Tree Farm Tour and Awards Ceremony
Doug and Teresa Moore’s South Prong Plantation
Florida Outstanding Tree Farmers of 2018
Baker County, FL

Date: Friday, October 19, 2018

Morning Tour: Meet at the property at 9:00 am ET to sign in, tour at 9:30 am, lunch and awards ceremony at noon.
Afternoon Tour: Meet at 11:30 am to sign in, lunch and awards ceremony at noon, tour at 1:30 pm.

Tour: Congratulations to Doug and Teresa Moore for their outstanding forest stewardship and being selected as Florida’s Outstanding Tree Farmers of 2018. Located at the headwaters of the St. Mary’s River in Baker County, South Prong Plantation encompasses over 2,400 acres of pine flatwoods, cypress swamps, and hydric hammock that is home to a wide variety of wildlife. While the primary objective on the property is high-quality wildlife habitat, the plantation also produces timber and is a great example of integrating these objectives. Prescribed fire is an important tool here and Doug has been involved in organizing the North Central Florida Prescribed Burn Association. The family provides educational outreach programs at the property to fellow landowners and conservation groups, in partnership with the University of Florida / IFAS Extension service, Florida Fish and Wildlife Conservation Commission (FWC), Florida Forest Service and others. Doug is a FWC certified Youth Hunt Master and leads youth hunts on the property. He also leads camping and merit badge programs with the Boy Scouts.

Funding for this event is provided by the Florida Tree Farm Program, USDA Forest Service via the Florida Department of Agriculture and Consumer Service’s Florida Forest Service, and the Florida Sustainable Forestry Initiative Implementation Committee.
Topics to be covered during the tour:

- The use of prescribed fire in pine plantations of varying ages and species
- Various management techniques which enhance wildlife habitat
- Site preparation techniques for planting pines
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CONGRATULATIONS DOUG AND TERESA MOORE: 2018 FLORIDA OUTSTANDING TREE FARMERS OF THE YEAR

For Doug and Teresa Moore, forest stewardship was an opportunity to begin a new life after many successful years in agriculture. Dairy farming had been the family business for three generations. Doug had a farm with 2,000 head of dairy cows in Duval County, as well as 600 acres of corn in Putnam County and a landscape tree nursery. However, Jacksonville’s growth, together with increasingly restrictive regulations led him to quit the dairy business in 2004. It had long been a dream of his to own timberland that he could live on and manage for timber and wildlife, so Doug began looking into timber tracts.

In 2002, he purchased timberland in Baker County from the International Paper Company. He chose the land because it was close to his farm in Duval County, and most of all, because the property was diverse. Doug explains: “I had a large amount of pine plantation to provide the needed future income, but also had a 400-acre hardwood swamp that is the beginning on the South Prong of the St. Mary’s River. It also consisted of several old homesteads (including moonshine stills). We have also found many Indian artifacts on the property due to the creek that runs through it.”

A True Working Forest

South Prong Plantation encompasses over 2,400 acres of pine flatwoods, cypress swamps and hydric hammock that is home to a wide variety of wildlife. While Doug’s primary objective is managing for high-quality wildlife habitat, the plantation also produces timber and is a great example of integrating intensive timber management and wildlife habitat management.
Doug’s management objectives are a combination of timber income and recreation for the family. “I would like to set it aside for conservation so it would be used after I am gone for the same purpose as it is now,” he says. “But I still want the family to be the managers, not the government.

**Outreach**

Doug also offers the property for use to the University of Florida / IFAS Extension service, Florida Fish and Wildlife Conservation Commission (FWC), and other partners for educational programs. He’s an FWC certified Youth Hunt Master and leads youth hunts on the property. He also leads camping and merit badge programs with the Boy Scouts.

“I offer and encourage many organizations to visit my property, from hunters to the tree huggers,” he says. “I think the more people understand that a working tree farm like mine can provide a renewable resource while enhancing wildlife and conservation for the future, the better the industry will be.”

**“Plenty of Help Out There”**

With a background primarily in livestock management, Doug needed a bit of a primer on forestry and wildlife management when he got started. He found help through courses provided by the University of Florida’s Cooperative Extension Service and the Florida Forest Service.

“When I purchased the property, I took every course offered by Extension to learn about wildlife management and forestry,” Doug explains. “I took the Master Tree Farmer level 1 and 2, Master Wildlifer, Preparing for the Next Owner, and other courses. I became a Certified Burn Manager, and I now have a business, Flatwoods Management LLC, in which I contract prescribed burning, timberland maintenance and wildlife management. “With management planning and practice I’ve had assistance though the Forest Stewardship program, cooperative Extension service, UF, FWC, Florida Forest Service, National Wild Turkey Federation, my friend and consulting forester, Leonard Wood, and many others. There is plenty of help out there. I’m very surprised that more landowners do not take advantage of it.”

Congratulations to Doug, Teresa, and the family for being selected as the 2018 Florida Outstanding Tree Farmers of the Year!
Florida’s Forest Stewardship Program

Forest Stewardship is active management of forest land to keep it in a productive and healthy condition for present and future generations, and to increase the economic, environmental and social benefits of these lands. Forest Stewards are landowners who manage their forest lands on a long-term basis by following a multiple resource management plan.

The Forest Stewardship Program addresses the improvement and maintenance of timber, wildlife, soil and water, recreation, aesthetics, as well as forage resources.

Eligibility

Private forest landowners with at least 20 acres of forest land and a desire to manage their ownerships according to Stewardship principles can participate in the Forest Stewardship Program. Also, adjacent landowners, with similar management objectives, may combine their holdings to meet this acreage limitation.

Benefits to Landowners

- A customized management plan that is based on the landowner's objectives. The plan will include forest stand characteristics, property maps, management recommendations, and a five-year time line for future planning. This plan also serves as documentation of active management on the property that may help reduce tax liability.
- An opportunity for public recognition as a certified "Forest Steward".
- Educational workshops, tours and the quarterly Florida Land Steward newsletter developed and distributed by the University of Florida, IFAS Cooperative Extension Service and other partners.

How to Enroll

Contact your local Florida Forest Service County Forester and tell them that you would like to have a Forest Stewardship Plan prepared for your property. More information and application online at: http://FreshFromFlorida.com/ForestStewardship
Tree Farm Program

The American Tree Farm System® is a program of the American Forest Foundation and was founded in 1941 to promote the sustainable management of forests through education and outreach to family forest landowners. Nearly 26 million acres of privately owned forestland and 80,000 family forest landowners in 46 states are enrolled in this program and committed to excellence in forest stewardship. About half of all Tree Farms are located in the South.

Eligibility

Private forest landowners with at least 10 acres of forest land and have a desire to manage their ownerships according to sustainable forestry guidelines can participate in Tree Farm.

Benefits to Landowners

Tree Farmers are good stewards of their forestland committed to protecting watersheds and wildlife habitat and conserving soil. They manage their forestland for various reasons, including timber production, wildlife, recreation, aesthetics, and education/outreach. Tree Farmers receive many benefits:

- Representation on local, state, and federal issues affecting forestland owners.
- Exposure to a network of forestry professionals and landowners committed to sustainable forestry.
- Invitations to workshops, tours and the quarterly Florida Land Steward newsletter produced by University of Florida IFAS and other partners.
- Certification that meets international standards of sustainable forest management.
- Participation in local, state, regional, and national Outstanding Tree Farmer of the Year awards and recognition.

Getting into the Program

Contact your local Florida Forest Service County Forester and tell them that you would like to join the Tree Farm program. More information here:

https://www.treefarmsystem.org/florida
SILVICULTURE BEST MANAGEMENT PRACTICES (BMPs)

Silviculture BMPs are the minimum standards necessary to protect our state’s waterbodies and wetlands from the degradation and sedimentation that can sometimes occur because of erosion during and immediately following recent forestry operations. Silviculture BMPs should be applied on all bonafide ongoing forestry operations, especially those adjacent to waterbodies and wetlands, and may be enforced by federal, state, and local authorities through reference of regulatory statute or rule.

SILVICULTURE BMP COURTESY CHECKS

Silviculture BMP courtesy checks are available to give landowners, land managers, and loggers a “report card” on Silviculture BMP implementation for recent or ongoing forestry operations. This helps with future management planning as well as evaluating the performance of contractors on your property.

SILVICULTURE BMP SITE ASSESSMENTS

On-the-ground Silviculture BMP site assessments are available to discuss which Silviculture BMPs will apply to planned operations on a specific site. This helps with harvest plan development, road layout, mitigating of existing problem areas, etc.

SILVICULTURE BMP NOTICE OF INTENT

The Silviculture BMP Notice of Intent (Rule 5J-6 F.A.C.) is a voluntary one-time pledge that a landowner signs to indicate his or her intention to follow Silviculture BMPs on their property. Once a landowner has signed the Notice of Intent, he or she will become eligible to receive a presumption of compliance with state water quality standards during future bonafide ongoing forestry operations. This is very important if the landowner’s property falls within an area covered by a Florida Department of Environmental Protection Basin Management Action Plan for impaired waters.

ADDITIONAL SERVICES

For information on the services listed above or any other services provided by the Florida Forest Service’s Hydrology Section please contact your local BMP Forester.

