
# Alabama Tree Farm
# Landscape Management Plan

# Landscape Management Plan Creation

## Plan Development and Composition

This Landscape Management Plan (LMP) was adapted from the Florida LMP developed by the American Forest Foundation (AFF), in conjunction with Southern Forestry Consultants, Inc. (SFC). The original components of the Alabama LMP were developed by the Alabama Tree Farm Committee in conjunction with a Steering Committee comprised of Natural Resource Professionals. With the guidance, technical consultation, and support of the agencies represented, the Alabama Tree Farm worked cooperatively to evaluate and incorporate edits, comments, and modifications that resulted in the LMP for Alabama.

The Alabama LMP began as a pilot project in 2017 that covered North Alabama and was titled, North Alabama Landscape Management Plan. This plan was put into practice in 2018 and was third party audited by PricewaterhouseCoopers (PwC) in 2019. Through that process, required action items and suggestions were given to the Alabama Tree Farm Committee to improve the North Alabama LMP. In 2020, the Alabama LMP was extended statewide with improvements made.

## Alabama LMP Development Support Committee

Both the prior North Alabama LMP and the current state wide Alabama LMP were developed via the collaboration of a Natural Resources Steering Committee (Steering Committee) made up of natural resource professionals. The Steering Committee provided content and input on various thematic, structural, and scientific components of the plan, including through various drafts. Additionally, Steering Committee members facilitated access to and procured data for the development of the geospatial database. We wish to thank and recognize the individual members of the team and partnering organizations. Steering Committee members included representatives of:

- Alabama Tree Farm Program
- Alabama Forestry Commission
- NRCS
- Auburn University
- Sustainable Forestry Initiative
- Alabama Soil and Water Conservation Committee
- Alabama Cooperative Extensions Services
- Shorteaf Initiative
- American Forest Foundation
- American Tree Farm System
- Westrock
- USDA
- DCNR

## Additional Stakeholders

The Alabama Tree Farm Program also sought input from a variety of additional stakeholders with expertise in the natural resources, species conservation, planning, forest certification and

auditing, consulting forestry, landowner engagement, change management, and regulatory disciplines. Support Committee members also solicited feedback and ideas from their own organizations and external stakeholders.

## Funding Support

The development of the Alabama LMP was made possible with financial support from the following partners. We wish to thank and recognize them:

- American Forest Foundation
- American Tree Farm System
- Alabama Forest Foundation
- Alabama Sustainable Forestry Initiative Implementation Committee
- Westrock
- Georgia Pacific
- Resolute Forest Products
- USDA Forest Service's Landscape Scale Restoration Grant (LSR)

## AFF's Landscape Conservation and Wildlife Goals

The South's forests rank highly in terms of biodiversity and number of wildlife species. But today wildlife is under pressure due to years of conversion of forests to non-forest uses - including development and residential uses - fragmented waterways, natural fire suppression, and an influx of invasive species. In fact, there are more than 500 at-risk wildlife species across the South, including Alabama. In addition, the South's forests are also important from an economic standpoint. More than 50% of the wood harvested that flows into supply chains comes from family-owned forestland in the region. The forestry section supports more than 1.1 million jobs in the South alone.

AFF's research has found that wildlife habitat and a sustainable wood supply can go hand in hand, when family landowners are actively managing. In fact, landowners who are harvesting are also helping wildlife—85% of those who have harvested have also implemented one or more other wildlife-improvement activities. AFF with local, state, and federal partners is working to increase the number of landowners across the South actively and sustainably managing their forests to provide a sustainable wood supply and wildlife habitat for at-risk species.

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## 1.0 Introduction

A landscape management plan (LMP) is a vital and innovative tool, offering a wide array of benefits and opportunities to landowners, foresters, and other natural resource professionals, state and federal agencies, conservation partners, industry, and others. This plan complements the Stand Management map and the Stand Management Recommendations given to you by your forester. Additional informational type documents and lincs are available on the LMP website in the following categories: Forest Management, Wildlife Management, Threatened and Endangered Species, Invasive Species, Insect and Disease, Cost Share and Additional Resources. Specifically, this LMP can:

- Help family landowners overcome one of the biggest barriers to participating in forest certification through the American Tree Farm System by eliminating the need for every landowner to develop and maintain an extensive individual management plan.
- Support coordination of action on landscape-scale priorities across ownerships.
- Provide participating landowners with access to the benefits of the ATFS certification.
- Establish and strengthen relationships between landowners and their foresters.
- Be used by a diversity of forestry specialists, including Alabama Forestry Commission foresters, consulting foresters, and industrial foresters.
- Be implemented adaptively across an array of conditions, landowner objectives, and ownerships. Although arranged as a single document, the chapters are designed both to support each other and to be used flexibly as forest conditions and objectives change.
- Illustrate practical silvicultural options to manage family woodlands sustainably, achieve landscape conservation goals, and conform to AFF Standards of Sustainability through a variety of strategies and approaches for forest ecosystems specific to Alabama.
- Utilize the best available science and resources provided at the federal, state, and local levels through a program-developed and maintained geospatial database.
- Support the efforts of foresters from across sectors to work with previously unengaged landowners and promote conservation initiatives.
- Optimize grant funding at the local, state, and national level for conservation initiatives on private land.
- Preemptively address threats to at-risk species through habitat protection.
- Provide additional access to certified materials for timber industry partners.

This LMP is designed to complement and align with federal, state, and local laws. Resources in this LMP do not override federal, state, or local forestry regulations that may not be addressed directly in this plan.

Why a LMP? Conservation at Scale

Forest management plans have long been a principal component of traditional family woodland owner programs in the United States. Management plans are a requirement for forest certification and, because the individual plans are costly and time-consuming for both landowners and foresters to develop, they have been identified as the biggest barrier to family landowner engagement. In addition, recent research conducted by the U.S. Forest Service suggests that the development of extensive individual landowner forest management plans have only moderate to minimal impacts on family woodland owner behavior. Rather, it is the

accompanying engagement with or receiving technical advice from a natural resource management professional that provides the motivation and support landowners need to act on the ground. The planning process remains critical to sustainable forest management. However, there is a need for a more cost-effective approach that reflects what is known about what will effectively encourage family landowner behavior and support coordinated efforts to address the critical landscape-scale conservation needs and opportunities. By setting motivational goals at the landscape level, we are creating a new call to action that allows us to engage a wider network of landowners. We know that values like wildlife conservation and management are important to landowners and this landscape-scale management plan allows us to set aspirational goals for the landscape that align with that motivation. The LMP is designed to reduce the management plan barrier that family landowners face to becoming involved in conservation activities and streamline the ATFS certification process. This approach maintains the credibility required for ATFS certification while providing landowners with the essential technical support to ensure their long-term sustainable management. Finally, it also offers a mechanism for coordinating landscape-scale priorities across small family forest ownerships.

The Alabama Tree Farm Committee, in conjunction with numerous natural resource partners, has therefore developed this LMP to address landowner and landscape-level objectives within Alabama. This plan complements the Stand Management map and Stand Management Recommendations given to you by your forester.

More specifically, this plan incorporates and supports all portions of the following site-specific and landscape-level considerations that are applicable to family woodland landowners:

- AFF 2021 Standards of Sustainability for Forest Certification (AFF Standards)
- Alabama's Best Management Practices
- Alabama's Wildlife Action Plan 2015-2025
- Alabama Forest Action Plan

This LMP will be revised and updated periodically to reflect changing dynamics with specific forest resources and on the landscape broadly, as well as updates to the certification standards. Similarly, it is critical to monitor landowners' management to ensure congruence between the LMP and efforts on the ground. As required under certification, routine monitoring efforts conducted by active ATFS Inspecting Foresters shall take place at the individual landowner level.

### 1.1 Forest Resource Professionals

This LMP relies on experience, skills, and thoughtful professionalism of foresters and other natural resource managers. The relationships they build with family woodland owners are central to the success of this LMP and achieving the shared aims of delivering conservation impact.

As the Society of American Foresters (SAF) describes within the Preamble to its Code of Ethics:

"Service to society is the cornerstone of any profession. The profession of forestry serves society by fostering stewardship of the world's forests. Because forests provide valuable resources and perform critical ecological functions, they are vital to the wellbeing of both society and the biosphere."

The role of forest resource professionals includes passing along their experience and expertise regarding the complex relationships between air, water, climate and weather, trees, flora and fauna, ecosystem processes, and anthropocentric considerations. This consultation and advice provided by forest resource professionals is commonly provided to landowners or their agents interested in managing their forestland. Landowners can utilize the services of a forest resource professional to manage and monitor vendors and contractors performing silvicultural management activities on the land. Forestry resource professionals also can assist landowners with contracts and the maintenance and retention of appropriate records and documentation relating to forest management activities and certification. Furthermore, landowners can gain advice regarding taxes, estate planning, and relevant laws, regulations, and ordinances under the guidance of a forest resource professional. This LMP was developed as a resource for these professional foresters to assist in landowner engagement, identification, characterization of landowner site-specific features and objectives, and the identification and management of local forest types.

Various professional organizations and certification bodies, including state forester registration boards, SAF, and the Association of Consulting Foresters (ACF), provide membership standards and requirements to ensure the qualified, responsible, and ethical application of forestry principles is upheld. The American Tree Farm System also recognizes the importance of these forestry professionals by establishing specific eligibility requirements and compliance policies of all ATFS Inspectors.

### 1.2 Adaptive Management

This LMP is purposefully designed as an adaptive tool for implementation in a wide array of settings and circumstances, recognizing the range, variability, and fluidity on the landscape, amongst objectives and conditions. It is not designed as a strict blueprint for action but, rather, as a guide and supportive structure, responsive to a number of interacting factors.

All silvicultural options, management activities, and implementation measures provided in this LMP are predicated on an underlying assumption of variation and changing conditions. Changes and variability in conditions (especially objectives, weather, and markets) can have significant impacts on the timing, feasibility, and success of all silvicultural implementation operations. For example, the decision of when and how to harvest timber could vary

tremendously based on recent weather conditions and market conditions. Likewise, forest landowner objectives could significantly impact both the target forest type and the silvicultural implementation methods needed to meet those goals and objectives. Inherently, silvicultural operations have some flexibility on the timing of implementation to more effectively meet the shifting window of conditions to achieve the desired result. For example, mature shortleaf pine forests are rarely killed from frequent low intensity prescribed burns. However, mortality is seen in shortleaf pine stands with thick litter layers accumulated after years of fire exclusion. In mature shortleaf stands diameter growth may be decreased with frequent fire.

Harvesting operations and regeneration efforts could vary significantly when focused on meeting different landowners' objectives like maximizing revenue or conserving rare species. The tolerance to shift operations slightly increases the feasibility of meeting the established goals and objectives.

Therefore, this LMP should not be viewed as an unchangeable text, but rather a living document dependent on ongoing evaluation and adapted implementation required for success.

### 1.3 2021 AFF Standards of Sustainability within the LMP

The AFF Standards promote the health and sustainability of America's family forests. These Standards are designed as a tool to help woodland owners be effective stewards of the land as they adaptively manage renewable resources, promote environmental, economic, and social benefits, and work to increase public understanding of sustainable forestry. The eligibility requirements for participation in the ATFS state program certification are available on the ATFS website.

The AFF Standards are based on international sustainability metrics and American guidelines for sustainable forest management and serve as the basis for the ATFS certification program. The ATFS certification program is internationally endorsed by the Programme for the Endorsement of Forest Certification (PEFC™). Landowners following these Standards are recognized as ambassadors for exemplary woodland stewardship.

Each of the eight Standards of Sustainability addresses aspects of sustainable forest management. Moving from general to specific, each standard incorporates performance measures and indicators to illustrate conformance. All components of each Standard apply to every property certified under the AFF Standards. A Standard is an overarching principle of sustainability. A performance measure refines the Standard's intent and describes considerations and pathways for conformance. An indicator identifies specific actions or activities that demonstrate conformance.

These Standards, Performance Measures, and Indicators presented below include links to examples of where they are addressed within the LMP:

- **STANDARD 1 Commitment to Practicing Sustainable Forestry**

**Landowner** demonstrates commitment to **forest health** and **sustainability** by developing a forest **management plan,** implementing sustainable practices, and seeking opportunities to expand their knowledge and understanding of sustainable forest management.

**Performance Measure 1.1** Landowner shall have and implement a written forest management plan consistent with the size of the forest and the scale and intensity of the forest activities.

**Indicator 1.1.1** Management plan shall be active and adaptive, embody the landowner's current objectives, remain appropriate for the land certified, and reflect the current state of knowledge about natural resources and sustainable forest management

**Indicator 1.1.2 (a)** Management plans shall describe current forest conditions, landowner's objectives, and management activities aimed at achieving landowner's objectives, document a feasible strategy for activity implementation, and include a map accurately depicting significant forest-related resources.

**Indicator 1.1.2 (b**) The forest management plan shall demonstrate consideration of the following resource elements: forest health, soil, water, wood and fiber production, threatened or endangered species, special sites, invasive species, and forests of recognized importance. Where present and relevant to the property, the plan shall describe management activities related to these resource elements.

**Indicator 1.1.2 (c)** Where present, relevant to the property and consistent with landowner's objectives, the plan preparer should consider, describe, and evaluate the following resource elements: fire, wetlands, desired species, recreation (Recreation objective, Recreation resource), forest aesthetics (Aesthetics objectives, Aesthetics resources), biomass, and carbon.

**Indicator 1.1.3** The landowner should monitor for changes that could interfere with the management objectives as stated in the management plan. When problems are found, reasonable actions are taken.

How the LMP Addresses This Standard:

This LMP along with the Stand Management Map and Stand Management Recommendations document serves as the written management plan for all participating landowners in Alabama. In addition, informational type documents and links are available on the LMP website sorted by regions in the following categories: Forest Management, Wildlife Management, Threatened and Endangered Species, Invasive Species, Insect and Disease, Cost Share and Additional Resources. This plan provides the necessary flexibility to be active and adaptive to the variety of landowner objectives and related management activities available to the landowners, regardless of the size and scale of their property. As noted in the links included throughout this section, this LMP addresses each of the AFF Standards.

The geodatabase serves as a complement to the Stand Management Map given to you by your forester. This secure geodatabase reflecting the best available science was developed to include all the necessary spatial information to support sustainable forest management, including the following geodatabase layers:

- Historical Structures
- Cemeteries
- Hydrologic
- Critical Habitat
- Strategic Habitat
- EDD Maps
- Counties
- Roads
- Soil
- Parcels
- Mills
- State and National Land

Landowners utilizing the LMP may also have information specific to their tree farm included on the ATFS Inspection Form (021 Form) by an ATFS Inspecting Forester as additional documentation and appendage to the LMP. It is important to note that the strategy for implementing the plan to meet the landowners' objectives is that: foresters will regularly monitor markets, forest health, etc., to propose treatments; owners will approve implementation of practices and harvests; and foresters and owners will meet at regular intervals, appropriate to management, to discuss progress and changes needed.

- **STANDARD 2 Compliance with Laws**

**Forest management** activities comply with all relevant federal, state and local laws, regulations and ordinances.
**Performance Measure 2.1** Landowner shall comply with all relevant federal, state, county, and municipal laws, regulations, and ordinances governing forest management activities.

**Indicator 2.1.1** Landowner shall comply with all relevant laws, regulations, and ordinances and will correct conditions that lead to adverse regulatory actions, if any.

**Indicator 2.1.2** Landowner should obtain advice from appropriate qualified natural resource professionals or qualified contractors who are trained in, and familiar with, relevant laws, regulations, and ordinances.

How the LMP Addresses This Standard:

This LMP makes reference to the application of relevant laws and regulations. All landowners certified to ATFS agree to meet all federal, state, and local regulations.

- **STANDARD 3 Reforestation and Afforestation**

**Landowner** completes timely restocking of **desired species** of trees on a **regeneration harvest** site and nonstocked areas where tree growing is consistent with land use practices and the **landowner's objectives**.

**Performance Measure 3.1** Reforestation or afforestation shall be achieved by a suitable process that ensures adequate stocking levels.

**Indicator 3.1.1** Reforestation or afforestation shall achieve adequate stocking of desired species reflecting the landowner's objectives within five years after regeneration harvest or an appropriate time frame for local conditions, or within a time interval as specified by applicable regulation.

How the LMP Addresses This Standard:

Under each of the forest types outlined in this LMP, information is provided on the different strategies to achieve success in reforestation and afforestation efforts. The State of Alabama does not specify a required stocking level or post-harvest activity, so landowners operating under this LMP agree to achieve adequate stocking of desired species based on their objectives within five years after harvest. ATFS Inspectors may also document these efforts within the 021 Form to ensure conformance.

- **STANDARD 4 Air, Water, and Soil Protection**

Forest management practices maintain or enhance the **ecosystems** and **ecosystem services** provided by the forest, including air, water, soil and site quality.

**Performance Measure 4.1** Landowner shall meet or exceed practices prescribed by state forestry best management practices (BMPs) that are applicable to the property.

**Indicator 4.1.1** Landowner shall implement specific state forestry BMPs that are applicable to the property.

**Indicator 4.1.2** Landowner shall minimize road construction and other disturbances within riparian zones and wetlands.

**Performance Measure 4.2** Landowner shall consider a range of forest management activities to control pests, pathogens, and unwanted vegetation.

**Indicator 4.2.1** Landowner should evaluate alternatives to pesticides for the prevention or control of pests, pathogens, and unwanted vegetation to achieve specific management objectives (NNIP and Nuisance Plant Treatment Methods, NNIA Treatment Methods, Nuisance Animal Treatment Methods, Biological Control).

**Indicator 4.2.2** Pesticides used shall be approved by the Environmental Protection Agency (EPA) and applied, stored and disposed of in accordance with EPA-approved labels and by persons appropriately trained, licensed, and supervised.

**Performance Measure 4.3** When used, prescribed fire shall conform with landowner's objectives and all applicable rules, laws, and regulations.

**Indicator 4.3.1** Prescribed burns shall conform with the landowner's objectives and state and local laws and regulations

How the LMP Addresses This Standard:

This LMP references applicable Alabama BMPs, which accompany the strategies to be implemented on the ground. All landowners certified to ATFS agree to meet or exceed all applicable state forestry BMPs, even those that are voluntary. When management activities that will cause any soil disturbance or require chemical application, the BMPs are consulted and applicable BMP methods employed. No field evidence of BMP implementation is expected where no management activity has occurred.

- **STANDARD 5 Fish, Wildlife, Biodiversity, and Forest Health**

Forest management activities contribute to the conservation of **biodiversity**.

**Performance Measure 5.1** Forest management activities shall protect habitats and communities occupied by threatened or endangered species as required by law (Listed Species spatial layer, Critical Habitat spatial layer, Rare Habitat spatial layer, Wildlife Management and Protection, Rare Plant and Animal Protection Table).

**Indicator 5.1.1** Landowner shall periodically confer with natural resource agencies, state natural resource heritage programs, or qualified natural resource professionals or review other sources of information to determine occurrences of threatened or endangered species on the property and their habitat requirements (Listed Species spatial layer, Critical Habitat spatial layer, Rare Habitat spatial layer).

**Indicator 5.1.2** Forest management activities shall incorporate measures to protect identified threatened or endangered species on the property (Wildlife Management and Protection, Rare Plant and Animal Protection).

**Performance Measure 5.2** Landowner should address the desired species or desired forest communities when conducting forest management activities, if consistent with landowner's objectives.

**Indicator 5.2.1** Landowner should consult available and accessible information on management of the forest for desired species or forest communities and integrate it into forest management.

**Performance Measure 5.3** Landowner should make practical efforts to promote forest health.

**Indicator 5.3.1** Landowner should make practical efforts to promote forest health, including preventing, controlling, or responding to disturbances such as wildland fire, invasive species, and other pests, pathogens, or unwanted vegetation, to achieve specific management objectives.

**Performance Measure 5.4** Where present, forest management activities should maintain or enhance forests of recognized importance (FORI) (FORI spatial layer).

**Indicator 5.4.1** Appropriate to the scale and intensity of the situation, forest management activities should incorporate measures to contribute to the conservation of identified FORI.

How the LMP Addresses This Standard:

This LMP was developed in direct consultation with appropriate natural resource professionals including the Alabama Forestry Commission, NRCS, Auburn University, and others. Based on this consultation, considerations for and, where applicable, protections of threatened and endangered species, their habitat requirements, desired species, desired forest communities, forest health and FORI are integrated into the silvicultural strategies included in this LMP, as required by the AFF Standards.

In addition, resources compiled by the relevant authorities are referenced throughout the LMP. The LMP provides required information on threatened and endangered species, their habitat requirements, desired species, desired forest communities, forest health and FORI. Foresters and ATFS Inspectors may also use the 021 Form to include information specific to a tree farm regarding forest health, such as additional species composition information or treatment information.

Foresters working with landowners can provide technical support in managing of site-specific resources, as supported by this LMP.

With support of the LMP as guidance, foresters can advise landowners in making practical efforts to promote forest health. Integrated pest management (IPM) is an excellent approach to controlling, suppressing, or preventing pests and can take many forms. Preventative measures to improve forest health or protect the property from injurious organisms are often the most practical and effective approaches. Pesticide applications may be used when other control measures are ineffective or impractical. While landowners and designated representatives are urged to take feasible actions to address pests, pathogens, and unwanted vegetation, third-party assessors are advised that, in some cases, there may be no feasible options for controlling a pest or outbreak due to severity, scale, and timing of the onset. When herbicides are used, landowners are required to follow EPA regulations.

When conducting prescribed burns, landowners operating under this LMP shall follow all state regulations and are encouraged to work with qualified professionals. Additional information about burning based on forest type is included in the following sections.

- **STANDARD 6 Forest Aesthetics**

Forest management activities recognize the value of **forest aesthetics**.

**Performance Measure 6.1** Landowner should manage the visual impacts of forest management activities consistent with the size of the forest, the scale and intensity of forest management activities, and the location of the property.

**Indicator 6.1.1** Forest management activities should apply visual quality measures compatible with appropriate silvicultural practices (Aesthetics objectives, Silvicultural Options).

How the LMP Addresses This Standard:

This LMP addresses aesthetic issues relevant to each of the common forest types in the region in their respective sections. Forest aesthetics considerations can be incorporated into management planning with little cost to the landowner. Employing forest aesthetics considerations into the management plan can produce a much more visually appealing experience on property visits for owners, their guests, and passers-by using nearby public roads.

- **STANDARD 7 Protect Special Sites**

**Special sites** are managed in ways that recognize their unique historical, archeological, cultural, geological, biological or ecological characteristics.

**Performance Measure 7.1** Forest management activities shall consider and maintain any special sites relevant on the property (Historical Structures spatial layer, Cemeteries spatial layer, Historical and Cultural Sites).

**Indicator 7.1.1** Landowner shall make a reasonable effort to locate and protect special sites appropriate for the size of the forest and the scale and intensity of forest management activities (Historical Structures spatial layer, Cemeteries spatial layer).

How the LMP Addresses This Standard:

The LMP was developed in direct consultation with relevant authorities on special sites of biological and geological significance. In addition, additional resources were consulted in the development of the LMP, including the section special sites. This includes direction on how to identify special sites and protect them while implementing forest management activities. Publicly designated special sites are included in layers of the geodatabase relative to threatened and endangered species, FORI, and cultural and historical sites.

Special sites may be identified on a property's 021 Form or on the Stand Management Recommendations Form, which serves as a supporting component of this plan. Where appropriate, special sites may also be identified on the ground. However, some landowners may choose not to identify some special sites on a map, a 021 Form or other documentation, or on the ground to protect these sites from vandalism or overuse. Many landowners may simply verbally describe the specials site and its location, as a complement to this plan.

Landowners or designated representatives are advised to make efforts to protect any known special sites especially during forest management activities. These efforts may include creating a vegetation buffer, fencing the area, or otherwise distinguishing it from surrounding areas. Because special sites are often in the ground, measures may be taken to control erosion and limit soil disturbance. Landowners and designated representatives are advised to review their special sites and approaches to protection with qualified natural resource professionals and qualified contractors assisting in forest management activities.

- **STANDARD 8 Forest Product Harvest and Other Activities**

**Forest product** harvests and other management activities are conducted in accordance with the **landowner's objectives** and consider other forest values.

**Performance Measure 8.1** Landowner should use qualified natural resource professionals and qualified contractors when contracting for services.

**Indicator 8.1.1** Landowner should seek qualified natural resource professionals and qualified contractors (Forest Resource Professionals).

**Indicator 8.1.2** Landowner should engage qualified contractors who carry appropriate insurance and comply with appropriate federal, state, and local safety and fair labor rules, regulations, and standard practices.

**Indicator 8.1.3** Landowners should retain appropriate contracts or records for forest product harvests and other management activities to demonstrate conformance to the Standards.

**Performance Measure 8.2** Landowner or designated representative shall monitor forest product harvests and other management activities (Forest Resource Professionals, Silvicultural Options) to ensure they conform to their objectives.

**Indicator 8.2.1** Harvest, utilization, removal, and other management activities shall be conducted in compliance with the landowner's objectives and to maintain the potential of the property to produce forest products and other benefits sustainably (Common Forest Resources, Forest Resources).

How the LMP Addresses This Standard:

The LMP encourages landowners to seek qualified natural resource professionals and qualified contractors, who carry appropriate insurance and comply with appropriate federal, state, and local safety and fair labor rules, regulations, and standard practices. The LMP also encourages landowners to retain appropriate contracts for 3 years, recognizing, in some circumstances that may not be appropriate and necessary.

The silvicultural strategies in this LMP are specifically designed with an aim to achieve landowner's objectives and conservation objectives and to maintain the potential of the property to produce forest products and other benefits sustainably.

### 1.4 Conservation Incentives

There are several programs and markets available to landowners that can reward them and provide incentives for their conservation efforts. The most widely used programs are cost-shares. The USDA Natural Resource Conservation Service (NRCS) and Farm Service Agency offer programs such as the Conservation Reserve Program, Emergency Forest Restoration Program, Healthy Forests Reserve Program, Environmental Quality Incentives Program (EQIP), Regional Conservation Partnership Program, and Conservation Stewardship Program that provide matching funds or cost-share reimbursements to private landowners for management activities such as reforestation, silvopasture, thinning, and prescribed burning. The Alabama Forestry Commission (AFC) provides technical assistance in concert with these programs. These conservation-minded landowners often choose to maintain their land as legacy forests that can be passed down for future generations to utilize, protect, and enjoy.

Some landowners sign conservation easements ensuring this long-term protection. Landowners can enter their property into a conservation easement agreement through various entities. Conservation easements vary, but most ensure the land is never developed while allowing the landowner to continue management activities such as timber harvests in return for which they receive a property tax break. This option also allows many landowners a strategy during the estate planning process. Some landowners may also be able to earn credits on private mitigation banking markets through the enhancement or restoration of wetlands or threatened or endangered species habitat.

This LMP is designed to complement, provide continuity, and help support landowner engagement in these described programs.

### 1.5 Ecosystem Services

Forests provide ecosystem services to society that are wide-ranging and difficult to value. These ecosystem services include clean air and water, carbon sequestration, aquifer recharge, climate resilience, and biodiversity. There are currently no significant markets for these services in the Alabama, but they may develop in coming years. However, lack of financial incentives does not discount the crucial services ecosystems provide us, making ecological maintenance and restoration an important objective for many landowners.

## 1.6 Engaging the Landowner

The supplemental guide, Foresters Guide to Implementing the Alabama Landscape Management Plan , is designed as a resource for foresters in using the LMP to effectively support landowners while streamlining administrative and related elements of landowner engagement. This resource provides a step-by-step approach for foresters to document a participating landowner's conformance to the AFF Standards utilizing the 021 Form.

The Alabama LMP and Forester's Guide can also be utilized for landowners with existing or outdated plans. The same process should be followed when replacing the existing or outdated plan. Additionally, the existing plan can be used during a review of the landowner's objectives, forest types and resources, and implementation activities but is not required. The additional information found in this LMP and the geodatabase will then be used to supplement and replace the existing plan.

