

# Longleaf Pine Forest Establishment Hub



The Forest Stewardship Program is designed to integrate forest management objectives of sustaining quality native timber, native wildlife populations, soil & water resources, aesthetics, & recreation, over a 10-year planning period. This template provides landowners with technical guidance that places near-equal emphasis of these objectives. It prescribes conservation practices to establish new longleaf pine forests using either artificial planting methods or natural regeneration methods.

Longleaf pine produces high quality timber products, & when managed as a forest with fire, also supports one of the most biologically diverse natural ecosystems in North America. Longleaf pine forests once covered 92 million acres of the Southeast US. Only 3% of that forest remains. At the beginning of the 20<sup>th</sup> century GA had about 4 million acres of longleaf pine forest that has since declined to less than ½ million. Changes in landuse, overharvest, & lack of restoration have ruined longleaf forests, resulting in loss of wildlife & what are now 20 high priority animals & 56 high priority plants in GA. Fortunately, many landowners are beginning to restore longleaf & the natural fire frequencies, through prescribe burning, that these forests depend on ecologically. Founded with input & strong support from many individuals & over 60 conservation organizations, longleaf pine forest restoration is supported by your GA Forestry Commission's *Statewide Forest Resources Assessment & Strategy* as well as your GA Department of Natural Resources *State Wildlife Action Plan*.

Unlike loblolly or slash pine, longleaf pine can be prescribe burned safely throughout its first decade of growth. This maintains quality native understory plant communities for wildlife. Longleaf pine is also less susceptible to early mortality, pine-bark beetles, annosum root rot, fusiform rust, wildfires, ice, wind, & decline. They can grow on more soil types & produce more timber volume on low site-index or sandy soils than any other pine species. Because longleaf pine naturally outlives these other pine species by hundreds of years, landowners have longterm management flexibility that can benefit wildlife, aesthetics, recreation, timber, soil & water. A longleaf pine forest produces many natural resources when planted at appropriate densities, prescribed burned every 1-2 years, & thinned often to maintain tree canopy cover of 30-60%.

To receive finely-tuned technical guidance, request a visit from a natural resource professional like a registered forester, wildlife biologist, &/or soil-water conservationist. Professional assistance is available from State & Federal organizations like your GA Forestry Commission ([www.gatrees.org](http://www.gatrees.org)), GA Department of Natural Resources- Wildlife Resources Division ([www.georgiawildlife.com](http://www.georgiawildlife.com)), US Department of Agriculture ([www.ga.nrcs.usda.gov](http://www.ga.nrcs.usda.gov)), & private consultants.

- 1. Monitor forest health throughout your entire property with a natural resource professional.** Carefully tour your land together to discuss your management objectives, planning options for the next 10 years, available conservation incentive programs, & specific areas with issues needing immediate correction. For example, evaluate Best Management Practices implementation & control invasive-exotic plants to prevent spread & long-term economic & environmental damage. Refer to [Manage Forests with Enhanced Conservation Strategies](#) template for a summary of considerations.



Action	Names			Date
Tour property with natural resource professional(s)...	<i>(list phone &amp; e-mail of each)</i>			on
Correct issues needing immediate attention, like...	<i>(circle or list issues invasive-exotic or nuisance plant/tree, tree disease/condition, BMP problem, &amp;/or other _____)</i>	<i>(describe problems)</i>	<i>(describe locations)</i>	by
Apply for conservation incentive program(s)...	<i>(program, agency/organization, &amp; phone #)</i>			by
Request stand type map* & plan in version...	<i>(circle plan type)</i> Forest Stewardship Plan (GFC), Conservation Plan (NRCS), Brief follow-up letter of suggestions, or other _____			by

\* A stand map of your land should identify locations & acres of all stands from the tables of the hub templates: Pine, Mixed Pine & Hardwood, Hardwood, Loblolly & Slash Pine Establishment, Longleaf Pine Establishment, Hayfield, Grazingland, Cultivated Cropland, & Pond/Lake, as well as wildlife openings, wildlife shelterwoods, transitional habitat buffers, mature forest buffers, & prescribe burn compartments. Other features may include wetlands, highly erodible soils, & special natural areas. Your map should include landowner name, total acres, county, streams/rivers-perennial, trails/roads on property, roads paved or major, boundary, directional arrow, map scale, name of natural resource professional who created map.