**Panhandle Area**
(850) 681-5942

**Robin Holland**
Peninsula Area
Robin.Holland@FreshFromFlorida.com
(352) 732-1781
Forestry
Wildlife Best Management Practices

- Forestry Wildlife Best Management Practices for State Imperiled Species (WBMPs) were adopted into Florida Administrative Code (Rule 51-8) on October 21, 2014.
- WBMPs were developed through a partnership between the Florida Department of Agriculture and Consumer Services’ Florida Forest Service and the Florida Fish and Wildlife Conservation Commission (FWC).
- WBMPs are voluntary practices designed as a practical approach for avoiding and minimizing the loss of State Imperiled Species due to silviculture operations.
- WBMP practices address the 16 State Imperiled Species which are considered to be potentially vulnerable to silviculture operations including ten aquatic species, two burrowing animals, and four nesting birds.
- WBMPs are designed to supplement the existing water quality-based Silviculture BMPs which already provide many valuable benefits to the conservation and management of fish and wildlife in Florida.
- Landowners and other forestry resource professionals can enroll in the voluntary program by completing a WBMP Notice of Intent. Those who do not wish to enroll will continue to be subject to all current laws and regulations regarding State Imperiled Species.
- Once enrolled, applicants who properly implement WBMPs will no longer be required to obtain a permit authorizing the incidental take of State Imperiled Species during bonafide ongoing forestry operations. In addition, they will not be subject to any fines or penalties associated with an incidental take of the State Imperiled Species covered by the WBMP Manual.
- WBMPs are not designed to facilitate wildlife habitat restoration or species recovery and expansion. Also, they do not address any Federally Listed Species. For information on Federally Listed Species, refer to FWC’s online “Florida Wildlife Conservation Guide.”
- To obtain more information or a copy of the WBMP Manual and Notice of Intent, contact your local Florida Forest Service BMP forester (see below) or a FWC Landowner Assistance Program biologist (850) 488-3831.

Florida Forest Service BMP Foresters

Panhandle Area
(850) 681-5942

Peninsula Area
(352) 732-1781

Robin.Holland@FreshFromFlorida.com
Open Burning Benefits Agriculture, Land Clearing, Silviculture


Objectives:

1. Fuel Reduction* - one of the most important reasons; one of the most effective elements of any Fire Prevention/Life Safety program; provides an indirect benefit to wildlife and other resources
2. Site Preparation - preparing areas for the seeding or planting process
3. Disease Control - certain pathogens that reduce growth can be controlled or eliminated
4. Wildlife Management - prescribed fire is rarely lethal to most forms of wildlife
5. Range Management - more acres being burned for grazing purposes than for all other uses of fire combined
6. Biological Community Restoration and Maintenance – periodic prescribed burning is critical to natural systems restoration and in maintaining biological diversity and balance
* Wildfire events typically include hazards of fireline intensity, flame length, and crown fire potential.

http://myfdacs.doacs.state.fl.us/forestry/forest_protection/fp_docs/2014_Fire_Laws.pdf

Wildfire Hazard Reduction Treatment by the Florida Forest Service: [590.125, (5) F.S.]. The Florida Forest Service may conduct fuel reduction initiatives, including, but not limited to, burning and mechanical and chemical treatment, on any area of wildland within the state which is reasonably determined to be in danger of wildfire...

Wildfire Hazard Mitigation: [590.01 F.S.] “The application of prescribed burning or other alternative fuel treatment methods to reduce vegetative fuels as a hazard. This service is provided on an area that is determined to be a wildfire hazard area by the FFS.”

Wildfire Hazard Mitigation in the WUI involves:

- prevention and mitigation actions to increase awareness of communities and homeowners regarding their wildfire risk and hazards, and
- the pre-fire implementation of measures which modify/reduce fuels or ignition sources within a wildland/forest environment and the built environment.

The end: that the effects of subsequent wildfire upon natural resources, human life, and property are minimized.

Suwannee Forestry Center D 6 serves Baker, Bradford, Columbia, Hamilton, Suwannee and Union Counties
Per the Southern Wildfire Risk Assessment Portal Risk Summary Report for the Suwannee Forestry Center D 6, it is estimated that 197,366 people live within the WUI.

https://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/For-Communities/Firewise-Communities/Wildfire-Mitigation-Contacts

A Wildfire Mitigation Specialist is assigned to each of the Florida Forest Service (FFS) field units.

As part of the total Florida Wildfire Hazard Mitigation Program, the FFS field unit assists in all community planning and provides guidance for the application of Firewise principles in pre-fire preparedness, mitigation and protection initiatives.

Wildfire Mitigation Specialist/PIO, services provided:

-facilitation of Community Wildfire Protection Plans (each has a Wildland Fuel Management Strategy which includes both the education and demonstration of prescribed fire as a mitigation tool on public and private wildlands)

-liaison for the Fire Adapted Communities and Firewise USA program (fuel reduction in the Home Ignition Zone is key to surviving a wildfire)

-assistance to fire departments on the International Assoc. Of Fire Chief’s Ready Set Go Program (incorporates Firewise principles in the Ready element)

-coordinate District WUI wildfire mitigation projects with Region 2 Mitigation Team

-Public Information Officer Duties for District. Audiences are local, state and national. Topics FFS Successes, shared knowledge regarding all FFS Programs, the WUI, the Cohesive Strategy, current wildfires, prescribed fire awareness...collaboration, e.g. Baker County Fire Adapted Community Work Group involving: County and city government, planning, emergency, law enforcement and fire agencies, FL FWC and State Parks, US Forest Service, US FWS, land/timber managers, Firewise Communities, and cross-boundary GA County Fire Departments
Got Invasives?

Invasive exotic plant problem? Find a program to help by using FloridaInvasives.org.

The Florida Invasive Species Partnership has collected, evaluated and categorized assistance programs into a single resource, making it easier to find the financial and/or technical assistance available to Florida landowners to prevent or control invasive exotic species problems. FloridaInvasives.org has an online resource of management assistance programs to help in your fight against problematic plant species. This resource takes the guesswork out of finding the agencies or organizations offering assistance and will direct you to available programs. The Landowner’s Incentives Database will also provide the requirements for each program, to help you decide if they are a good match for your needs.

Why was FloridaInvasives.org developed?
Invasive species have been identified as being costly ecologically and economically statewide in Florida. The Florida Invasive Species Partnership (FISP) is a collaboration of public and private entities in Florida, formed to link efforts at preventing and controlling invasive exotic plants across agency and property boundaries. FISP has developed an on-line tool of available financial and technical assistance sources to make it easier for landowners and land managers to find them.

How does FloridaInvasives.org help you?
FISP has created a searchable database, the Florida landowner incentives database, accessible at FloridaInvasives.org that allows you to find an assistance program for your needs. Search by your county, target species or other pertinent information into the online tool and you will retrieve a current list of available programs. FloridaInvasives.org will help provide focus to your search so that you can get the right person at the right program.

FloridaInvasives.org:
- Builds community awareness,
- Leverages limited resources through cooperation and
- May reduce individual land management costs.

This resource will be regularly updated with the most current program information to provide you the most up-to-date opportunities.

Go to FloridaInvasives.org to find out more.

Species Shown from top to bottom: Mexican Petunia, Boston Fern, Mimosa, Cogongrass, Camphor
Ten Tips for Encouraging the Use of Your Pine Plantations by Game Species

Holly K. Ober, Stanton Rosenthal, and William Sheftall

Many forest landowners are interested in managing their property to achieve more than one objective. A common combination of objectives for Florida forest landowners is producing timber products while also providing habitat for wildlife that can be hunted. These two objectives are compatible, but some tradeoffs may be required because strategies that maximize timber production are not always the same as those that provide superior habitat for game species.

Before implementing any forest management activities, it is important to think through your objectives and decide which is the higher priority: wildlife or timber production? Individuals who prioritize wildlife over hunting may sacrifice some income that could have been attained through timber, but they may recoup this if they charge for hunting leases after they have improved the habitat for game species.

Habitat is a species-specific concept. What makes a particular area good habitat for one species may make it less useful for other species. Therefore, it is impossible to manage a single stand of trees to provide quality habitat for all wildlife species simultaneously. However, many of the popular game species in Florida have similar habitat needs, so it is possible to implement strategies that are likely to benefit several of the species you may want to attract across your entire acreage. Here we provide brief tips on how to make pine plantations more suitable for game species, and list additional resources where further details can be found. Information on increasing the wildlife diversity in pine plantations is available in Ten Tips for Increasing Wildlife Biodiversity in Your Pine Plantations (http://edis.ifas.ufl.edu/UW319).

Figure 1. Pine plantations can provide habitat for game such as white-tailed deer.
Credits: Holly Ober, UF/IFAS
Tip #1—Increase Spacing among Trees

Forest owners interested in maximizing growth rates of pines typically plant at high densities (often 726 trees per acre, or tpa). Stands planted at high densities allow little sunlight to reach the forest floor. This greatly limits the amount and variety of herbaceous plants (i.e., grasses, legumes, and forbs) that can grow within the stand. Because most game species rely on herbaceous plant growth on the forest floor for food (grazing, seed eating, bugging) or cover, dense tree spacing may prevent use of these stands by these animals.