## 1.7 Physiographic Regions of Alabama

There are five physiographic regions of Alabama. These regions are classified according to both their geologic structures and histories, looking at the distribution of land, water, soil and rock material that forms the land surface. These physiographic regions include: Highland Rim, Cumberland Plateau, Valley and Ridge, Piedmont and the East Gulf Coastal Plain. The LMP documents and publications are sorted by regions in the following categories: Forest Management, Wildlife Management, Threatened and Endangered Species, Invasive Species, Insect and Disease, Cost Share and Additional Resources

### 1.7.1 Highland Rim

This region is in Tennessee, Kentucky, Indiana and the very north portion of Alabama. The area consists of low, rolling hills, upland flats and narrow valleys. In many areas the land surface is pitted by limestone sinks. Elevations reach about 900 feet along the Alabama-Tennessee border. Significant sand and gravel deposits occur on the valley floor and on terraces along the major rivers. The average annual precipitation in this area is 43 to 63 inches with a freeze-free period average of 230 days. Most of the ground water used in this area is from a Mississippian-age carbonate aquifer system. This area supports oak-hickory forests. Yellow poplar is common on the deeper soils. Understory plants include a variety of grasses, forbs, vines and shrubs. There are springs, lime sinks and caves in this region.

### 1.7.2 Cumberland Plateau

This region is found mostly in Alabama. This area is deeply dissected and consists mainly of a series of narrow valleys, steep escarpments, and broad plateaus that are underlain by consolidated bedrock. Elevations range from 330 to 2,300 feet. The bedrock consists of alternating beds of limestone, dolomite, shale and sandstone. The narrow river valleys are filled with unconsolidated deposits of clay, silt, sand and gravel. The average annual precipitation is

53 to 60 inches. The surface water is suitable for almost all uses. This area supports mixed oak, hickory-pine, and oak-hickory forests. Shortleaf pine, loblolly pine, Virginia pine, sweetgum, yellow-poplar, red oak and white oak are the major overstory species. Dogwood and redbud are the major midstory species. Almost two-thirds of the area is forestland.

### 1.7.3 Valley & Ridge

This region is found in Tennessee, Alabama, Virginia and Georgia. This area is highly diversified. It has many parallel ridges, narrow intervening valleys and large areas of low, irregular hills. The bedrock in this area consists of alternating beds of limestone, dolomite, shale and sandstone. The narrow river valleys are filled with unconsolidated deposits of clay, silt, sand and gravel. The average annual precipitation in most of this area is 41 to 55 inches. The ground water used in this area is from a Cambrian to Mississippian age carbonate aquifer system that has beds of limestone, dolomite, shale and sandstone. This area supports hardwoods or mixed hardwoods and pine. The deeper soils support good oak-hickory stands. The shallower soils support pine or oak-pine types.

### 1.7.4 Piedmont

This region is found in North Carolina, Georgia, Virginia, South Carolina and Alabama. The area is a rolling to hilly upland with a well-defined drainage pattern. Streams have dissected the original plateau, leaving narrow to fairly broad upland ridgetops and short slopes adjacent to the major streams. The valley floors are generally narrow. Precambrian and Paleozoic metamorphic and igneous rocks underlie most of this region. The average annual precipitation is 45 to 60 days inches. Ground water supplies are relatively small, but shallow and deep wells in the crystalline bedrock aquifer are the principal sources of water for domestic use in the area. The uplands in this area generally support a mixture of hardwoods and pine. Loblolly pine, slash pine, white oak, red oak, yellow-poplar and sycamore are the principal species. The understory includes dogwood, honeysuckle and briars.

### 1.7.5 East Gulf Coastal Plain

This region is found in Alabama, Mississippi, Georgia, Florida, North Carolina, Virginia, South Carolina, Tennessee and Louisiana. The area is strongly dissected into nearly level and gently undulating valleys and gently sloping to steep uplands. Stream valleys generally are narrow in their upper reaches but become broad and have widely meandering stream channels as they approach the coast. The region is underlain by eroded igneous and metamorphic bedrock. The average annual precipitation in the area is 61 to 72 inches. Precipitation and perennial streams provide an abundance of water. The surface water is suitable for all uses. This area supports mixed oak-pine vegetation. Loblolly pine, longleaf pine, slash pine, shortleaf pine, sweetgum, yellow-poplar, red oak and white oak are the major overstory species. The Blackbelt Prairie which is part of the East Gulf Coastal Plain has some unique characteristics. This area is in Alabama and Mississippi. Most of the area is underlain by Cretacceous-age clay, marl, soft

limestone, or chalk of the Selma Group. The average annual precipitation in this area is 53 to 61 inches. The surface water in the area is suitable for all uses. This area supports both deciduous hardwoods and conifers. Red oak, white oak, sweetgum, blackgum, loblolly pine, and shortleaf pine are the dominant overstory species. Forests of mixed oaks and loblolly pine are dominant on acid soils. Mixed hardwood forests dominate flood plains, and forests of eastern redcedar and sugarberry dominate alkaline hills and side slopes. Eastern redcedar, dogwood and osage orange are the major midstory species.

### 2.0 Site Specific Characterization Through Geodatabase Tools

To support identification of the existing conditions present on any site for which the LMP may be used, a GIS-based catalog was developed. This geodatabase represents the accumulation and organization of the most site-specific geospatial characterization tools that are publicly available within the LMP. The strategic goal of this geodatabase is to provide forest resource professionals with a geospatial tool that presents tabular data helpful in developing forest management goals and recommendations using the best available science.

Use of the geodatabase is not compulsory for use of the LMP. In addition, site conditions may also be identified through on the ground reconnaissance.

### 2.1 Instructions for Use

This geodatabase can be used within a geographic information system (GIS) to view, summarize, and manipulate both geospatial and tabular data. Numerous fee-based and free shareware-style geospatial applications are available and accessible for natural resource professionals.

After the user identifies the referenced property, they can then toggle and select between individual or multiple geospatial resource layers that will present summarized tabular data for the selected location. For instance, a user can determine the haul distance to specific product mills and view detailed soil types to aid in prescribing harvesting operations. Likewise, users could quickly determine which critical or strategic habitat is nearby their referenced site.

### 2.2 Geodatabase Layer Descriptions

The following 13 geospatial layers and aerial imagery layer comprise the LMP geodatabase used for site-specific characterization of subject landowner properties. Each layer is referenced by its name within the geodatabase and information is provided about the source layer's name, location, and a brief description of the content found within the layer.

#### 2.2.1 Historical Structures

Layer Source Name: **Historical Structure Locations in Alabama**

Description: *This dataset contains historic structure locations and attributes in Alabama.*

Layer Source Location:Historical Structure Locations in Alabama

(Last Accessed 01/30/24)

#### 2.2.2 Cemeteries

Layer Source Name: **Cemetery Sites Alabama**

Description: *This dataset contains point data for named cemeteries derived from the National Map GNIS. The current file is not a complete listing of all cemeteries in Alabama, and only represents those named cemeteries that are mapped at 1:24000 scale by the USGS. It should be noted that this only represents a portion of the actual number of cemeteries in the state of Alabama, and it should not be considered a completed product.*

Layer Source Location: Cemetery Sites in Alabama

(Last Accessed 01/30/24)

### 2.2.3 Hydrologic

Layer Source Name: **USFWS National Wetlands Inventory**

Description: *This data set represents the extent, approximate location, and type of wetlands These data delineate the areal extent of wetlands and surface waters as defined by Cowardin et al. (1979).*

Layer Source Location: https://www.fws.gov/wetlands/Data/Mapper.html

(Last Accessed 01/30/24

### 2.2.4 Critical Habitat

Layer Source Name: **U.S. FWS Threatened & Endangered Species Active Critical Habitat Report**

Description: *This data set represents ECOS Data Services/ ESA Species Critical Habitat Boundaries for threatened and endangered species. Critical Habitat is a specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery*

Layer Source Location: http://ecos.fws.gov/ecp/report/table/critical-habitat.html

(Last Accessed 01/30/24)

### 2.2.5 Strategic Habitat

Layer Source Name: Alabama Rivers and Streams Network SHU Mapper

Description: This system serves as a repository for both tabular and geospatial data related to specially-designated watersheds, river segments, and road crossings within Alabama and neighboring states.

Layer Source Location: https://warcapps.usgs.gov/SHU/Map

(Last Accessed 01/30/24)

### 2.2.6 EDDMaps

Layer Source Name: **EDDMaps**

Description: *Point data of invasive species collected by EDDMaps users.*

Layer Source Location: https://www.eddmaps.org/tools/

(Last Accessed 01/30/24)

### 2.2.7 Counties

Layer Source Name: **Alabama County Boundaries**

Description: This dataset contains the county boundaries for Alabama's 67 counties.

Layer Source Location: Alabama County Boundaries

(Last Accessed 01/30/24)

### 2.2.8 Roads

Layer Source Name: World Street Maps

Description: Several state maps depicting roads, streets and topos.

Layer Source Location: Alabama Road Maps

(Last Accessed 01/30/24)

### 2.2.9 Soil

Layer Source Name: **Soil Survey Spatial and Tabular Data**

Description: *This dataset contains the boundaries and descriptions of soil types.*

Layer Source Location: https://gdg.sc.egov.usda.gov/GDGOrder.aspx

(Last Accessed 01/30/24)

### 2.2.10 Parcels

Layer Source Name: **Alabama Parcel Data by County**

Description: *This dataset contains parcel boundaries for each county available in Alabama,*

Layer Source Location: www.alabamagis.com/

(Last Accessed 01/30/24)

### 2.2.11 Mills

Layer Source Name: **Primary Forest Products Network**

Description: Location of mills available in Alabama

Layer Source Location: Forest Products Locator

(Last Accessed 01/30/24)

### 2.2.12 National and Alabama State Forests

Layer Source Name: USA Parks

Description: This system serves as a repository for both tabular and geospatial data related to National Forests and Alabama State Forests and Parks.

Layer Source Location: National Forests in Alabama

(Last Accessed 01/30/24)

### 2.2.13 National Conservation Easement Database (NCED Conservation Easement Boundaries

Layer Source Name: NCED Easements

Description: The National Conservation Easement Database (NCED) is the first national database of conservation easement information, compiling records from land trusts and public agencies throughout the United States.

Layer Source Location: National Conservation Easements

(Last Accessed 01/30/2024)

## 3.0 Objectives

Forest management objectives generally fall into two overlapping, mutually supportive categories: landowner and landscape objectives. Landowner objectives are those considerations important to landowner achievement which measure the relative success or failure of the management in their perspective. These objectives can be used by forest resource professionals to provide, design, and implement services important to the landowner. Landowner objectives are often easily determined because they are also considered forest resources common to all forest types (*e.g.*, aesthetics and recreation). Landowner objectives change over time with changes in personal circumstances, life stages, and other factors. They are subject to change and, as such, management should be adaptable. Landowner objectives may also change or adapt as the landowner becomes aware of landscape objectives or their stewardship practice matures. Landscape objectives are those objectives identified on a national or ecoregional level that provide the greatest benefit towards forested ecosystem restoration, maintenance, and enhancement.

Generally following the determination of a landowner's objectives, forest resource professionals can identify the landscape-level objectives that the landowner objectives support. Landowner and landscape-level objectives can be the same (*e.g.*, hydrologic protection and conservation) or provide opportunities to support and enhance each other. For example, a landowner may consider their primary objectives wildlife management and ecological restoration. Through forest management activities to promote these objectives, the landowner could also be supporting landscape objectives like wildlife habitat management, rare plant and animal protection, non-native and invasive species management, and in some cases utilization of prescribed fire or native pine ecosystem restoration.

### 3.1 Landowner Objectives

There are several common landowner objectives considered under this LMP. The USDA National Woodland Owner Survey Results and Observations (Butler et al 2016) and research suggests significant general continuity in objectives across the family landowner demographic. Each potential landowner objective is discussed relative to its application towards forest management. Each landowner objective is also discussed relative to its application within each of the common Alabama forest types.

### 3.1.1 Aesthetics

Forest aesthetics spark a sense of personal landowner pride, stewardship, and privacy. Many landowners maintain and enhance their forest aesthetics for their family, community, neighbors, and passers-by to enjoy. Forest management activities consistent with the size of the forest, the scale and intensity of forest management activities, and the location of the property tend to increase the aesthetic value. Forest resource professionals can assist landowners with implementing and managing silvicultural options in a manner that increases aesthetic value of the property.

Over the course of time, a wide range of aesthetic objectives can be accomplished with the suite of silvicultural tools within this LMP. Even though many silvicultural tools may produce immediate and temporary results that decrease aesthetic value, the consistent application and long-term results of these operations produce enhanced overall aesthetic value of the forest. For example, the short-term visual conditions produced following a prescribed fire may have minimal aesthetic value, however the resultant functional and aesthetic changes in species composition and midstory or invasive species control becomes evident in just weeks following the burn. Furthermore, the aesthetic condition of consistently burned forestlands increases rapidly with each subsequent prescribed fire event. Likewise, the long-term aesthetic value gained from performing timber-thinning operations far outweighs the short-term optics following harvesting operations. Landowners are rewarded with a sense of pride when their hard work and investment in management activities results in aesthetic accomplishments.

### 3.1.2 Wildlife Management and Protection

Alabama is rich with both game and non-game wildlife species. Many landowners are interested in managing, conserving, and protecting these species and their habitat.

There are many hunting opportunities in the State of Alabama in terms of acreage and game quality and quantity. White-tailed deer, wild turkey, bob-white quail, and duck are commonly managed by many family landowners.

### 3.1.3 Recreation

Many landowners enjoy a variety of forms of active and passive outdoor recreation, from simply hiking their woods and wildlife viewing to hunting and off-highway vehicles. Those that live onsite may recreate on their forests daily while others may live across the state or country and only visit during hunting season.

### 3.1.4 Conservation

Many landowners indicate a general interest in conservation of nature. Some landowners have a conservation objective because they would like to see their forest ownership remain intact and capable of being passed down from generation to generation. Others see conservation as protecting the intrinsic values of nature.

For this LMP, conservation is defined as the process of maintaining a natural resource (*e.g.*, forested ecosystem) for perpetual use. This definition inherently associates conservation with the proper use of ecological processes to maintain the forested ecosystem. This LMP integrates this objective into proposed strategies.

### 3.1.5 Forest Health Management

Maintaining and promoting forest health is a major landowner concern and objective. This objective is also specifically addressed in individual landscape objectives, such as invasive species. Many unengaged landowners not actively managing their forests initially contact a forest resource professional regarding forest health issues.

Non-native invasive species cause major ecological and economic damage to Alabama forests. Native forest pests are always a potential threat to forests. Several native diseases and non-native diseases also cause damage across multiple forest types.

Common disease terms associated with the forests located in Alabama include:

- **Canker**: Localized dead area on the stem or branch of a tree that appears either sunken or swollen
- **Rust**: Obligate fungal parasite that derives its nutrition from a living host. A characteristic portion of its life cycle is bright orange to yellow spore stage that appear as "rust" on trees.
- **Blight**: Rapid or sudden death of leaf, branch or stem tissue.
- **Decay**: Degradation of the wood tissue (bole, roots, branches) by wood-decay fungi that are utilizing the wood as a food source.
- **Little-leaf**: This particular disease name is a mis-misnomer as the disease has nothing to do with the leaves of trees, but rather the root systems of short leaf, loblolly, slash and to a lesser extent longleaf pine.

Various cost-share programs, grants, and services aid landowners in taking preventative measures to avoid devastating outbreaks and infestations. Silvicultural options such as timber harvest, prescribed burning, and non-native invasive species treatments are also available to landowners to improve forest health.

### 3.1.6 Revenue

Sources of forest-based revenue in Alabama are diverse and can be derived from each forest type. Some landowners choose to balance revenue with other objectives while for others it is their primary objective and livelihood.

#### *3.1.6.1 Timber Management*

Landowners have diverse timber markets in Alabama, allowing them to manage on short or long rotations for pine, hardwood, and cypress products. This flexibility and economic potential in timber markets allows for restoration, revenue, and investment.

There are many tools available to meet these various objectives including thinning, clearcut, and natural and artificial regeneration. They can utilize uneven-aged management with longleaf pine and hardwoods and even-aged management with other pine species and cypress.

*3.1.6.2 Non-Timber Forest Products*

Forestland owners have many revenue sources aside from timber products. Alabama forests provide various non-timber forest products (NTFP). These markets can provide landowners with revenue between timber harvests or serve as their main source of revenue generation from their forests.

*3.1.6.3 Non-Forest Associated Land Uses*

Some private landowners wish to generate revenue through eco-tourism by opening their land to public access for a fee. Hunting leases are an example.

Various aggregate materials can be mined for construction, development, concrete, forest roads, and many other uses. These include but are not limited to sand, clay, stone, and gravel. This may entail local and state permitting. Additional permitting information is available at ADEM. These activities can be conducted in conjunction with pond construction. Both activities will alter nearby hydrology, which will likely have ecological impacts. Commercial extraction of such materials may prevent or cause the loss of ATFS certification.

Land conversion from forestland may prevent or cause loss of ATFS certification and access to certified fiber for industry.

Timberland real estate can be a lucrative source of revenue for many landowners, but may not be consistent with the requirements of the AFF Standards , resulting in decertification with transition to another land use. Some properties are passed down through generations while others may change ownership over time as investments. Life and business circumstances can change rapidly and real estate provides flexible options to quickly adapt to potential obstacles. Timberland real estate may involve land development or staying in forestry and agriculture.

### 3.1.7 Ecological Restoration

Ecological restoration is the practice of renewing and restoring degraded, damaged, or destroyed ecosystems and habitats in the environment by active human intervention and action. This includes forest ecosystems that have been reduced in scale or impacted by disruption of natural management regimes, including fire.

Restoration tools are further discussed within silvicultural option sections within all the common Alabama Forest Types. They include methods to maintain, improve, and restore natural ecosystems.

### 3.1.8 Hydrological Protection and Restoration

Hydrological processes and functions such as sheet flow and hydroperiod are often altered by anthropogenic means such as development, agriculture, and intensive silviculture. This causes ecological alterations and degradation to natural communities, which in turn can alter the production of forest resources and the attainment of other forest landowner objectives. Additionally, impacts from silvicultural operations near aquatic resources can have significant impacts on streams, rivers, and lakes. Erosion from road construction can contribute sedimentation to water bodies affecting flow and quality of the water. Similarly, excessive harvesting near aquatic resources can increase water temperature and sedimentation from erosion, which has detrimental impacts on fish and other aquatic life. These impacts can be mitigated and in some cases restored through BMPs, which protect and enhance hydrology and soil quality through sustainable silvicultural practices and proper forest operations. Hydrological restoration also takes place at the property level through engineered projects like plugging drainage ditches and canals. These larger-scale projects may affect adjacent landowners or those miles up or downstream.

## 3.2 Landscape Objectives

The landscape-level objectives discussed below are important to all forest types and should be considered for each landowner. They are summarized below rather than included in the forest types discussion due to their uniform applicability across all forest types.

### 3.2.1 Support Healthy Forest Products Industry

This LMP promotes maintaining a healthy forest products industry in Alabama through sustainable forest management practices. This can be achieved through carefully planned timber harvests and timely site preparation and reforestation. Certification through ATFS also supports sustainable forestry and adds value to timber markets.

Silviculture BMPs also support sustainable silvicultural through practices that protect and enhance water and soil quality. By voluntarily conducting safe, responsible, and sustainable forestry practices, over-regulation is avoided, which keeps timber markets alive and thriving

### 3.2.2 Wildlife Management and Protection

Simply conserving forestland is a form of wildlife habitat protection. Some landowners wish to take a more active wildlife management role by maintaining, enhancing, and restoring wildlife habitat and its components: food, cover, water, and space.

Private lands in the Alabama provide valuable habitat to many imperiled species. Threatened and endangered species are considered in the development of silvicultural strategies. Many

silvicultural tools are available to maintain, enhance, and restore habitat for game and non-game species including prescribed fire, timber harvests, groundcover restoration, invasive species control, food plots, and wildlife openings. See table 1 for a list of threatened or endangered species in Alabama or go to U.S. Fish and Wildlife Website. If imperiled species or their habitats are located, the following protection measures can be used. However, adaptation, as needed for specific conditions, is appropriate:

- Limited mechanical entry
- Increased management activity (prescribed fire, thinning, etc.)
- Restricted pesticide use
- Residual tree maintenance
- Buffer zone establishment and maintenance
- Hunting or fishing limitations
- Signage or marking of the habitat area
- Communicate sensitive habitat or species locations in contracts; discuss with contractors

**Table 1.** Threatened and Endangered animal and plant species in Alabama (updated 01/31/2024)

| Common Name | Scientific Name |
|---|---|
| Plants | |
| Little amphianthus | Amphianthus pusillus |
| Price"s potato-bean | Apios priceana |
| Lyrate bladderpod | Lesquerella lyrata |
| Mohr's Barbara's buttons | Marshallia mohrii |
| Green pitcher-plant | Sarracenia oreophila |
| Fringed campion | Silene polypetala |
| Gentian pinkroot | Spigelia gentianoides |
| Leafy prairie-clover | Dalea foliosa |
| Pondberry | Lindera melissifolia |
| Harperella | Ptilimnium nodosum |
| Michaux's sumac | Rhus michauxii |
| Alabama canebrake pitcher-plant | Sarracenia rubra ssp. alabamensis |
| American chaffseed | Schwalbea americana |
| Tennessee yellow-eyed grass | Xyris tennesseensis |
| Relict trillium | Trillium reliquum |
| Alabama leather flower | Clematis socialis |
| Kral's water-plantain | Sagittaria secundifolia |

| | |
|---|---|
| Morefield"s leather flower | Clematis morefieldii |
| American hart's-tongue fern | Asplenium scolopendrium var. americanum |
| Louisiana quillwort | Isoetes louisianensis |
| Alabama streak-sorus fern | Thelypteris pilosa var. alabamensis |
| White fringeless orchid | Platanthera integrilabia |
| Fleshy-fruit gladecress | Leavenworthia crassa |
| Whorled Sunflower | Helianthus verticillatus |
| Georgia rockcress | Arabis georgiana |

Animals

| | |
|---|---|
| Red Hills salamander | Phaeognathus hubrichti |
| dusky gopher frog | Rana sevosa |
| Black warrior (=Sipsey Fork) Waterdog | Necturus alabamensis |
| Red-cockaded woodpecker | Picoides borealis |
| Piping Plover | Charadrius melodus |
| Whooping crane | Grus americana |
| rufa red knot | Calidris canutus rufa |
| Eastern Black rail | Laterallus jamaicensis ssp. jamaicensis |
| Alabama lampmussel | Lampsilis virescens |
| Pale lilliput (pearlymussel) | Toxolasma cylindrellus |
| Pink mucket (pearlymussel) | Lampsilis abrupta |
| Dromedary pearlymussel | Dromus dromas |
| Littlewing pearlymussel | Pegias fabula |
| White wartyback (pearlymussel) | Plethobasus cicatricosus |
| Finerayed pigtoe | Fusconaia cuneolus |
| Rough pigtoe | Pleurobema plenum |
| Shiny pigtoe | Fusconaia cor |
| Orangefoot pimpleback (pearlymussel) | Plethobasus cooperianus |
| Ring pink (mussel) | Obovaria retusa |
| Black clubshell | Pleurobema curtum |
| Southern combshell | Epioblasma penita |
| Heavy pigtoe | Pleurobema taitianum |
| Cumberlandian combshell | Epioblasma brevidens |
| Inflated heelsplitter | Potamilus inflatus |
| Orangenacre mucket | Hamiota perovalis |
| Oyster mussel | Epioblasma capsaeformis |
| Cracking pearlymussel | Hemistena lata |
| Purple bankclimber (mussel) | Elliptoideus sloatianus |
| Fanshell | Cyprogenia stegaria |
| Oval pigtoe | Pleurobema pyriforme |
| Finelined pocketbook | Hamiota altilis |
| Shinyrayed pocketbook | Hamiota subangulata |
| Ovate clubshell | Pleurobema perovatum |
| Southern clubshell | Pleurobema decisum |
| Triangular Kidneyshell | Ptychobranchus greenii |
| Alabama moccasinshell | Medionidus acutissimus |

| | |
|---|---|
| Coosa moccasinshell | Medionidus parvulus |
| Dark pigtoe | Pleurobema furvum |
| Southern pigtoe | Pleurobema georgianum |
| Gulf moccasinshell | Medionidus penicillatus |
| Chipola slabshell | Elliptio chipolaensis |
| Fuzzy pigtoe | Pleurobema strodeanum |
| Alabama lampmussel | Lampsilis virescens |
| Clubshell | Pleurobema clava |
| Oyster mussel | Epioblasma capsaeformis |
| Dromedary pearlymussel | Dromus dromas |
| Cracking pearlymussel | Hemistena lata |
| Yellow blossom (pearlymussel) | Epioblasma florentina florentina |
| Finerayed pigtoe | Fusconaia cuneolus |
| Rabbitsfoot | Quadrula cylindrica cylindrica |
| Georgia pigtoe | Pleurobema hanleyianum |
| Choctaw bean | Obovaria choctawensis |
| Alabama pearlshell | Margaritifera marrianae |
| Spectaclecase (mussel) | Cumberlandia monodonta |
| Snuffbox mussel | Epioblasma triquetra |
| Cumberlandian combshell | Epioblasma brevidens |
| Cumberland monkeyface (pearlymussel) | Theliderma intermedia |
| Shiny pigtoe | Fusconaia cor |
| Turgid blossom (pearlymussel) | Epioblasma turgidula |
| Tubercled blossom (pearlymussel) | Epioblasma torulosa torulosa |
| Tapered pigtoe | Fusconaia burkei |
| Slabside Pearlymussel | Pleuronaia dolabelloides |
| Winged Mapleleaf | Quadrula fragosa |
| Narrow pigtoe | Fusconaia escambia |
| Southern Sandshell | Hamiota australis |
| Round Ebonyshell | Reginaia rotulata |
| Cumberland bean (pearlymussel) | Villosa trabalis |
| Sheepnose Mussel | Plethobasus cyphyus |
| Southern kidneyshell | Ptychobranchus jonesi |
| Purple Cat's paw (=Purple Cat's paw pearlymussel) | Epioblasma obliquata |
| Birdwing pearlymussel | Lemiox rimosus |
| Canoe Creek Clubshell | Pleurobema athearni |
| Round hickorynut | Obovaria subrotunda |
| Longsolid | Fusconaia subrotunda |
| Alabama cave shrimp | Palaemonias alabamae |
| Slenderclaw crayfish | Cambarus cracens |
| Watercress darter | Etheostoma nuchale |
| Alabama cavefish | Speoplatyrhinus poulsoni |
| Slackwater darter | Etheostoma boschungi |
| Pygmy Sculpin | Cottus paulus (=pygmaeus) |
| Alabama sturgeon | Scaphirhynchus suttkusi |
| Cahaba shiner | Notropis cahabae |
| Palezone shiner | Notropis albizonatus |

| | |
|---|---|
| Gulf sturgeon | Acipenser oxyrinchus (=oxyrhynchus) desotoi |
| Boulder darter | Etheostoma wapiti |
| Goldline darter | Percina aurolineata |
| Blue shiner | Cyprinella caerulea |
| Vermilion darter | Etheostoma chermocki |
| Trispot darter | Etheostoma trisella |
| Rush Darter | Etheostoma phytophilum |
| Spring pygmy sunfish | Elassoma alabamae |
| Spotfin Chub | Erimonax monachus |
| Mitchell's satyr Butterfly | Neonympha mitchellii mitchellii |
| Indiana bat | Myotis sodalis |
| West Indian Manatee | Trichechus manatus |
| Gray bat | Myotis grisescens |
| Perdido Key beach mouse | Peromyscus polionotus trissyllepsis |
| Alabama beach mouse | Peromyscus polionotus ammobates |
| Northern Long-Eared Bat | Myotis septentrionalis |
| Hawksbill sea turtle | Eretmochelys imbricata |
| Leatherback sea turtle | Dermochelys coriacea |
| Kemp's ridley sea turtle | Lepidochelys kempii |
| Alabama red-bellied turtle | Pseudemys alabamensis |
| Flattened musk turtle | Sternotherus depressus |
| Eastern indigo snake | Drymarchon couperi |
| Gopher tortoise | Gopherus polyphemus |
| Black pinesnake | Pituophis melanoleucus lodingi |
| Loggerhead sea turtle | Caretta caretta |
| Green sea turtle | Chelonia mydas |
| Anthony's riversnail | Athearnia anthonyi |
| Armored snail | Marstonia pachyta |
| Tulotoma snail | Tulotoma magnifica |
| Lacy elimia (snail) | Elimia crenatella |
| Cylindrical lioplax (snail) | Lioplax cyclostomaformis |
| Flat pebblesnail | Lepyrium showalteri |
| Painted rocksnail | Leptoxis taeniata |
| Plicate rocksnail | Leptoxis plicata |
| Round rocksnail | Leptoxis ampla |
| Slender campeloma | Campeloma decampi |
| Interrupted (=Georgia) Rocksnail | Leptoxis foremani |
| Rough hornsnail | Pleurocera foremani |
| Anthony's riversnail | Athearnia anthonyi |

All tables are reviewed annually by ATFS. Last reviewed 01/30/2024

Source:
https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=AL&stateName=Alabama&statusCategory=Listed

### 3.2.3 Watershed Protection and Restoration

Alabama contains several major watersheds including the Tennessee, Coosa, Black Warrior, Mobile-Tensaw River Delta, Upper Pea River and Cahaba. Well-managed forests protect these watersheds and ensure clean drinking water, waterways, and healthy aquatic habitats. The Alabama Rivers and Streams Network has identified priority watersheds (SHUs) and river corridors (SRRUs) to focus activities for the management, recovery, and restoration of populations of rare fishes, mussels, snails, and crayfishes. The purpose of designating SHUs and SRRUs is to facilitate watershed management and restoration efforts addressing habitat and water quality issues.