2. **Prepare sites for new longleaf pine stands** by first asking a natural resource professional to confirm if this site is in the natural range of longleaf pine. Longleaf once naturally covered 2/3rds of the Southeast & is adapted to all but the wettest soils. Avoid establishing longleaf in hydric soils, agricultural crop fields or pastures with pH 7.0+ soils unless lessened by fallowing for 1+ years, & planned locations of roads or wildlife openings. Reduce mortality by choosing longleaf pine instead of loblolly or slash if within the natural range of longleaf, especially for low site-index soils. Ensure GA's Best Management Practices are met or exceeded.
  - A. **Prepare former cutover forest sites for planting**, selecting the least intensive set of site preparation methods needed for this location to reduce cost, minimize erosion, & maintain habitat for wildlife.
    - i. **Apply appropriate herbicide(s) to control competition from plants.** Herbicides for site preparation purposes that control woody & herbaceous competition should be applied after a final timber harvest, after 9-12 months of growing season to allow enough resprouting for chemical uptake, not during a drought, & between late spring & fall prior to leaf-fall. Refer to [Herbicide Use in Georgia Forests](#) template. Always follow herbicide label instructions & obtain cost quotes for applying herbicides by backpack sprayer, skidder or other vehicle, & aerially.
    - ii. **As an option to improve conditions for planting, prescribe burn** from 2 months after herbiciding to as close to planting time as possible. Create firebreaks & obtain a burn permit from the Georgia Forestry Commission (GFC) the day of & prior to burning. GFC provides full-service burning assistance at a fair cost. It should be a rare need & would be an additional site-prep cost, but where needed combine the above herbicide & prescribe burn treatments with mechanical treatments. While one or more of these practices may be needed, select the least intensive site preparation method needed for this location to minimize erosion, reduce cost, & maintain habitat for wildlife. Mechanical treatments may include *KG shearing* alone to allow *ripping* of rows for planting. For areas that were densely stocked, *raking & piling* of residual logging debris may be needed. For areas with waxy understory plants like gallberry or wax myrtle, *chopping* root mats may be needed. For areas in floodplains or sandy soils with low water tables, *bedding* may be needed.
  - B. **Prepare existing mature longleaf pine stands for natural regeneration**, marking trees to leave by selecting 40-55 well-formed, evenly distributed 40+ year old trees per acre that amount to a basal area (BA) of about 30 feet<sup>2</sup>/acre. Seed typically falls within 100 feet of each longleaf pine. *Evaluate & control woody plants* in the forest understory with prescribe fire, & only as necessary herbicides, prior to harvest. This will open the understory & improve conditions for pine seed-to-soil contact & germination. *Harvest pines not selected as seed trees* in October-November to create a seed tree harvest. *Then monitor longleaf pine flowers/cones/seedfall* each October-November to predict which year adequate seed fall will occur. Seed fall typically occurs once every 3-7 years & is defined as adequate when there are at least 30 cones per tree & 1,000 cones per acre. Prescribe burn again just prior to seed fall that occurs October-November. Natural seed fall from longleaf cones is predictable in stands with BA of 60 or less, & in October-November 2 years after flowering or 1 year after cones develop. In summary, see the FSP Pine Forest Management Hub to (1) plan a thin for this stand to 50-60 BA if it is not already, (2) then wait 3+ years & plan the seed tree cut to 30 BA, & (3) then plan for natural regeneration by including a 3-7 year range for monitoring seed fall & establishment, as described in 3B below.
  - C. **Prepare former fields for planting**, selecting the least intensive set of site preparation methods needed for this location to reduce cost, minimize erosion, & maintain habitat for wildlife.
    - i. **Eradicate all non-native, invasive grasses like Bermuda, bahia, & fescue prior to planting** because they will compete with pine seedlings for growth & will inhibit the long-term growth of native plant communities needed by native wildlife for at least decades. Apply an appropriate herbicide at an effective rate during an active growth stage, & then follow-up 1-year later during spring with spot-treatments or other methods as needed prior to planting in fall/winter. Eradicate Bermuda grass by broadcasting Imazapyr herbicide & being very thorough with follow-up monitoring & herbicide treatment(s). Eradicate fescue &/or bahia grass by broadcasting glyphosate herbicide. Research shows that Glyphosate will not kill Bermuda grass in the long-term. Refer to [Herbicide Use in Georgia Forests](#) template. Always follow herbicide label instructions & obtain cost quotes for applying herbicides.



- ii. *As an option to improve conditions for planting, prescribe burn* from 2 months after herbiciding to as close to planting time as possible. It should be a rare need & would be another site-prep cost, but where necessary mow, or 1-3 months prior to planting scalp planting rows 3” deep in former cultivated fields & 4-5” deep in former pastures, along contours, & in 300’ lengths leaving 3-4’ unscalped to prevent erosion. Create firebreaks & obtain a burn permit from the GFC the day of & prior to burning. GFC provides full-service burning assistance at a fair cost.
- iii. *Subsoil planting rows 1-3 months prior to planting*, or if a hardpan exists & scalping was used, rip off-center of scalped rows to help roots of pine seedlings grow. The further in advance to planting this is done will increase the likelihood of rainfall occurrence & soil conditions for growth.

