the Tombigbee and Mobile Rivers are federally listed as a Threatened species
LOUISIANA	federally listed as a Threatened species

and shrub encroachment is excessive. Intensive mechanical and chemical site treatment should be avoided except when necessary for habitat restoration. Burrows should also be clearly marked and avoided during equipment operations.



The optimal basal area depends heavily on the site index (a measure of growth potential) of a stand. On some sites habitat may still be suitable with the basal area as high as 90ft²/acre. Generally, the target basal area should be 60-80ft²/acre or below. You should establish a basal area spectrum - from a high point when thinning is required to the low point that is reached once a stand is thinned. An ideal basal area spectrum will promote tree growth for sawlogs and timber as well as creating gopher tortoise habitat.

One of the problems for the gopher tortoise is its life history. While they can live to a ripe age of 60 or so, they do not reach reproductive age until they are 16 to 21 years old. They produce fewer offspring as they age, and of course, are not rapid dispersers. Although it may seem that there are still a number of gopher tortoise out there, the current generation is aging and suffering lower reproductive success due to degraded habitat conditions. While still relatively common, as older gopher tortoise die they are not being replaced by young ones. The recommendations included in this handbook will improve habitat for the gopher tortoise. Landowners who manage to improve habitat for gopher tortoise on their property are strongly encouraged to enter into a Safe Harbor agreement.



Red-cockaded Woodpecker
Photo by Phillip Jordan

Safe Harbor has been well received by landowners. Over 500,000 acres of southern pineland in Georgia, North Carolina, South Carolina, Texas, and Virginia are enrolled in the program containing over a quarter of all Red-cockaded Woodpeckers found on private lands.

RED-COCKADED WOODPECKER

The Red-cockaded Woodpecker is the only southeastern pine-dependent bird listed under the Endangered Species Act, reflecting its reliance on fire-maintained, mature pine stands. It is clearly the most specialized and demanding bird on this list, and also the rarest. The only North American woodpecker that is colonial, its family groups consist of a breeding pair and usually three to seven former offspring. The size of a group's territory

averages 125 acres and centers on plots of 60 to 300 year old living trees. The woodpecker prefers longleaf for both nesting and foraging habitat but will also use slash, shortleaf, loblolly, or other pines where longleaf is absent. They avoid hardwood forests or any situation with a dense hardwood understory. Most Red-cockaded Woodpeckers today exist on public lands – about 20 percent of all woodpeckers are found on private lands. Fortunately for private landowners, Safe Harbor agreements encourage management for habitat suitable for this woodpecker while offering insurance against onerous regulatory limitations. There is great hope that this species will thrive on both public and private lands into the future.



Northern Bobwhite
Photo by Randy Browning,
MFWF/USFWS

NORTHERN BOBWHITE

The Northern Bobwhite is a beloved upland game bird and hunting for it is a big part of the rich Southern rural heritage. Unfortunately, this highly valued species has undergone a severe population decline over the past three decades. Current estimated numbers reflect at least a 65 percent drop. These declines have been particularly dramatic in Mississippi and Louisiana, where current populations are 90 percent smaller than those of 25 years ago. This quail species thrives in large

blocks of native grassland, with or without a tree canopy. Although often associated with mixed agricultural settings with ample amounts of grass and shrubs, highest densities occur in well-managed longleaf pine stands. The main causes of decline are related to “cleaner” agriculture, replacement of native grasses by exotic species, reduction in the size and fragmentation of blocks of suitable habitat, and pine stands without fire management becoming choked with woody undergrowth and unsuitable for bobwhite. Like all the other species on this list, Northern Bobwhite populations stand to become much healthier if the recommendations in this handbook are implemented.

Bachman's Sparrow
Photo courtesy of Cornell Lab
of Ornithology, by Charles Platt



BACHMAN'S SPARROW

Perhaps not as conspicuous as some other species, Bachman's Sparrow is nonetheless one of the most characteristic birds of southeastern pine habitat. It also depends on an open understory dominated by native grasses, and can do well either in fire-maintained pine forest or other grassland situations. It expanded its range northward early in the 20th Century, probably in response to new habitat created by farm

Brown-headed Nuthatch
Photo courtesy of Cornell Lab of
Ornithology, by Betty Darling Cottrille



abandonment. As farmland grew into mature forest and fire was suppressed throughout the area, both population size and range contracted significantly. Its former name, Pine Woods Sparrow, speaks volumes regarding its habitat affinities and its potential to benefit from improved southeastern pine habitat management.