BMPs are often implemented and promoted to ensure these operations don't impair water quality. The Alabama Environmental Management Act authorizes the Alabama Department of Environmental Management (ADEM) to establish and enforce water quality standards, regulations and penalties in order to carry out the provisions of state and federal water quality laws. From that authorization, ADEM's Administrative Code prohibits the deposition of pollutants into or the degradation of the physical, chemical, or biological integrity of waters of the state. With regard to silviculture, nonpoint source pollutants include, but are not limited to, sediment, organic materials, temperature, trash, pesticides and nutrients that are man induced.

The Alabama Forestry Commission is not an environmental regulatory or enforcement agency, but it does accept the responsibility to maintain and update Alabama's Best Management Practices (BMPs) for Forestry whenever necessary to help Alabama's forestry community meet state water quality needs.

### 3.2.4 Forestland Conservation and Retention

Alabama's forests face many threats, with land-use conversion being the leading cause of loss in forest cover. Forests, their ecosystems, and natural resources can be conserved through conservation easements, sustainable forest management, and habitat management.

### 3.2.5 Non-Native and Invasive Species (NNIS) and Nuisance Species Management

There are many non-native invasive plant (NNIP) and animal (NNIA) species in Alabama. A list of all NNIS species may be found at The University of Georgia - Center for Invasive Species and Ecosystem Health.

The Alabama Invasive Plant Council also provides a list of the most common NNIP and nuisance species that impact forest management.

Additionally, there are numerous native species that can function as nuisance species when their abundance and distribution adversely impact historic and healthy forest conditions, limit forest regeneration, increase wildfire risk, and reduce biodiversity. Forest resource professionals can accurately assess which native species are serving in a nuisance capacity and inhibiting the achievement of landscape objectives.

See Table 2, for a list of common NNIP found in Alabama.

*3.2.5.1 Prevention and Monitoring*

Prevention is the key first step. Landowners and managers can limit the spread of NNIPs by minimizing ground disturbance activities and inspecting silvicultural and agricultural equipment for cleanliness prior to entering and departing property. Spread of NNIAs can be minimized by avoiding the transport of these species from one property to another and through effective fencing. However, even with strong prevention measures, birds, weather, and other modes of spread will occur.

Monitoring should take place during routine work or recreational activities on the property. It is important to have species identification skills and resources to aid in monitoring. Early detection through monitoring allows for rapid, aggressive treatment before infestations become established and spread throughout the property.

*3.2.5.2 Documentation and Planning*

Documentation of new and existing infestations with GPS coordinates, GIS mapping, or location notes assists in the treatment and monitoring of infestations. Infestations can be marked with flagging, paint, or other means. Documentation is also beneficial to ensure all pesticides are approved by the EPA and applied, stored and disposed of in accordance with EPA-approved labels and by persons appropriately trained, licensed, and supervised.

NNIS and nuisance species management plans can be developed to treat minor and major infestations. Integrated pest management (IPM) is adaptive, aggressive and may include the following:

- Infestation occurrence and treatment documentation
    - Good record keeping
    - Mapping of new and existing
- Treatment plan and schedule
    - Frequency, seasonality, and methods
    - Combination of treatment methods typically most effective
- Monitoring plan and schedule
    - Frequency and locations
- Adjust retreatment methods and monitoring as needed
- Repeat this cycle until control is achieved

*3.2.5.3 NNIP and Nuisance Plant Treatment Methods*

- Chemical
    - Ground: broadcast or isolated treatment

        - Foliar, cut stump, hack-n-squirt, injection, basal bark, soil spot (grid)
        - Backpack and hand sprayers; ATV, farm tractor, skidder-mounted sprayers
    - Aerial: broadcast by helicopter (broadcast)
- Mechanical: broadcast or isolated
    - Hand-pull, chop, mow, mulch
- Prescribed fire (broadcast)
    - Dormant or growing season
- Additional information can be found through AIPC website

*3.2.5.4 NNIA Treatment Methods*

- Feral hogs
    - Do not transport onto property and prohibit hunting lessees from doing so
    - Property boundary fencing
    - Promote year-round aggressive hunting and trapping
    - Careful game species food plot crop selection
    - Consultation and additional information through USDA Wildlife Services

*3.2.5.5 Nuisance Animal Treatment Methods:*

- White-tailed deer
    - Do not transport onto property and prohibit hunting lessees from doing so
    - Modify and increase deer harvest to control population abundance and sex ratios
    - Property boundary fencing
    - Install exclusionary fencing around young plantations or regeneration areas
    - Time-logging activities and use uneven aged stands to provide continual availability of browse and forage options.

*3.2.5.6 Biological Control*

Per the U.S. Forest Service's Forest Health Technology and Enterprise Team (FHTET), a biological control is "the reduction of an organism's population density through use of its natural enemies". The FHTET recognizes biological

control as being one of the most effective and cost-efficient long-term approaches for managing widespread non-native invasive species infestations. This involves utilizing natural enemies (parasites, predators, herbivores, and pathogens) to reduce the population of hosts, whose abundance influences the population levels of natural enemies (USDA-FS 2016). Biological control can be used as a component within a comprehensive IPM program (van Lenteren 2012).

In some scenarios, biological control may also be used for native vegetation management such as utilizing fenced goats as an alternative to herbicide, mechanical, or prescribed fire. However, the use of "prescribed grazing" in these scenarios can be less selective from a species standpoint, impacting both desirable and undesirable species (USDA-NRCS 2015). Despite good intentions and rigorous governmental regulatory environmental risk assessments along with standards and guidelines for the import, export, shipment, evaluation, and release of biological controls, it is still possible for these species themselves to become ecologically problematic in forest settings (van Lenteren 2012).

**Table 2.** Common Alabama non-native invasive plants and animals. (updated 01/30/2024)

| Common Name | Scientific Name |
|---|---|
| TREES | |
| tree-of-heaven | Ailanthus altissima |
| Silktree | Albizia julibrissin |
| camphor tree | Cinnamomum camphora |
| Chinese parasoltree | Firmiana simplex |
| Chinaberrytree | Melia azedarach |
| Princesstree | Paulownia tomentosa |
| trifoliate orange, hardy orange | Poncirus trifoliate |
| callery pear "Bradford" | Pyrus calleryana |
| Tallowtree | Triadica sebifera |
| tungoil tree | Vernicia fordii |
| SHRUBS | |
| coralberry, hen's eyes | Ardisia crenata |
| thorny olive | Elaeagnus pungens |
| autumn olive | Elaeagnus umbellate |
| Lantana | Lantana camara |
| shrubby lespedeza | Lespedeza bicolor |
| glossy privet | Ligustrum lucidum |
| Japanese privet | Ligustrum japonicum |
| Chinese privet | Ligustrum sinense |
| Bell's honeysuckle | Lonicera X bella |
| sweet breath of spring | Lonicera fragrantissima |
| Amur honeysuckle | Lonicera maackii |

| | |
|---|---|
| leatherleaf mahonia, Beale's barberry | Mahonia bealei |
| nandina, sacred bamboo | Nandina domestica |
| Macartney rose | Rosa bracteata |
| Cherokee rose | Rosa laevigata |
| multiflora rose | Rosa multiflora |
| tropical soda apple | Solanum viarum |
| beach vitex | Vitex rotundifolia |
| VINES | |
| Oriental bittersweet | Celastrus orbiculatus |
| sweet autumn virginsbower | Clematis terniflora |
| Chinese yam | Dioscorea oppositifolia |
| English ivy | Hedera helix |
| Japanese honeysuckle | Lonicera japonica |
| Japanese climbing fern | Lygodium japonicum |
| Kudzu | Pueraria montana var. lobata |
| bigleaf periwinkle | Vinca major |
| common periwinkle | Vinca minor |
| Chinese wisteria | Wisteria sinensis |
| GRASSES, GRASS-LIKES, AND CANES | |
| giant reed | Arundo donax |
| pampas grass | Cortaderia selloana |
| Cogongrass | Imperata cylindrical |
| Japanese stiltgrass, Nepalese browntop | Microstegium vimineum |
| torpedo grass | Panicum repens |
| Vaseygrass | Paspalum urvillei |
| golden bamboo | Phyllostachys aurea |
| Johnsongrass | Sorghum halepense |
| FORBS (Broadleaf Plants) | |
| nodding plumeless thistle, musk thistle | Carduus nutans |
| wild taro, coco yam, elephant ears | Colocasia esculenta |
| tropical spiderwort, benghal dayflower | Commelina benghalensis |
| hairy crabweed, mulberry weed | Fatoua villosa |
| Chinese lespedeza | Lespedeza cuneate |
| purple loosestrife | Lythrum salicaria |
| Asiatic dewflower, wartremoving herb | Murdannia keisak |
| chamber bitter | Phyllanthus urinaria |
| rattlelbox, scarlet wisteria | Sesbania punicea |
| AQUATIC and WETLAND PLANTS | |
| Alligatorweed | Alternanthera philoxeroides |
| Brazilian elodea | Egeria densa |
| common water hyacinth | Eichhornia crassipes |
| hydrilla, waterthyme | Hydrilla verticillata |
| parrot feather watermilfoil | Myriophyllum aquaticum |
| Eurasian water milfoil, spike watermilfoil | Myriophyllum spicatum |
| Cuban bulrush | Oxycaryum cubense |
| common reed (grass) | Phragmites australis |

| | |
|---|---|
| water lettuce | Pistia stratiotes |
| giant salvinia, kariba-weed | Salvinia molesta |
| ANIMAL | |
| Feral hog | *Sus scrofa* |
| Feral cat | *Felis catus* |
| Feral dog | *Canis lupus familiaris* |

All tables are reviewed annually by ATFS. Last reviewed 01/30/2024.

Source: www.invasive.org

## 4.0 Common Forest Resources

The forest resources discussed below are applicable resources from all forest types in the LMP and may be considered for each landowner. They are summarized below rather than included in the forest types discussion due to their relative uniform applicability across all forest types.

### 4.1 Historical and Cultural Sites

Many private lands contain various historical and cultural resources, which are noted as "special sites" under the AFF Standards. Therefore, forest management activities are often developed to consider and maintain any special sites relevant on the property. Landowners may be aware of these sites or their locations may be documented. Some resources may be mapped with federal, state, or local agencies and organizations. Forest resource professionals often discuss known sites with landowners. If the landowner is unaware of any sites or the land is newly acquired, there are many resources available to review potential recorded sites such as the National Register of Historic Places (NRHP), the Alabama Historical Society and local historical societies and museums.

The property can also be reviewed on the ground through visual reconnaissance by the landowner or forest resource professional, within a reasonable scale relative to property acreage and accessibility. Local historical organizations have limited resources but may be able to assist with locating or interpreting potential significant sites and local preservation laws. Sites listed by these organizations reflect a determination of a site's significance to the history of a community, state, or nation and should be protected as required by federal, state, or local laws. Non-listed sites of personal significance to the landowner may also be protected.

Special sites may be identified in a property's 021 Form or other programmatic documentation, which serves as a supporting component of this plan. Where appropriate, special sites may also be identified on the ground. However, some landowners may choose not to identify some special sites on a map, a 021 Form or other documentation, or on the ground to protect these sites from vandalism or overuse. Many landowners may simply verbally describe the specials site and its location, as a complement to this plan.

Landowners and their forest resource professionals are encouraged to make reasonable efforts to locate and protect special sites appropriate for the size of the forest and the scale and intensity of forest management activities. Protection of historical and cultural sites during land management activities can be considered during planning, contract development, monitoring, and follow-up inspections. These sites can be designated on the ground with vegetative buffers, flagged or blazed trees, fencing, or signage and communicated to contractors and sub-contractors.

Landowner considerations for determining whether to designate an unlisted site may include:

- **Significance**:
    - Site has made a significant contribution to the broad patterns of history.
    - Associated with the lives of significant persons of the past.
    - Embody distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a distinguishable entity whose components may lack individual distinction.
    - Yielded or likely to yield information important in history or pre-history.
- **Age**: Minimum 50 years old.
- **Integrity**:
    - Site must retain its historical physical integrity with its character-defining features still present.
    - Building, structure, or landscape feature must be relatively unchanged.
    - Archeological site must be relatively undisturbed, with its patterns and layers of artifacts relatively intact.
    - Traditional cultural site must be recognizable to today's affiliated cultural group, evidenced through tradition and still used or revered today.
- **Personal significance**: Such as a location, structure, or artifact with a family importance or meaning.

Special sites of biological and geological significance and sensitivity may be identified through consultation undertaken related to the identification of threatened or endangered species and natural communities. Cultural and historical resources can be mapped and marked on the ground to aid general protection, documentation, and monitoring efforts. However, some landowners may wish to keep these sites unmarked and unmapped to avoid attracting attention that could lead to vandalism, theft, or degradation.

Historic, cultural, and special sites may include:

- Native American burial grounds, camps, mounds, etc.
- Historic dwellings, structures, foundations, barns, wells, cattle dipping vats, ruins, cemeteries, bridges, etc.
- Geological formations, sinkholes, limestone bluffs or outcroppings, caves or entrances, spring heads, springs, etc.
- Rare plant populations

### 4.2 Forests of Recognized Importance (FORI)

Forests of recognized importance (FORI) represent globally, regionally, and nationally significant large landscape areas of exceptional ecological, social, cultural, or biological values. These forests are evaluated at the landscape level, rather than the stand level and are recognized for a combination of unique values, rather than a single attribute. FORIs may include but are not limited to landscapes with exceptionally high concentrations of one or more of the following:

- Protected, rare, sensitive, or representative forest ecosystems such as riparian areas and wetland biotopes.
- Areas containing endemic species and critical habitats of multiple threatened or endangered plant and animal species, as identified under the Endangered Species Act (ESA) or other recognized listings.
- Recognized large-scale cultural or archeological sites including sites of human habitation, cities, burial grounds, and *in situ* artifacts.
- Areas containing identified and protected water resources upon which large metropolitan populations are dependent.
- Areas containing identified unique or geologic features including geysers, waterfalls, lava beds, caves, or craters.

While landowners are encouraged to contribute to or support the values that led to the FORI designation of the area, the FORI designation does not compel the landowner to take any actions.

#### FORI Designation

In the United States, because of their significance, FORIs have generally been identified and protected by federal or state governments or are under conservation easement by an environmental nonprofit organization. There is at this time no state or federal agency that regulates FORIs on private forestlands in the United States. Several conservation organizations have identified areas that they believe are of exceptional status, yet there remains no single central clearinghouse of information regarding such forested landscapes.

#### *Aquatic Habitat Management*

One priority within Alabama includes strategic habitat management for aquatic species. Strategic Habitat Units (SHUs) and Strategic River Reach Units (SRRUs) are watersheds and river reaches that in the opinion of aquatic biologists (United States Fish & Wildlife Service, Alabama Department of Conservation & Natural Resources and Geological Survey of Alabama) support viable and healthy aquatic habitat, populations of imperiled species, and provide good opportunities for their restoration and recovery. SHU-related data is used in facilitating and coordinating watershed management and restoration efforts across Alabama. These units were selected based on the presence of federally listed and state imperiled species, the

designation of critical habitat for these species, and expert knowledge about essential habitat components required for these species to survive.
Suitable habitat for these species includes:

- areas with geomorphically stable stream and river channels
- suitable flow regimes
- clear water
- a diversity of channel substrate types with minimal amounts of fine sediment and filamentous algae
- few or no competitive or predaceous nonnative species

***Restoration projects across Alabama***

Shortleaf forest restoration. The Shortleaf Initiative was founded in 2013 and is a collaborative, strategic and energetic response to the dramatic decline of shortleaf pine forests and associated habitats that once covered a vast area from eastern Texas to Florida and up the eastern seaboard to New Jersey. The SPI represents a broad range of public and private organizations as well as key state and federal agencies currently working in the shortleaf pine ecosystem. While some restoration efforts have been underway for some time, a range-wide conservation plan for shortleaf pine was released in June 2016 to identify optimum restoration strategies, increase coordination among shortleaf proponents and maximize the effectiveness of ongoing efforts.

Longleaf Ecosystem Restoration. Well-managed longleaf pine forests provide quality habitat for a variety of desirable plant and animal species. For example, bobwhite quail populations thrive in frequently burned longleaf pine stands, which typically support high legume populations. Fox squirrels, wild turkeys, whitetail deer, countless varieties of songbirds and many native butterflies flourish in longleaf pine forests as well. Reptiles and amphibians are frequent inhabitants of these forests, many found nowhere else. The Longleaf Alliance and America's Longleaf Restoration Initiative are great resources to learn more about the Longleaf Ecosystem Restoration.

White Oak Restoration. White oak forests support extensive plant and animal biodiversity, white oak is the most commercially important timber oak, generating billions of dollars annually and supplying necessary material to industries such as furniture, flooring, cabinetry, and wine and spirits. Due to shifts in land management and ecological changes, older white oak trees are not being replaced by younger white oak trees at a pace that will support long-term sustainability. The White Oak Initiative is a great resource to learn more about restoration efforts.

***Public Lands***

Due to their recognized conservation priorities for protecting habitat, biodiversity, water resources, cultural sites, and unique geologic features, all area federal and state protected public lands are considered FORIs within this LMP. This designation includes but is not limited to state forests, state parks, national forests, national parks, water management areas, wildlife management areas, and wildlife refuges. The state and federal public lands within the region are included in the FORI spatial layer.

Landowner Actions to Protect FORIs

For family landowners, a likely scenario is that their property is adjacent to a state or federally protected area and identified as a FORI at a landscape scale. Landowners should consider the impact to a neighboring FORI and opportunities to support consideration of specific values or attributes when planning and implementing activities on their forest property. Given the size and scale of family ownerships eligible for ATFS certification, landowners may be limited in their abilities to significantly impact FORI presence and quality through management at the small scale.

Management activities on or adjacent to an identified FORI should seek to contribute to or support the values that led to the designation of the area. While landowners are encouraged to contribute to or support the values that led to the FORI designation of the area, the FORI designation does not compel the landowner to take any actions.

During the ATFS inspection process, an ATFS Inspecting Forester shall confirm the presence or absence of a FORI on the property. The ATFS Inspecting Forester should also identify any efforts the landowner is making to support the values of the identified FORI within the 021 Form.

### 4.3 Recreation

Alabama forests are popular places to recreate for their unique topography, biological diversity, and the wide range of potential activities. Landowners can enjoy personal and family recreational use or lease their land as a means of revenue generation. Potential recreation activities:

- Hunting and leases
- Fishing and leases
- Off-highway vehicles (OHV) and leases
- Eco-tourism and leases
- Wildlife viewing and birding
- Hiking
- Bicycling
- Equestrian
- Camping
- Environmental education
- Geocaching
- Paddling

### 4.4 Aesthetics

A wide range of forest types, topography, and aquatic features throughout Alabama provide unique forest aesthetic values. The forests themselves vary from open, pine-dominated forest to mixed hardwood forests.

## 5.0 Common Alabama Forest Cover Types

This section discusses the common forest cover types and general stand conditions natural resource professionals may encounter while working with landowners in Alabama. In this LMP, forest type is defined as a classification of forests by dominant overstory species or group of species and has been categorized using the Society of American Foresters (SAF) Forest Cover Types for the Southern Forest Region and include Southern Pine, Oak-Pine, Oak-Hickory, Bottomland, and Other Forests.

### 5.1 Pine Dominant Forest Type

There are various southern pine species located within Alabama. Pine is often planted in dense, productive plantations with genetically improved seedling stock. Common species found in a pine dominant forestry type include:

Table 3. Common dominant overstory species for the Southern Yellow Pine Forest type.

| **Southern Yellow Pines** | |
|---|---|
| Sand pine | *Pinus clausa* |
| Longleaf pine | *Pinus palustris* |
| Longleaf/Slash pine | *Pinus palustris/Pinus elliottii* |
| Shortleaf pine | *Pinus enchinata* |
| Virginia pine | *Pinus virginiana* |
| Loblolly pine | *Pinus taeda* |
| Loblolly/Shortleaf pine | *Pinus taeda/Pinus enchinata* |
| Slash pine | *Pinus elliotii* |
| Pond pine | *Pinus serotine* |

All tables are reviewed annually by ATFS. Last reviewed 01/30/2024

Source: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445

There are most common species of pine that are actively managed in Alabama are loblolly, shortleaf, longleaf, slash, and virginia, although examples of others can be found throughout Alabama.

The majority of pine dominated forests are managed using similar silvicultural techniques for landowner objectives and produce similar products. Due to this, general pine management is discussed primarily and specific characteristics/management considerations for high priority/use pines are mentioned at the end of each of the following sections.

The pines that have been identified as high use are discussed in greater detail beyond general pine management are:

- Loblolly- The primary species in Alabama for timber production, loblolly does well with many site conditions but is best suited to upland pine sites with a high clay component. Typically in managed plantations with higher densities. Loblolly can have comparatively poorer form, a denser crown, and faster growth than other common southern pines.
- Shortleaf pine is a native species to north Alabama. Shortleaf pine mostly occurs scattered in natural, uneven aged stands, often with mixed hardwood or loblolly pine. Shortleaf pine can be planted and managed as a plantation on appropriate sites.
- Longleaf pine is the longest lived of the southern pine species and can reach 250 years in age. It is generally managed on longer rotations. Longleaf pine is highly pyrophytic.
- Slash pine is not as long-lived as other pine species and is unsuitable for uneven-aged management. However, it can be managed on longer rotations for high-value products. Slash pine can be planted and managed as a plantation on appropriate sites.
- Virginia pine mostly occurs scattered in natural, uneven aged stands, often with mixed hardwood or loblolly/shortleaf pine. It can be planted and managed as a plantation on appropriate sites.

Pine is not only economically valuable but is a key ecological component in natural communities. Revenue and conservation objectives can be balanced or achieved individually through pine management.

### 5.1.1 Landowner Objectives Summary

*5.1.1.1 Aesthetics*

Well managed pine forests have high quality aesthetics. Mature stands that have been prescribed burned and/or thinned have an open, park-like structure with large, well-formed pines and little to no midstory. Young stands with quality groundcover managed with the LMP's appropriate silvicultural tools have the potential for the ideal stand structure and aesthetics with time.

Silvicultural tools can be used to maintain and enhance aesthetics. Forest operations can be planned with aesthetics in mind to ensure these objectives are met. For example, when clearcutting loblolly stands, a strip of pines can be left as a buffer against adjacent high visibility areas such as roadways or neighboring homes. Or during thinning operations, placing logging decks within the stand interior, away from roadways.

**Loblolly** Considerations: Loblolly forests are generally grown on shorter rotations, with less focus for aesthetics. The high density of these forests allow for less sunlight, which impacts the understory.

**Longleaf** Considerations: Longleaf forests are generally grown on longer rotations. Longleaf management often focuses on the regular use of fire, which results in a very clean understory.

**Shortleaf** Considerations: Shortleaf is also grown on longer rotations and is often found in mixed pine-hardwood stands, which are high in wildlife diversity.

**Slash** Considerations: Mature Slash forests can have a park like appearance with the regular use of fire and thinning.

*5.1.1.2 Wildlife Habitat Management and Protection*

The pine dominant forest type and its associated natural communities provide excellent wildlife habitat management and protection opportunities. Many game and imperiled species can be found within pine forests. Game species are actively managed on private lands while non-game species are managed to a lesser extent.

Hunting is a common wildlife management objective in the pine dominant forest type. Many game and non-game species prefer the frequently fire-maintained open, grassy groundcover and lack of midstory. They also prefer a relatively lower overstory density. Hunting leases are used to manage healthy game populations while also generating revenue to help pay for pine management activities such as prescribed fire.

Habitat objectives in pine forests in Alabama can be met with various silvicultural tools. For example, thinning planted pine stands to a lower overstory density more favorable to wildlife or creating small clearcuts for wildlife openings to diversify habitat and create edge. Many game and non-game species of pine forests will benefit from these activities including white-tailed deer, wild turkey, and red cockaded woodpecker.

Wildlife habitat protection objectives can be met through preservation practices. The more hands-off preservation approach can be used to protect non-game species in healthy, fully functioning pine forests. However, active management with prescribed fire at minimum is required to maintain this forest type and its habitat components.

**Loblolly and Slash Wildlife Considerations**: Adequately described in general wildlife section.

**Shortleaf Wildlife Considerations**: Shortleaf pine is an important species that provides high habitat value for many wildlife species. Shortleaf pine functions as a structural habitat element in both mixed oak-pine forests and in pine-grassland woodlands. It also adds diversity throughout all stages of plant succession and stand development. Within the range of shortleaf pine, wildlife species are variously associated with shortleaf based on stand density, the proportion of hardwoods within a structural stage of development, and availability of habitat structure within the specific niche that each wildlife species occupies.

Shortleaf also is a key species in ecosystems where it occurs naturally because its occurrence and relative dominance are defined to a large extent by the natural disturbance regime, particularly fire. Fire frequency and season, to some extent, define the understory plant community response and determine shortleaf pine's potential for regeneration, establishment of future codominant and dominant trees, and perpetuate a relative mix of pines with other associated tree species within a stand. This understory community response to fire or lack of fire defines much of the ground-dwelling or ground-foraging wildlife species populations.

**Longleaf Wildlife Considerations**: One of the primary ecosystems for threatened and endangered species. Due to its higher tolerance for prescribed fire at a younger age and during the growing season the longleaf pine dominated forest is important to many forbes and animals that are threatened and endangered.

Growing season burns or burns in the early summer late spring can be very helpful to landowners looking to control hardwoods and stimulate native flora production. Game species such as

quail desire grassy open areas that can be achieved quicker and easier with a fire tolerant species such as longleaf pine.

Mature longleaf pines have much thinner crowns that allow more light to the forest floor for growing vegetation and native understory. This in combination with their longevity makes it a great species for those with wildlife priorities.

*5.1.1.3 Recreation*

Pine dominant forests are popular recreational areas in Alabama, especially in the cooler months. The open, park-like stand structure, often with rolling hills, provides a scenic backdrop for any of the following recreational activities:

- Hunting and leases
- Bicycling
- Equestrian
- Camping
- Environmental education
- Geocaching
- Off-highway vehicles (OHV) and leases
- Wildlife viewing and birding
- Hiking

*5.1.1.4 Conservation*

The pine dominant forest type can be managed in a conservation-oriented manner. This can be accomplished using multiple-use management by balancing utilization and protection of timber, wildlife, rare plants, recreation and hydrology. Pine forests are fire dependent and require frequent application of prescribed fire at minimum for ecological maintenance.