Two modifications can increase the suitability of pine plantations for game species. First, pines can be planted initially at lower densities (350 to 500 tpa). Alternatively, pines can be planted at high densities and then thinned several times early in the life of the stand. The first thinning should occur when trees reach a merchantable size (usually around 15 years for pulpwood). Subsequent thinning can be planned every 5 to 10 years thereafter. Thinning according to this schedule will not only increase food availability and cover for game, but will also improve growing conditions for the remaining trees.

Tip #2—Use Herbicides to Selectively Control the Hardwood Midstory

Pine stands with wide spacing can develop a dense midstory of hardwood shrubs and trees if these are left to grow. A dense midstory prevents sunlight from getting to the ground. It also creates competition between the pines, the hardwoods, and the non-woody plants that occur at the ground level. As mentioned in tip #1, the herbaceous plants that occur at the ground level provide an extremely important source of food for game species.

Herbicides can be used to selectively remove the midstory hardwood layer while not disturbing the desirable plants.

Tip #3—Use Fire to Stimulate Non-Woody Groundcover and to Control Hardwoods

Natural fires were historically a common occurrence in Florida, and they alter forests in ways that benefit wildlife. Prescribed burning is a technique that can be used to obtain the same benefits that would occur after a wildfire, but under more controlled conditions.

Fire increases habitat quality in pine stands for game species in several ways: it reduces the hardwood midstory, increases the quantity and diversity of herbaceous plants, and improves the quality of herbaceous plants as wildlife food. Younger herbaceous plants tend to be more palatable and more nutritious than older plants, so fire benefits wildlife by creating a flush of highly nutritious food plants. Also, fire increases seed, fruit, and flower production of many species, which results in a greater diversity and increased quantity of food for wildlife. Varying the time of year when burns are implemented and the return intervals between fires will favor different plants. See Prescribed Burning Regulations in Florida at http://edis.ifas.ufl.edu/FR055, for additional information on prescribed burning.

Tip #4—Maximize the Amount of Edge Habitat

Game species thrive in areas where multiple habitat types meet. Most game species feed on herbaceous plants that are typically more abundant outside of planted pine stands than within, but they rely on the forest to provide cover from predators. Thus, by creating numerous small forest stands rather than a few large stands, a large amount of this transition area—called “edge habitat”—is created. Forest stands planted next to one another should be at least 8–10 years apart in age to maximize the difference in food and cover resources available from each.

Edges can be either “hard” or “soft”. Hard edges are abrupt transitions between habitats, whereas soft edges are more gradual transitions. Because abrupt habitat transitions are less beneficial to game species than more gradual transitions, efforts should be made to make hard edges softer. This could involve a gradual thinning of trees between a dense forest stand and a grassy area or the promotion of weedy and shrubby areas between grassy areas and forest stands.

Tip #5—Maintain a Diversity of Food Sources

Certain hardwood trees and shrubs provide hard mast (nuts) and soft mast (fruit) that serve as important sources of food for game species. Hardwood drainages and bottomland forests are examples of areas where hardwoods naturally predominate, and where a variety of food sources are typically available to wildlife. These areas should not be
converted to pines, but should be allowed to stay as is so that a sequence of varying food resources becomes available throughout the year. If any hardwoods are harvested from these areas, care should be taken to retain those individual trees that consistently produce large crops of mast. See Managing Oaks to Produce Food for Wildlife at http://edis.ifas.ufl.edu/UW293, for additional information on managing oaks for wildlife.

Tip #6—Create Travel Corridors
Most animals do not feel comfortable moving through exposed, treeless areas during the day, which can limit their ability to obtain food and find cover. Planting narrow lanes of trees to connect isolated stands of trees in open agricultural landscapes will increase animal movement among stands. Similarly, if trees and shrubs are allowed to grow along fence lines, these linear routes will be used more frequently as travel corridors than if all natural vegetation is regularly removed.

Tip #7—Create and Maintain Permanent Forest Openings
As mentioned in tips #1 and 2, naturally occurring herbaceous plants are an important source of food for game species. Because the amount of groundcover that will grow within pine stands is limited, the areas next to pine stands can be managed to provide additional food resources. Roads, firebreaks, power line easements, and rights-of-way are areas that need to be maintained in fairly open conditions to serve their primary purpose, and can easily be managed in ways that increase food availability for wildlife.

Periodic disking, mowing, or prescribed burning will prevent growth of trees and shrubs while stimulating herbaceous plants as well as the seeds and insects associated with them that are food for young turkey and quail. Disturbing the soil at different times of year will stimulate different plants: October disking will promote heavy-seeded annuals, April disking will promote seed-producing grasses, and June disking will promote plants that attract insects. Disturbing different areas at different times of the year makes a variety of food available to wildlife.

Tip #8—Use Logging Decks Strategically
Make decisions regarding the location of logging decks carefully. These areas can serve as permanent openings that provide food for wildlife. They should be positioned strategically—to intersperse food and cover into large blocks of forests; to increase edge; to add contrasting habitat in areas where upland forest and drains converge; and to encourage aggregation in locations convenient for hunting and viewing and in places where the soil is conducive to grow the type of cover or forage desired.

You will reap the greatest benefits from logging decks that are properly maintained. It is wise to assess what you can do to your logging decks up-front to reduce your maintenance costs later on. Carefully consider soil conditions when siting your decks and invest in up-front weed control and liming if needed. Be sure to discuss with loggers how stumps will be removed and where debris will be piled for later burning. If you do not plan this out before the logging begins, a great deal of time and effort may be required to clear stumps and debris later.

Tip #9—Create Food Plots
Poor soil fertility tends to produce natural vegetation which is low in nutritional quality. Most of Florida’s soils are low in fertility compared to soils elsewhere in the United States, which is part of the reason Florida has relatively small-bodied deer relative to more northern states. Planting food plots with nonnative varieties known to be palatable to game species can be a good strategy to provide nutrients known to be limiting to wildlife, such as high protein foods during warmer months when animals are reproductively active, and carbohydrates during the cooler months. Food plots are also an option for aggregating game for viewing and hunting. It is important to keep in mind that Florida’s low soil fertility makes it difficult to grow some forages that thrive in other regions of the country, so be sure to select forages appropriate for the soils in your area.

A great deal of information is available on how, where, and when to plant food plots as well as which plants to include in a food plot. See Establishment of Food Plots for White-Tailed Deer in Central and South Florida at http://edis.ifas.ufl.edu/UW262; A walk on the wild side: 2013 cool-season forage recommendations for wildlife food plots in North Florida at http://edis.ifas.ufl.edu/ag139; and Supplemental Feeding and Food Plots for Bobwhite Quail at http://edis.ifas.ufl.edu/UW264 for information tailored to specific species and regions of the state.

Tip #10—Leave Some Brushy Areas
Although it is important to prevent hardwoods from forming a continuous, tall canopy under your pines across large acreages, leaving a few small, scattered areas of brushy
vegetation is a good idea. Turkey hens seek out areas with dense brush 2–3 feet high that provides overhead cover to conceal their nests from predators during nesting season (April through June). Although quail prefer warm-season bunch grasses 1–2 feet tall when nesting (May through August), small patches of low brushy vegetation in and around pine stands will provide escape cover and food resources. Disturbing such areas on a periodic basis (every 3 to 5 years) will stimulate early-successional mast-producing species such as blackberries and dewberries, while preventing the establishment of woody trees.

Additional Information


Guidelines for Creating and Managing Wildlife Openings in Pine Plantations

Scotland Talley, Wildlife Biologist
Habitat Conservation Scientific Services
Division of Habitat and Species Conservation
Florida Fish and Wildlife Conservation Commission

Always keep in mind that openings are just a supplement to well managed forest habitat and should never be considered the primary resource for wildlife. Openings are an opportunity to increase diversity in the landscape, a source of supplemental nutrition, and an attractant to increase harvest or improve viewing opportunities. Food plots cannot substitute for poor quality habitat in an unmanaged forest.

Size, Shape and Location

When developing a plan for wildlife openings the targeted species determines the size, shape and location. Openings for deer and turkey should be no less than 1 acre in size, while openings for bobwhite quail ¼ to 1 acre in size are perfectly adequate. Fields planted for doves should be a minimum of 3-5 acres in size, or larger depending on the number of hunters. On forested properties with no agriculture at least 5% of the acreage should be maintained in openings, 10% if the stands have a high basal area and dense canopy.

Openings should maximize the amount of edge created. Long, linear openings with irregular shapes are more effective than large square or round fields. Wildlife tends to avoid large open areas and tends to stay close to cover. If a log ramp or other existing opening is to be managed leaving brush piles or clumps of shrubs in the opening can create more edges and break up sight lines. Utility right-of-ways are good locations for managing vegetation, but require coordination with the utility company to avoid conflicts. Full sunlight for at least 6 hours per day is desirable for maximizing the productivity of openings. In mature stands with trees 50+ feet in height the orientation of the opening is important. Openings that are oriented on an east-west axis can be narrower since they will receive more sunlight. A width of 30-50 ft. should be sufficient for an east-west opening, while a north-south oriented opening would require 75-100 ft. in width. Openings that will be managed for native vegetation can be narrower than openings that are planted to agronomic species. For bobwhite quail “ring-a-round” openings can be created around large hardwood trees or clumps of hardwoods. These openings should be created outside the dripline of the hardwoods and serve as firebreak to protect them from prescribed burns. These openings can also be managed for native vegetation or agronomic species, and shrubby vegetation can be managed inside the ring. These openings will provide hard and soft mast, seeds and excellent cover.