BROWN-HEADED NUTHATCH

The Brown-headed Nuthatch is relatively common in pine forests. People often see or hear them in small family groups, foraging for insects high in the branches of the canopy. Its association with mature pines may make it a good indicator of the health of Southeastern pine forests, and its steady population decline in recent decades speaks poorly of that health. Causes of that decline go back to the same problems faced by other species - fire suppression, hardwood intrusion, conversion of longleaf to other species, and loss and fragmentation of habitat. If this conservation effort is a success, populations of this bird may make the quickest and most noticeable recovery.

HENSLOW'S SPARROW

Unlike the other birds on this list, all of which are year-round residents of Southeastern pinelands, Henslow's Sparrow is a migrant that just spends winters in this habitat. It is one of the highest conservation priorities in the Northeast, from Oklahoma



Henslow's Sparrow
Photo courtesy of
Cornell Lab of
Ornithology,
by Betty Darling
Cottrille

to New York, where it is dependent on grasslands with tall, dense vegetation and thick litter. In winter, the secretive bird is little known and rarely seen as it skulks in the grassy understory of pine forests. It prefers relatively open savannah situations, and is particularly dependent on the type of grassy ground cover that results from fires. It is one of those migratory birds that may be suffering greatly due to deterioration of habitat conditions in both its breeding range and its wintering range.

BLACK PINE SNAKE

The black pine snake is perhaps the rarest of the animals featured in this handbook, and is currently a candidate for federal listing. It is an isolated subspecies of a complex of pine snakes that is historically limited in distribution to the northeast corner of the Florida parishes in Louisiana, where it is now apparently extirpated, and a few counties in southern Mississippi and a portion of Alabama west of the

Mobile River Delta.

Within this small range, the snake occupies sandy, well-drained upland soils with an overstory of longleaf pine, a fire suppressed mid-story, and dense herbaceous cover. They occasionally use gopher tortoise burrows as retreats and winter den sites though they prefer

stump holes. As with many southern pine dwellers, ideal black pine snake habitat is dependent on fire. It is perhaps in more trouble than the others because it requires a larger home range. Therefore, it is particularly harmed by forest fragmentation. The black pine snake also has a low reproductive rate, and is commonly mistaken for a poisonous snake and killed. The black pine snake is actually a friend to forest owners, feeding on mice and other small mammals that damage seedlings.

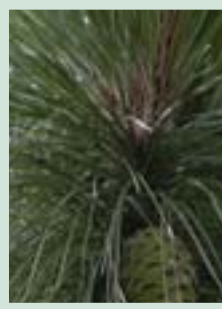


Black Pine Snake
Photo by Terry Vandeventer



Safe Harbor Agreements:

Protecting Endangered Species without Fear of Increasing Regulations



Fire-maintained, southern pine forests produce both ample wildlife populations and income from timber harvests. Some landowners worry, however, that managing southern pine forests in ways that benefit rare wildlife can also result in increased regulation under the federal Endangered Species Act if, as a result of good land stewardship, endangered species take up residence on the property. Since the Act prohibits destruction of occupied habitat, many landowners fear that doing good by endangered species may cost them the flexibility to manage their property as they wish.

Indeed, most southern landowners have heard stories of other landowners who have prematurely harvested timber or otherwise changed management on their land so as to avoid creating habitat for Red-cockaded Woodpeckers or other federally-endangered species. Fortunately there is a new tool available, Safe Harbor Agreements, that allows landowners to manage their lands for wildlife without fear of increased regulation under the Endangered Species Act.

Safe Harbor was first developed in the North Carolina Sandhills for the Red-cockaded Woodpecker. Under the program, landowners agree to protect existing populations of endangered species and to undertake proactive conservation measures to benefit those species. In the Sandhills, landowners might agree to use prescribed fire, plant longleaf pine, protect mature trees as possible nest sites, drill artificial cavities, or other activities that benefit the woodpecker. In exchange, the landowner receives an assurance from the U.S. Fish & Wildlife Service that if the population of woodpeckers on the property increases, the landowner will not be subject to additional regulation under the Endangered Species Act.

Safe Harbor has been well received by landowners. More than 500,000 acres of southern pineland in Georgia, North Carolina, South Carolina, Texas, and Virginia are enrolled in the program containing over a quarter of all Red-cockaded Woodpeckers found on private lands. Nationwide, well over two million acres are enrolled in over a dozen states for a variety of endangered species. Safe Harbor is also benefiting



endangered species as landowners are rolling out the welcome mat for rare animals and plants while continuing to manage their lands for timber, crops, and/or livestock.