*5.1.1.5 Ecological Restoration*

Shortleaf and Longleaf:

Both Shortleaf and Longleaf pine are important species that provide high habitat value for many wildlife species. Shortleaf pine functions as a structural habitat element in both mixed oak-pine forests and in pine-grassland woodlands. Wildlife species are variously associated with each pine system based on stand density and availability of habitat structure within the specific niche that each wildlife species occupies. Both are key species in ecosystems where it occurs naturally because its occurrence and relative dominance are defined to a large extent by the natural disturbance regime, particularly fire. In some cases cost share may be available for landowners interested in restoring a shortleaf or longleaf pine ecosystem on their property.

### *5.1.1.6 Hydrological Protection and Restoration*

Hydrology is an important component of healthy, fully functioning natural communities. Ecosystems are impacted by hydroperiod, sheet flow and water quality. Hydrological impacts can be mitigated and in some cases restored through Silviculture BMPs which protect and enhance hydrology and soil quality through sustainable silvicultural practices and proper forest operations.

On wetter sites, bedding should be avoided or minimized. Limit new road construction. Existing forest roads can be properly maintained through grading, pulling ditches, installing culverts, hard surface low water crossings, turnouts and water bars as needed. Old windrows and beds can be leveled to improve hydrology but may be avoided if more overall harm will be done to the ecosystem than good (i.e. groundcover impacts).

*5.1.1.7 Forest Health Management*

The most destructive insect pests to pine are southern pine beetle and Ips. Loblolly is the preferred host for southern pine beetle, although they can be found in other pine types. It is usually not a major issue in younger, well-managed stands. However, damage can be severe in overstocked and senescent stands, especially if offsite or other stressors occur (i.e. drought, lightning strikes, fire stress). Once a severe outbreak occurs, it can spread to adjacent, well-managed, younger stands. Outbreaks range from a few spots across a stand to hundreds of acres. Tip moths and seedling debarking beetles can be problematic in young stands.

With appropriate seedling and site selection and release and thinning regimes, pine generally has minimal issues following successful establishment.

Non-native species should be monitored and treated. See TABLE 1

**Loblolly Considerations**: The most detrimental diseases for loblolly pine are fusiform rust and black root rot. Fusiform rust-resistant seedling stock can be planted and the alternate host – *Quercus* spp. can be reduced where infection is excessive. Fusiform rust can become a major issue following over-fertilization of loblolly pine, vegetation control and on old field sites that were heavily fertilized or grazed. Root rot can be an issue in thinned stands. The fungus (*Phaeolus schweinitzii*) is more destructive than root rot. This fungus causes stem and root rot, often following logging damage to residual stems.

**Longleaf Considerations**: The main disease of longleaf pine is brown-spot needle blight (Scirrhia acicola). Other diseases include pitch canker, annosus root rot, and cone rust. Insects that attack longleaf pine include black turpentine beetle, bark beetles, and seed bugs. These unwanted pests and pathogens can be controlled by reducing the number of thinnings per rotation and conducting prescribed burns.

**Shortleaf Considerations**: Littleleaf disease is the most serious disease of shortleaf pine and is caused by a complex of factors including the fungus Phytophthora cinnamomi Rands, low soil nitrogen, and poor internal soil drainage. Little leaf disease can be controlled by avoiding planting where evidence of the disease is visible on existing trees and removal of infected trees. Annosus root rot is also found in shortleaf can be controlled by reducing the number of thinnings per rotation and conducting prescribed burns.

**Slash Considerations:** Slash pine is susceptible to fusiform rust, pitch canker, annosus root rot, pales weevil, southern pine beetle and Ips. Slash, unlike Longleaf, cannot handle prescribed fire until the bark thickens and it reaches about 10 to 15 feet tall (depending on fuel load).

*5.1.1.8 Revenue*

The pine dominant forest type provides a wide array of revenue opportunities including timber and non-timber forest products, silvopasture, eco-tourism and many others.

### 5.1.2 Landscape Objectives

*5.1.2.1 Wildlife Habitat Management*

Pine dominant forests provide habitat for game and non-game species at the landscape scale. In Alabama, efforts should accelerate the restoration and enhancement of critical forest and freshwater habitats and associated wildlife species. These includes species such as, but not limited to, northern bobwhite quail and prairie warbler, as well as fish, amphibians and other aquatic species, as well as a diverse population of other game and non-game species.

*5.1.2.2 Utilization of Prescribed Fire*

The focus of prescribed fire at the landscape scale is fuel management. Pine forests managed with prescribed fire have low fuel loads which helps reduce landscape level wildfire risk and hazard in Alabama. Wildlife and aesthetic benefits of fire-maintained forests across the landscape are also important. Wildlife that migrate throughout the area benefit from the widespread, high quality habitat prescribed fire creates. Prescribed burning also provides private and public landowners and fire managers across the state an incentive to coordinate for a common mission.

**Benefits of Prescribed Fire**

**Hazardous fuel reduction:** Forest fuels accumulate rapidly in pine stands and pose a serious threat from wildfire. Prescribed fire is the most practical way to reduce dangerous accumulation of combustible fuels. Wildfires that burn in areas where fuels have been reduced by prescribed fire cause less damage and are much easier to control.

**Wildlife habitat improvement:** Prescribed fire is highly recommended for wildlife habitat management where loblolly, shortleaf, longleaf, or slash pine is the primary over story species. Periodic fire tends to favor under story species that provide browse for wildlife. Deer, dove, quail, and turkey are some of the game species that benefit from prescribed fire.

**Insect and disease control:** Prescribed fire is the most effective and practical means of controlling brownspot disease in longleaf pine seedlings and cone insects such as the white pine cone beetle.

**Aesthetic appearance enhancement:** Prescribed fire improves recreation and aesthetic values by increasing occurrence and visibility of flowering annuals and biennials and maintains open spaces for vistas.

**Native vegetation improvement:** Use of prescribed fire encouraging the new growth of native vegetation, and maintaining the many plant and animal species whose habitats depend on periodic fire.

**Seeding and planting preparation:** Prescribed fire is useful when regenerating southern pines. On open sites, prescribed fire can expose mineral soil and control competing vegetation until seedlings become established.

**Loblolly and Slash Prescribed Fire Considerations:** In general, loblolly and slash less than 8 years in age will be damaged by prescribed fire. Therefore, if commercial timber production is a goal, prescribed fire should be withheld until trees are well established. Trees that are at least 3 - 4 inches ground diameter or about 15 feet in total height are generally not damaged by low-intensity fire.

**Longleaf Prescribed Fire Considerations** Fire in Longleaf can be used as an early rotation release in longleaf stands once they can handle fire. A grass stage burn will promote earlier, more uniform vertical growth in longleaf. Broadcast prescribed burning serves as a mid-rotation release in longleaf stands. It is very susceptible to crown and inner bark scorch, especially in younger stands. However, fire may be used in longleaf pine during all stages of development.

**Shortleaf Prescribed Fire Considerations** Shortleaf pine possesses many fire tolerant traits. These include the ability to rapidly sprout following, thick platy bark protecting the cambium from fire injury, and abundant seed crops and persistent cones that allow seedlings to recover after a fire. Shortleaf seedlings and saplings top-killed by fire sprout from reproductive buds located in the basal crook, a unique root feature of shortleaf.

A Prescribed Fire Association (PFA) may provide a landowner the means to accomplish prescribed fire on their property. PFAs allow landowners to pool resources, and for less experienced burners to gain experience from their peers. The goal of a PFA is to promote the safe and responsible use of fire in the region through increasing landowner access to education, training, technical support, funding, equipment for burning, and hands on experience to achieve multiple management objectives. PFAs can be local, county or multi-county.

A **burning permit**, 9-13-11 of the 1975 Code of Alabama, is required for all forestry and agricultural burns in Alabama. In general, the permit means the burner has the manpower and equipment to control the fire and agrees to stay with the fire until it is out. Burning permits may be obtained by calling the Alabama Forestry Commission. Even though the burner has a permit, he/she is still responsible for any damage to others that may be caused by the fire or smoke.

Even though the law requires a permit for all "wood & field" fires, the AFC has administratively exempted fires smaller than 1/4 acre if it is more than 25 feet from a forested area. However, the burner is still responsible for the fire.

To obtain a Burn Permit please contact the AFC dispatch center for your county. Certified Burn Managers can obtain a permit on-line by visiting http://burnpermits.forestry.alabama.gov

There are some County and City Laws that also restrict outdoor burning. Burners are responsible for contacting their local government for additional information

In Alabama, there are several organizations and resources are available to share prescribed fire knowledge and resources:

Southern Fire Exchange

Alabama Forestry Commission

Alabama Prescribed Fire Council

*5.1.2.3 Rare Plant and Animal Protection*

Alabama is home to many rare species found only in this region. Table 1, shows the imperiled species found in Alabama.

Habitat:

**Shortleaf habitat consideration**: Shortleaf pine functions as a structural habitat element in both mixed oak-pine forests and in pine-grassland woodlands. It also adds diversity throughout all stages of plant succession and stand development. Within the range of shortleaf pine, wildlife species are variously associated with shortleaf based on stand density, the proportion of hardwoods within a structural stage of development, and availability of habitat structure within the specific niche that each wildlife species occupies. Shortleaf also is a key species in ecosystems where it occurs naturally because its occurrence and relative dominance are defined to a large extent by the natural disturbance regime, particularly fire. Fire frequency and season, to some extent, define the understory plant community response and determine shortleaf pine's potential for regeneration, establishment of future codominant and dominant trees, and perpetuate a relative mix of pines with other associated tree species within a stand. This understory community response to fire or lack of fire defines much of the ground-dwelling or ground-foraging wildlife species populations, such as the bob white quail.

**Longleaf habitat consideration**: The species in this ecosystem are not only resistant to fire but also dependent upon it. The longleaf pine is the dominant tree species in this system and is essential to its integrity, but the floral and faunal diversity of the system lies in its understory. The understory throughout the longleaf range contains from 150 to 300 species of groundcover plants per acre, more breeding birds than any other southeastern forest type and about 60 percent of the amphibian and reptile species found in the Southeast.

### 5.1.3 Silvicultural Options

*5.1.3.1 Timber Harvest*

The following silvicultural and land management tools are available to Alabama forest resource professionals to meet various landowner objectives and utilize forest resources. These are the common methods used but there may be others available. One or a combination of these tools may be used to meet single or multiple objectives. Landowner objectives and budget ultimately determine which tools may be utilized. Local contractor availability, timber and NTFP markets, project scale, local regulations, site conditions, local climate, the degree of planning and scheduling and other factors also influence the forester and landowner decision making process when determining which tools to utilize to efficiently and effectively meet landowner objectives.

The Silviculture BMPs compile voluntary guidelines, strategies and considerations for managing, enhancing and protecting: timber, rare plant and animal species/habitat, aquatic ecosystems and air and water quality, during silvicultural operations. Silvicultural BMP's apply to: timber harvest, site preparation, reforestation and forest operations (roads, water control structures, etc.) activities. Historical and cultural resource protection and recreation management are also considered during planning and active silvicultural operations.

**Identified Pine Species Management Considerations**

The following bulk of the silvicultural recommendations apply the majority of the pine dominated ecosystem at some point during the management cycle. However, some species have special considerations for their successful harvest, management and reforestation. These are addressed for the pines of high use below. Unless otherwise identified specifically by species, listed general silvicultural practices can be considered in pine management, preferably with the guidance of a qualified professional.

**Loblolly and Slash harvest considerations**: Loblolly pine is a highly productive commercial species. Loblolly pine is most productive on the clay soils of upland pine sites. Slash pine is also a productive commercial species that is most productive on the spodic soils of mesic and wet flatwoods. They are offsite on deep, sandy soils. These species are sometimes managed on shorter rotations for pulpwood, oriented strand board and chip-n-saw. They can be grown on longer rotations for higher valued products such as saw timber, poles and ply logs. Management regimes and rotation length are determined by local markets and landowner objectives.

Loblolly and Slash pines are shade intolerant and are best suited for even-aged management, providing landowners the option of managing intensively and maximizing revenue with short rotations. Loblolly and Slash also allow the flexibility to grow stands out longer for aesthetics and wildlife.

**Shortleaf harvest considerations**: Shortleaf pine is shade intolerant and is best suited for even-aged management. One interesting growth trait of shortleaf pine seedlings is the development of a j-shaped crook in the stem at ground-line. Associated with this crook are lateral buds, which will elongate if the top is killed. This ability to sprout, which continues for about 10 years after germination, is rare among conifers, and may, perhaps, be an adaptation to fire.

**Longleaf harvest considerations:** Longleaf pine is a long-lived species with relatively slower growth characteristics compared to loblolly and slash pines, particularly for the first one to five years. Once it reaches the “rocket state” (rapid vertical growth), growth rates are comparable among these species. This relatively slower growth habit and other physiological characteristics produce high quality saw timber and pole products. It is often managed on longer rotations for these high-value products compared to loblolly and slash pines.

Longleaf found in north Alabama is found on montane habitat, dominating the southern and southwestern slopes (though not confined to them) and ridgelines up to about 2000 ft. elevation in north Alabama. The soils in which these longleaf grow are well drained with beds of flinty pebbles, sandstone ridges and even rock outcrops.

Longleaf is well-suited for uneven-aged management, providing landowners the option of managing for a steady, long-term income stream through single-tree selection or group selection harvests. This allows for a mix of products per harvest and meeting a mix of objectives, such as aesthetics.

*Thinning*

Thinning is a primary land management tool used to meet various objectives such as revenue, aesthetics, wildlife and restoration. The type and timing of thinning are dependent on several factors including landowner objectives, market conditions and stand and site conditions. This is a stand-specific determination that should be made by a forester. There are also site-specific Wildlife BMPs, related to thinning harvests, particularly in streamside management zones.

Several types of merchantable release thinnings are utilized in pine stands. Merchantable release thinning includes row thinning in un-thinned planted pine stands. The most common row thinning methods are every third and fifth row thinnings. Every other and fourth row thinnings are also utilized along with every sixth and seventh row.

Single-tree selection via logger-selection or a logger-select thinning (operator select) of the residual rows is common during first thinning. Some first thinnings in planted pine, and most thereafter, are thinned through marked selection or marked-select thinning by a forester. Foresters also mark 1+ acre demonstration areas on logger-selection first thinnings to walk through and discuss with logging crews how the stand will be thinned.

Single-tree selection in combination with row thinning is preferred over straight row thinnings without selection. Whether marked or logger-selection, single-tree selection improves forest health, aesthetics and promotes higher net growth. A straight row thinning reduces competition for the trees adjacent to take row, but leaves inferior cull trees throughout stand.

If wildlife, aesthetics or biodiversity are primary objectives, stands are thinned to a lower density. If timber and revenue are primary objectives, a higher density is maintained. If managing for multiple-uses, a moderate density can be used.

Natural pine stands are typically thinned using marked selection by a forester. Marking natural stands allows for more control over thinning density and quality due to their variable nature. If a natural stand is relatively uniform, with mostly lower value pulpwood or has a dense understory, it may be more efficient to use logger-selection and close supervision. Due to lack of row access, first thinnings in natural stands may call for a slightly lower density to improve logger operability.

Following two to three thinnings, planted stands appear more natural and have improved aesthetics. Prior to each thinning, landowner objectives can be revisited. Eventually, a decision must be made on final harvest or conducting a natural regeneration cut.

Natural regeneration and under-planting harvests utilize thinning and will be discussed in Reforestation.

**Loblolly and Slash Thinning considerations**

On productive sites, planted loblolly and slash pine generally require a first thinning around age 15-20. On less productive sites, it may be pre-merchantable or not have enough volume per acre to market until around age 20 in which case stand replacement may be strongly considered.

First thinnings involve row-thinning, preferably with marked-selection or operator-selection thinning. Natural stands are thinned using marked/selection. Subsequent thinnings will generally take place every five to ten years in planted and natural stands.

Pre-merchantable 20+ year-old planted loblolly and slash pine stands or those overstocked with natural regeneration, may require a pre-merchantable thinning or fuelwood chipping harvest.

Many landowners may choose not to thin mature even-aged and two-aged loblolly and slash stands as their desired future condition has been met. They enjoy the benefits of this mature stand structure such as high quality wildlife habitat, aesthetics and recreational opportunities. Other landowners may choose to occasionally lightly thin their mature pine for revenue, forest health and maintaining overstory composition. See the forest health section for the risks associated with managing mature loblolly and slash pine.

**Shortleaf and Longleaf Thinning Considerations**

On productive sites, planted shortleaf and longleaf generally require a first thin age 15-20. On less productive sites, planted longleaf may be pre-merchantable or not have enough volume per acre to thin until age 20 or 30.

First thinnings in planted shortleaf and longleaf stands involve row-thinning, preferably with marked-selection or operator-selection thinning. Natural stands are thinned using marked selection. Subsequent thinnings will generally take place every five to ten years in planted and natural stands.

Pre-merchantable planted longleaf stands of 20 to 25 years old or those overstocked with natural regeneration may require a pre-merchantable thinning or fuelwood chipping harvest.

Many landowners may choose not to thin uneven-aged shortleaf and longleaf stands as their desired future condition has been met. They enjoy benefits of uneven-aged management such as high-quality wildlife habitat, aesthetics, and recreational opportunities. Other landowners may choose to occasionally lightly thin their uneven-aged longleaf for revenue, forest health, and maintaining stand structure and overstory composition.

*Clearcut*

Clearcutting is a standard silvicultural practice in managing shade intolerant pine for timber and other objectives. Clearcuts are utilized in planted or natural stands of pine and hardwood.

Another primary use of clearcutting is for salvage harvests which are discussed in that section.

A clearcut can also be utilized for species conversion within a timber stand to meet various objectives or may reflect a change in objectives.

There are site-specific Silviculture BMPs, when using clearcuts, particularly in streamside management zones. The size and shape of clearcuts can be considered if wildlife and aesthetics are also objectives. Timing and seasonality can be crucial on certain sites.

**Loblolly and Slash clearcut considerations**

Clearcutting is a standard silvicultural practice in managing shade intolerant loblolly and slash pine for timber and other objectives.

**Longleaf clearcut considerations:**

Clearcutting longleaf pine is a sound silvicultural practice in managing this shade intolerant species for timber, pine straw, and other objectives. Clearcuts are utilized in planted or natural stands. However, the diversity of forest products and the longer rotation age for longleaf pine reduces the amount of clearcutting that occurs under longleaf pine management.

**Shortleaf clearcut considerations:**

On typical high hazard littleleaf disease sites of highly eroded, low fertility clay, with a large component of shortleaf pine and an adequate combined stocking of all species, the stand may be managed as follows:

- In stands with more than 25% of trees diseased, cut shortleaf pine as soon as merchantable.
- Where littleleaf disease is causing important losses on shortleaf pine, plan cutting operations to favor other more resistant species.

Shortleaf located on a high site index site, over 70, it is common to clear cut and artificially regenerate a less susceptible species, usually loblolly pine.

*Chipping*

Another form of timber harvest in Alabama is chipping. Material is felled and skidded conventionally, then ran through an industrial chipping machine at the loading deck, with chips being hauled to the mill rather than tree-length. Both pre-merchantable and merchantable pine, hardwood and shrub materials can be chipped. The maximum diameter of the material to be chipped varies by chipping machine and species.

Hardwood and pine, tree-length pulpwood can be hauled as clean chips, which have a similar stumpage price as pulpwood. Clean chips are derived from nearly pure, living wood with very little vegetation and debris mixed in. Hardwood and pine clean chip loads must be sorted. Young merchantable pine clearcuts can be clean-chipped.

**Fuelwood chips** can be derived from the same size and species of material as clean chips but include dead and living vegetation such as needles, leaves and limbs. A load of fuelwood chips can contain a mix of hardwood, pine and shrub materials. Fuelwood chips are burned at mills and biomass energy plants to generate electricity and are the lowest value timber product in Alabama markets. They are also processed into pellets and shipped to European markets and burned for energy production.

Fuelwood chipping is commonly used in low-value, hardwood, clearcuts, land clearing operations or other situations where it is not feasible to conduct a traditional timber harvest. These operations may break-even or generate a small amount of revenue from fuelwood, but more importantly, they can meet other landowner objectives, such as hardwood reduction and removal or site clearing. Fuelwood or clean-chipping can be used where a very debris-free post-harvest site is required. For example, fuelwood chipping can be used as part of site preparation for groundcover restoration projects.

Pine stands present opportunities for fuelwood chipping operations such as reducing overstocked natural regeneration in mature, two-aged stands or hardwood reduction.

*Salvage*

Salvage harvests are valuable tools that help make the most of difficult circumstances. They are commonly utilized to harvest timber following varying degrees of catastrophic natural disasters. These include wildfires, climatic events such as hurricanes and forest health issues such as southern pine beetle outbreaks.

The primary purpose of a salvage harvest is to utilize as much of the damaged timber resource prior to mortality and a complete loss of merchantability. Salvage is also used to maintain or enhance forest health and aesthetics. Sometimes secondary objectives become primary or attainable following a catastrophic event. For example, restoration and recreation goals may get realigned, allowing for good management accomplishments to arise out of what appears to be a completely bad situation at the time.

Salvage operations typically involve clearcuts but that is not always the case. A salvage operation can entail evaluating an impacted stand and thinning the damaged timber using marked-selection, while maintaining the relatively healthy trees. There is always a forest health risk involved in the determination to clearcut or thin damaged timber. This determination is situation and site-specific and should be made following careful evaluation.

Salvage harvest operations can be used in pine stands. For example, southern pine beetle outbreak may require a salvage clearcut.

### *5.1.3.2 Reforestation*

Reforestation is a core tool of sustainable forestry. The goal is to successfully establish a species appropriate for the site, while meeting landowner objectives. This process involves careful planning and selection of: artificial or natural regeneration, species, seedlings, density, site preparation, planting method and release. Each of these elements of reforestation are dictated by: landowner objectives, site conditions, selected species, current and forecasted timber markets, budget and other factors.

*Artificial Vs. Natural Regeneration*

A selection between artificial and natural regeneration must be made during the stand and property-level silvicultural planning process. This selection is driven by landowner objectives and site specific circumstances. However, there are pros and cons to each reforestation strategy. (See Table 4.)

**Table 4.** Comparison summary of artificial and natural regeneration methods of reforestation.

| | Pros | Cons |
|---|---|---|
| **Artificial** | More productive timber management | More expensive: seedling and planting costs |
| | Better stand development: form, growth | Rows may decrease aesthetics during early rotation |
| | More control over seedling quality through improved genetics: growth rate, disease resistance, form | More heavy equipment entry required (soil compaction, rare plants) |
| | Control over planting density and spacing | |
| | More conducive to high-production management | |
| | Less likely to require pre-merchantable thinning (cost) | |
| | Can use for species conversion, *i.e.*, underplant desired species | |
| | Less fire exclusion time due to faster growth | |
| **Natural** | Less expensive: no seedling and planting costs | Less productive timber management |
| | More conducive to conservation-oriented management: uneven-aged | Poorer stand development: form, growth |
| | Less heavy equipment entry (soil compaction, rare plants) | Less control over seedling quality: only single tree selection thinning (seed trees) |
| | Lack of rows may increase aesthetics | Less control over seedling density and spacing |
| | Even-aged pine stands can be converted to two-aged, then uneven-aged structures | No control of cone or seed production |
| | More fire exclusion time due to slower growth (slash, loblolly, shortleaf) | May require single or multiple pre-merchantable release thinnings (cost) |

All tables are reviewed annually by ATFS. Last reviewed 01/30/2024.

*Site Preparation*

Adequate site preparation is required to achieve high survival rates and successfully establish a new stand of timber. The following methods can be used in various forest types for natural or artificial regeneration. Site conditions, landowner objectives and budget drive this selection. Target vegetation includes herbaceous, grasses, non-crop pines, woody shrubs and hardwood species. Site preparation is broken into three categories: chemical, mechanical and prescribed fire. These methods can be used individually or in combination. Site preparation treatments generally take place in the Spring and Summer months prior to Winter planting.

Vegetative competition varies across pine sites and the appropriate site preparation technique(s) can be selected to adequately control it. Vegetative competition will need to be controlled *prior* to planting to achieve successful establishment.

### ***Chemical Site Preparation***

**Herbicide** should be applied based on the recommended site preparation label rate for the target and crop species and site conditions. The appropriate herbicide and chemical site preparation technique should be selected to effectively target the primary woody and herbaceous vegetative competition.

Site preparation herbicide is typically applied aerially by helicopter or through ground application using the broadcast or banded techniques.

There are site-specific Silviculture BMPs and Wildlife BMPs, related to site preparation, particularly in streamside management zones.

### ***Mechanical Site Preparation***

There are many mechanical site preparation methods to choose from. Some can be used on various sites, while others have very site-specific applications. All the following methods can be used with establishing pine.

**Bedding** is used on flat, wet pine sites to elevate the roots of seedlings and promote respiration and growth. There are various bedding machines that create beds of different heights, depending on how wet the site is. Some wet sites are difficult or impossible to successfully, artificially regenerate without beds.

Bedding is appropriate for timber management objectives but can have long-term negative impacts on desirable groundcover, aesthetics and hydrology.

Bedding machines are pulled behind farm tractors, bull dozers, or more commonly, skidding machines, depending on horsepower requirements and site conditions.

**Roller drum chopping** is used on various pine sites to reduce woody and herbaceous competition. There are various sizes of roller drum choppers with various lengths of blades. The appropriate equipment should be selected based on site conditions (i.e. soil moisture, topography, etc.) and vegetation size and density.

Many chopping machines can be filled with varying levels of water to achieve different degrees of vegetative impacts. For example, a site with light, herbaceous vegetation may not require the chopper to be filled, while it may be appropriate to chop a woody vegetative site with a full drum.

Choppers are pulled behind farm tractors, bull dozers, or more commonly, skidding machines, depending on horsepower requirements and site conditions.

**Scalping** and **ripping/subsoiling** usually only take place on old field and pasture sites during afforestation. Scalping peels back thick, matted turf grass, creating a vegetation-free strip to plant seedlings in.

Ripping or subsoiling is used in compacted soils like those found in pastures and old field sites, particularly those on clay soils.

**Root raking and piling**, with an optional pile burn is a common site preparation method to reduce debris for mechanical planting. Usually only large surface material is raked for silvicultural use, not stumps and roots which is the case during land clearing operations. The piles may be left or burned, depending on objectives and budget.

**Mowing and mulching** can be effective mechanical site preparation in stands to be naturally regenerated. Especially those with heavy fuel loads and lack of prescribed fire history. Mowing can reduce the fuel load and allow for safer, more effective site preparation burns.

**Harrowing/disking** can be used on relatively clean sites or those that have been raked or burned, to create vegetation-free strips to plant seedlings in.

**Shearing** involves a heavy bulldozer equipped with an oversized V-blade that shears off stumps and any other vegetation and debris. This material is then piled with root rakes and typically burned. This creates a very clean planting site, ideal for establishing a pine straw stand. This can also be used during groundcover restoration or converting clearcut timber to pasture or crops.

**Logging** impacts to understory vegetation can be utilized as part of a broader site preparation plan, especially when carefully timed. In heavy fuels and understory, logging acts as an initial fuel reduction treatment that can be followed up by chemical, mechanical and/or prescribed fire site preparation.

***Prescribed Site Preparation Burn***

Prescribed fire can be used solely or in combination with other site preparation methods. It is common to prescribed burn following mechanical and chemical site preparation. Site preparation burns typically take place in the late Summer, early Fall once fuels have cured and prior to Winter planting.

*Artificial Regeneration*

Artificial regeneration follows clearcutting. Reference TABLE 4 for a comparison summary of the advantages and disadvantages of artificial and natural regeneration.

Planting density is an important consideration and dependent on: landowner objectives, budget, site conditions, cost share requirements and other factors. The soil productivity, hydrology and natural community should be evaluated during artificial regeneration planning. A density should be selected that meets primary objectives such as timber, wildlife, aesthetics and recreation. If timber management is an objective a relatively higher density should be selected.

If timber management is not an objective, lower planting densities will meet wildlife, rare plant and aesthetic objectives. However, due to tree biology and physiology, planting at too low of a density will result in aesthetic tradeoffs and a stand of short, shrub-like trees with excessive limbs. They will never develop into tall, straight, well-formed trees as most landowners aesthetically desire and envision their forest. A medium, balanced density that meets multiple objectives can also be considered.