Openings should be well distributed across the property and away from public roads or property boundaries where they might be attractive to poachers. Avoid slopes or areas with poor soils. Openings that are located along changes in habitat are very beneficial to wildlife. For example, an opening placed along the transition between pine
plantation and hardwood drain will create a space where three habitat types are in close proximity. Openings placed near bedding or roosting areas and thick escape cover are also beneficial. On properties where water is scarce openings should be close to a water source.

Openings can be managed for native vegetation or agronomic species. The type of vegetation managed depends on the primary species of interest, the acceptable costs, and the level of supplemental nutrition required for meeting your objectives.

Managing Native Vegetation in Openings

Managing native vegetation is the least costly and time-consuming option. If the area is forested there is a high initial cost associated with clearing the trees, but using log ramps or temporary harvest roads or skid trails can reduce this cost. Stumps should be cleared if possible to allow manipulation of the soil to maintain the opening. If stumps are not cleared then the opening can be maintained by burning and/or mowing for several years, then disking can be begin after the stumps have rotted sufficiently.

Disking at different times of year and different frequencies will favor different plant communities and structure. Similarly, burning can be used to affect the structure and composition of the plant community. As a general rule, disking in the late fall and winter favor legumes and seed producing herbaceous plants such as ragweed and beggarweeds, while spring and summer disking and burning tend to favor a grass dominated community. On land that has been in agricultural production prior to reforestation spring and summer disking can result in stands dominated by undesirable weeds such as coffeeweed, wild radish, and rattlebox. Disking annually or biannually will maintain a community of annual forbs and legumes while disking less frequently will promote a community that includes grasses, woody shrubs, and blackberry.

Larger openings provide an opportunity to create diversity by dividing them into strips or blocks that receive treatments in rotation. By disking or burning one-half or one-third of an opening each year several different types of habitat are available. Including a border around the opening that is allowed to grow up into shrubby cover that is mown, disked, or burned every 4-5 years can enhance this diversity. In smaller openings it may be impractical to divide them into strips, but a rotation of treatments on smaller openings around the property can provide diversity in the landscape.

Managing openings for natural vegetation has several advantages. The cost is lower, and native vegetation is adapted to the site and climactic conditions. The diversity of forages produced ensures that something is available year round for wildlife. The volume and palatability of forage may not equal the production of a food plot planted to agronomic species, but improvements can be made by applying fertilizer.

Managing Agronomic Species in Openings

Planting wildlife openings to agronomic species is a popular option, but is more costly and requires a significantly greater investment of time. Unsuccessful plantings
are usually the result of poor planning or “cutting corners”. These plantings are essentially agricultural crops and therefore require the same degree of planning and care as a crop planted for market. The payoff for proper planning and care is a large quantity of highly palatable and nutritious forage.

The first step is determining what crops are to be managed in each opening (Table 1). Larger openings can be divided into strips and planted to several different crops. Some openings can be planted to reseeding annuals or perennials, which will reduce the intensity of management. Ideally a planting schedule will ensure that across the property some of the wildlife openings are producing quality forage throughout the year.

For example, a planting schedule for annuals might be strips of grain sorghum (milo) and browntop millet planted in spring/summer followed by a fall planting of a rye/wheat mixture in fall over the browntop millet strips. Food is provided through summer/fall and early winter by the millet and grain sorghum and the rye/wheat mixture provides forage in late winter through spring. A planting of reseeding annuals or perennials might consist of deer vetch (Aeschynomene), perennial peanut, or clovers. Selecting the best species depends on the soils and moisture available on the site. The deer vetch and perennial peanut are warm season forages and clovers will provide winter and spring forage. This type of planting will require a light disking in the fall to promote reseeding and should not need replanting for 3-5 years. Another strategy is planting a reseeding annual such as clover and over-planting with an annual such as iron clay pea in summer or wheat in the fall.

After determining what will be planted a soil test should be obtained for each opening. Your County Extension agent can provide you instructions on collecting soil samples. The test will provide liming and fertilization requirements for the crops you intend to plant. Liming should be carried out as soon as possible because the effect of lime on soil chemistry requires 2-3 months to develop. Fertilization requirements will be reported for the three major nutrients: Nitrogen (N), Phosphorus (P), and Potassium (K). Fertilizer is sold in various mixes of these three nutrients. The mix is identified on the label in percent by weight in the order N-P-K, thus a 50 lb. bag of 10-10-10 contains 5 lb. of each nutrient in 35 lb. of inert material. Fertilizer should be applied just prior to planting at the rate recommended by the soil test. If the Nitrogen (N) requirement is very high (> 100 lb./ac.) applications should be made, half at planting and the other half at 6-8 weeks after germination.

Your County Extension agent can provide information on the best local varieties to plant, planting dates, and recommended planting rate. If planting legumes the proper inoculants must be applied to the seed prior to planting. Crops should be monitored for any sign of insect activity after planting. If caught early a light application of pesticide can be effective and prevent loss. For reseeding annuals or perennials a selective herbicide treatment may be necessary to control competition and ensure good establishment.
Keeping records and experimenting with different planting strategies is the best way to determine what will give you the best results. Soils, climate, aspect, wildlife population density and many other variables will influence your openings.

**Other Considerations**

If you are planting for white-tailed deer using exclusion cages to protect a small area will allow you to determine what impact deer are having on your planting. A 10-foot piece of welded wire fencing will make a 3-foot diameter cage that can be staked down in your opening. Roll the fencing into a cylinder and stake it down securely in your food plot. This will give you an easy visual assessment of the utilization of your planting. You may find that the peas germinated just fine, but your deer hammered them before they could become established.

If you are managing your openings for birds you should not use insecticides in spring because hens and poults are feeding heavily on insects at that time of year. Mowing or disking strips in fall and winter will make seed more readily available for quail and dove, but some cover strips should be left standing. Always make sure there is a brush pile or some weedy thickets nearby so quail and turkey poults can escape avian predators.

Another feature that can be added to an opening is planting edges with fruit producing shrubs and small trees. Native plums, crabapple, blueberries, pears and other species will provide excellent food and cover further enhancing the wildlife opening. These can be planted or you can take advantage of existing blackberries, dogwoods, etc. by protecting them from fire or mechanical disturbance. Hedgerows of blackberries, blueberries, plums and other shrubs should be cut back periodically (4-7 years) to encourage new growth that will produce more fruit. No more than ½ of the hedgerow should be cut back in a given year.

Experiment and keep records to ensure that you’re getting the most out of your efforts. Most importantly take time to sit a few evenings and enjoy watching visitors to your wildlife garden. After all that’s the best reward!
Longleaf Pine Regeneration

Chris Demers, Alan Long, and Patrick Minogue

Longleaf pine (Pinus palustris) has many favorable characteristics for landowners who have long-term, multiple-use resource management objectives. Of all the southern pine species, longleaf pine is the most insect-, disease-, and fire-resistant and has the greatest longevity. When burned regularly, longleaf pine forests develop a stable grass savannah ecosystem, providing ideal habitat for many plants and animals.

Longleaf pine is a pioneer species on a variety of sites but is intolerant of competition and flooding during its grass stage, when it appears like a clump of grass. Historically, fire and moisture have been the principal factors controlling longleaf distribution within its natural range. In the lower Coastal Plain longleaf grows on sandy, well-drained to excessively well-drained soils where loblolly or slash pine perform more poorly. Fire removes competing vegetation, exposing the bare soil necessary for successful seedling establishment. In the historic fire-dominated longleaf pine grass savannah ecosystem, relatively stable plant communities are characterized by an overstory of uneven-aged, widely spaced longleaf pines and fire-tolerant oaks such as bluejack oak (Quercus incana) and turkey oak (Quercus laevis) and a predominate ground cover of bunch grasses such as wiregrass (Aristida stricta) and bluestems (Andropogon spp.) which facilitate ignition and spread of periodic fires (Landers 1991). It is interesting to note that, despite this tree's performance on high, dry ground, its Latin name means “swamp pine.” It does grow sparsely in wet areas as well.

Artificial Regeneration

Options for artificial regeneration include planting of bareroot or containerized seedlings or direct seeding. Control of pine stocking (density) is best when seedlings are planted and container-grown seedlings generally provide the best survival rate. However, direct seeding may be a viable option for some situations, such as regenerating relatively small areas.

Site Preparation

Longleaf pine is very intolerant of shade and is difficult to regenerate successfully without vegetation control. Vegetative competition around seedlings must be kept at a minimum until an adequate number of seedlings emerging from the grass stage are at least as tall as the competition. The type and degree of site preparation and the choice of site preparation methods before planting longleaf seedlings will depend on the regeneration technique used, site conditions and your management goals.
At the very least, prepare the area for direct seeding by first performing a prescribed burn. Disking also enhances seeding establishment by exposing mineral soil and reducing competing vegetation for a short period of time. More challenging site conditions require more extensive site preparation techniques to increase the likelihood of success.