In Mississippi, the first Safe Harbor agreement was developed for Dr. John Lambert's 750-acre property in Sumrall. "Any manager hates surprises and wishes to avoid them. The Safe Harbor program helps me to do that. It lets me know where I stand in relation to present or future regulations," says Dr. Lambert. Under the agreement, Dr. Lambert will agree to maintain and manage habitat for the dozen or so federally threatened gopher tortoises he has on his property and he will also open up many of his loblolly pine stands through thinning, use of prescribed fire to encourage lush herbaceous vegetation, and mechanical and chemical control of hardwoods and other invasive species. In return, if Dr. Lambert's population of tortoises increases, he will not be subject to additional regulation that might prevent him from harvesting timber in habitat that is today unoccupied by tortoises. He is also protected if Red-cockaded Woodpeckers decide to colonize his property.

The USFWS is currently developing a Safe Harbor program that will make it easy for landowners to enroll in the program. In order to participate, landowners will have their property surveyed to establish baseline habitat conditions, and will then sign an agreement providing that they will undertake activities to benefit the gopher tortoise (and the Red-cockaded Woodpecker, if the landowner desires). The USFWS and other organizations are also making funding available to help support habitat restoration on private lands. As long as landowners abide by the agreement, they will be able to harvest timber or conduct other habitat-altering activities on their property so long as they maintain the same amount of suitable, occupied habitat as was present on the property when the agreement was signed.

Safe Harbor is, of course, entirely voluntary. For many landowners, it provides a useful insurance policy that allows them to be good stewards of their land without having to worry that they might run afoul of the Endangered Species Act.



Photo by Randy Browning, MFWF/USFWS

Cost-Share Opportunities

There are a number of cost-share programs to assist forest landowners with the conservation practices described in this handbook. These programs are designed to provide financial incentives for voluntary participation of landowners in conservation efforts. The programs also recognize that conservation practices provide a social benefit while incurring an expense to the landowner, so they help decrease these costs. The process of seeking cost-share funds can be complex and at times confusing, but perseverance pays off in the end. You will find that with each experience the process becomes easier. Seek advice from your forester and from landowners who have successfully participated in the programs.

FEDERAL PROGRAMS

The availability of federal financial cost-share assistance varies at the state and local levels. The USDA Natural Resource Conservation Service (NRCS) administers the Environmental Quality Incentives Program (EQIP) and the Wildlife Habitat Incentives Program (WHIP). At the state level, state working committees determine which practices are eligible for funding at what level and then distribute the funds to counties where the funds are distributed to landowners. At the county level, working groups determine which practices will take priority in the application process. EQIP and WHIP cost-share up to 75 percent of the costs of conservation practices. You must also sign an agreement that the improved area will be properly managed for 1-10 years for EQIP and 5-15 years for WHIP. To find out if cost-share assistance is available for the conservation practices you are interested in, contact your local NRCS office.

State forestry agencies administer the federal Forest Land Enhancement Program (FLEP). The state agencies set the funding priorities for FLEP so that it complements cost-share opportunities through state programs. These funds are intended specifically for family forestlands (non-industrial). FLEP covers up to 75 percent of costs and requires an agreement of 10 years or more. Contact your local state forest agency to learn more.

U.S. FISH & WILDLIFE SERVICE PARTNERS FOR FISH & WILDLIFE

Individual landowners can become involved by contacting the USFWS Partners for Fish & Wildlife in your state. A biologist will contact you to discuss your needs, the opportunities available, and assist you as possible. If your project meets certain criteria, the USFWS may share or pay some of the costs.

U.S. FISH & WILDLIFE SERVICE PRIVATE STEWARDSHIP GRANTS PROGRAM

The Mississippi Fish & Wildlife Foundation is administering a limited amount of cost-share funding received from the USFWS for the Gopher Tortoise Conservation Initiative. Landowners interested in applying for funding to engage in management that will directly benefit gopher tortoise should contact Randy Browning by phone (601) 264-6010 or by mail at PO Box 16533, Hattiesburg, MS 39404. Priority will be given to landowners entering into Safe Harbor Agreements for the gopher tortoise.