The following is a sample of tree spacing and density (Trees per Acre.)

| Spacing by Feet | Trees per Acre |
|---|---|
| 6 X 10 | 726 |
| 6 X 12 | 605 |
| 7 X 10 | 622 |
| 7 X 12 | 519 |
| 8 X 8 | 680 |
| 8 X 10 | 544 |
| 8 X 12 | 454 |
| 9 X 9 | 538 |
| 9 X 10 | 484 |
| 10 X 10 | 435 |

Artificial regeneration generally involves planting seedlings in rows that are spaced at a desired density. However, a random or natural pattern can be established using hand planting.

High survival rates depend on selecting appropriate species for the site, adequate site preparation, suitable planting method, proper care of quality seedlings and natural factors such as climate and pests. A seedling survival check should be conducted following the first growing season to determine if the stand was successfully established, to document initial stocking and decide if supplemental planting is required to achieve desired stocking.

Adequate survival rates with all pine species can be achieved with careful reforestation planning and execution. Landowners should establish their own standard for survival prior to planting, given the site conditions. Planting a few extra seedlings for “insurance” towards a desired stocking density may also be worthwhile.

***Hand Planting Vs. Machine Planting***

Hand planting entails crews planting seedlings by hand. Refer to Table 5. for more information on this method and a comparison with machine planting.

Machine planting involves two main methods. Flatwoods planting (rubber-tired tractor) or V-blade planting. Flatwoods planting requires a cleaner site, hence more mechanical site preparation. This is due to limitations of the planting machine itself and the rubber-tired farm tractor commonly used to pull it.

V-blade machine planting generally uses the same planting machine, but is pulled behind a bull-dozer with a large heavy duty "V"-shaped blade that clears large debris and creates a vegetation-free strip that seedlings are planted in. V-blade planting can handle rougher sites, hence does not require as much mechanical site preparation. V-blade is essentially planting and site preparation in-one, but costs more than flatwoods planting. If contract specifications allow it, V-blade can result in planting seedlings in a trench on wetter sites. This can result in high mortality.

V-blade is particularly useful if mechanical or chemical site preparation plans are not completed prior to scheduled planting. Or where chemical site preparation methods conflict with landowner objectives. Refer to Table 5. for more information on machine planting.

Any of the planting methods can be used to plant pine.

**Table 5.** Comparison summary of hand and machine planting methods of artificial regeneration.

| | Pros | Cons |
|---|---|---|
| **Hand Planting** | Less expensive than machine planting | More potential for human-caused error, *i.e.*, J or L rooting, seedling depth, and packing issues, etc. |
| | Can plant rough sites without raking | Inexperienced crews require more supervision |
| | Experienced, supervised crews have similar quality and consistency to machine planting | |
| | Less groundcover impact and soil compaction | |
| | Easier to plant any pattern for natural look (no rows) | |
| | Can use for under-planting thinned stands | |
| | Can plant any pine or cypress species; bare root or containerized seedlings | |
| | Can be used on hills and steep topography | |
| **Machine Planting (Flatwoods & V-Blade)** | Less human-caused error, *i.e.*, J or L rooting, seedling depth, and packing issues | More expensive than hand planting |
| | Generally more consistent than hand planting | Flatwoods requires cleaner site or more mechanical site preparation |
| | Requires less supervision | More groundcover and soil impacts, especially V-blade |
| | Can plant any pine species; bare root or containerized seedlings | Harder to plant natural pattern |
| | V-blade requires less site preparation | Cannot under-plant thinned stands |
| | | Harder to plant hills and steep topography |

All tables are reviewed annually by ATFS. Last reviewed 01/30/2024.

***Seedlings***

This section will focus on pine seedlings. Pines are most commonly planted on larger scale with focus on multiple objectives, typically emphasizing timber/fiber production. Hardwoods are more commonly planted on a smaller-scale, focusing on wildlife management.

***Containerized Vs. Bare Root***

Containerized seedlings are considered higher quality, average higher survival rates, but are more expensive. Containerized seedlings are more resilient during transport and storage and can be kept longer once lifted if properly stored in a refrigerated trailer (refer). Pine seedlings are available with various genetic *improvements*, such as growth rate, form and disease resistance. Improved, containerized pine seedlings are more expensive than bare root and are preferred if planting budget allows. Orders can be placed early summer to ensure needs are met and avoid delays in planting.

In comparison, bare root seedlings generally average lower survival rates, require immediate planting once lifted, are very vulnerable during transport and storage, yet are less expensive. Bare root seedlings are very sensitive to warmer temperatures, dry air, and direct sunlight. Bare root can have comparable survival to containerized with proper planting technique (depth, angle and packing), adequate site preparation, storage and handling.

Both should be planted as soon as possible after lifting, be stored in a refer and kept under seedling tarps in the shade prior to planting.

Hand, flatwoods and V-blade planting methods can be used to plant all pine species in Alabama, bare root or containerized.

**Shortleaf Seedling Considerations**:

Shortleaf pine seedlings exhibit greater sensitivity to weather changes that occur soon after planting than loblolly, for both bareroot and containerized. When shortleaf and loblolly are exposed to the same harsh weather conditions immediately after planting, shortleaf tends to "brown-up" whereas loblolly seedlings remain green. Shortleaf, however, usually makes a full recovery in the spring following the harsh weather event. When planting it is best to plant the root collar just below the soil surface, as deep planting does not affect resprouting and improves initial survival.

**Longleaf Seedling Considerations:**

The depth at which longleaf seedlings are planted greatly influences their survival and growth. It is important to recognize that there are drastic differences between the planting depth at which container and bareroot longleaf pine need to be planted.

Containerized longleaf seedlings should be planted leaving 1 to 1.5 inches of the container plug exposed on flat, dry sites. On wet sites, 2 to 3 inches of the plug should be exposed for containerized longleaf seedlings.

Bareroot longleaf seedlings should be planted at a depth so that the terminal bud is slightly at or below the soil surface.

### ***Afforestation***

*Natural Regeneration*

Pine, hardwood and cypress stands can be naturally regenerated to meet various objectives, including uneven-aged management. This section will focus on pine. Large-scale artificial regeneration of cypress and hardwood is generally not economically feasible for most private landowners. These species can coppice and are generally clearcut and regenerated in this manner. High-graded hardwood and cypress stands can be clearcut and naturally regenerated to improve timber quality and aesthetics.

Reference Table 4. for general information on pine natural regeneration and a comparison between this method and artificial regeneration**.**

Premerchantable thinning is often required in natural regeneration management regimes and is discussed in the release treatment section.

Existing pine stands can be naturally regenerated to meet various objectives, including two-aged management and aesthetics. Due to the growth characteristics and product markets, loblolly pine is not managed uneven-aged. Some natural pine stands encountered may have been historically high-graded and a decision must be made on whether to clearcut and start over by planting higher quality genetics or naturally regenerate and hope for the best.

Pine generally produces abundant seed annually, peaking in October. Planning for natural regeneration of pine should entail evaluating the cone crop the prior spring and carefully timed site preparation prior to Fall seed catch. Natural regeneration of pine requires careful planning and coordination.

#### ***Site preparation***

Site preparation options are the same between pine natural regeneration methods and are similar to artificial regeneration site preparation. A natural regeneration harvest itself can serve as a form of site preparation. On sites with a history of prescribed fire or light fuel loads, site preparation may simply entail a carefully timed prescribed burn. Prescribed burning late summer, early Fall will prepare the seed bed by scarifying the soil, promoting seed catch. Conducting prescribed burns near seed dispersal should be avoided, as seed predation will be greater due to less groundcover. Some understory regrowth is desirable so the seeds are not completely exposed to predators. In stands with heavy fuel loads, a single site preparation burn will likely not be adequate. Establishing a fire regime and reducing fuel loads over time can allow for a successful site preparation burn in the future. Or a combination of site preparation methods can be combined with prescribed fire to achieve natural regeneration sooner.

Seed trees should be considered and protected when conducting any site preparation activities for natural regeneration.

***Shelterwood***

Shelterwood entails thinning a stand to approximately 30-40 square feet per acre of basal area or about 20-50 trees per acre. Shelterwood allows for a more uniform coverage of natural regeneration across a stand. It also allows for a uniform application of prescribed fire across the site by maintaining adequate needlecast. Younger age classes are sheltered by a higher density of seed trees. Seed trees should be the highest quality in terms of crown size, form and health/vigor. Seedling growth may be slightly lower compared to seed tree method if seed trees are retained, which is optional, following successful stand establishment.

***Seed Tree***

The seed tree method can be used to naturally regenerate pine. The seed tree method is similar to shelterwood except stands are thinned to a slightly lower basal area of approximately 10-30 square feet per acre or about 10-20 trees per acre. A good cone crop is important using this method to ensure adequate seed catch at this lower density. Seed trees should be the highest quality in terms of crown size, form and health/vigor. Seedling growth may be slightly higher compared to shelterwood if seed trees are retained, which is optional following successful stand establishment.

***Group Selection***

The final method of natural regeneration is group selection, which is less commonly used to naturally regenerate pine. These are small .25-.5-acre clearcuts interspersed throughout a stand. The size is critical to ensure adequate seed coverage. If they are too large, the interior portions may not regenerate adequately. Consequently, these understocked areas tend not to burn consistently due to lack of needlecast, leading to thickets of woody vegetation. Group selections can be conducted independently, but more commonly made in combination with a stand-wide thinning. Group selections can be beneficial to wildlife since they create edge and a juxtaposition of habitat.

*5.1.3.3 Release*

Early and mid-rotation release treatments are common in pine management within Alabama. Chemical, mechanical and prescribed fire are the three primary types of treatments used to release pines from vegetative competition and promote timber production through increased vertical and diameter growth and good form. Target vegetation includes herbaceous, grasses, non-crop pines, woody shrubs and hardwood species. These treatments may take place in planted or natural pine stands. Merchantable thinning harvest is another form of release and discussed in the timber harvest section.

*Chemical*

Early and mid-rotation herbicide release treatments targeting vegetative competition are utilized where additional competition control is required. This is sometimes due to

insufficient site preparation. Herbicide should be applied based on the recommended release label rate for the target and crop species and site conditions. The appropriate herbicide and chemical release method should be selected to effectively target the primary woody and herbaceous vegetative competition. Seasonality, weather conditions and herbicide mode of action should also be considered in application methods and herbicide selections. Herbicide, when used in conjunction with prescribed fire can prove to be very useful in understory reduction. Considerations for method selection include treatment area size, financial limitations, timing, target species, crop tree species, soil conditions among other variables. A resource professional should be consulted prior to treatment.

These early and mid-rotation methods include:

- Ground- Most commonly used in applications where overstory damage or crop tree damage are concerns. Used commonly with foliar and soil active herbicide applications. When determining if broadcast or spot is appropriate for site consider current understory conditions and accessibility.
    - Broadcast or banded
        - Skidder, farm tractor or ATV-mounted sprayers
    - Spot (grid)- There are many methods of spot or grid treatments that are often specific to herbicide choice, target species and to some degree timing.
        - ATV or backpack sprayers
- Aerial- Consider nearby landscapes and their uses as well as the treatment site before using aerial application. Many pines and other trees are sensitive to certain herbicides which can cause stunting/damage or mortality of desired species.
    - Broadcast
        - Helicopter

*Mechanical*

Early and mid-rotation mechanical release treatments targeting vegetative competition are utilized where additional competition control is required. This is sometimes due to insufficient site preparation. These treatments are similar to site preparation and include: mowing, chopping and mulching. All three can be used for early-rotation release but caution should be used to avoid damaging young pines. Chopping may damage feeder roots in mature pines and should not be used mid-rotation.

Prescribed *Fire*

Prescribed fire can be used as an early rotation release in loblolly pine stands once they can handle fire. Broadcast prescribed burning serves as a mid-rotation release in loblolly stands.

*Premerchantable Thinning*

Pre-merchantable thinnings are common in overstocked, naturally regenerated stands and slow-growing planted and natural stands. These treatments reduce competition and promote proper stand development. They can also be used to improve aesthetics and wildlife habitat. Pre-merchantable thinning is a cost.

Merchantable thinning is a release treatment in older stands and discussed in the timber harvest section.

**Loblolly and Slash Pre-merchantable Thinning Considerations**: Pre-merchantable thinning can be used in stands that have naturally regenerated or had very high initial stocking and survival rates. If in stand that has been naturally regenerated, later access to the stand and future management needs should be considered.

Pre-merchantable thinning can be a particularly useful tool for reducing forest health issues by limiting stressors on trees. Limited resources are an issue in a densely stocked stand and loblolly is particularly prone to forest pests and diseases.

**Longleaf Pre-merchantable Thinning Considerations**: Pre-merchantable thinning can be a tool used to reduce overstocked longleaf stands that are not yet merchantable. In some cases where high stocking and survival are present longleaf may not yet be of merchantable size when a thinning is ideal. Oftentimes, the financial resources for a pre-merchantable thinning dictate that the stand be carried into overstocking condition until a merchantable thin can be performed.

In a naturally regenerated stand pre-merchantable thinning is advisable when the landowner wishes to thin out the thick areas where the longleaf is established. Typically though this method is not used in naturally regenerated longleaf stands as the pockets of longleaf regeneration will sufficiently thin themselves out without many forest health concerns.

**Shortleaf Pre-merchantable Thinning Considerations**:

Pre-merchantable thinning can be used as a tool to reduce overstock in shortleaf stands. Shortleaf pine seedlings are shade intolerant and grow slowly their first two years. If not controlled, hardwood competition will overtop the new seedlings and reduce seedling stocking.

Merchantable thinning is a release treatment in older stands and discussed in the timber harvest section.

*5.1.3.4 Prescribed Fire*

Alabama's natural communities were shaped for centuries through fires started by lightning, Native Americans and settlers. Prescribed fire is a key land management tool used to maintain and restore the fire dependent natural communities of Alabama by mimicking historical, natural fire regimes and resetting succession. Prescribed fire is safely and responsibly applied to ecosystems to achieve various land management objectives such as aesthetics, wildlife habitat and biodiversity.

Prescribed fire plays a critical ecological maintenance and restoration role in pine forests, mimicking historic natural fires. Without fire, the pine forest would succeed to hardwood forests in most cases.

Pine is fire tolerant once the bark thickens and it reaches about 10-15 feet tall (depending on fuel load). Pine forests should be prescribed burned every one to three years to maintain and

restore the ecosystem in which it is dominant and to enhance wildlife habitat, improve aesthetics, reduce vegetative competition, reduce fuel loads and stimulate rare plants.

**Loblolly and Slash Prescribed Fire Considerations:** In general, loblolly and slash less than 8 years in age will be damaged by prescribed fire. Therefore, if commercial timber production is a goal, prescribed fire should be withheld until trees are well established. Trees that are at least 3 - 4 inches ground diameter or about 15 feet in total height are generally not damaged by low-intensity fire.

**Shortleaf Prescribed Fire Considerations**: Shortleaf pine is susceptible to crown and inner bark scorch, especially in younger stands. Shortleaf up to 30 years old are able to resprout from the stump after top-killed by fire. Frequent use of prescribed fire in planted shortleaf stands keeps competing hardwoods under control.

**Longleaf Prescribed Fire Considerations:** Longleaf pine is well-adapted to fire, as is evidenced by the seedling stage (also known as the grass stage for the grasslike appearance of the seedlings), thick bark, long flammable needles, white buds that reflect heat, and seeding and germination stages that take place after fires. During this grass stage, seedlings appear as a cluster of needles around a white bud. At this time, seedlings can withstand extensive burning by fire. Once past the grass stage, they become vulnerable to fire but are able to grow tall very rapidly because of their extensive root systems. Frequent use of prescribed fire in mature longleaf stands promotes the health of longleaf pine and its ecosystem.

*Advantages of Prescribed Fire*

There are many benefits to using prescribed fire to meet land management objectives. This practice reduces fuel loads, which directly lowers the risks and hazards associated with catastrophic wildfires. If a wildfire occurs in an area with a history of prescribed fire, the intensity and severity of that wildfire will be substantially less compared to areas without.

Prescribed fire opens the mid and understories by consuming overgrown vegetation and dead fuels. This stimulates many species of grasses, forbs and herbs. The result is an open, lush, scenic understory that is aesthetically pleasing.

Stands maintained with prescribed fire have more plant and wildlife biodiversity compared to fire suppressed stands. Even old field sites planted with pines develop a more diverse understory compared to those without fire. This diverse, open understory is also beneficial to many wildlife species, including red cockaded woodpecker, which requires this fire maintained structure. Likewise, allowing fire to burn through isolated and ephemeral wetlands within forest stands is beneficial for diversity in those natural communities.

Prescribed fire increases the nutrient content of forage species and the mast productivity of species. Wildlife prefer this nutrient and mast-rich understory. Pines and other plant species receive a post-burn flush of nutrients through increased nutrient cycling.

Landowners also enjoy this fire maintained understory for the improved access and beautiful, open views it provides. This enhances recreational activities such as hunting,

wildlife viewing and hiking. Prescribed fire also reduces many forest pest species such as ticks and chiggers. This also improves outdoor recreational experiences and helps reduce the spread of tick-borne illnesses such as Lyme disease and rocky mountain spotted fever.

*Disadvantages of Prescribed Fire and Ways to Mitigate*

Inappropriately applied prescribed fire can reduce growth rates and lead to mortality in pine stands. Excessive heat can scorch crowns and cause damage to feeder roots and inner bark. Excessive scorch alone may just slow growth and cause isolated mortality. When excessive scorch is combined with other stress factors such as poor soil quality, offsite species, overstocking and drought, widespread mortality may occur. Southern pine beetle (*Dendroctonus frontalis*) or ips beetle (*Ips* spp.) outbreaks are more likely to occur following excessive scorch.

There are ways to mitigate these negative impacts. Cool, dormant season burns should be utilized initially until fuel loads are reduced, especially in long-unburned stands. Thick duff layers should be reduced slowly over time by only burning following precipitation to avoid damaging feeder roots. Appropriate firing techniques should be selected considering overstory species, stand structure, burn objectives, desired fire intensity and severity, fuels (type, loading, structure) and weather conditions.

Fire is inherently dangerous so a certain level of risk comes along with conducting prescribed burns. Tied to that risk is the liability if a burn does not go as planned which causes many landowners to avoid prescribed burning. Landowners have the option to transfer that liability by hiring a state or private contractor to conduct their burning.

Much of prescribed burning revolves around the weather and even with careful planning and forecasting, the weather can change. Most other preparation and implementation factors can be controlled. Burn planning is crucial and should at minimum include:

- Thorough burn prescription development
- Weather forecasting and observations
- Smoke management and screening
- Gathering resources
- Notification of neighbors, the public and local emergency responders
- Having a contingency plan in place

Documentation and record keeping of prescribed fire planning and activities is encouraged.

*Methods of Prescribed Fire*

***Broadcast Burning***

The act of burning acreage to meet various objectives is referred to as **broadcast burning**. . It is the most common type of prescribed fire. Broadcast burning is used to meet various objectives including: fuel reduction, ecological maintenance and restoration, wildlife habitat management, aesthetics and imperiled species management.

***Site Preparation Burns***

Site preparation burning is a form of broadcast burning that prepares sites for artificial or natural regeneration. Site preparation burns reduce vegetative competition, improve access and operability for planting and scarify the soil for seed catch. They also meet some of the same objectives as broadcast burning.

***Pile Burns***

Pile burning is a form of site preparation burning. Large post-harvest debris within clearcuts is rakes into scattered piles and burned. The objective is reducing logging slash to improve access and operability for machine planting. Pile burning is not used to reduce vegetative competition. A site preparation burn may incorporate pile burning.

*Fire Return Intervals*

Fire return interval is the frequency at which a burn unit will be burned. This is site-specific and primarily dependent on landowner objectives, budget, forest type, fuel conditions and fire history. Determining the appropriate fire return interval at the burn unit level is vital to a successful burn program.

It is beneficial for pine stands to be prescribed burned a minimum of every one to three years. This can be adjusted based on the factors listed in the previous paragraph.

*Seasonality*

Seasonality plays an important role in a prescribed fire program and should be carefully considered to help meet specific objectives. Seasonality should be varied over time, avoiding burning the same stands, during the same season. Not *all* natural fires occurred in the growing season.

Historically, most natural fires burned during the growing season in Alabama. Many plant species adapted to this seasonality and require fire in the spring or summer months to reproduce. Growing season burns also reduce fuel loads quicker and result in delayed woody regrowth. If wildlife management is the focus, growing season burns result in excellent habitat.

However, **growing season** burns are challenging due to increased potential for scorch caused by higher ambient temperatures. Growing season prescribed burns are ideal for sites with lighter fuel loads or those with a history of prescribed fire. The southern pine beetle's main dispersal is in the Spring when trees are already drought stressed. Adding additional stress caused by a hot prescribed burn may lead to an outbreak. Pines are susceptible to mortality caused by crown scorch during Spring due to bud elongation.

**Dormant season** burns promote more woody species stems per acre and less grass, forb and herbaceous ground cover. Dormant season burns safely and slowly lighten fuel loads, but post-burn woody regrowth occurs faster. Dormant season burns are generally easier to conduct due to cooler temperatures, less intense fire behavior, consistent winds and higher fuel and soil moisture. Pine trees are in dormancy during the winter months so impacts from scorch are not as dramatic, but should still be kept to a minimum. There

are generally more available burn days in dormant season. There is less potential for dormant season burns to stress pines or lead to mortality issues.

Dormant season burns are ideal for sites with heavier fuel loads or those little to no burn history. For example, reintroducing fire to a dense pine plantation with a thirty-year rough (i.e. time since the last burn) would be most successful using a dormant season burn. If desired, burning can be transitioned to the growing season after one or two initial dormant burns. If wildlife management, groundcover and biodiversity are not objectives, but timber management is, dormant season prescribed fire is a better fit. A dormant season burn can substitute for a scheduled growing season burn if Winter conditions are more favorable, avoiding missing an entire year.

**Fall burns** are typically not conducted under pines since they are transitioning into dormancy and very susceptible to mortality during this time. If excessive scorch occurs, pines may not have adequate needles to survive until Spring. Fall tends to be the second driest time of year in Alabama (Spring being driest) and there is a Fall southern pine beetle dispersal, so adding another stressor is risky. If maintaining quality groundcover is an objective, fall burns should be avoided since many grasses and herbaceous species flower and seed in the Fall. However, if pine dormancy has begun early, the fuel load is light and appropriate lighting techniques are used, it is possible to successfully conduct a Fall burn. This may be beneficial where hardwood reduction is an objective as they are also vulnerable in the Fall. Burning in the Fall also allows an early start to long burn seasons with ambitious acreage goals.

Pine can be prescribed burned year-round.

*Fire Weather*

One of the most important considerations in planning and conducting a prescribed burn is fire weather. Burn prescriptions should contain a section with desired, forecasted and actual fire weather for a burn unit.

**Relative humidity (RH)** is the amount of moisture in the air in relation to the air temperature. RH is the main factor for spotting potential and affects fire intensity and fuel availability. Various fuel sizes are affected differently by RH. Fine fuels like grasses and leaves are more responsive to RH. They absorb and release moisture much faster compared to the slower responses of heavier fuels like branches and logs. RH is a factor in whether a fuel will burn and how well it will burn. This is important within the burn unit but also when using natural firebreaks such as hardwoods.

The **temperature** is a major factor in RH, fire intensity, scorch potential, live fuel moisture.

**Wind speed and direction** affects fire intensity, rate of spread, smoke management and spotting potential.

**Dispersion index** is essentially a measure of atmospheric stability which is directly related to smoke and heat lift. It also affects scorch potential.

**Live fuel moisture** is a measure of the amount of moisture in live vegetation. This affects fuel volatility, availability and fire intensity.

**Days since last rain** affects live fuel moisture, fire intensity, drought indices, and the ability of natural firebreaks such as hardwood stands or wetlands to hold fire.

The **Keech-Byram Drought Index** or **KBDI** is an indicator of drought severity and may help determine if a prescribed burn can take place. It measures soil and duff layer moisture assuming there are eight inches of moisture available to vegetation in a saturated soil. During burn planning, KBDI can help indicate how wet duff layers and wetlands might be.

*5.1.3.5 Fertilization*

Fertilization can be utilized on Alabama's nutrient poor soils. Fertilization uptake is dependent on soil composition (i.e. sand versus clay, drainage) among other factors. Excessive fertilization may cause fusiform rust issues. Fertilizer label rates and material safety data sheets provide additional guidance on application procedures and rates.

**Loblolly and Slash Fertilizer Considerations**: On the proper site with the proper considerations fertilizer can be a good tool to increase fiber production within a stand. It is important to consider available research on inputs and returns in similar situations before recommending fertilizer application. Generally, sites low in nutrients and poorly drained make the most economically attractive option for fertilizer application. It is always wise to perform soil testing before considering an activity as expensive as fertilization. Of the pines discussed loblolly responds the best to fertilizer treatments from a timber production aspect.

**Longleaf Fertilizer Considerations**: Particular care should be taken when using fertilizer on longleaf sites. Excessive rates can lead to issues with limb drooping and pitch canker. A soil or foliar sample should be analyzed before application of fertilizer. It is not advisable to use similar fertilization rates for other southern pines on longleaf and recommendations should generally be lower.

The most common situation where fertilizer is something to consider in longleaf is in pine straw raking plantations where the organic matter is being limited through chemicals and the direct removal for an extended period of time. Since longleaf is not typically considered a high production species fertilizer is rarely considered to increase fiber production.

**Shortleaf Fertilizer Considerations**: Shortleaf pine will respond to fertilization on many sites, however it will not respond as dramatically as loblolly or slash pine, and will not reach similar early growth rates. In addition, fertilizing shortleaf stands at incorrect times can reduce survival and increase undesired species. Shortleaf is less nutrient-demanding than loblolly pine, and it does not respond as strongly to fertilizer. Generally, fertilization is only recommended on fair to good sites; trees on shallow, rocky, or very dry soils will not likely respond.

### 5.1.4 Forest Resources

*5.1.4.1 Fish & Wildlife*

The forests and associated aquatic ecosystems of Alabama provide habitat for a wide array of game and non-game fish and wildlife, including several imperiled species. (See Table 1) These forests can be managed in ways that enhance, restore and protect the valuable habitats these species call home. These species may be managed for various objectives such as conservation, preservation or recreation. Present listed species can be documented, mapped and monitored.

Pine forests provide habitat to hundreds of game and non-game species including bob white quail, wild turkey and deer. In Alabama pine forests are home to several rare species including a large number of aquatic species. (Table 1.)

*5.1.4.2 Timber Products*

**Timber merchantability,** whether planted or natural, pine or hardwood, will depend on local timber markets and mill product specifications. Timber markets in Alabama currently include:

- Pulpwood:
  - Pine and Hardwood
    - Tree-length and clean chips
- Oriented strand board (OSB): pine
  - Similar price as pulpwood
- Chip-n-saw: pine
- Sawtimber: pine
- Poles and pilings: pine
- Mulch: hardwood
- Fuelwood:
  - Pine, hardwood and large woody shrub species
    - Chips for energy production
  - Hardwood
    - Firewood
- Other hardwood products: Pallets, mats, small diameter saw timber for furniture

**Loblolly Timber Merchantability Considerations:** Primarily grown for pulpwood, chip-n-saw, and sawtimber. Due to its generally moderate form, fast growth rate and potential to retain limbs, loblolly is sometimes grown in short pulpwood rotations. However, it is not uncommon to see higher value solid wood products produced in a loblolly stand, particularly with advancing genetics. Pulpwood products occur anywhere from ages 12-20 in a stand and are the primary component in a first thinning. Poles and Sawtimber size trees are present general after year 25-30, site dependent.

**Longleaf Timber Merchantability Considerations**: Longleaf pine produces a variety of wood products ranging from fuelwood to poles. Typically has a higher amount of poles and sawtimber products due to form, although this can vary from site to site and management regime.

**Shortleaf Timber Merchantability Considerations:** Wood utilization of shortleaf pine is similar to the loblolly pines and end-products include lumber, composites and paper.

**Slash Timber Merchantability Considerations:** Slash pine is sometimes managed for lower-value, short-rotation products such as pulpwood. It is also managed for all the other pine products.