The most common situations encountered include recently harvested forest sites and conversion of old fields and pasture land. On recently harvested forest sites, most residual hardwoods should be removed with heavy machinery such as a root rake or controlled using various herbicides (Table 1). Following herbicide treatment, broadcast site preparation burning is often done to improve hand or machine planting access. V-blade planters are used to improve machine planting access by pushing debris away from the planted row. On old fields and pastures, ripping will help break hardpans (compacted soil layers) and scalping a narrow (1–2 ft) strip, about 2 to 3 inches deep, along the planted row will break up the sod and improve the effectiveness of the planting machine in setting the seedlings with good soil contact. Scalping and ripping are usually done following the contour on sloping land to avoid erosion problems. It is best to rip the soil during dry periods in the summer to obtain good soil fracture and well in advance of the planting season, so that eventually rain will settle the soil prior to planting in the late fall or winter.

When planting into established grass sod, the most effective practice is to deaden the sod with glyphosate herbicide (Table 1) either by broadcast application or by treating the broadcast site preparation burning is often done to improve hand or machine planting access. V-blade planters are used to improve machine planting access by pushing debris away from the planted row. On old fields and pastures, ripping will help break hardpans (compacted soil layers) and scalping a narrow (1–2 ft) strip, about 2 to 3 inches deep, along the planted row will break up the sod and improve the effectiveness of the planting machine in setting the seedlings with good soil contact. Scalping and ripping are usually done following the contour on sloping land to avoid erosion problems. It is best to rip the soil during dry periods in the summer to obtain good soil fracture and well in advance of the planting season, so that eventually rain will settle the soil prior to planting in the late fall or winter.

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Once seedlings are established, a prescribed burning program is a natural and cost-effective means to manage hardwood vegetation and also shift the ground cover to grass savannah species which provide desirable habitat for many desired wildlife species (Platt et al. 1998; Noss 1989).

### Planting

Since longleaf pine seedlings do not become truly dormant, they require greater care in handling and planting than other southern pines. The success of longleaf pine planting depends on (1) good soil moisture at and following planting; (2) a well-prepared, competition-free site; (3) fresh, healthy, top quality planting stock; (4) extreme care in handling the stock from lifting to planting; (5) quality planting; and (6) managing competing vegetation through stand establishment. High quality seedlings can be grown as either bare root or container stock, but container stock is somewhat more forgiving of less than optimum conditions.

The appropriate planting density will depend on your objectives. Low planting densities, 300 to 500 seedlings per acre or less, may be appropriate for longleaf ecosystem restoration and/or to provide wildlife habitat (such as that for bobwhite quail), whereas as many as 750 seedlings per acre or more may be desirable to optimize timber production and pine straw raking.

Supplies of longleaf pine seedlings may not be sufficient to meet demands, so order your seedlings by early summer at the latest. For a list of longleaf nurseries, call your Florida Forest Service County Forester [here](http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/For-Landowners/County-Foresters) or the Longleaf Alliance, at 334-427-1029, and request a copy of the Longleaf Nursery List. This is also available on their website: [here](http://www.longleafalliance.org/).

Choose a tree planting contractor that has experience with planting longleaf pine. Planting failures frequently result from improper seedling handling and planting. Hiring an experienced and reputable contractor may help to ensure
Longleaf Pine Regeneration

seedling survival and minimize the possibility of having to replant.

BAREROOT SEEDLINGS

Longleaf pine seedlings at the nursery are stem-less and resemble a carrot with a clump of pine needles on top. Ideally, bareroot seedlings should have (1) a root collar diameter (RCD) of 0.4 to 0.6 inch; (2) a stout, 6- to 8-inch or longer tap root; (3) at least 6 well-developed, 6- to 8-inch lateral roots with evidence of ectomycorrhizal development; (4) a winter bud with scales; (5) abundant, large, fascicled needles that are free of brown-spot disease; (6) been grown at a reputable nursery; (7) been undercut in the nursery bed well before lifting; and (8) a seed source from the same region as the planting site. Seedlings with a RCD of 0.3 inch or less generally have low survival rates.

Longleaf seedlings come out of the grass stage and initiate stem height growth when the seedlings have a RCD of about one inch. After planting, longleaf seedlings allocate their growth to develop a tap root prior to initiating stem height growth. As noted above, seedlings may initiate height growth at a younger age if competing vegetation is controlled. Once the seedlings emerge from the grass stage, height growth is comparable with loblolly or slash pine of the same age.

CONTAINERIZED SEEDLINGS

There is increasing interest in using containerized longleaf pine seedlings (plugs) because they generally have greater survival than bareroot seedlings. Also, containerized seedlings can be planted throughout the year, whenever soil moisture is adequate before and after planting. Containerized seedlings have even been successfully planted during the hot summer months, when afternoon rains are common. They can be used to replant partial regeneration failures in the year they occur as well. Studies have shown that both fall-planted and late winter-planted containerized longleaf seedlings often have better survival and growth than winter-planted bareroot seedlings. Seedlings grown in large containers (large plugs) can enhance survival on adverse sites, but to ensure success sufficient site preparation and vegetation control measures must be taken.

The main drawback of containerized seedlings is cost. On average, the price per thousand is about twice as much for container-grown seedlings as the cost for bareroot seedlings. The larger the plug volume, the greater the cost to produce the plugs. Also, containerized seedlings are more bulky to handle during shipping and planting. However, cost-share programs and increased survival make them a feasible option.

NURSERY TO FIELD

Proper care and handling of seedlings from the nursery to the field includes several steps: (1) pick up seedlings from the nursery the day they are lifted; (2) protect roots from desiccation; (3) protect seedlings from wind and refrigerate them if possible during transportation to the planting site (place plugs loosely in large coolers or waxed boxes); (4) store seedlings in a cool, well-ventilated area for no more than three days before planting (or up to 3 weeks in refrigeration, 5 weeks with humidity control); and (5) do not expose seedlings to sunlight or heat. To optimize success, plant seedlings within three days of pickup from the nursery. Large planting jobs may require multiple trips to the nursery.

Longleaf seedlings are normally planted between November and the beginning of March when cool temperatures are prevalent and soils are normally moist. Planting during the early part of this time frame is best to give seedlings time to grow new roots before the dry weather of April and May. Containerized seedlings can be planted earlier whenever available soil moisture is adequate and rainfall occurs as noted above, but risks are diminished during the winter planting season. Avoid planting during periods of low soil moisture, dry weather, high temperature, low relative humidity, high winds or when soil is frozen.

Take enough seedlings to the field for one day of planting and keep them moist, but not submerged. When hand-planting bareroot seedlings, keep a little water or wet Tera-Sorb in the bottom of the planting bag. Make sure tree planters carry seedlings in the bag to prevent the roots from drying out.

For bareroot seedlings, machine planting is preferable to hand planting because the larger slit created by the machine provides for better root alignment. If hand-planting, bareroot seedlings should be planted with a shovel or large dibble. Containerized seedlings can be planted with a cylinder-type dibble or any of the flat-bladed implements used to plant bareroot stock.

For bareroot stock, position seedlings with taproots straight down and root collars at or slightly below the ground line (no more than 1 inch below), which allows the bud to be exposed once the soil has fully settled. Attention to detail during planting is critical—a seedling planted too shallow will die quickly, and a seedling planted too deep will die slowly.
For **containerized seedlings**, position the plug so that the terminal bud is just slightly above the soil surface to insure the seedling is not planted too deep; the terminal bud must remain above the soil surface. Planting plugs too shallow could cause them to dry out and die.

Do not plant directly in a subsoiled/ripped furrow because the seedlings may sink. Instead, offset 2–4 inches to the side of the ripped furrow.

On scalped sites with sandy soil, soil movement back into the scalped furrow should be anticipated, and containerized seedlings should be planted somewhat more shallowly. Optimum planting depth will depend on conditions; sandy soils and sloping ground tend to have more soil movement. Recent research by the Longleaf Alliance suggests that on scalped sites prone to soil movement leaving approximately ½ to 1 inch of the plug above the soil surface may position the terminal bud at an optimum final height, favoring good survival. However, keep in mind that planting plugs too shallowly will increase the risk of the seedlings drying out and dying, especially if an extensive dry period follows planting.

**A WORD ABOUT COST-SHARE CONTRACTS**

If you have a cost-share contract under the USDA’s Conservation Reserve Program or Wildlife Habitat Incentives Program, the planting crew must know about it. If not, they may plant more than the maximum number of seedlings allowed in the terms of the contract, causing problems with your funding.

**POST-PLANTING CARE**

Once seedlings are planted, the principal factors affecting seedling development are vegetative competition and brown-spot needle blight. Prescribed fire is the most common cultural treatment used to control both. If average brown-spot infection exceeds 20% of the cumulative foliage on sampled seedlings, a burn will be needed to control the disease unless it will result in excessive mortality. Seedlings in the early stages of height growth (coming out of the grass stage) are most susceptible to fire kill, especially when heavily infected by brown-spot.

**Direct Seeding**

Due to increases in seed costs, this once cost-effective regeneration option is now potentially cost prohibitive, and it involves substantial risk. Failure can occur as a result of inadequate control of competing vegetation, low seeding rates, using seed not treated with bird or rodent repellent, seeding at the wrong time, or adverse weather conditions. Often, direct seeding results in stands with patchy stocking, with some areas not adequately stocked and some areas with too many trees. Low, poorly drained sites that are likely to be covered with standing water a week or more after seeding should be avoided. Likewise, deep upland sands that dry out rapidly after a rain are also unsuitable for direct seeding. Generally, sites that can be successfully planted can also be successfully seeded. As with planting, site preparation methods must control vegetative competition and expose at least 50% of the mineral soil. Seeds must be in contact with the mineral soil for germination to take place. Seeds lodged in non-soil material will probably not become established.