STATE PROGRAMS

Mississippi

The Forest Resource Development Program (FRDP) provides financial assistance to eligible landowners for establishing and improving a crop of trees. This program helps offset a landowner's expense by sharing the cost of implementing specific forestry practices designed to produce timber and enhance wildlife development. Cost-share payments can cover 50 to 75 percent (depending on the practice) of the total cost of implementing one or more forestry practices, but cannot exceed a maximum limit set for each individual practice. Eligible landowners can receive up to \$5,000 of FRDP assistance a year.

In turn, a landowner agrees to protect the area receiving FRDP assistance from fire and grazing and to properly manage the area for a minimum of ten years.

Contact your Mississippi Forestry Commission county office for more information.

Alabama

The Alabama Agricultural and Conservation Development Commission Program (AACDCP) provides up to 60 percent cost-sharing for practices aimed at erosion control, agricultural water quality improvement, and improving forest resources. Forestry practices include tree planting, site preparation for natural and artificial regeneration, and timber stand improvement. Erosion control and water quality improvement



practices are also available. To qualify for participation, landowners must apply for treatment on at least one acre. To receive payment, practices must be performed according to the specifications of the site-specific management plan. Timber stand improvement practices must be maintained for five years. All other forestry practices must be maintained for 10 years.

Contact your Alabama Forestry Commission Regional Office for more information.

Louisiana

The Forestry Productivity Program (FPP) provides financial assistance to eligible landowners for establishing and improving a crop of trees. This program helps offset a landowner's expenses by sharing the cost of implementing specific forestry practices designed to produce a timber crop.

Cost-share payments cover 50 percent of the total cost of implementing one or more forestry practices, not to exceed a maximum limit set for each individual practice. Eligible landowners can receive up to \$10,000 of FPP assistance each fiscal year.

Each landowner who participates in a FPP cooperative agreement with the Louisiana Department of Agriculture and Forestry (LDAF) shall be required to maintain the forestry usage for a period of 10 years. If land is sold, conveyed, etc. before the end of the agreement, the original recipient of funds is bound to the agreement unless the new owner assumes responsibility in writing.

Contact you LDAF District Office for more information.





STATE	NUMBER OF TREE FARMERS	TREE FARM ACREAGE	% OF FORESTS IN FAMILY OWNERSHIP
ALABAMA	2,597	2,380,555	73%
LOUISIANA	2,137	1,269,723	63%
MISSISSIPPI	3,778	1,583,903	72%

The American Tree Farm System

*Brenda and Orby Wright,
2002 Mississippi Tree
Farmers of the Year
Photo by Randy Browning,
MFWF/USFWS*

Take a drive through the countryside, and chances are, you'll come across a forested property displaying the familiar diamond shaped green and white American Tree Farm System (ATFS) sign. If you own forestland, you may wonder why and how one becomes a Certified Tree Farm. Or perhaps, you have been a Tree Farmer for years.

The roots of ATFS run deep – it is the oldest and largest conservation, education, certification, and advocacy program for private forest landowners in the United States. It all began in 1941 when the first Tree Farm was designated in the state of Washington to show private forest landowners ways to manage their forests. Since its founding, ATFS has recognized and encouraged sustainable forest management on private forestland.

Nationwide, ATFS counts 51,000 family forest owners, managing 33 million acres of non-industrial private forests.

What does it mean when a forest landowner proudly displays the Tree Farm sign? It means a qualified volunteer forester has visited the landowner and provided them with free advice and recommendations that increase the health, productivity, and longevity of their forest, and the importance of managing for wood, water, wildlife, and recreation. It also means the property has been certified by a professional forester as being sustainably managed for the future. Landowners who enroll their forestland in ATFS are following a management plan that meets the American Forest Foundation's (AFF) Standards of Sustainability for Forest Certification, demonstrating a commitment to stewardship of the land.

Enrollment in ATFS is free, thanks to the 4,500 qualified volunteer inspecting foresters across the country. These specially trained professional foresters work individually with landowners to determine if AFF's standards and guidelines are met, and if so, provide the landowner with a certificate and Tree Farm sign to display on the property. A landowner's property must be reinspected every five years to maintain ATFS certification status.

Certified Tree Farmers gain access to a special set of learning opportunities. They receive Tree Farm newsletters and bulletins from their own state Tree Farm committees and they can subscribe to the award winning Tree Farmer Magazine. Certified Tree Farmers are eligible to compete in local, state, regional and national Outstanding Tree Farmer of the Year contests. Additionally, Tree Farmers are invited to the annual National Tree Farmer Convention, conferences, field days, study tours, and seminars that teach them how to become even better forest stewards.