Timber is considered pre-merchantable if it is not marketable as one of the products above. All of the major timber product groups can be harvested from pine forests including pulpwood, chip-n-saw, saw timber and poles. Pine forests also allow for fuelwood harvests, especially utilizing natural regeneration and hardwood reduction treatments.

*5.1.4.3 Non-Timber Forest Products*

Many non-timber forest products opportunities exist within pine forests, including silvopasture:

*Silvopasture*

Pine is conducive to **silvopasture**. Silvopasture is an agroforestry practice combining livestock, forage and timber management within the same land management unit (Hamilton 2008). This system provides landowners various combinations of options to manage forage (hay, etc.), livestock (cattle, etc.) and pine straw for short-term revenues while managing their timber for high-value products (poles and sawtimber) on longer rotations. Properly managed silvopasture systems also allow farms to be more profitable by diversifying revenue sources and cutting feed costs. However, landowners should be willing and able to actively manage the forage, livestock and timber components.

The open forage areas within the management unit allow for biodiversity, enhancing cool season grasses, while also allowing for warm season grass production. The areas with timber provide shade to livestock. This open, relatively low density stand structure enhances aesthetics, property values and recreational opportunities. This system also promotes wildlife populations and provides habitat for wild turkey and quail. The combination of timber and quality forage also prevents erosion and improves water quality and hydroperiod.

Silvopasture provides economic security by reducing risk through diversification of products. However, prior to establishing a new silvopasture system, local land-use, cost share and tax regulations should be reviewed. Forestry and agriculture may have different land use and zoning regulations which may be tied to separate tax structures. Some states consider silvopasture cost sharable through EQIP.

Silvopasture is generally established in pastures. Existing timber stands can be thinned or clearcut corridors of adequate width that support forage production. Converting existing stands can be costly due to extensive site preparation needs. Large acreage is required to simultaneously support viable timber and livestock production.

Visit Silvopasture: Establishment & management principles for pine forests in the Southeastern United States" for more information (Hamilton 2008).

*Other Current and Potential NTFP Markets*

- **Ornamental Products**
  - Pine Tips for Garlands
  - Pine Cones
  - Grapevines
  - Burl and Crooked Wood
- **Landscape Products**
  - Pine Bark Mulches
  - Pine Needles

## 5.2 Oak-Pine Forest Type

Upland Mixed Hardwood-Pine (Oak-Pine) is a combination of uneven-aged, natural forest types which include multiple upland natural communities. Refer to Table 6. for a listing of the common dominant overstory species by associated FNAI natural community comprising Oak-Pine.

**Table 6.** Common dominant overstory tree species for the Oak-Pine forest type.

| **Oak-Pine types** | |
|---|---|
| Longleaf pine/scrub oak | *Pinus palustris/Quercus ilicifolia* |
| Shortleaf pine/oak | *Pinus enchinata/ Quercus* |
| Virginia pine/oak | *Pinus virginiana/ Quercus* |
| Loblolly pine/hardwood | *Pinus taeda* |
| Slash pine/ hardwood | *Pinus elliotii* |

All tables are reviewed annually by ATFS. Last reviewed 01/30/2024.

Source: Eyre, F.H., 1980, Forest Cover Types of the United States and Canada: Society of American Foresters, 148p.

In comparison to the pine-dominated upland forest types, Oak-Pine forests have relatively low timber productivity and generally are not actively managed, aside from sites of upland pine. They are not generally fire tolerant or dependent, aside from upland sites of pine.

### 5.2.1 Landowner Objectives Summary

*5.2.1.1 Aesthetics*

Oak-Pine forests have high-quality, varying aesthetics across the natural communities that compose this forest type. The overstory diversity provides character and variety compared to the pine-dominated forests. Most Oak-Pine forests provide opportunities in Alabama for fall foliage colors. Slope forests provide relatively steep topography and vegetation that are

indicative of the Piedmont or Appalachian regions of the United States. Most upland sites in Alabama are Oak-Pine dominated,uneven-aged, provide their own type of beauty and possess a lot of character. These aesthetic characteristics often provide landowners incentives to exclude intensive silvicultural management in these forests, especially those presently in desired future condition. Thus, Oak-Pine forests are often preserved for their character and beauty.

Silvicultural tools can be used to maintain and enhance aesthetics. Forest operations should be planned with aesthetics in mind to ensure these objectives are met. For example, when clearcutting Oak-Pine stands, a strip of hardwoods can be left as a buffer against adjacent high-visibility areas such as roadways or neighboring homes.

*5.2.1.2 Wildlife Habitat Management and Protection*

The Oak-Pine forest type and its associated natural communities provide excellent wildlife habitat management and protection opportunities. Many game and imperiled species can be found within Oak-Pine forests.

Active management of game species is more common on private lands while non-game species are managed to a lesser extent.

Hunting is a common wildlife management objective in the Oak-Pine forest type, particularly for white-tailed deer, wild turkey, and gray squirrel. Hunting leases are used to manage healthy game populations while also generating revenue to help pay for management activities such as NNIS.

Oak-Pine habitat objectives can be met with various silvicultural tools, such as creating small group selection clearcuts for wildlife openings to diversify habitat and creating beneficial edge effects. Many game and non-game species of Oak-Pine forests will benefit from these activities, including white-tailed deer and wild turkey. Many mast producing trees exist within the Oak-Pine forest type and make it ideal for wildlife forage.

*5.2.1.3 Recreation*

Oak-Pine forests are popular recreational areas in Alabama, especially in the cooler months. The open, park-like stand structure, often with rolling hills, provides a scenic backdrop for any of the following recreational activities:

- Hunting and leases
- Bicycling
- Equestrian
- Camping
- Environmental education
- Geocaching
- Off-highway vehicles (OHV) and leases
- Wildlife viewing and birding
- Hiking

*5.2.1.4 Conservation*

The Oak-Pine forest type can be managed in a conservation-oriented manner. This can be accomplished using multiple-use management by balancing utilization and protection of timber, wildlife, rare plants, recreation, and hydrology.

*5.2.1.5 Ecological Restoration*

Natural regeneration can be conducted to restore these Oak-Pine forests. Hydrological restoration can also assist in ecological restoration of these forests.

*5.2.1.6 Hydrological Protection and Restoration*

Hydrology is an important component of healthy, fully functioning natural communities. Upland and wetland ecosystems are impacted by hydroperiod, sheet flow, and water quality. Hydrological impacts can be mitigated and in some cases restored through Alabama BMP's which protect and enhance hydrology and soil quality through sustainable silvicultural practices and proper forest operations.

Existing forest roads should be properly maintained through grading, pulling ditches, installing culverts, hard surface low water crossings, turnouts, and water bars as needed. Limit new road construction. Old windrows and beds can be leveled to improve hydrology but should be avoided if more overall harm will be done to the ecosystem than good (*e.g.*, groundcover impacts).

*5.2.1.7 Forest Health Management*

Oak-Pine forests are generally not intensively managed and, as such, minor mortality caused by native diseases and insects are typically not a major concern. If a major mortality incident occurs, it should be evaluated and addressed. Major native insect and disease damage is species and site specific and should evaluated by a forester.

The list below shows common and important pests or conditions that affect many species found in the oak-pine forest type. They are are listed only under the most common host(s).

- **Ash** -borers, ash yellows
- **Beech** -beech bark disease, beech blight aphid
- **Dogwood** -dogwood anthracnose, borers, club gall, powdery mildew
- **Elm** -vascular diseases, leaf beetles
- **Hickories** -decline, gall phylloxera, fall webworm, twig girdlers/pruners, hickory tussock moth
- **Locust** -locust leafminer, locust borer, rimosus heart rot
- **Maples** -Verticillium wilt, yellow-bellied sapsucker, whitemarked tussock moth
- **Oaks**-defoliators, decline, galls, leaf blister, shoestring root rot, borers, scale insects, anthracnose, oak wilt, periodical cicada, twolined chestnut borer, acorn feeders
- **Sycamore** -anthracnose, lace bugs, sycamore tussock moth
- **Yellow Poplar** -leaf weevil, Columbian timber beetle, aphids

One example found in north Alabama is the Emerald ash borer, or EAB. The EAB is a federally-regulated insect pest, was recently confirmed in Calhoun County. The Alabama Department of Agriculture & Industries (AGI) working with the USDA Animal and Plant Health Inspection Service (APHIS), the USDA Forest Service, and the Alabama Forestry Commission recently established a quarantine for the affected area to limit the insect's human-assisted spread within the state. The regulated area consists of Cherokee, Cleburne, and Calhoun counties. Regulated articles include any product that may harbor the emerald ash borer (at any developmental stage: egg,

larva, pupa, or adult) including hardwood firewood, ash nursery stock, non-heat-treated ash lumber, and other unprocessed ash wood material (stems, roots, stumps, etc.).

The quarantine will allow the movement of a regulated article outside of the regulated area once the hauler has entered into a compliance agreement and obtained a permit from the AGI, only during the emerald ash borer's 'no fly' period from November 1 to March 1. Any wood-processing facility outside of the regulated area receiving regulated articles from the regulated area must also enter into a compliance agreement with the AGI.

Non-native invasive species should be monitored and treated. See the Non-native invasive species section.

*5.2.1.8 Revenue*

Oak-Pine provides a wide array of revenue opportunities including timber, NTFP, non-forest associated land uses and many others.

### 5.2.2 Landscape Objectives

*5.2.2.1 Wildlife Habitat Management*

Oak-Pine forests provide habitat for game and non-game species at the landscape scale.

*5.2.2.2 Utilization of Prescribed Fire*

Most Oak-Pine forests are not fire dependent (aside from upland sites mixed woodland and previously discussed sites of upland pine) or managed with prescribed fire.

*5.2.2.3 Rare Plant and Animal Protection*

Alabama is home to many rare species found only in this region and contains several global populations. Oak-Pine forests provide vital habitat to many imperiled plant and animal species. Table 1, shows the imperiled species found in Alabama. Additional information on current listing status for each species can be found in the geodatabase.

### 5.2.3 Silvicultural Options

*5.2.3.1 Timber Harvest*

The following silvicultural and land management tools are available to Alabama resource professionals to meet various landowner objectives and utilize forest resources. These are the common methods used in this region but there may be others available. One or a combination of these tools may be used to meet single or multiple objectives. Landowner objectives and budget ultimately determine which tools should be utilized. Local contractor availability, timber and NTFP markets, project scale, local regulations, site conditions, local climate, the degree of planning and scheduling, and other factors also influence the forester and landowner decision-making process when determining which tools to utilize in order to efficiently and effectively meet landowner objectives.

Alabama BMP's compile voluntary guidelines, strategies, and considerations for managing, enhancing, and protecting: timber harvest, site preparation, reforestation, and forest operations

(roads, water control structures, etc.) activities, as well as timber and NTFP resources, rare plant and animal species or habitat, aquatic ecosystems, and air and water quality, during silvicultural operations. Historical and cultural resource protection and recreation management are also considered during planning and active silvicultural operations.

In comparison to the pine-dominated forest types, these upland mixed pine-hardwood forests have relatively low timber productivity and value and generally are not actively managed silviculturally. However, silvicultural opportunities exist within Oak-Pine ecosystem.

Soils, productivity, and timber quality vary greatly across these sites. Some Oak-Pine forests produce mostly low-value products such as hardwood pulpwood and fuelwood, while others are more productive producing high quality solid wood products.

Oak-Pine forests can be dominated by shade-tolerant hardwoods, which are best suited for uneven-aged management. Oak-Pine allows the flexibility to manage for timber while also meeting aesthetic and wildlife objectives.

*Thinning*

Thinning Oak-Pine forests is not commonly practiced in Alabama. The hardwoods present on less productive stands generally produce low-value products, making it sometimes infeasible to thin. However, thinning can be conducted in Oak-Pine dependent upon landowner objectives, markets and stand conditions.

Thinning is a primary land management tool used in Alabama to meet various objectives such as revenue, aesthetics, wildlife and restoration. The type and timing of thinning are dependent on several factors including landowner objectives, market conditions, and stand and site conditions. This is a stand-specific determination that should be made by a forester. There are also site-specific Alabama BMP's related to thinning harvests, particularly in wetlands and SMZs.

Thinning in mixed pine hardwood stands should be considered when:

- Trees are over-mature (past the stage of reasonable growth)
- Disease or insect activity is destroying parts of the stand
- Cull trees are present that will never increase in value and are not suitable for wildlife habitat
- Desirable trees will respond if released from competition
- Over stocking
- A desire to change the species competition

Oak-Pine stands can be thinned using marked selection by a forester. Marking Oak-Pine stands allows for more control over thinning density and quality due to their variable nature. Desired residual species ratio should be considered during planning. Logger operability should be considered during marking.

Pre-merchantable thinning or fuelwood chipping harvests can be used in Oak-Pine stands.

Many landowners may choose not to thin Oak-Pine as their stands are already in the desired future condition. They enjoy the benefits of this forest type's structure such as high-quality wildlife habitat, aesthetics, and recreational opportunities. Other landowners may choose to occasionally lightly thin their Oak-Pine for revenue, forest health, and maintaining overstory composition.

Additional thinning methods in Oak Pine include mechanical, chemical, and prescribed fire:

- Mechanical: This method includes felling or girdling competing trees to allow healthy residual trees to flourish. This method can result in vigorous resprouting because it does not kill the roots of hardwoods.
- Chemical: Herbicides can be used as an alternative thinning method that controls the entire tree, including the roots, which prevents resprouting.
- Prescribed Fire: Prescribed fire has limited utility for oak-pine management. Fire can kill smaller hardwood stems, may damage larger stems, and create openings in the stand.

Natural regeneration harvests are discussed in the reforestation section.

*Clearcut*

Clearcutting is the standard silvicultural practice in managing Oak-Pine for timber and other objectives. This is primarily driven by timber markets and economics, as well as silviculture and tree biology.

Another primary use of clearcutting is for salvage harvests, which are discussed in that section.

A clearcut can also be utilized for species conversion within a timber stand to meet various objectives or may reflect a change in objectives. Many Oak-Pine forests were historically dominated by longleaf, shortleaf, loblolly, or slash pine because of the presence of fire.

Alabama BMP's should be followed when using clearcuts, particularly in wetlands and SMZs. The size and shape of clearcuts should be considered if wildlife and aesthetics are also objectives. Non-clearcut buffers or "beauty strips" can be used along roads and highways to reduce negative aesthetics associated with clearcuts. Timing and seasonality are crucial in wetlands and wet upland sites.

*Chipping*

Another form of timber harvest utilized in Alabama is chipping. Material is felled and skidded conventionally, then ran through an industrial chipping machine at the loading deck, with chips being hauled to the mill rather than tree-length. Both pre-merchantable and merchantable pine hardwood and shrub materials can be chipped. The maximum diameter of the material to be chipped varies by chipping machine and species.

Hardwood and pine tree-length pulpwood can be hauled as clean chips, which have a similar stumpage price as pulpwood. Clean chips are derived from nearly pure, living

wood with very little vegetation and debris mixed in. Hardwood and pine clean chip loads must be sorted. Young, merchantable Oak-Pine clearcuts can be clean-chipped.

**Fuelwood chips** can be derived from the same size and species of material as clean chips but include dead and living vegetation such as needles, leaves, and limbs. A load of fuelwood chips can contain a mix of hardwood, pine, and shrub materials. Fuelwood chips are burned at mills and biomass energy plants to generate electricity and are the lowest value timber product in Alabama markets. They are also processed into pellets and shipped to European markets and burned for energy production.

Fuelwood chipping is commonly used in low-value, hardwood clearcuts, land clearing operations, or other situations where it is not feasible to conduct a traditional timber harvest. These operations may break-even or generate a small amount of revenue from fuelwood, but more importantly, they can meet other landowner objectives, such as hardwood reduction and removal or site clearing. Fuelwood or clean-chipping can be used where a debris-free post-harvest site is required. This type of operation can reduce the competing understory within the stand.

Oak-Pine stands present opportunities for fuelwood chipping operations, such as reducing overstocked natural regeneration or adjusting hardwood species ratios.

*Salvage*

Salvage harvests are valuable tools that help make the most of difficult circumstances. They are commonly utilized to harvest timber following varying degrees of catastrophic natural disasters. These include wildfires, climatic events such as hurricanes, and forest health issues such as southern pine beetle outbreaks.

The primary purpose of a salvage harvest is to utilize as much of the damaged timber resource prior to mortality and a complete loss of merchantability. Salvage is also used to maintain or enhance forest health and aesthetics. Sometimes secondary objectives become primary or attainable following a catastrophic event. For example, restoration and recreation goals may get realigned, allowing for good management accomplishments to arise out of what appears to be a completely bad situation at the time.

Salvage operations typically involve clearcuts, but that is not always the case. A salvage operation can entail evaluating an impacted stand and thinning the damaged timber using marked selection while maintaining the relatively healthy trees. There is always a forest health risk involved in the determination to clearcut or thin damaged timber. This determination is situation and site specific and should be made following careful evaluation.

Salvage harvest operations can be used in Oak-Pine stands. For example, widespread wind throw may require a salvage clearcut. Or various native and non-native forest health issues may call for a salvage harvest in Oak-Pine.

### *5.2.3.2 Reforestation*

*Natural Regeneration*

Oak-Pine stands can be naturally regenerated to meet various objectives, including uneven-aged timber management, timber stand improvement, wildlife, and aesthetics. Oak-Pine species can coppice and are generally clearcut and regenerated in this manner. High-graded hardwood stands can be clearcut and naturally regenerated to essentially start over by improving timber quality and aesthetics.

Pre-merchantable thinning is often required in natural regeneration management regimes and is discussed in the release treatment section.

***Site Preparation***

A carefully timed natural regeneration harvest typically serves as site preparation when naturally regenerating Oak-Pine stands. For example, a clearcut can be regenerated through coppice. Other forms of site preparation previously discussed may also be utilized.

***Thinning from Above***

Thinning from above can be used to release existing natural regeneration in Oak-Pine. This method entails removing all or part of the dominant overstory trees, releasing the suppressed natural regeneration already in place within the midstory. This method requires carefully planned logging operations as to not destroy the desired trees being released during overstory harvest.

***Shelterwood***

Shelterwood entails thinning an Oak-Pine stand to a lower density, allowing seed trees to naturally regenerate the site. Shelterwood allows for a more uniform coverage of natural regeneration across a stand. Natural regeneration is sheltered by a higher density of seed trees. Seed trees should be the highest quality in terms of crown size, form, and health or vigor. Seedling growth may be slightly lower compared to seed tree method if seed trees are retained, which is optional, following successful stand establishment.

***Seed Tree***

The seed tree method is similar to shelterwood except stands are thinned to a slightly lower density. Seed trees should be the highest quality in terms of crown size, form, and health or vigor. Seedling growth may be slightly higher compared to shelterwood if seed trees are retained, which is optional following successful stand establishment.

***Group Selection***

The final method of natural regeneration is group selection. These are small, quarter-acre to one-acre clearcuts interspersed throughout a stand. The size and shape of the clearcut is critical to ensure adequate seed coverage. If they are too large, the interior portions may not regenerate adequately. Group selections can be conducted independently or made in combination with a stand-wide thinning.

Group selections can be beneficial to wildlife since they create edge and a juxtaposition of habitat.

*5.2.3.3 Release*

Early and mid-rotation release treatments are uncommon but can be used in Oak-Pine management within Alabama. **Chemical** and **mechanical** are the two primary types of treatments used to release Oak-Pine from vegetative competition and promote timber production through increased height and diameter growth and good form. Target vegetation includes herbaceous plants, grasses, non-crop tree species, and woody shrubs. A merchantable thinning harvest is another form of release and is discussed in the timber harvest section.

On most sites, pine-hardwood stands are a transition from pine to hardwood. This has occurred due to the lack of frequent fires and natural succession. Pines are adapted to seed-in on bare soil in open areas. Pine seedlings will not survive long when shaded by competing larger trees. Most of the desirable southern hardwood species also require direct sunlight for best growth. Many have the ability to survive for decades in the understory or mid-story, in effect waiting until an opening overhead is created. Without management, most pine sites will eventually become pine-hardwood sites.

*Chemical*

Early and mid-rotation **herbicide release treatments** targeting vegetative competition are utilized where additional competition control is required. This is sometimes due to insufficient site preparation. **Herbicide** should be applied based on the recommended release label rate for the target and crop species and site conditions. The appropriate herbicide and chemical release method should be selected to effectively target the primary woody and herbaceous vegetative competition.

These early and mid-rotation methods include:

- Ground
  - Broadcast or banded
    - Skidder, farm tractor, or ATV-mounted sprayers
  - Spot: hack and squirt or individual tree injections
    - ATV or backpack sprayers
- Aerial
  - Broadcast
    - Helicopter

*Mechanical*

Early and mid-rotation **mechanical release treatments** targeting vegetative competition are utilized where additional competition control is required. This is sometimes due to insufficient site preparation. These treatments are similar to site preparation and include: **mowing**, **chopping,** and **mulching**. All three can be used for early-rotation release, but caution should be used to avoid damaging young pines. Chopping may damage feeder roots in mature pines and should not be used mid-rotation.

*Pre-merchantable Thinning*

**Pre-merchantable thinnings** are a consideration in overstocked, naturally regenerated Oak-Pine stands. These treatments reduce competition and promote proper stand development. They can also be used to improve aesthetics and wildlife habitat. Pre-merchantable thinning is a cost.

*5.2.3.4 Prescribed Fire*

Aside from the previously discussed Southern pine forest type, Oak-Pine forests are not fire dependent and rarely burn. However, their ecotones generally burn along with their adjacent fire dependent uplands. Burning these ecotones is crucial for the many rare species found there. Oak-Pine forests with an adequate pine component will carry fire. Pure hardwood stands only entirely burn within narrow fire weather conditions.

### 5.2.4 Forest Resources

*5.2.4.1 Fish and Wildlife*

The forests and associated aquatic ecosystems of Alabama provide habitat for a wide array of game and non-game fish and wildlife, including several imperiled species (see Table 1.) These forests can be managed to enhance, restore, and protect the valuable habitats these species call home. These species may be managed for various objectives such as conservation or recreation. Present listed species should be documented, mapped, and monitored.

Alabama BMP's compile strategies and considerations for managing and protecting these species and their habitat during silvicultural operations, such as marking a rare plant or animal area with flagging, paint, or signage to protect during harvest operations, regular active monitoring, and following up with post-harvest inspections. Alabama BMP's also consider fish and wildlife conservation in relation to silvicultural activities.

Oak-Pine forests provide habitat to hundreds of game and non-game species including wild turkey and white-tailed deer. Oak-Pine forests are home to several rare species, including a large number of aquatic species. See Table 1.

*5.2.4.2 Timber Products*

Timber **merchantability,** whether planted or natural, pine, or hardwood, depends on local timber markets and mill product specifications. The geodatabase can be utilized to locate and contact local mills and calculate haul distance. Alabama timber markets currently include these products:

- Pulpwood:
  - Pine and hardwood
    - Tree-length and clean chips
- Oriented strand board (OSB): pine
  - Similar price as pulpwood
- Chip-n-saw: pine

- Saw timber: pine and hardwood
- Poles and pilings: pine
- Mulch: hardwood and cypress
- Fuelwood:
    - Pine, hardwood, and large woody shrub species
        - Chips for energy production
    - Hardwood
        - Firewood
- Other hardwood products: pallets, mats, small-diameter saw timber for furniture

Timber is considered **pre-merchantable** if it is not marketable as one of the products above. All of the major timber product groups can be harvested from Oak-Pine forests including pulpwood, chip-n-saw, saw timber, and fuelwood. Oak-Pine forests are commonly managed for all of these products.

*5.2.4.3 Non-Timber Forest Products (NTFP)*

NTFP opportunities exist within Oak-Pine forest.

*Other Current and Potential NTFP Markets*

- **Other Edible Products**
    - Nuts
    - Mushrooms
- **Ornamental Products**
    - Pine Tips for Garlands
    - Pine Cones
    - Grapevines
    - Burl and Crooked Wood
- **Landscape Products**
    - Pine Bark Mulches
    - Pine Needles

## 5.3 Oak-Hickory Forest Type

The Oak-Hickory forest type is a combination of uneven-aged, natural forest types which include multiple upland natural communities. Refer to Table 7. for a listing of the common dominant overstory species comprising the Oak-Hickory forest type.

**Table 7.** Common dominant overstory tree species for the Oak-Hickory forest type.

| **Oak-Hickory types** | |
|---|---|
| White Oak and Southern Red Oak | *Quercus alba/ Quercus falcata* |
| Northern Red Oak and Black Oak | *Quercus rubra/ Quercus velutina* |
| Scarlet Oak and Chestnut Oak | *Quercus coccinea/ Quercus prinus* |
| Pignut Hickory and Mockernut Hickory | *Carya glabra/ Carya tomentosa* |
| Shagbark Hickory | *Carya ovata* |

All tables are reviewed annually by ATFS. Last reviewed 01/30/24

Source: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445

### 5.3.1 Landowner Objectives Summary

*5.3.1.1 Aesthetics*

Oak-Hickory forests have high-quality, varying aesthetics across the natural communities that compose this forest type. The overstory diversity provides character and variety compared to the pine-dominated forests. Most Oak-Hickory forests provide opportunities in Alabama for fall foliage colors. Slope forests provide relatively steep topography and vegetation that are indicative of the Piedmont or Appalachian regions of the United States. These aesthetic characteristics often provide landowners incentives to exclude intensive silvicultural management in these forests, especially those presently in desired future condition. Thus, Oak-Hickory forests are often preserved for their character and beauty.

Silvicultural tools can be used to maintain and enhance aesthetics. Forest operations should be planned with aesthetics in mind to ensure these objectives are met. For example, when clearcutting Oak-Hickory stands, a strip of hardwoods can be left as a buffer against adjacent high-visibility areas such as roadways or neighboring homes.

*5.3.1.2 Wildlife Habitat Management and Protection*

The Oak-Hickory forest type and its associated natural communities provide excellent wildlife habitat management and protection opportunities. Many game and imperiled species can be found within Oak-Hickory forests.

Active management of game species is more common on private lands while non-game species are managed to a lesser extent.

Hunting is a common wildlife management objective in the Oak-Hickory forest type, particularly for white-tailed deer, wild turkey, and gray squirrel. Hunting leases are used to manage healthy game populations while also generating revenue to help pay for management activities such as NNIS.

Oak-Hickory habitat objectives can be met with various silvicultural tools, such as creating small group selection clearcuts for wildlife openings to diversify habitat and creating beneficial edge effects. Many game and non-game species of Oak-Hickory forests will benefit from these

activities, including white-tailed deer and wild turkey. Many mast producing trees exist within the Oak-Hickory forest type and make it ideal for wildlife forage.

*5.3.1.3 Recreation*

Oak-Hickory forests are popular recreational areas in Alabama, especially in the cooler months. The open, park-like stand structure, often with rolling hills, provides a scenic backdrop for any of the following recreational activities:

- Hunting and leases
- Bicycling
- Equestrian
- Camping
- Environmental education
- Geocaching
- Off-highway vehicles (OHV) and leases
- Wildlife viewing and birding
- Hiking

*5.3.1.4 Conservation*

The Oak-Hickory forest type can be managed in a conservation-oriented manner. This can be accomplished using multiple-use management by balancing utilization and protection of timber, wildlife, rare plants, recreation, and hydrology.

*5.3.1.5 Ecological Restoration*

Natural regeneration can be conducted to restore these Oak-Hickory forests. Hydrological restoration can also assist in ecological restoration of these forests.

*5.3.1.6 Hydrological Protection and Restoration*

Hydrology is an important component of healthy, fully functioning natural communities. Upland and wetland ecosystems are impacted by hydroperiod, sheet flow, and water quality. Hydrological impacts can be mitigated and in some cases restored through Alabama BMP's which protect and enhance hydrology and soil quality through sustainable silvicultural practices and proper forest operations.

Existing forest roads should be properly maintained through grading, pulling ditches, installing culverts, hard surface low water crossings, turnouts, and water bars as needed. Limit new road construction. Old windrows and beds can be leveled to improve hydrology but should be avoided if more overall harm will be done to the ecosystem than good (*e.g.*, groundcover impacts).