In general, local seed sources are best. Seed or seedlings from North and South Carolina tend to grow poorly when planted on the Florida peninsula and vice versa. Most genetic improvement work with longleaf pine is concentrated on breeding for brown-spot disease resistance and accelerated initial height growth.

Purchase seeds from a reputable seed dealer. Longleaf seeds should be refrigerated at subfreezing temperatures until sowing. Sowing can take place in fall, when moisture is adequate and maximum daytime temperatures drop below 85 degrees. Seed can be sown at low cost by broadcast seeding at 3 pounds per acre, or spot seeding (dropping 3 to 5 seeds per spot). Row seeding, at 1 to 2 feet spacing between seeds, can be used when better control over spacing and density is desired. Large areas are best seeded by aircraft which use carefully calibrated equipment. After establishment (two to three years), clumps of seedlings can be thinned down to one tree.

**Natural Regeneration For Even-Aged Stands**

Landowners who already have stands of longleaf pine can take advantage of a practical, inexpensive natural regeneration method known as the *shelterwood* system, a natural seeding method well-suited to the biological requirements of this species. The shelterwood method maximizes per-acre seed production and yields sufficient needle litter to fuel fires hot enough to inhibit hardwood regeneration and to prepare a seed bed. Regular prescribed burns should be scheduled throughout the rotation to maintain a low understory. The mature stand is removed in a series of three harvests, with a portion left standing as a seed source until regeneration is well established. Success with this method depends on (1) a good seed year with adequate seed supply,
Longleaf Pine Regeneration

(2) a receptive seedbed, (3) minimal vegetative competition and (4) ample soil moisture.

The three harvests of the shelterwood system serve 3 basic purposes: (1) to prepare the stand for production of abundant seed, (2) to modify the environment in a way that promotes germination and survival, and (3) to build up the amount and size of advance regeneration to ensure a well-distributed stand following overstory removal.

Preparatory Cut

The preparatory cut may be 10 or more years before the planned final “removal” harvest date of the stand and at least 5 years before the “seed cut”. This preparatory cut is essentially a thinning which reduces the basal area (BA) of the stand to a maximum of 60–70 square feet per acre of dominant and codominant pines. This cut promotes crown development and cone production. Most of the hardwoods not controlled by fire should also be cut at this time.

Seed Cut

The seed cut is made 5 years prior to the planned removal harvest and leaves no more than 30 square feet BA per acre of the largest dominant trees, with well-developed crowns and best stem form, typically 15 inches diameter at breast height (dbh) or greater. Trees with evidence of past cone production are favored. Cone production peaks in the range of 30 to 40 square feet BA per acre, but the lower end of this range is preferred because logging-related seedling losses increase when more trees are removed in the final cut.

Monitor the cone crop by taking spring binocular counts of both flowers (next year’s cone crop) and 1 year-old conelets (this year’s cone crop) on selected sample trees in the regeneration area. These counts will give an estimate of the potential for the cone crop to regenerate the stand so that the seedbed can be prepared before the cones open. Generally, few seeds are produced by trees under 30 years old or under 10 inches dbh.

In order to achieve adequate natural regeneration, the available seed supply must feed various forms of wildlife with enough left over to establish a satisfactory stand. A minimum of 750 to 1,000 or more cones per acre is needed for successful regeneration. Longleaf cone crops are highly variable. Good seed crops occur every 5 to 10 years. Seedfall begins in late October and continues through November, but most seeds fall within a period of 2 to 3 weeks. About 70% of viable seeds fall within 65 feet of the parent tree. Under favorable weather conditions, seeds will germinate one or two weeks after dispersion. A prescribed burn 1 year before seedfall will remove accumulated litter and expose sufficient mineral soil for seedling establishment. A late-spring burn is most effective in controlling woody stems.

Removal Cut

Once an acceptable stand of seedlings is established, the parent overstory can be removed. This cut can be delayed if necessary for management needs or market conditions. Seedlings can survive 8 or more years under the parent overstory with little or no effect on survival given exclusion of burning. However, logging damage becomes more serious once seedling height growth begins and fire exclusion leads to encroachment of competing hardwoods.

Naturally regenerated stands require the same attention as planted stands with respect to brown-spot disease and competing vegetation. Young stands should not be burned until at least 2 years after the removal cut to allow time for logging slash to decay and the seedlings to respond to release.

Natural Regeneration for Uneven-Aged Stands

Uneven-aged stands are created using the selection system. In the selection system, trees representing a range in diameter classes are harvested at fixed intervals (called the cutting cycle, which ranges from 10 to 25 years). Regeneration (either natural or artificial) occurs in the harvested openings. This management approach allows periodic harvests, while maintaining a continuous forest cover. Smaller, lower quality trees are also removed to improve the overall quality of the stand. This method is covered in detail in this publication on opportunities for uneven-age management: http://edis.ifas.ufl.edu/fr132.

Conclusion

Longleaf pine has many desirable characteristics for landowners who have multiple-use forest management objectives. On appropriate sites, and with careful attention to detail during the regeneration phase, it is possible to enjoy the versatility of this species without compromising growth rates.

References

Anon. “Keys to successfully planting longleaf pine.” Brochure by the Longleaf Alliance. Andalusia, AL.


Table 1. Common herbicide treatments for longleaf pine establishment. Read and follow all label directions.

<table>
<thead>
<tr>
<th>Common Name/Soil Texture</th>
<th>Rate of Active Ingredient (ai) or Acid Equivalent (ae) per Acre</th>
<th>Trade Name Amount Product per Acre</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site preparation of recently harvested forest sites primarily to control hardwood and shrub vegetation prior to planting:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexazinone/</td>
<td>For soil types:</td>
<td>Velpar® L</td>
<td>For soil types:</td>
</tr>
<tr>
<td>Sand, loamy sand, sandy loam</td>
<td>2-3 lb ai/Ac</td>
<td></td>
<td>4-6 qts/Ac</td>
</tr>
<tr>
<td>Loam, silt loam, sandy clay loam</td>
<td>3-4 lb ai/Ac</td>
<td></td>
<td>6-8 qts/Ac</td>
</tr>
<tr>
<td>Silty clay loam, clay loam, sandy clay, silt, silty clay, clay</td>
<td>4-5 lb ai/Ac</td>
<td></td>
<td>8-10 qts/Ac</td>
</tr>
<tr>
<td><strong>Imazapyr plus Glyphosate</strong></td>
<td>0.625 lb ai + 3.0 lb ai/Ac</td>
<td>Chopper® Accord®, XRT</td>
<td>40 oz mass + 2.2 qts/Ac</td>
</tr>
<tr>
<td><strong>Site preparation prior to planting on fallow pasture sites:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glyphosate</td>
<td>2.0 lb ai/Ac</td>
<td>Accord®, XRT</td>
<td>1.5 qts/Ac</td>
</tr>
<tr>
<td><strong>Herbaceous weed control (grasses and broadleaf weeds) applied over-the-top of planted longleaf seedlings in early spring, at least one month after planting to allow for new root growth prior to herbicide treatment.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexazinone plus Sulfometuron</td>
<td>6 oz ai/Ac + 1.5 oz ai/Ac</td>
<td>Velpar® L Oust®, XP</td>
<td>24 oz liq. + 2 oz mass/Ac</td>
</tr>
<tr>
<td>Hexazinone plus Sulfometuron</td>
<td>7.6 oz ai/Ac + 1.4 oz ai/Ac</td>
<td>Oustar®</td>
<td>*12 oz/Ac</td>
</tr>
</tbody>
</table>
Herbaceous weed control (HWC) during the spring following planting slash pine seedlings can be critical to growth and survival on old-field, pasture, hayfield, and cut-over sites, particularly in droughty years.

A four to six foot wide band is often as effective as a broadcast treatment.

Wait at least one to two months after planting prior to over-the-top herbicide application to obtain best pine tolerance and growth response.