**3. Establish new longleaf pine stands on prepared sites with a 6’x12’ spacing (605 trees per acre) if timber is a more important objective than wildlife, or with a 7’x12’ spacing (518 trees per acre) if wildlife is a more important objective than timber, & reserve a 2-3 acre wildlife opening per 25 acres.**

- A. *When artificially regenerating longleaf*, plant genetically improved pine seedlings & cull naturally regenerated seedlings in overstocked areas. Order container-grown or bare-root seedlings from nurseries early like July. Plant seedlings *as soon as soil moisture is adequate* from November-December, or even up to 4 months earlier if soil moisture is unusually present. Once you pickup seedlings, carefully follow directions to maintain them & plant only those with straight & healthy roots. Plant containerized seedlings so that plugs are elevated 0.5-1” on flat terrain, 1-1.5” on scalped soils, & 2-3” on wetter soils. Plant bareroot seedlings so root collars are even with to 0.5” below ground level. Seedling survival is higher for containerized seedlings planted by hand, & higher for bareroot seedlings planted by machine.
- B. *When naturally regenerating an existing mature longleaf pine stand*, determine when adequate regeneration has occurred & then prevent overstocking. Adequate natural regeneration from an October-November seedfall can be verified if about (1) 4,500 longleaf pine seeds per acre have germinated by January & (2) 750 of these remain viable as free-to-grow seedlings at 1 year of age. Use several mil-acre plots the first winter after seedfall to determine if each have about 4-5 germinants, & then again about one year later to determine if 75% of plots have one free-to-grow seedling. Once adequate regeneration is achieved, begin a prescribe burn rotation as soon as possible to manage over-stocking & competition, & to enhance native plant biodiversity. Longleaf pine can be prescribe burned safely in every year of its life stages except as a germinant & except that special care with intensity & season of burn is needed when seedlings have sprouted from the grass stage & haven’t yet reached 6-10’ height. It is safe to burn grass stage longleaf pine when root collar diameters are at least 1”.

Longleaf Pine Stand Name <i>See map legend</i>		Acres	Control Competition from <i>(circle all that need control)</i>	Site Preparation <i>(circle the 1<sup>st</sup> needed)</i>	Site Preparation <i>(circle the 2<sup>nd</sup> if needed)</i>	Trees/Acre <i>(circle one)</i>
			bermuda (be), bahia (ba), or fescue grass (fe), other invasive-exotic (ie), woody hardwood (hw), volunteer pines (vp), herbaceous plants (hp)	herbicide using spot (hs), band (hba), or broadcast (hbr); burn (b), subsoil (sub), scalp (sc), mow (m), other (o)	herbicide using spot (hs), band (hba), or broadcast (hbr); burn (b), subsoil (sub), scalp (sc), mow (m), other (o)	timber primary objective = 605 tpa wildlife primary objective = 518 tpa.
Regenerate		·	by controlling competition of (be) (ba) (fe) (ie) (hw) (vp) (hp)	by site preparing with( ) in month ___ of year ___	& site preparing with ( ) in month ___ of year ___	& establishing ___ tpa in month ___ of year ___.
Regenerate		·	by controlling competition of (be) (ba) (fe) (ie) (hw) (vp) (hp)	by site preparing with( ) in month ___ of year ___	& site preparing with ( ) in month ___ of year ___	& establishing ___ tpa in month ___ of year ___.
Regenerate		·	by controlling competition of (be) (ba) (fe) (ie) (hw) (vp) (hp)	by site preparing with( ) in month ___ of year ___	& site preparing with ( ) in month ___ of year ___	& establishing ___ tpa in month ___ of year ___.

*For landowners with a primary objective of bobwhite quail & other wildlife dependent on younger early successional plant communities, manage for Pine Savanna habitat* . Create this habitat type as described at [www.bobwhitetech.org](http://www.bobwhitetech.org) which is: (1) pine forests maintained through time at 40 to 60 square feet per acre basal area; or pine forests with 40% to 60% canopy cover; & (2) greater than or equal to 70% herbaceous native ground cover; & (3) a 2 year fire frequency. To restore a viable population of quail in forested landscapes, what is needed are frequent thinnings, 1-2 year prescribe fire rotations, & 2,500-5,000+ contiguous acres of this habitat type. Chances of success increase if your land is within a high restoration potential area, as shown on a map in the [Priority Conservation Landscapes in Georgia](#) template. Seek guidance from a professional wildlife biologist before implementing practices.