*5.3.1.7 Forest Health Management*

Oak-Hickory forests are generally not intensively managed and, as such, minor mortality caused by native diseases and insects are typically not a major concern. If a major mortality incident occurs, it should be evaluated and addressed. Major native insect and disease damage is species and site specific and should evaluated by a forester.

The list below shows common and important pests or conditions that affect many species found in the oak-hickory forest type. They are listed only under the most common host(s).

- **Ash** -borers, ash yellows

- **Beech** -beech bark disease, beech blight aphid
- **Dogwood** -dogwood anthracnose, borers, club gall, powdery mildew
- **Elm** -vascular diseases, leaf beetles
- **Hickories** -decline, gall phylloxera, fall webworm, twig girdlers/pruners, hickory tussock moth
- **Locust** -locust leafminer, locust borer, rimosus heart rot
- **Maples** -Verticillium wilt, yellow-bellied sapsucker, whitemarked tussock moth
- **Oaks**-defoliators, decline, galls, leaf blister, shoestring root rot, borers, scale insects, anthracnose, oak wilt, periodical cicada, twolined chestnut borer, acorn feeders
- **Sycamore** -anthracnose, lace bugs, sycamore tussock moth
- **Yellow Poplar** -leaf weevil, Columbian timber beetle, aphids

One example found in Alabama is the Emerald ash borer, or EAB. The EAB is a federally-regulated insect pest, was recently confirmed in Calhoun County. The Alabama Department of Agriculture & Industries (AGI) working with the USDA Animal and Plant Health Inspection Service (APHIS), the USDA Forest Service, and the Alabama Forestry Commission recently established a quarantine for the affected area to limit the insect's human-assisted spread within the state. The regulated area consists of Cherokee, Cleburne, and Calhoun counties. Regulated articles include any product that may harbor the emerald ash borer (at any developmental stage: egg, larva, pupa, or adult) including hardwood firewood, ash nursery stock, non-heat-treated ash lumber, and other unprocessed ash wood material (stems, roots, stumps, etc.).

The quarantine will allow the movement of a regulated article outside of the regulated area once the hauler has entered into a compliance agreement and obtained a permit from the AGI, only during the emerald ash borer's 'no fly' period from November 1 to March 1. Any wood-processing facility outside of the regulated area receiving regulated articles from the regulated area must also enter into a compliance agreement with the AGI.

Non-native invasive species should be monitored and treated. See the Non-native invasive species section.

*5.3.1.8 Revenue*

Oak-Hickory provides a wide array of revenue opportunities including timber, NTFP, non-forest associated land uses, and many others. Several Oak species including White Oak can contain high-quality sawtimber, veneer, pulp, firewood and wildlife revenue.

### 5.3.2 Landscape Objectives

*5.3.2.1 Wildlife Habitat Management*

Oak-Hickory forests provide habitat for game and non-game species at the landscape scale.

*5.3.2.2 Utilization of Prescribed Fire*

Most Oak-Hickory forests are not fire dependent (aside from upland sites mixed woodland and previously discussed sites of upland pine) or managed with prescribed fire.

*5.3.2.3 Rare Plant and Animal Protection*

Alabama is home to many rare species found only in this region and contains several global populations. Oak-Hickory forests provide vital habitat to many imperiled plant and animal

species. Table 1. shows the imperiled species found in Alabama by county. Additional information on current listing status for each species can be found in the geodatabase.

### 5.3.3 Silvicultural Options

*5.3.3.1 Timber Harvest*

The following silvicultural and land management tools are available to Alabama resource professionals to meet various landowner objectives and utilize forest resources. These are the common methods used in this region but there may be others available. One or a combination of these tools may be used to meet single or multiple objectives. Landowner objectives and budget ultimately determine which tools should be utilized. Local contractor availability, timber and NTFP markets, project scale, local regulations, site conditions, local climate, the degree of planning and scheduling, and other factors also influence the forester and landowner decision-making process when determining which tools to utilize in order to efficiently and effectively meet landowner objectives.

Alabama BMP's compile voluntary guidelines, strategies, and considerations for managing, enhancing, and protecting: timber harvest, site preparation, reforestation, and forest operations (roads, water control structures, etc.) activities, as well as timber and NTFP resources, rare plant and animal species or habitat, aquatic ecosystems, and air and water quality, during silvicultural operations. Historical and cultural resource protection and recreation management are also considered during planning and active silvicultural operations.

Soils, productivity, and timber quality vary greatly across these sites. Oak-Hickory forests on poor to marginal sites produce mostly low value products such as hardwood pulpwood and fuelwood, while those found on better sites can produce more valuable solid wood products.

Oak-Hickory forests can be dominated by shade-tolerant hardwoods, which are best suited for uneven-aged management. Oak-Hickory allows the flexibility to manage for timber while also meeting aesthetic and wildlife objectives.

*Thinning*

Thinning Oak-Hickory forests is not commonly practiced in Alabama. The hardwoods present on less productive stands generally produce low-value products, making it sometimes infeasible to thin. However, thinning can be conducted in Oak-Hickory dependent upon landowner objectives, markets and stand conditions.

Thinning is a primary land management tool used in Alabama to meet various objectives such as revenue, aesthetics, wildlife and restoration. The type and timing of thinning are dependent on several factors including landowner objectives, market conditions, and stand and site conditions. This is a stand-specific determination that should be made by a forester. There are also site-specific Alabama BMP's related to thinning harvests, particularly in wetlands and SMZs.

Thinning in Oak-Hickory stands should be considered when:

- Tree are over-mature (past the stage of reasonable growth)
- Disease or insect activity is destroying parts of the stand

- Cull trees are present that will never increase in value and are not suitable for wildlife habitat
- Desirable trees will respond if released from competition
- Over stocking
- A desire to change the species competition

Oak-Hickory stands can be thinned using marked selection by a forester. Marking Oak-Hickory stands allows for more control over thinning density and quality due to their variable nature. Desired residual species ratio should be considered during planning. Logger operability should be considered during marking.

Pre-merchantable thinning or fuelwood chipping harvests can be used in Oak-Hickory stands.

Many landowners may choose not to thin Oak-Hickory as their stands are already in the desired future condition. They enjoy the benefits of this forest type's structure such as high-quality wildlife habitat, aesthetics, and recreational opportunities. Other landowners may choose to occasionally lightly thin their Oak-Hickory for revenue, forest health, and maintaining overstory composition.

Additional thinning methods in Oak-Hickory stands include mechanical, chemical, and prescribed fire:

- Mechanical: This method includes felling or girdling competing trees to allow healthy residual trees to flourish. This method can result in vigorous resprouting because it does not kill the roots of hardwoods.
- Chemical: Herbicides can be used as an alternative thinning method that controls the entire tree, including the roots, which prevents resprouting.
- Prescribed Fire: Prescribed fire has limited utility for oak-pine management. Fire can kill smaller hardwood stems, may damage larger stems, and create openings in the stand.

*Clearcut*

Clearcutting is the standard silvicultural practice in managing Oak-Hickory for timber and other objectives. This is primarily driven by timber markets and economics, as well as silviculture and tree biology.

Another primary use of clearcutting is for salvage harvests, which are discussed in that section.

Alabama BMP's should be followed when using clearcuts, particularly in wetlands and SMZs. The size and shape of clearcuts should be considered if wildlife and aesthetics are also objectives. Non-clearcut buffers or "beauty strips" can be used along roads and highways to reduce negative aesthetics associated with clearcuts. Timing and seasonality are crucial in wetlands and wet upland sites.

*Salvage*

Salvage harvests are valuable tools that help make the most of difficult circumstances. They are commonly utilized to harvest timber following varying degrees of catastrophic natural disasters. These include wildfires, climatic events such as hurricanes, and forest health issues such as southern pine beetle outbreaks.

The primary purpose of a salvage harvest is to utilize as much of the damaged timber resource prior to mortality and a complete loss of merchantability. Salvage is also used to maintain or enhance forest health and aesthetics. Sometimes secondary objectives become primary or attainable following a catastrophic event. For example, restoration and recreation goals may get realigned, allowing for good management accomplishments to arise out of what appears to be a completely bad situation at the time.

Salvage operations typically involve clearcuts, but that is not always the case. A salvage operation can entail evaluating an impacted stand and thinning the damaged timber using marked selection while maintaining the relatively healthy trees. There is always a forest health risk involved in the determination to clearcut or thin damaged timber. This determination is situation and site specific and should be made following careful evaluation.

Salvage harvest operations can be used in Oak-Hickory stands. For example, widespread wind throw may require a salvage clearcut. Or various native and non-native forest health issues may call for a salvage harvest in Oak-Hickory.

*5.3.3.2 Reforestation*

*Natural Regeneration*

Oak-Hickory stands can be naturally regenerated to meet various objectives, including uneven-aged timber management, timber stand improvement, wildlife, and aesthetics. Oak-Hickory species can use the coppice method and are generally clearcut and regenerated in this manner. High-graded hardwood stands can be clearcut and naturally regenerated to essentially start over by improving timber quality and aesthetics.

***Site Preparation***

A carefully timed natural regeneration harvest typically serves as site preparation when naturally regenerating Oak-Hickory stands. For example, a clearcut can be regenerated through coppice. Other forms of site preparation previously discussed may also be utilized.

***Thinning from Above***

Thinning from above can be used to release existing natural regeneration in Oak-Hickory. This method entails removing all or part of the dominant overstory trees, releasing the suppressed natural regeneration already in place within the midstory. This method requires carefully planned logging operations as to not destroy the desired trees being released during overstory harvest.

***Group Selection***

The final method of natural regeneration is group selection. These are small, quarter-acre to one-acre clearcuts interspersed throughout a stand. The size and shape of the clearcut is critical to ensure adequate seed coverage. If they are too large, the interior portions may not regenerate adequately. Group selections can be conducted independently or made in combination with a stand-wide thinning. Group selections can be beneficial to wildlife since they create edge and a juxtaposition of habitat.

### 5.3.4 Forest Resources

*5.3.4.1 Fish and Wildlife*

The forests and associated aquatic ecosystems of Alabama provide habitat for a wide array of game and non-game fish and wildlife, including several imperiled species (see Table 1.) These forests can be managed to enhance, restore, and protect the valuable habitats these species call home. These species may be managed for various objectives such as conservation or recreation. Present listed species should be documented, mapped, and monitored.

Alabama BMP's compile strategies and considerations for managing and protecting these species and their habitat during silvicultural operations, such as marking a rare plant or animal area with flagging, paint, or signage to protect during harvest operations, regular active monitoring, and following up with post-harvest inspections. Alabama BMP's also consider fish and wildlife conservation in relation to silvicultural activities.

Oak-Hickory forests provide habitat to hundreds of game and non-game species including wild turkey and white-tailed deer. Oak-Hickory forests are home to several rare species, including a large number of aquatic species. See Table 1.

*5.3.4.2 Timber Products*

Timber **merchantability,** depends on local timber markets and mill product specifications. The geodatabase can be utilized to locate and contact local mills and calculate haul distance. Alabama timber markets currently include these products:

- Pulpwood:
    - Tree-length and clean chips
- Saw timber: hardwood
- Mulch: hardwood and cypress
- Fuelwood:
    - Hardwood, and large woody shrub species
        - Chips for energy production
    - Hardwood
        - Firewood
- Other hardwood products: pallets, mats, small-diameter saw timber for furniture

Several Oak species including White Oak can contain high-quality sawtimber, veneer, pulp, firewood and wildlife revenue.

*5.3.4.3 Non-Timber Forest Products (NTFP)*

NTFP opportunities exist within Oak-Hickory forest.

*Other Current and Potential NTFP Markets*

- **Other Edible Products**
  - Nuts
  - Mushrooms
- **Ornamental Products**
  - Grapevines
  - Burl and Crooked Wood

## 5.4 Mixed Bottomlands Forest Types

Mixed bottomlands are a combination of forest types, which include multiple wetland natural communities that are associated with streams, rivers, low-lying wet areas, and depressions. They are each similar in silvicultural operability and hydrology. These are uneven-aged, natural forested wetlands with long hydroperiods. Bottomlands have limited utility of prescribed fire and most species are fire intolerant.

Refer to Table 8. for a listing of the common dominant overstory species by associated SAF Forest Type.

**Table 8.** Common dominant overstory tree species for Mixed Bottomlands forest type.

| Bottomland types | |
|---|---|
| Cottonwood | *Poplutus deltoides* |
| Willow Oak/Water Oak | *Quercus phellos/ Quercus nigra* |
| Live Oak | *Quercus virginiana* |
| Swamp Chestnut Oak/Cherrybark Oak | *Quercus michauxii/Quercus pagoda* |
| Sweetgum/Willow Oak | *Liquidambar styraciflua/Quercus phellos* |
| Sugarberry/American Elm/Green Ash | *Celtis laevigata/Ulmus americana/Fraxinus pennsylvanica* |
| Sycamore/Sweetgum/American Elm | *Platanus/Liquidambar styraciflua/Ulmus americana* |
| Black Willow | *Salix nigra* |
| Overcup Oak/Water hickory | *Quercus lyrata/Carya aquatica* |
| Baldcypress | *Taxodium distichum* |
| Baldcypress/tupelo | *Taxodium distichum/Nyssa* |
| Water tupelo/Swamp tupelo | *Nyssa aquatica/Nyssa biflora* |
| Sweet bay/Swamp tupelo/ redbay | *Laurus nobilis/Nyssa biflora/Persea borbonia* |

All tables are reviewed annually by ATFS. Last reviewed 01/30/2024.

Source: Eyre, F.H., 1980, Forest Cover Types of the United States and Canada: Society of American Foresters, 148p.

In comparison to the pine-dominated upland forest types, these wetlands have relatively low timber productivity. This is due to slower growth rates and their harvest windows being limited by longer hydroperiods. However, they can be sustainably managed by a variety of management schemes as long as Alabama's BMP's are followed.

### 5.4.1 Landowner Objectives Summary

#### *5.4.1.1 Aesthetics*

Mixed bottomlands have high-quality aesthetics across the natural communities that compose this riverine-associated forest type. The highlight for most landowners are the rivers, creeks, and streams that punctuate mixed bottomlands' overstory diversity and uneven-aged structure. Mixed bottomlands provide opportunities in Alabama for viewing fall foliage. They are often solely preserved for their regional uniqueness, character, and beauty.

Silvicultural tools can be used to maintain and enhance aesthetics. Forest operations should be planned with aesthetics in mind to ensure these objectives are met.

#### *5.4.1.2 Wildlife Habitat Management and Protection*

The mixed bottomlands forest type and its associated natural communities provide wildlife habitat management and protection opportunities. Many game and imperiled species can be found within these forests. Mast producing trees found in the mixed bottomland forest type are ideal for wildlife forage. Mature trees found on these sites can be ideal habitat for a variety of wildlife.

Active management of game species is more common on private lands while non-game species are managed to a lesser extent.

Hunting is a popular wildlife management objective in the mixed bottomlands forest type, particularly for wood ducks, gray squirrel, and white-tailed deer. Hunting leases are used to manage healthy game populations while also generating revenue to help pay for management activities such as NNIS management.

Mixed bottomland habitat objectives can be met with various silvicultural tools. For example, clearcuts can be used to create beneficial edge effects and diversify habitat. Many game and non-game species of mixed bottomlands will benefit from these activities including white-tailed deer, wild turkey, and wood stork.

*5.4.1.3 Recreation*

Mixed bottomland forests can be popular recreational areas in Alabama, especially in the cooler months when biting insects subside. Their overstory diversity and water features provide a unique backdrop for the following recreational activities:

Hunting and leases

- Environmental education
- Wildlife viewing and birding
- Hiking
- Geocaching

*5.4.1.4 Conservation*

The mixed bottomlands forest type can be managed in a conservation-oriented manner. This can be accomplished using multiple-use management by balancing utilization and protection of timber, wildlife, rare plants, recreation, and hydrology.

*5.4.1.5 Ecological Restoration*

Natural regeneration and small-scale artificial regeneration can be conducted to restore these mixed bottomland forests. Large-scale artificial regeneration of hardwoods is economically unviable for most Alabama landowners. Hydrological restoration can also assist in ecological restoration of these forests.

*5.4.1.6 Hydrological Protection and Restoration*

Hydrology is an important component of healthy, fully functioning natural communities. Bottomland mixed hardwood ecosystems are impacted by hydroperiod, sheet flow, and water quality. Hydrological impacts can be mitigated and in some cases restored through Alabama BMP's which protect and enhance hydrology and soil quality through sustainable silvicultural practices and proper forest operations.

Existing forest roads should be properly maintained through grading, pulling ditches, installing culverts, hard surface low water crossings, turnouts, and water bars to dissipate runoff. Limit new road construction. Permanent roads should be constructed on the highest elevation. Old windrows and beds can be leveled to improve hydrology but should be avoided if more overall harm will be done to the ecosystem than good (*e.g.*, groundcover impacts). Culverts and bridges should not change the high-water channel. Temporary roads should avoid fragile areas and have minimum impact on drainage.

*5.4.1.7 Forest Health Management*

Mixed bottomlands are generally not intensively managed and, as such, minor mortality caused by native diseases and insects are typically not a major concern. If a major mortality incident occurs, it should be evaluated and addressed. Major native insect and disease damage is species and site specific and should evaluated by a forester. Non-native invasive species should be monitored and treated.

The list below shows common and important pests or conditions that affect many species found in the oak-pine forest type. They are are listed only under the most common host(s).

- **Ash** -borers, ash yellows
- **Beech** -beech bark disease, beech blight aphid
- **Dogwood** -dogwood anthracnose, borers, club gall, powdery mildew
- **Elm** -vascular diseases, leaf beetles
- **Hickories** -decline, gall phylloxera, fall webworm, twig girdlers/pruners, hickory tussock moth
- **Locust** -locust leafminer, locust borer, rimosus heart rot
- **Maples** -Verticillium wilt, yellow-bellied sapsucker, whitemarked tussock moth
- **Oaks**-defoliators, decline, galls, leaf blister, shoestring root rot, borers, scale insects, anthracnose, oak wilt, periodical cicada, twolined chestnut borer, acorn feeders
- **Sycamore** -anthracnose, lace bugs, sycamore tussock moth
- **Yellow Poplar** -leaf weevil, Columbian timber beetle, aphids

*5.4.1.8 Revenue*

Mixed bottomlands provide revenue opportunities including timber and NTFP and eco-tourism.

### 5.4.2 Landscape Objectives

*5.4.2.1 Wildlife Habitat Management*

Mixed bottomlands provide habitat for game and non-game species at the landscape scale. For example. the American Bald Eagle often nests in or near these mixed bottomland sites due to availability of habitat (nesting trees) and food source.

*5.4.2.2 Utilization of Prescribed Fire*

Mixed bottomlands are not fire dependent. See prescribed fire section for more information.

*5.4.2.3 Rare Plant and Animal Protection*

Mixed bottomlands provide vital habitat to many imperiled plant and animal species. Table 1. shows the imperiled species found in the state.

### 5.4.3 Silvicultural Options

*5.4.3.1 Timber Harvest*

The following silvicultural and land management tools are available to Alabama forest resource professionals to meet various landowner objectives and utilize forest resources. These are the common methods used in this region but there may be others available. One or a combination of these tools may be used to meet single or multiple objectives. Landowner objectives and budget ultimately determine which tools should be utilized. Local contractor availability, timber and NTFP markets, project scale, local regulations, site conditions, local climate, the degree of planning and scheduling, and other factors also influence the forester and landowner decision-making process when determining which tools to utilize in order to efficiently and effectively meet landowner objectives.

Alabama BMP's compile voluntary guidelines, strategies, and considerations for managing, enhancing, and protecting: timber harvest, site preparation, reforestation, and forest operations (roads, water control structures, etc.) activities, as well as timber and NTFP resources, rare plant and animal species or habitat, aquatic ecosystems, and air and water quality, during silvicultural operations. Historical and cultural resource protection and recreation management are also considered during planning and active silvicultural operations.

Soils, productivity, and timber quality vary greatly across these sites. Soils are saturated or inundated much of the year and harvest windows are narrowed to dryer months (April through June and September through October) and droughts. Some mixed bottomland forests on poor to marginal sites produce mostly low-value products such as hardwood pulpwood and fuelwood, while those situated on better sites are more productive, producing high quality solid wood products.

Mixed bottomland forests can be dominated by shade-tolerant hardwoods, which are best suited for uneven-aged management. Mixed bottomlands allow the flexibility to manage for timber while also meeting aesthetic and wildlife objectives.

*Thinning*

Thinning mixed bottomland forests is not commonly practiced in Alabama. The hardwoods present on less productive stands generally produce low-value products, making it sometimes infeasible to thin. However, thinning can be conducted in mixed

bottomland forests dependent upon landowner objectives, markets and stand conditions.

Thinning is a primary land management tool used in Alabama to meet various objectives such as revenue, aesthetics, wildlife and restoration. The type and timing of thinning are dependent on several factors including landowner objectives, market conditions, and stand and site conditions. This is a stand-specific determination that should be made by a forester. There are also site-specific Alabama BMP's related to thinning harvests, particularly in wetlands and SMZs.

Thinning in mixed bottomland stands should be considered when:

- Trees are over-mature (past the stage of reasonable growth)
- Disease or insect activity is destroying parts of the stand
- Cull trees are present that will never increase in value and are not suitable for wildlife habitat
- Desirable trees will respond if released from competition
- Over stocking
- A desire to change the species competition

Mixed bottomland stands can be thinned using marked selection by a forester. Marking mixed bottomland stands allows for more control over thinning density and quality due to their variable nature. Desired residual species ratio should be considered during planning. Logger operability should be considered during marking.

Pre-merchantable thinning or fuelwood chipping harvests can be used in mixed bottomland stands.

Many landowners may choose not to thin mixed bottomland as their stands are already in the desired future condition. They enjoy the benefits of this forest type's structure such as high-quality wildlife habitat, aesthetics, and recreational opportunities. Other landowners may choose to occasionally lightly thin their mixed bottomland for revenue, forest health, and maintaining overstory composition.

Additional thinning methods in mixed bottomland include mechanical and chemical:

- Mechanical: This method includes felling or girdling competing trees to allow healthy residual trees to flourish. This method can result in vigorous resprouting because it does not kill the roots of hardwoods.
- Chemical: Herbicides can be used as an alternative thinning method that controls the entire tree, including the roots, which prevents resprouting.

*Clearcut*

Clearcutting is the standard silvicultural practice in managing mixed bottomlands for timber and other objectives. This is primarily driven by timber markets, economics, and hydrology. Mixed bottomland hardwood species coppice and should be cut above the stem mean water mark to allow for successful regeneration.

Another primary use of clearcutting is for salvage harvests, which are discussed in that section.

Timing and seasonality are crucial in wetlands and wet upland sites. Mat logging is generally required to minimize soil and hydrological impacts to mixed bottomlands. Alabama BMP's should be followed when using clearcuts, particularly in wetlands and SMZs. The size and shape of clearcuts should be considered if wildlife and aesthetics are also objectives. Non-clearcut buffers or "beauty strips" can be used along roads and highways to reduce negative aesthetics associated with clearcuts.

Accurate and precise recommendations about specific forest property are available from several sources. In Alabama, registered foresters can offer educational and technical assistance to forest landowners regarding the sensitive nature of mixed bottomlands.

*Chipping*

Another form of timber harvest in Alabama is chipping. Material is felled and skidded conventionally, then ran through an industrial chipping machine at the loading deck, with chips being hauled to the mill rather than tree-length. Both pre-merchantable and merchantable pine, hardwood, and shrub materials can be chipped. The maximum diameter of the material to be chipped varies by chipping machine and species.

Hardwood pulpwood can be hauled as **clean chips**, which have a similar stumpage price as pulpwood. Clean chips are derived from nearly pure, living wood with very little vegetation and debris mixed in. Hardwood clean chip loads must be sorted.

**Fuelwood chips** can be derived from the same size and species of material as clean chips but include dead and living vegetation such as needles, leaves, and limbs. A load of fuelwood chips can contain a mix of hardwood, pine, and shrub materials. Fuelwood chips are burned at mills and biomass energy plants to generate electricity and are the lowest-value timber product in Alabama markets. They are also processed into pellets and shipped to European markets and burned for energy production.

Fuelwood chipping is commonly used in low-value, hardwood, clearcuts, land clearing operations, or other situations where it is not feasible to conduct a traditional timber harvest. These operations may break-even or generate a small amount of revenue from fuelwood, but, more importantly, they can meet other landowner objectives, such as hardwood reduction and removal or site clearing. Chipping can also be used in place of a pre-merchantable thinning to reduce natural regeneration or tree density in overly stocked stands. This avoids pre-merchantable thinning costs and will generate revenue or break-even. Fuelwood or clean-chipping can be used where a very debris-free post-harvest site is required.

Mixed bottomlands present opportunities for fuelwood chipping operations as an alternative to hauling tree-length.

*Salvage*

Salvage harvests are valuable tools that help make the most of difficult circumstances. They are commonly utilized to harvest timber following varying degrees of catastrophic

natural disasters, which include wildfires, climatic events such as hurricanes, and forest health issues such as southern pine beetle outbreaks. Salvage harvests should occur as soon as safely possible to utilize as much of the damaged timber resource prior to mortality and a complete loss of merchantability. Salvage is also used to maintain or enhance forest health and aesthetics. Sometimes secondary objectives become primary or attainable following a catastrophic event. For example, restoration and recreation goals may get realigned, allowing for good management accomplishments to arise out of what appears to be a completely bad situation at the time.

Salvage operations typically involve clearcuts, but that is not always the case. A salvage operation can entail evaluating an impacted stand and thinning the damaged timber using marked selection while maintaining the relatively healthy trees. There is always a forest health risk involved in the determination to clearcut or thin damaged timber. This determination is situation and site specific and should be made following careful evaluation.

Salvage harvest operations can be used in mixed bottomlands. For example, a tornado may occur in a mixed bottomland stand and the impacted timber can be salvaged.

*5.4.3.2 Reforestation*

*Natural Regeneration*

***Site Preparation***

A carefully timed natural regeneration harvest typically serves as site preparation when naturally regenerating mixed bottomland stands. For example, a clearcut can be regenerated through coppice. Other forms of site preparation previously discussed may also be utilized.

Mixed bottomland stands can be naturally regenerated to meet various objectives, including uneven-aged timber management, timber stand improvement, wildlife, and aesthetics. Mixed bottomland hardwood species can coppice and are generally clearcut and regenerated in this manner. High-graded mixed bottomlands can be clearcut and naturally regenerated to essentially start over by improving timber quality and aesthetics.

Thinning from above, shelterwood, seed tree, and group selection natural regeneration harvests may also be utilized in mixed bottomlands, but this is less common in Alabama.

*Mixed bottomland forests are not artificially regenerated in Alabama at a significant scale.*

*5.4.3.3 Prescribed Fire*

Prescribed fire has limited utility in mixed bottomland forests. Prescribed fire is not used for timber stand improvement because it damages the relatively thin bark of the hard and soft wood trees found in mixed bottomlands. Not only can fire kill smaller hardwood stems, it may damage larger stems and create openings for pest and decay organisms.

### 5.4.4 Forest Resources

*5.4.4.1 Fish and Wildlife*

The forests and associated aquatic ecosystems of Alabama provide habitat for a wide array of game and non-game fish and wildlife, including several imperiled species (see Table 1.). These forests can be managed in a way that enhance, restore, and protect the valuable habitats these species call home. These species may be managed for various objectives such as conservation or recreation. Present listed species should be documented, mapped, and monitored.

Alabama BMP's compile strategies and considerations for managing and protecting these species and their habitat during silvicultural operations, such as marking a rare plant or animal area with flagging, paint, or signage to protect during harvest operations, regular active monitoring, and following up with post-harvest inspections. Alabama BMP's also consider fish and wildlife conservation in relation to silvicultural activities.

Mixed bottomlands provide habitat to hundreds of game and non-game species including wood ducks and white-tailed deer. Mixed bottomland forests are home to several rare species, including a large number of aquatic species. (Table 1.)