**HERBICIDES FOR CONTROL OF BROADLEAF WEEDS AND GRASSES**
(all treatments applied over-the-top of pines unless noted otherwise)

**ARSENAL® AC (BASF; 53% imazapyr; 4 lb per gal)**
- Very effective on perennial grasses, including difficult to control species like Bermudagrass, seedling Johnsongrass, and Panicums
- Weak on broadleaf weeds in the composite group (see Oust® XP®)
- Effective on established weeds
- Apply 4 – 6 fluid oz product per acre
- Do not add surfactant
- Imazapyr may cause severe slash pine stunting at excessive rates, ensure proper sprayer calibration to apply precise herbicide rate per acre
- Optimum timing: Early post to post emergence of weeds (April to May)
- Grass and broadleaf weed control including, but not limited to: bahiagrass, barnyardgrass, bluegrass (annual, Kentucky), Bermudagrass, crabgrass, fescue, foxtail, Italian ryegrass, Johnsongrass, lovegrass, panicums, sandbur, wild oats, witchgrass, camphorweed, carpetweed, chickweed, clovers, cocklebur, dandelion, dognen, horseweed, goldenrod, knotweed, lambsquarters, milkweed, ragweed (common, giant), pepperweed, pigweed, plantain, pockweed, purslane, pusley (Florida), shepards purse, sowthistle, stinging nettle, annual spurge, sunflower, tansymustard, wild carrot, wild parsnip, wild turnip
**OUST® XP®** (DuPont; 75% sulfometuron methyl)
- Very effective on a broad spectrum of broadleaf weeds, including composites
- Weak on perennial grasses including Bermudagrass, some panicums, and broomsedge species (see Arsenal® AC)
- 1st Year plantings: apply 2-4 oz Oust product per acre
- Optimum timing: Pre-emergence to early post emergence (March-April)
- Do not use Oust when soil pH > 6.2
- Grass & broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutedge (yellow), Panicum (broadleaf), pokeweed, ragweed, shepherd’s purse, white snakeroot, yellow sweetclover, annual bluegrass, barnyardgrass, foxtail barley, foxtail fescue, Italian ryegrass, jointed goatgrass, bromes (red, ripgut), reed canarygrass, signalgrass, yellow foxtail, mustard, pepperweed, pigweed, sunflower, vetch, wild carrot, wild oats
- See weeds controlled in Arsenal AC, Oust XP, and Escort XP sections

**LINEAGE® HWC** (DuPont; 37.5% imazapyr + 28.1% sulfometuron methyl + 7.5% metsulfuron)
- Apply 5.3 oz product per acre
- Do not add surfactant
- Optimum timing is early post emergence (March – April)
- Very broad spectrum control of grasses and broadleaf weeds
- Imazapyr may cause excessive slash pine seedling stunting, ensure proper sprayer calibration to apply precise herbicide rates per acre
- See weeds controlled in Arsenal AC, Oust XP, and Escort XP sections

**OUST® XP®** (DuPont; 75% sulfometuron methyl) + **VELPAR L®** (DuPont; 25% hexazinone, 2 lb ai/gal) or **OUST® XP® + VELPAR® DF** (DuPont, 75% hexazinone)
- Broad spectrum weed control of broadleaf weeds and most grasses, weak on Bermudagrass, broomsedge, and some Panicums
- Hexazinone may cause pine seedling mortality on sandy sites, ensure proper calibration and follow label directions regarding appropriate rates for various soil types
- Apply 2-4 oz Oust product + VELPAR L 2 - 3 pints (or Velpar DF 10 – 16 oz product) per acre depending on soil texture (see product label)
- Optimum timing: Pre to early post emergence of weeds (March - early May)
- Do not use Oust when soil pH > 6.2. Use low rate of Oust + Velpar L or Velpar DF on coarse textured (sand, loamy sand, and sandy loam) soils and where soils are low in organic matter (see label)
- Grass & broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutedge (yellow), Panicum (broadleaf), pokeweed, ragweed, shepherd’s purse, white snakeroot, yellow sweetclover, annual bluegrass, barnyardgrass, foxtail barley, foxtail fescue, Italian ryegrass, jointed goatgrass, bromes (red, ripgut), reed canarygrass, signalgrass, yellow foxtail, mustard, pepperweed, pigweed, sunflower, vetch, wild carrot, wild oats, asters, brackenfern, fleabane
**OUSTAR®** (DuPont; 11.8% sulfometuron methyl and 63.2% hexazinone)
- Similar to Oust XP + Velpar products as above, but in a packaged mixture
- The ratio of active ingredients is set; hexazinone rate tends to be too high on sandy sites
- **1st Year** weed control application product rates per acre:
  - 10-12 oz Course textured soils (sand, loamy sand, sandy loam)
  - 12-16 oz Medium textured soils (loam, sandy clay loam, silt loam)
  - 16-19 oz Fine textured soils (clay loam, sandy clay, silty clay loam, silty clay)
- **After 1st year** weed control application product rates per acre:
  - 12-16 oz Course textured soils
  - 16-19 oz Medium textured soils
  - 18-24 oz Fine textured soils
- Do not use Oustar when soil pH > 6.2
- Optimum timing: Pre to early post emergence (March - early May)
- Grass & broadleaf control including, but not limited to: chickweed, crabgrass, dogfennel, fescue, fireweed (willowweed), goldenrod, horseweed, Kentucky bluegrass, nutsedge (yellow), Panicum (broadleaf), pokeweed, ragweed, shepherd’s purse, white snakeroot, yellow sweetclover

**OUST® XP® + AATREX® 4L** (Syngenta; 42.6% atrazine)
- Apply 2-4 oz Oust product + 4-8 pints Aatrex 4L product per acre (lower rate on coarse textured soils and higher rate on medium to fine textured soils)
- Pre to early post emergence weeds <1.5” tall over dormant pines in early spring
- For grass & broadleaf weed control including plants listed by Oust XP as well as: barnyardgrass*, giant foxtail*, green foxtail*, large (hairy) crabgrass*, wild oats, witchgrass*, yellow foxtail*, cocklebur*, groundcherry, jimsonweed, lambsquarters, annual morningglory, mustards, nightshade, pigweed, purslane, ragweed, sicklepod*, velvetleaf (buttonweed)* using Attrex 4L.
  * indicates partial control using Attrex 4L

**OUST® EXTRA** (DuPont; 56.25 % sulfometuron methyl + 15% metsulfuron methyl)
- Apply 2 2/3 to 3 oz Oust Extra product per acre
- **Pre to** early post emergence
- Note Escort XP + Oust XP for plants controlled

**ESCORT® XP®** (DuPont; 60% metsulfuron methyl)
- Apply 1/3 - 2 oz Escort XP product
- Pre to early post emergence
- Blackberry control + broadleaf weeds & grasses; annual sowthistle, aster, bahiagrass, bee balm, bittercress, bitter sneezeweed, blackberry, blackeyed-susan, blue mustard, bull thistle, buttercup, chicory, cocklebur, common chickweed, common groundsel, common purslane, common yarrow, common sunflower, conical catchfly, corn cockle, crown vetch, curly dock, dandelion, dewberry, dogfennel, false chamomile, fiddleneck tarweed, field pennycress, garlic mustard, goldenrod, henbit, honeysuckle, multiflora rose and other wild roses,
lambsquarters, lettuce (miners, wild), marestail/horseweed*, maximilian sunflower, mustard (transy-, treacle, wild), oxeye daisy, Pennsylvania smartweed, plantain, pigweed (redstem, smooth), plumleaf thistle, prostate knotweed, redstem filaree, sericea lespedeza, shepherd’s purse, silky crazyweed (locoweed), falseflax, sweet clover, tansy ragwort, teasel, wild carrot, wild garlic, woolly croton, wood sorrel, yankeeweed.

* Certain biotypes of marestail/horseweed are less sensitive to Escort XP.

OUST® EXTRA + ARSENAL® AC
♦ Apply 2 oz Oust Extra + 4 oz Arsenal product per acre
♦ Early post to post emergence
♦ Imazapyr may cause severe slash pine stunting at excessive rates, ensure proper sprayer calibration to apply precise herbicide rate per acre
♦ Refer to list of plants controlled for Escort XP and Arsenal

ESCORT XP + VELPAR L or VELPAR DF
♦ Apply ½ - 1.0 oz Escort XP product + Velpar L or Velpar DF product (see label for specific VELPAR rates) per acre
♦ Early post to post emergence
♦ Blackberry control + broadleaf weeds and grasses (refer to Escort and Velpar for lists of plants controlled)

VELPAR DF (DuPont; 75% hexazinone)
♦ May cause mortality where excessive rates are applied on sandy soils, ensure proper sprayer calibration to apply precise herbicide rate per acre, following label recommendations regarding specific herbicide rates for various soil types
♦ 1st Year weed control application product rates per acre (the same amounts can be applied in years 2, 3, and 4):
  1 ½ lb Course textured soils (loamy sand, sandy loam)
  1 1/3 – 1 ½ lb Medium textured soils (loam, sandy clay loam, silt, silt loam)
  1 ½ - 1 4/5 lb Fine textured soils (sandy clay, silty clay loam, silty clay, clay, clay loam)
♦ Weed control application product rates per acre for established trees (≥ 4-yrs-old):
  1 1/3 – 1 2/3 lb Course textured soils
  1 2/3 – 2 1/3 lb Medium textured soils
  2 1/3 – 2 2/3 lb Fine textured soils
♦ Optimum timing: Pre to early post emergence (March – early May)
♦ Grass & broadleaf control including, but not limited to: Asters, barnyardgrass, annual bluegrass, brackenfern, bromegrass, fleabane, foxtail, horseweed, ragweed, ryegrass

VELPAR L (DuPont; 25% Hexazinone)
♦ May cause mortality where excessive rates are applied on sandy soils, ensure proper sprayer calibration to apply precise herbicide rate per acre, following label recommendations regarding specific herbicide rates for various soil types
1st Year weed control application product rates per acre (the same amounts can be applied in years 2, 3, and 4):
21 to 32 oz Course textured soils (loamy sand, sandy loam)
24 to 40 oz Medium textured soils (loam, sandy clay loam, silt, silt loam)
28 to 48 oz Fine textured soils (clay, clay loam, sandy clay, silty clay loam, silty clay)

After 4th year weed control application product rates per acre:
21 to 40 oz Course textured soils
28 to 56 oz Medium textured soils
36 to 64 oz Fine textured soils