Forest products companies that participate in the Sustainable Forestry Initiative® Program recognize ATFS Tree Farms as a source of certified wood, positioning America's Tree Farmers as preferred suppliers to forest industry. The diamond shaped green and white ATFS sign displayed on a property is the sign of sustainable forestry.

For more information about the American Tree Farm System, call 888.889-4466 or visit www.treefarmssystem.org.

Contact Information

Under a grant from the U.S. Fish & Wildlife Service, Forested Flyways® is working with the American Bird Conservancy, Environmental Defense, Mississippi Fish & Wildlife Foundation, USDA Forest Service, and the U.S. Fish & Wildlife Service to improve pine habitat for the gopher tortoise and other species associated with the historically open forests of the South.



American Bird Conservancy's mission is to conserve wild birds and their habitats throughout the Americas. It is the only U.S.-based group dedicated solely to overcoming the greatest threats facing birds in the Western Hemisphere. www.abcbirds.org

The American Forest Foundation works to stop the loss of healthy and productive forests. AFF nurtures and promotes the power of private stewardship on America's family forestlands to conserve clean air and water, open space, and critical wildlife habitat. www.forestfoundation.org



Environmental Defense is dedicated to protecting the environmental rights of all people, including future generations. Among these rights are clean air and water, healthy and nourishing food, and a flourishing ecosystem. www.environmentaldefense.org



The USDA Forest Service Office of State and Private Forestry is the federal leader in providing technical and financial assistance to landowners and resource managers to help sustain the nation's forests and protect communities and the environment from wildland fires. www.fs.fed.us

The mission of the U.S. Fish & Wildlife Service is working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people. www.fws.gov



The Mississippi Fish and Wildlife Foundation was founded to conserve, restore and enhance the fisheries and wildlife resources for the enjoyment and enrichment of all residents of Mississippi, their progeny and visitors to our state. www.wildlifemiss.org

The American Tree Farm System's mission is to promote the growing of renewable forest resources on private lands while protecting environmental benefits and increasing public understanding of all benefits of productive forestry. www.treefarmssystem.org



Gopher Tortoise Habitat Conservation Sign

The goal of this handbook is to motivate landowners to engage in the Pine Ecosystem Conservation Initiative for the Gopher Tortoise. If you follow the conservation practices described in this handbook, please take the time to let us know and AFF will send you a sign to display. Management information provided for individual properties will be kept confidential. The impact of the program will only be reported and promoted collectively. By providing information that we can report for the collective impact of the program on the ground, you help improve our ability to find support for future efforts working with family forest owners.

Let your neighbors know that you are making a difference and helping wildlife. To receive a Gopher Tortoise Conservation sign please provide details on the conservation practices you employ, one representative photo and complete the Gopher Tortoise Habitat Application.



Gopher Tortoise Habitat Conservation Sign
Photo by Randy Browning, MFWF/USFWS

APPLICATION FOR GOPHER TORTOISE SIGN

This form can be downloaded at www.forestedflyways.org

1) **How does your land management benefit gopher tortoise conservation?**

(Management area must be at least 10 acres.)

2) **Which of the following activities have you undertaken and when? # Acres/year**

Dormant season/cool prescribed burn	_____
Growing season/hot prescribed burn	_____
Thinning to maintain basal area below 80 ft ² /ac	_____
Planting below 600 stems/ac	_____
Treatments to encourage herbaceous understory	_____
Control of kudzu or cogongrass	_____
Conversion to longleaf pine	_____
Enrollment into Safe Harbor Agreement	_____

ADDITIONAL COMMENTS:

3) **What new information did you learn from the handbook?
What are your future management plans?**

4) **How has this handbook improved your understanding of the wildlife species that depend on the southern pine forest?**

5) **How do you plan to share what you've learned from the handbook with neighbors or friends?**

NAME

MAILING ADDRESS

CITY

STATE

ZIP CODE

COUNTY

NUMBER OF ACRES OWNED

EMAIL

BY SUBMITTING THIS ENTRY FORM I AGREE TO THE FOLLOWING: IMAGES PROVIDED MAY BE USED BY THE PARTNER GROUPS TO PROMOTE THE GOPHER TORTOISE CONSERVATION INITIATIVE AND ITS GOALS.

SIGNATURE

DATE

Mail your completed application form and supporting photo to:

American Forest Foundation • Habitat Conservation
1111 Nineteenth Street, NW Suite 780 • Washington, D.C. 20036
www.forestedflyways.org



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