*Create better networks of mature upland & bottomland forest buffers to serve as travel corridors for wildlife* by designating 200-600’ wide bands on your stand type map that link new corridors needed to existing ones, & then leave these areas to grow as mature forests. Refer to [Priority Conservation Landscapes in Georgia](#) to see if your land is within a high priority area or watershed.



For areas reserved for wildlife openings, refer to [Wildlife Openings: Design & Management](#) template. For each wildlife opening within these Longleaf Pine Establishment Stands shown as planned on your map, add a row of prescriptions below.

Opening Name <i>See map legend</i>	Acres	Reserve 2-3 acre Wildlife Opening Per 25 acres	Management Intensity Option <i>(Circle one)</i>		
			<i>Low Medium High</i>		
Create	.	by reserving areas for openings	& manage using intensity option of	<i>L M H.</i>	
Create	.	by reserving areas for openings	& manage using intensity option of	<i>L M H.</i>	
Create	.	by reserving areas for openings	& manage using intensity option of	<i>L M H.</i>	
Create	.	by reserving areas for openings	& manage using intensity option of	<i>L M H.</i>	

- 4. Monitor longleaf pine seedling survival & manage native plant communities after establishment.**
- A. During 1<sup>st</sup> March-April (early spring) after establishment, (i) evaluate pine seedling survival, (ii) evaluate the area within 2' of tree seedling rows for plant competition & control competition if necessary, & (iii) if predicted as a need & prescribed by a natural resource professional to improve native plant diversity & abundance, as if often true within former fields, plant a mixture of native warm season grasses & forbs outside of the 2' bands from tree seedling rows (e.g., 8' wide interior area of a 12' wide planting row).** Most newly established plantings in former cutover forests will not need follow-up control from competing plants if the initial site preparation was done well. However, for stands that were just planted on former fields, an herbicide release in early spring may be needed using a 4-6' band application centered over each row. Soil type, fertility, & pH should help determine which herbicide & rate is most appropriate to not harm pine seedlings. Do not apply herbicides until longleaf seedlings have at least 2" of lateral root growth. It should be a rare need & would be an additional cost, but if plant competition remains substantial by mid spring, apply a 2<sup>nd</sup> band spraying from late May - June. Establish a native warm season grass & forb mixture between rows where band spraying avoids by planting ¼" deep during spring using a spreader or conventional drill for bearded seed & carrier for broadcasting seed, or a no-till drill for bearded seed. Cultipack before & after planting. Avoid incidental mortality by assessing what herbicides & rates have been & may be used prior to establishment. For example, you may need to wait a year prior to planting where residual soil-active herbicides (e.g., imazapyr) may still exist or if spot follow-up herbicide treatments are necessary to successfully eradicate Bermuda grass. Refer to [Herbicide Use in Georgia Forests](#) template.
- B. During 1<sup>st</sup> December (early winter) after one growing season since establishment, evaluate tree seedling survival, spacing, & density.** Sparse densities can occur from seedling mortality during or after planting, while natural regeneration can result in overstocked areas. A planted area is considered successfully established with a new pine stand if 70% or more of the seedling survive. If survival is less than this or if the stand is too dense with natural pine seedling regeneration, consult with your forester to consider options like spot planting, hand thinning, &/or replanting.
- C. Create a prescribe burn rotation planning map that details burn rotation & burn intensity.** The map should be included within your stand type map so you can easily see when & where to burn over the next 10 years. Map the boundaries of many prescribe burn compartments using existing forest roads, streams, firebreaks, & future firebreaks as needed. *Prescribe burn compartments should be:*
- i. **designated** by your forester, biologist, or other natural resource professional;
  - ii. **15-40 acres** to favor deer, turkey, quail, & other game wildlife, or **40-200 acres each** to favor wildlife in general;
  - iii. **evenly staggered along forest buffers** to provide access for wildlife;
  - iv. **rotationally burned** every 2-3 years for deer/turkey/general wildlife, 1-2 for quail/other wildlife dependent on younger early successional habitat, or per prescription from your consultant;
  - v. **combined into 2 or 3 annual burn groups** (# = burn rotation length), where each burn group (named Y1, Y2, or Y3) has about the same number of compartments & each burn group of compartments are widely scattered throughout property. If you only have 1 or 2 burn compartments, you may need to skip a year(s) of burning on your land.