Optimum timing: Pre to early post emergence (March - early May)

Grass & broadleaf control including, but not limited to: Asters, barnyardgrass, annual bluegrass, brackenfern, bromegrass, fleabane, foxtail, horseweed, ragweed, ryegrass

Also consider:
(1) The herbicide purchaser and applicator need to look closely at the herbicide label to make sure that the herbicide product used is: (a) labeled for the particular use site (e.g. “for use in forest sites”, “for use in conifer plantations”, etc.) (b) labeled for the pine crop species (or genus in some cases), and (c) labeled for the particular application (“herbaceous weed control in pine plantations”, “herbaceous release”, etc.). Herbicide products, even those with the same trade name (such as “Roundup”), may have different amounts of the active ingredient per gallon, so always follow the rates specified on the label of the particular container being used.
(2) Remember rates are per acre treated. Here are two examples of calculating the herbicide needed for a banded herbicide application using 10 oz Oustar product per acre treated, assuming 12 feet between the rows: (a) spraying a 4 foot wide band, 10 oz Oustar will take care of 3 acres total land area. In effect, one acre is banded and two acres are untreated, so herbicide is applied to one-third of the area. A total of 400 oz (25 lbs) of Oustar would be needed for a 120 acre field where one-third the area is treated in bands. (b) When spraying a 6 foot wide band on rows 12 feet apart, 10 oz Oustar will take care of 2 acres total land area. One acre is banded and one acre is untreated, so herbicide is applied to half the area. A total of 600 oz (37.5 lbs) of Oustar would be needed for a 120 acre field where herbicide is applied to one-half the area in bands.
(3) There are generics for some of the above listed herbicides and various product labels for the same active ingredient do vary. Read the product labels to make sure that your intended use is consistent with labeling.

Please read and follow all label recommendations. Inclusion of a product trade name or a company name in this publication does not constitute an endorsement of a product or a company, as other products manufactured by different companies might be equally suited for the intended herbicide use.

HERBICIDES FOR CONTROL OF ANNUAL & PERENNIAL GRASSES ONLY
(1) All grass control herbicides listed below are postemergence, foliar active herbicides.
(2) Best control for all grass species is obtained when grasses are in an early growth stage. For Texas panicum, apply when the grass is less than 4 inches tall. For Bermudagrass two applications are usually needed; the first when less than 6 inches tall and a second when re-growth is less than 4 inches. Multiple applications are also needed for
Johnsongrass.

(3) Herbicides in this group generally do not mix well with other herbicide products. However, it is very important to add surfactants (wetting agents) to improve plant uptake. See information below and product labels for details.

(4) Herbicide spray solution (water) volumes are typically between 10 to 20 gallons per sprayed acre (GPA) with a range 5-40 GPA; read label for specifics.

(5) Do not apply herbicides when pine seedlings and desirable grasses are under drought or other stress

(6) Do not apply herbicides when rainfall is expected within one hour.

**ENVOY® PLUS** (Valent; 12.6% clethodim, 0.97 lb clethodim per gallon, contains petroleum distillates)
- Apply 9 to 16 fluid oz per acre for annual grasses, 12 to 32 oz/acre for perennial grasses
- Add crop oil concentrate which contains at least 15% emulsifier at 1% volume/volume (1 qt per 25 gallons spray solution, but no less than 1 pint per acre) or non-ionic surfactant at 0.25% volume/volume (1 qt per 100 gallons)
- Apply in 10 to 40 gallons of water per acre
- Do not apply more than 64 oz/ac/ per season, make a minimum 14 day interval between applications, do not apply more than 32 oz/ac per application

**FUSILADE® DX** (Syngenta; 24.5% fluazifop-P-butyl, 2 lb per gallon fluazifop-P-butyl)
- Apply 16-24 fluid oz product per acre per application
- Use a lower dose for annual grasses, a higher dose for perennial grasses
- Add 1% crop oil concentrate (1 quart per 25 gal) or 0.25% nonionic surfactant (1 quart per 100 gal)
- Do not apply more than 72 fluid oz Fusilade DX per acre, per season

**ARROW® 2EC** (Makhteshim Agan of North America (MANA); 26.4% clethodim, 2.0 lbs clethodim per gallon, contains petroleum distillates)
- Apply 6 to 8 fluid oz product per acre for annual grasses and 8 to 16 oz/acre for perennial grasses
- Add crop oil concentrate which contains at least 15% emulsifier at 1% volume/volume (1 qt per 25 gallons spray solution, but no less than 1 pint per acre) or non-ionic surfactant at 0.25% volume/volume (1 qt per 100 gallons)

### WEED TOLERANCE TO SELECTED HERBICIDES

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Weeds tolerant to the herbicide listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARSENAL</td>
<td>sicklepod, tropic croton, blackberry, most legumes</td>
</tr>
<tr>
<td>AATREX</td>
<td>Bermudagrass, lespedezia, Johnsongrass, broomsedge, blackberry</td>
</tr>
</tbody>
</table>
### GRASS WEED RESPONSE TO HERBICIDES

<table>
<thead>
<tr>
<th>WEED</th>
<th>(^a) Fluazifop-P-butyl</th>
<th>(^b) Clethodim</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perennial Grasses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bermudagrass</td>
<td>G - E</td>
<td>G - E</td>
</tr>
<tr>
<td>Bahiagrass</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Johnsongrass (rhizome)</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>tall fescue</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>nutsedge</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td><strong>Annual Grasses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broadleaf signalgrass</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>crowfootgrass</td>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td>crabgrass</td>
<td>F</td>
<td>G</td>
</tr>
<tr>
<td>fall panicum</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>goosegrass</td>
<td>F - G</td>
<td>F - G</td>
</tr>
<tr>
<td>Johnsongrass (seedling)</td>
<td>G - E</td>
<td>E</td>
</tr>
<tr>
<td>sandbur</td>
<td>G</td>
<td>G - E</td>
</tr>
<tr>
<td>Texas panicum</td>
<td>G - E</td>
<td>G</td>
</tr>
</tbody>
</table>

Old-field non-scalped post-plant herbaceous weed control timing considerations for the Georgia Coastal Plain and Central to Northern Florida

<table>
<thead>
<tr>
<th>Soil drainage class</th>
<th>Pre- to early post emergence herbicide</th>
<th>Early post to post emergence herbicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somewhat excessively to excessively well</td>
<td>March</td>
<td>March to early April</td>
</tr>
<tr>
<td>Moderately well to well</td>
<td>March to early April</td>
<td>mid-March to mid-April</td>
</tr>
<tr>
<td>Poorly to somewhat poorly</td>
<td>April to early May</td>
<td>mid-April to mid-May</td>
</tr>
</tbody>
</table>

* Do not apply herbicides over longleaf for at least 2 months after planting and when there is 1 to 2 inches of new feeder root growth off 2 or more lateral roots and wait at least 1 to preferably 2 months after planting for slash pine.

** For scalped sites, herbicides applied from mid-April into mid- to late May have given good survival and growth results based on recent studies as long as seedlings are not under stress (especially drought stress).

Organization of GA (FL, AL, and SC in some cases) Coastal Plain Soil Series in Management Groups (Larry Morris “Forest soils and management decisions” workshop 2005)

<table>
<thead>
<tr>
<th>Drainage</th>
<th>Subsoil Type:</th>
<th>None (Sandy to loamy sand)</th>
<th>Loamy</th>
<th>Clayey</th>
<th>Spodic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very poorly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ Arg</td>
</tr>
<tr>
<td>Poorly to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Somewhat Poorly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>Rutledge</td>
<td></td>
<td>Torhunta</td>
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</tr>
<tr>
<td>10-20</td>
<td>Chipley</td>
<td></td>
<td>Lynchburg</td>
<td>Bladen</td>
<td>Rigidon</td>
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<tr>
<td>20-40</td>
<td>Osier</td>
<td></td>
<td></td>
<td></td>
<td>Mascotte</td>
</tr>
<tr>
<td>40-80</td>
<td>Scranton</td>
<td></td>
<td></td>
<td></td>
<td>Sapelo</td>
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<tr>
<td>0-10</td>
<td>Resota</td>
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<td></td>
<td></td>
<td>Leon</td>
</tr>
<tr>
<td>10-20</td>
<td>Pactolus</td>
<td></td>
<td></td>
<td></td>
<td>Mandarin</td>
</tr>
<tr>
<td>20-40</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-80</td>
<td></td>
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</tr>
<tr>
<td>Moderately Well to Well Drained</td>
<td></td>
<td>Goldsboro</td>
<td></td>
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<td>Onslow</td>
</tr>
<tr>
<td>0-10</td>
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<td>Tifton</td>
<td></td>
<td></td>
<td>Seagate</td>
</tr>
<tr>
<td>10-20</td>
<td></td>
<td>Dothan</td>
<td></td>
<td></td>
<td>Baymeade</td>
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- Dead Wood: Key to Enhancing Wildlife Diversity in Forests
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- Forest Management in the Interface: Practicing Visible Stewardship
- Forest Resource Information on the Internet: Connecting to Today’s Online Resources
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- Improving, Restoring, and Managing Natural Resources on Rural Properties in Florida: Sources of Financial Assistance
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- Ten Tips for Encouraging the Use of Your Pine Plantations by Game Species
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