*In general, higher prescribe fire management intensity levels will result in better long-term control of competing vegetation, more plant biodiversity, & better habitat for wildlife. Select a burn rotation of low, medium, or high intensity by burning each compartment every 3-2, 2, or 2-1 year(s), respectively. Select a burn strength level of low, medium, or high by substituting 1, 2, or 3 warm-season burns instead of cool-season burns, respectively.*



For each annual burn group planned on your map, add the total acres, year, & season of burn below.

Group Name <i>See map legend</i>	Acres	Year & Season of Burns										
		<i>For each year of burning, check box &amp; circle cool-season burn (c) or warm-season burn (w).</i>										
	Years=											
Burn Y1	.	in year(s)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)
Burn Y2	.	in year(s)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)
Burn Y3	.	in year(s)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)	(c/w)

**D.** *As an option to improve the likelihood of detecting & successfully correcting potential forest management issues that may have long-term consequences, monitor this stand 1-2 times each growing season* by looking for invasive-exotic plants (including grasses like Bermuda, bahia, fescue, & cogon) & issues with tree diseases or conditions, unusual plant competition, or Best Management Practices. This is especially important during the first three growing seasons.

**5. Prescribe burn each year according to your Prescribe Burn Rotation Planning Map.** To keep the benefits of timber & wildlife, it is important that you burn consistently according to your planning map. Every year, prepare for scheduled burning:

- A. *Refer to your prescribe burn rotation map* to determine which group to burn;
- B. *Have each burn compartment monitored by your consulting professional for site conditions* & consider specific burn techniques & intensity, warm or cool season burning, herbicide-control of invasive-exotic plants, remedy of tree diseases, etc.;
- C. *Maintain firebreaks* using existing features like forest roads & by disking, leaf-blowing, &/or raking; Identify & protect special locations like around select mast producing live trees & hardwood snags; &
- D. *Obtain a burn permit* from the Georgia Forestry Commission (GFC) the day of & prior to burning, & *verify with your certified prescribed burner if conditions are acceptable* for the particular stand(s) by visiting GFC’s website for current & forecasted weather conditions pertinent for burning. GFC can provide full-service burning assistance at a fair cost.

A certified prescribe burner should be aware that....

*During wet periods*, when KDBI is below 200, it is an excellent time to conduct burns in sensitive forests like those that have never been burned, have heavy fuel loads, &/or have young trees shorter than 20’. *During drought periods*, in pine stands use caution when KDBI is greater than 600 & do not burn when above 700, while in hardwood stands use caution when greater than 500 & do not burn when above 600. *General guidelines for safe burning include, but are not limited to:* relative humidity= 30-50%, temperature less than 60 degrees Fahrenheit, fine-fuel moisture= 10-20%, mixing height= 1,750+ feet, slightly stable or neutral atmosphere, transport windspeed= 9-20 mph, & in-stand windspeeds= 1-3 mph under closed tree canopies & 3-5 mph under open canopies (these speeds are equivalent to about 8-20 mph & 20 mph, respectively, as measured & forecasted from 20’ heights).

**6. Request an updated management plan at the beginning of each 10 year planning period.** For this stand, refer to [Longleaf, Loblolly, Slash, & Shortleaf Pine Forest Management Hub](#) template for technical guidance & continue monitoring forest health throughout your entire property with a natural resource professional. You will likely be encouraged to begin a sequence of prescribe burning & thinning between ages 10-20 years. Refer to [Priority Conservation Landscapes in GA](#) template to see if your land is in a high priority area & to consider conservation programs & practices best for you & the land you care for.

[Priority Conservation Landscapes in Georgia](#) template identifies specific locations for high priority restoration based on (a) conserving forestland diversity throughout our state, (b) watersheds & streams, (c) historic range for longleaf pine & American chestnut, & (d) native understory plant communities needed by quail & other wildlife in decline. For complete details about restoration needs & potential eligibility requirements for conservation incentives, visit [www.gatrees.org](http://www.gatrees.org) for the [Georgia Statewide Forest Resources Assessment & Strategy](#) which aims to help conserve our working forest landscapes, protect forests from harm, & enhance public benefits from trees & forests, by detailing 126 strategic actions needed to address our state’s 8 priority forestland issues; & [www.georgiawildlife.com](http://www.georgiawildlife.com) for the [Georgia State Wildlife Action Plan](#) which addresses 78 actions needed as summarized by the 5 major conservation themes of increase use of prescribe fire for habitat restoration, improve wetland protection & mitigation banking methods, provide technical & financial assistance for private landowners to voluntarily apply wildlife conservation practices, develop state strategy for invasive-exotic species control, & facilitate GA Land Conservation Program & other land protection efforts.