*5.4.4.2 Timber Products*

Timber **merchantability,** whether planted or natural, pine or hardwood, depends on local timber markets and mill product specifications. The geodatabase can be utilized to locate and contact local mills and calculate haul distance. Alabama timber markets currently include these products:

- Pulpwood:
  - Pine and hardwood
    - Tree-length and clean chips
- Oriented strand board (OSB): pine
  - Similar price as pulpwood
- Chip-n-saw: pine
- Saw timber: pine and hardwood
- Poles and pilings: pine
- Mulch: cypress, hardwood
- Fuelwood:
  - Pine, hardwood, and large woody shrub species
    - Chips for energy production
  - Hardwood
    - Firewood
- Other hardwood products: pallets, mats, small-diameter saw timber for furniture

Timber is considered pre-merchantable if it is not marketable as one of the products above. All the major timber product groups can be harvested from mixed bottomland forests including pine and hardwood pulpwood, chip-n-saw, saw timber, poles and veneer. Mixed bottomlands also allow for fuelwood harvests, especially utilizing natural regeneration and hardwood reduction treatments.

Mixed bottomland forests are commonly managed for hardwood pulpwood, fuelwood and various higher valued solid wood products.

*5.4.4.3 Non-Timber Forest Products (NTFP)*

NTFP opportunities exist within mixed bottomlands.

*Other Current and Potential NTFP Markets*

- **Other Edible Products**
  - Nuts
  - Mushrooms
- **Ornamental Products**
  - Pine Tips for Garlands
  - Pine Cones
  - Grapevines
  - Burl and Crooked Wood
- **Landscape Products**
  - Pine Bark Mulches
  - Pine needles

## 5.5 Other Southern Forest Types

Other Southern Forest types (OSFT), as classified by SAF forest types, include multiple natural communities that are primarily uneven-aged, natural forested land. They are not fire tolerant or dependent and each has a closed canopy. OSFT typically have dense over-, mid-, and understories and are sometimes impenetrable.

Refer to Table 9. for a listing of the common dominant overstory species for OSFT.

**Table 9.** Common dominant overstory species for Other Forest type:

| **Other southern forest types** | |
|---|---|
| Ashe-Juniper/redberry/ (Pinchot) juniper | *Juniperus ashei/Juniperus pinchotii* |
| Mohrs ("shin") oak | *Quercus mohriana* |
| Mesquite | *Prosopis* |
| Southern scrub oak | *Quercus* |
| Southern red cedar | *Juniperus silicicola* |
| Sweetgum/yellow poplar | *Liquidambar styraciflua/Liriodendron tulipifera* |
| Atlantic White cedar | *Chamaecyparis thyoides* |
| Pond cypress | *Taxodium ascendens* |

All tables are reviewed annually by ATFS. Last reviewed 01/30/24.

Source: Silvicultural systems for the major forest types of the United States. Agric. Handb. 445

In comparison to the pine-dominated forest types, these forest types have relatively low timber productivity. This is due to slower growth rates and their harvest windows may be limited by longer hydroperiods. However, they can be sustainably managed by using Alabama BMP's.

### 5.5.1 Landowner Objectives Summary

*5.5.1.1 Aesthetics*

OSFT are not known for their aesthetics.

Silvicultural tools can be used to maintain and enhance aesthetics. Forest operations may be planned with aesthetics in mind to ensure these objectives are met. For example, when clearcutting OSFT, a strip of trees can be left as a buffer against adjacent high-visibility areas, such as roadways or neighboring homes.

*5.5.1.2 Wildlife Habitat Management and Protection*

The OSFT and its associated natural communities provide wildlife habitat management and protection opportunities. Many game and imperiled species can be found within OSFT forests.

Active management of game species is more common on private lands while non-game species are managed to a lesser extent.

Many wildlife use these dense, often impenetrable OSFT for cover.

Hunting is a popular wildlife management objective in the OSFT, particularly for feral hogs, gray squirrel, and white-tailed deer. Hunting leases are used to manage healthy game

populations while also generating revenue to help pay for management activities such as NNIS management.

OSFT habitat objectives can be met with various silvicultural tools. For example, clearcuts can be used to create beneficial edge effects and diversify habitat. Many game and non-game species of OSFT will benefit from these activities including white-tailed deer, wild turkey, and little blue heron.

*5.5.1.3 Recreation*

OSFT forests are not popular recreational areas due to difficult access, poor aesthetics, and high occurrence of biting insects. However, the following recreational opportunities exist:

- Hunting and leases
- Environmental education
- Wildlife viewing and birding
- Hiking (boardwalks)
- Geocaching

*5.5.1.4 Conservation*

The OSFT forest type can be managed in a conservation-oriented manner. This can be accomplished using multiple-use management by balancing utilization and protection of timber, wildlife, rare plants, recreation, and hydrology.

*5.5.1.5 Ecological Restoration*

Natural regeneration and small-scale artificial regeneration can be conducted to restore these OSFT forests. Large-scale artificial regeneration of hardwoods is economically unviable for most Alabama landowners. Hydrological restoration can also assist in ecological restoration of these forests.

*5.5.1.6 Hydrological Protection and Restoration*

Hydrology is an important component of healthy, fully functioning natural communities. Upland and wetland ecosystems are impacted by hydroperiod, sheet flow, and water quality. Hydrological impacts can be mitigated and in some cases restored through Alabama BMP's which protect and enhance hydrology and soil quality through sustainable silvicultural practices and proper forest operations.

Existing forest roads should be properly maintained through grading, pulling ditches, installing culverts, hard surface low water crossings, turnouts, and water bars as needed. Limit new road construction. Old windrows and beds can be leveled to improve hydrology but should be avoided if more overall harm will be done to the ecosystem than good (*e.g.*, groundcover impacts).

*5.5.1.7 Forest Health Management*

OSFT are generally not intensively managed and, as such, minor mortality caused by native diseases and insects are typically not a major concern. If a major mortality incident occurs, it may be evaluated and addressed. Major native insect and disease damage is species and site specific and should evaluated by a forester.

*5.5.1.8 Revenue*

OSFT provide revenue opportunities including timber and NTFP.

**5.5.2 Landscape Objectives**

*5.5.2.1 Wildlife Habitat Management*

The OSFT provide habitat for game and non-game species at the landscape scale.

*5.5.2.2 Utilization of Prescribed Fire*

The OSFT are not generally fire dependent. See prescribed fire section for more information.

*5.5.2.3 Rare Plant and Animal Protection*

The OSFT provide vital habitat to many imperiled plant and animal species. Table 1. shows the imperiled species found in the state.

**5.5.3 Silvicultural Options**

*5.5.3.1 Timber Harvest*

The following silvicultural and land management tools are available to Alabama natural resource professionals to meet various landowner objectives and utilize forest resources. These are the common methods used in this region but there may be others available. One or a combination of these tools may be used to meet single or multiple objectives. Landowner objectives and budget ultimately determine which tools should be utilized. Local contractor availability, timber and NTFP markets, project scale, local regulations, site conditions, local climate, the degree of planning and scheduling, and other factors also influence the forester and landowner decision-making process when determining which tools to utilize in order to efficiently and effectively meet landowner objectives.

Alabama BMP's compile voluntary guidelines, strategies, and considerations for managing, enhancing, and protecting: timber harvest, site preparation, reforestation, and forest operations (roads, water control structures, etc.) activities, as well as timber and NTFP resources, rare plant and animal species or habitat, aquatic ecosystems, and air and water quality, during silvicultural operations. Historical and cultural resource protection and recreation management are also considered during planning and active silvicultural operations.

In comparison to the pine-dominated forest types, these OSFT have relatively low timber productivity and value and generally are not actively managed for silviculture on most private lands. However, silvicultural opportunities exist within OSFT.

OSFT occur on relatively unproductive organic muck, heavy clay, and peat soils. This Other Forest Type forest produces mostly low-value products such as hardwood pulpwood and fuelwood.

OSFT are typically managed uneven-aged. OSFT allow the flexibility to manage for timber while also meeting aesthetic and wildlife objectives.

*Thinning*

Thinning of these OSFT is not commonly practiced in Alabama. They produce low-value products and it is not usually economically viable to manage these forests through thinning.

*Clearcut*

Clearcutting is the standard silvicultural practice in managing Other Forest Type for timber and other objectives. This is primarily driven by timber markets, economics, and hydrology. Other Forest Type hardwood species coppice and should be cut above the stem mean water mark to allow for successful regeneration.

Another primary use of clearcutting is for salvage harvests, which are discussed in that section.

Timing and seasonality are crucial in these OSFT and wet upland sites. Mat logging is generally required to minimize soil and hydrological impacts. There are site-specific Alabama BMP's when using clearcuts, particularly in these OSFT and SMZs. The size and shape of clearcuts should be considered if wildlife and aesthetics are also objectives. Non-clearcut buffers or "beauty strips" can be used along roads and highways to reduce negative aesthetics associated with clearcuts.

*Chipping*

Another form of timber harvest in Alabama is chipping. Material is felled and skidded conventionally, then ran through an industrial chipping machine at the loading deck, with chips being hauled to the mill rather than tree-length. Both pre-merchantable and merchantable pine, hardwood, and shrub materials can be chipped. The maximum diameter of the material to be chipped varies by chipping machine and species.

Hardwood and pine tree-length pulpwood can be hauled as **clean chips**, which have a similar stumpage price as pulpwood. Clean chips are derived from nearly pure, living wood with very little vegetation and debris mixed in. Hardwood and pine clean chip loads must be sorted. Young merchantable pine clearcuts can be clean-chipped.

**Fuelwood chips** can be derived from the same size and species of material as clean chips but include dead and living vegetation such as needles, leaves, and limbs. A load of fuelwood chips can contain a mix of hardwood, pine, and shrub materials. Fuelwood chips are burned at mills and biomass energy plants to generate electricity and are the lowest value timber

product in Alabama markets. They are also processed into pellets and shipped to European markets and burned for energy production.

Fuelwood chipping is commonly used in low-value, hardwood, clearcuts, and land clearing operations, or other situations where it is not feasible to conduct a traditional timber harvest. These operations may break-even or generate a small amount of revenue from fuelwood, but, more importantly, they can meet other landowner objectives such as hardwood reduction and removal or site clearing. Chipping can also be used in place of a **pre-merchantable thinning** to reduce natural pine regeneration or tree density in overly stocked planted pine stands. Fuelwood or clean-chipping can be used where a very debris-free post-harvest site is required.

OSFT present opportunities for fuelwood chipping operations as an alternative to hauling tree-length.

*Salvage*

**Salvage harvests** are valuable tools that help make the most of difficult circumstances. They are commonly utilized to harvest timber following varying degrees of catastrophic natural disasters including wildfires, climatic events such as hurricanes, and forest health issues such as southern pine beetle outbreaks.

The primary purpose of a salvage harvest is to utilize as much of the damaged timber resource prior to mortality and a complete loss of merchantability. Salvage is also used to maintain or enhance forest health and aesthetics. Sometimes secondary objectives become primary or attainable following a catastrophic event. For example, restoration and recreation goals may get realigned, allowing for good management accomplishments to arise out of what appears to be a completely bad situation at the time.

Salvage operations typically involve clearcuts, but that is not always the case. A salvage operation can entail evaluating an impacted stand and thinning the damaged timber using marked selection while maintaining the relatively healthy trees. There is always a forest health risk involved in the determination to clearcut or thin damaged timber. This determination is situation and site specific and should be made following careful evaluation.

Salvage harvest operations can be used in Other forest type. For example, a stand replacing wildfire may occur in an Other forest type stand and the impacted timber can be salvaged.

*5.5.3.2 Reforestation*

*Natural Regeneration*

***Site Preparation***

A carefully timed natural regeneration harvest typically serves as site preparation when naturally regenerating Other forest type stands. For example, a clearcut can be regenerated through coppice. Other forms of site preparation previously discussed may also be utilized.

***Coppice***

OSFT stands can be naturally regenerated to meet various objectives, including uneven-aged timber management, timber stand improvement, wildlife, and aesthetics. OSFT hardwood species can **coppice** and are generally clearcut and regenerated in this manner. High-graded OSFT can be clearcut and naturally regenerated to essentially start over by improving timber quality and aesthetics.

Thinning from above, shelterwood, seed tree, and group selection natural regeneration harvests may also be utilized in mixed forested these OSFT, but this is less common in Alabama.

*OSFT forests are not artificially regenerated in Alabama at a significant scale worth discussion.*

*5.5.3.3 Prescribed Fire*

Prescribed fire has limited utility in OSFT. Prescribed fire is not used for timber stand improvement because it damages the relatively thin bark of the hard and soft wood trees found in OSFT. Not only can fire kill smaller hardwood stems, it may damage larger stems and create openings for pest and decay organisms.

**5.5.4 Forest Resources**

*5.5.4.1 Fish and Wildlife*

The forests and associated aquatic ecosystems of Alabama provide habitat for a wide array of game and non-game fish and wildlife, including several imperiled species. See Table 1. These forests can be managed in a way that enhance, restore, and protect the valuable habitats these species call home. These species may be managed for various objectives such as conservation or recreation. Present listed species should be documented, mapped, and monitored.

The Alabama BMP's compile strategies and considerations for managing and protecting these species and their habitat during silvicultural operations, such as marking a rare plant or animal area with flagging, paint, or signage to protect during harvest operations, regular active monitoring, and following up with post-harvest inspections. The Alabama BMP's also consider fish and wildlife conservation in relation to silvicultural activities.

OSFT provide habitat to hundreds of game and non-game species including feral hogs and white-tailed deer. OSFT forests are home to several rare species (see Table 1.)

*5.5.4.2 Timber Products*

Timber **merchantability,** whether planted or natural, pine or hardwood, depends on local timber markets and mill product specifications. The geodatabase can be utilized to locate and contact local mills and calculate haul distance. Alabama timber markets currently include these products:

- Pulpwood:

    - Pine and hardwood
        - Tree-length and clean chips
- Oriented strand board (OSB): pine
    - Similar price as pulpwood
- Chip-n-saw: pine
- Saw timber: pine, cypress, and hardwood
- Poles and pilings: pine
- Mulch: cypress, hardwood
- Fuelwood:
    - Pine, hardwood, and large woody shrub species
        - Chips for energy production
    - Hardwood
        - Firewood
- Other hardwood products: pallets, mats, small-diameter saw timber for furniture

Timber is considered **pre-merchantable** if it is not marketable as one of the products above. All the major timber product groups can be harvested from Other Forest Type including hardwood and pine pulpwood, chip-n-saw, saw timber, and poles. Other Forest Type also allow for fuelwood harvests, especially utilizing natural regeneration and hardwood reduction treatments.

OSFT are commonly managed for lower-value products such as hardwood pulpwood and fuelwood.

*5.5.4.3 Non-Timber Forest Products (NTFP)*

NTFP opportunities exist within the Other Forest Type,

*Other Current and Potential NTFP Markets*

- **Other Edible Products**
    - Nuts
    - Mushrooms
- **Ornamental Products**

- Pine Tips for Garlands
- Pine Cones
- Grapevines
- Burl and Crooked Wood

- **Landscape Products**
  - Pine Bark Mulches
  - Pine Needles

## 6.0 References

*** The References included in this plan and on the LMP website are reviewed and updated on an annual schedule: January of each year. Last review date was January 2024.**


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## 7.0 Glossary of Forestry Terms

The following terms are used in this LMP. Definitions are drawn from the glossaries and programming associated with the AFF Standards of Sustainability and other sources, as identified by the Support Committee.

**Acre**
An area of land measuring 43,560 square feet. A square 1-acre plot measures 208.7 feet by 208.7 feet; a circular acre has a radius of 117.75 feet.

**Adaptive Management**
A dynamic approach to forest management in which the effects of treatments and decisions are monitored and used to modify management on a continuing basis to ensure that objectives are being met (Helms, et al., The Dictionary of Forestry, Society of American Foresters, 1998).

**Adverse Regulatory Actions**
Written warnings, citations or fines issued by law enforcement or regulatory bodies.

**Amphibian**
Any of a class of vertebrates that regulate their body temperature externally; lay shell-less eggs in wet areas; live in water during early development and live both in water and on land as adults; and use lungs, gills, and their skin for breathing. Most have four legs and smooth, moist skin without scales.

**Angiosperm**
A plant that has true flowers and bears its seeds in fruits. In temperate zones, many angiosperms are deciduous trees while in tropical zones, many are evergreen trees. Examples include oaks, willows, maples, and birches.

**Annual Ring**
The combination of one earlywood layer (light colored) and one latewood layer (dark colored) seen in a cross-section of a tree. One annual ring usually represents one year of growth.

**Artificial Regeneration**
The growth of new trees through seeding and planting.

**Bark**
The tough exterior covering of a woody root or stem that protects the tree from injury caused by insects and other animals, by other plants, by disease and by fire.

**Best Management Practices**
Procedures employed during harvesting or timber stand improvement activities that reduce erosion and prevent or control water pollution.

**Biltmore Stick**
A stick similar to a yardstick in appearance, but usually about 25 inches long. One side is scaled to read a tree's diameter by holding the stick horizontally at arm's length and against the tree at breast height. A Merritt hypsometer runs along one edge of the stick and is scaled to read a tree's height from 66 feet away from the tree's base. These two measurements are then used to find the tree's volume according to the volume table printed on one face of the stick.

**Biodiversity**
The variety and abundance of life forms, processes, functions and structures of plants, animals and other living organisms, including the relative complexity of species, communities, gene pools and ecosystems at spatial scales that range from local through regional to global (Helms, et al., The Dictionary of Forestry, Society of American Foresters, 1998).

**Bird**
Any of a class of vertebrates that regulate their body temperature internally, have bodies that are covered almost entirely with feathers, and have forelimbs modified as wings that enable most to fly.

**Board Foot**
A unit of measure equal to a board that is 1-inch thick, 12-inches long and 12-inches wide, or 144 cubic inches.

**Bole**
The main trunk of a tree.

**Broadleaf**
A class of trees that have broad, flat leaves of many different shapes; most are deciduous; also called hardwood because most broad-leaved trees have harder wood than do conifers. Examples include oak, hickory, maple, and ash.

**Buffer Strip**
A narrow zone or strip of land, trees, or vegetation bordering an area. Common examples include visual buffers, which screen the view along roads, and streamside buffers, which are used to protect water quality. Buffers may also be used to prevent the spread of forest pests.

**Cambium**
A thin layer of specialized cells within a tree's trunk that divide to produce new inner bark cells to the outside and new sapwood cells to the inside. The narrow band of cells that is responsible for the tree's growth in circumference.

**Canopy**
The "roof" of the forest formed by the crowns of the tallest trees.

**Carrying Capacity**
The maximum number of healthy wildlife that a given habitat or area can support without degradation of the habitat.

**Cellulose**
The scientific name for wood fiber.

**Chain**
A distance of 66 feet.

**Clearcut**
A harvesting and regeneration method that removes all trees within a given area. Most commonly used in pine and hardwood forests that require full sunlight to regenerate and grow efficiently.

**Clinometer**
An instrument that is held at eye level to read stump height and merchantable or total height when standing 50 and 66 feet from the base of the tree. The difference between the two readings yields the height.

**Competition**
The struggle between trees to obtain sunlight, nutrients, water, and growing space. Every part of the tree, from the roots to the crown, competes for space and food.

**Complaint**
Labor complaints are those with formal documentation filed through a state's fair labor practices board or similar body.

**Conifer**
A class of trees that are evergreen, have needle or scale-like foliage and cone-like fruit; often called sOSFTwood. Examples include pine, hemlock, cedar, and cypress.

**Conservation**
Planned management and wise use of natural resources for present and future generations.

**Cord**
A standard unit of measure equivalent to 128 cubic feet of round or split wood. A standard cord measures 4 feet by 4 feet by 8 feet. A face cord or short cord is 4 feet by 8 feet by any length of wood under 4 feet.

**Cover**
(a) Any plant that intercepts rain drops before they reach the soil or that holds soil in place; (b) a hiding place or vegetative shelter for wildlife from predators or inclement weather.

**Crown**
The branches and foliage at the top of a tree.

**Cruise**
A survey or inventory of forestland to locate timber and estimate its quantity by species, products, size, quality, or other characteristics.

**Deciduous**
A group of trees that lose all of their leaves every year.

**Decomposition**
The process by which organic material such as leaves and branches are broken down by bacteria, fungi, protozoans, and the many different kinds of animals that live in the soil.

**Dendrology**
The study of trees; tree identification.

**Desired Species**
Those species of flora and fauna designated in the landowner's management plan and not known to cause negative impacts on the local environment.

**Designated Representative**
A person designated by a landowner to represent him or her. Designated representatives may include, but are not limited to, family members, trustees, property managers, qualified natural resource professionals and lawyers.

**Diameter at Breast Height (DBH)**
Tree diameter measured at 4.5 feet above ground level.

**Diameter Tape**
A steel measuring tape that has a scale calibrated to read a tree's diameter when wrapped around the tree's circumference.

**Earlywood**
Wood cells produced at the beginning of a tree's growing season that are generally light in color. Also called springwood.

**Ecology**
The science or study of the relationships between organisms and their environment.

**Ecological Succession**
The gradual change of plant and animal communities over time.

**Ecosystem**
A loosely defined area consisting of numerous habitats.

**Edge**
The transition between two different types or ages of vegetation.

**Environment**
The sum of all external living and non-living conditions and influences that affect the development and survival of an organism.

**Erosion**
The wearing away or removal of land or soil by the action of wind, water, ice, or gravity.

**Even-Aged Management**
A forest management method used to produce stands that are all the same age or nearly the same age by harvesting all trees in an area at one time or in several cuttings over a short time. This management method is commonly applied to shade-intolerant conifers and hardwoods.

**Evergreen**
A group of trees that do not lose all of their leaves every year but go through a gradual replacement by dropping only their oldest leaves each year. Instead of being bare in winter, these trees have leaves all year.

**Foliage**
The leaves of a tree or other plant.

**Forage**
Vegetation such as leaves, stems, buds, and some types of bark, that can be eaten for food and energy.

**Forb**
Any herb other than grass.

**Forest Floor**
The lowest level of the forest that is made up of tree seedlings, dead leaves and needles, grasses, ferns, flowers, fungi, and decaying plants and logs.

**Forest Health**
The perceived condition of a forest derived from consideration of such factors as its age, structure, composition, function, vigor, vitality, presence of unusual levels of insects or disease and resilience to disturbance and a range of stressors.

**Forest Management**
Caring for a forest so that it stays healthy and vigorous and provides the products and values the landowner desires.

**Forest Products**
Goods and materials derived from the forest that are tangible and physical objects of biological origin. Such materials may include, but are not limited to, timber, fuelwood, fibers, biomass, leaves, fruit, grass, fungi, berries, resins, gums, animal parts, water, soil, gravel, stone and other minerals on forestland. In addition, products may also include other quantifiable goods or services including carbon storage or water protection.

**Forests of Recognized Importance (FORI)**
Globally, regionally and nationally significant large forest landscape areas of exceptional ecological, social, cultural or biological values. These forests are evaluated at the landscape level, rather than the stand level, and are recognized for a combination of unique values, rather than a single attribute.

**Forest Type**
A designation or name given to a forest based on the most abundant tree type or types in the stand; groups of tree species commonly growing in the same stand because their environmental requirements are similar.

**Forestry**
The art and science of managing forests to produce various products and benefits including timber, wildlife habitat, clean water, biodiversity, and recreation.

**Fuel Loading**
A buildup of easily ignited leaves, pine straw, branches, and trees on the forest floor.

**Group Selection**
(a) The removal of small groups of trees to regenerate shade-intolerant trees in the opening (usually at least a quarter acre); (b) a specific type of selective cutting.

**Gymnosperm**
A plant whose seeds are not enclosed in flowers. Most gymnosperms produce their seeds on the surface of the scales of female cones and are pollinated by wind. Conifers are the most common type of gymnosperm.

**Habitat**
An area in which a specific plant or animal naturally lives, grows, and reproduces; the area that provides a plant or animal with adequate food, water, shelter, and living space.

**Hardwoods**
Trees with broad, flat leaves as opposed to coniferous or needled trees. Wood hardness varies among the hardwood species, and some are actually softer than some softwoods.

**Heartwood**
The central core of a tree, which is made up of dense, dead wood and provides strength to the tree.

**High-Grading**
A harvesting technique that removes only the biggest and most valuable trees from a stand and provides high returns at the expense of future growth potential. Poor quality, shade-loving trees tend to dominate in continually high-graded sites.

**Hypsometer**
Any device used for measuring tree height.

**Increment Borer**
A hollow auger-like tool with a screw bit used to remove core samples from trees.

**Indicator**
Identifies specific actions or activities that demonstrate conformance.

**Integrated Pest Management (IPM)**
A pest control, suppression or prevention approach that utilizes a suite of complementary strategies including mechanical, biological, cultural, physical, genetic and chemical approaches.

**Invasive Species**
Plants, animals, or pathogens that are non-native to the ecosystem under consideration and whose introduction causes or is likely to cause harm. (USDA National Invasive Species Information Center, 2014)

**Landowner**
Entity that holds title to the property to be certified.

**Landowner's Objectives**
The stated landowner desires, reasons for ownership and potential activities that guide the management of the property.

**Latewood**
Wood cells produced at the end of the growing season that make up the darker section of an annual ring. Also called summerwood.

**Limiting Factor**
Any requirement for wildlife survival that is in limited supply.

**Mammal**
Any of a class of higher vertebrates whose bodies are covered with hair, who give birth to live young, nourish their young with milk from mammary glands, regulate their body temperature internally, have four types of well-developed teeth, and typically have four well-developed legs with toes that have nails, claws, or hoofs.

**Management Plan**
Documents that guide actions and that change in response to feedback and changed conditions, goals, objectives and policies. Management plans may incorporate several documents including, but not limited to, harvest plans, activity implementation schedules, permits, research, etc. For the purposes of the American Tree Farm System® eligible mangement plans, plan amendments may include letters, notes and other forms of informal updates in addition to formal plan revisions. The term "management plan" is inclusive of

stewardship plans and other similar documents that describe resources, landowner objectives and management strategies.

**Mast**
Fruits or nuts used as a food source by wildlife. SOSFT mast includes most fruits with fleshy coverings, such as persimmon, dogwood seed, or black gum seed. Hard mast refers to nuts such as acorns and beech, pecan, and hickory nuts.

**Multiple-Use Management**
The management of land or forest for more than one purpose, such as wood production, water quality, wildlife, recreation, aesthetics, and clean air.

**Natural Regeneration**
The growth of new trees in one of the following ways without human assistance: (a) from seeds carried by wind or animals; (b) from seeds stored on the forest floor; or (c) from stumps that sprout.

**Performance Measure**
Refines the standard's intent and describes considerations and pathways for conformance.

**Pesticide**
Pesticides include chemicals commonly known as fungicides, herbicides, insecticides and rodenticides.

**Phloem**
The part of a tree that carries sap from the leaves to the rest of the tree. Also called inner bark.

**Photosynthesis**
The process by which a plant or tree combines water and carbon dioxide with energy from the sun to make glucose and oxygen.

**Plant Succession**
The progression of plants from bare ground to mature forest.

**Prescribed Burning**
The practice of using regulated fires to reduce or eliminate material on the forest floor, for seedbed preparation or to control competing vegetation. Prescribed burning simulates one of the most common natural disturbances. Also called controlled burning.

**Prescribed Fire**
A fire ignited by management to meet specific objectives (Helms, et al., The Dictionary of Forestry, Society of American Foresters, 1998).

**Pulpwood**
Wood used in the manufacture of paper, fiberboard, or other wood fiber products. Pulpwood-sized trees are usually a minimum of 4 inches in diameter.

**Qualified Contractor**
Forest contractors who have completed recommended certification, licensing, training or education programs offered in their respective states.

**Qualified Natural Resource Professional**
A person who by training and experience can make forest management recommendations. Examples include foresters, soil scientists, hydrologists, forest engineers, forest ecologists, fishery and wildlife biologists or technically trained specialists in such fields.

**Qualified ATFS Inspector**
A qualified natural resource professional who has completed ATFS-required training for certifying forested properties and is eligible to inspect properties on behalf of ATFS. ATFS requires all trained inspectors meet approved eligibility requirements.

**Reforestation**
Reestablishing a forest by planting or seeding an area from which forest vegetation has been removed.

**Release**
To free a tree from competition with its immediate neighbors by removing the surrounding trees. This occurs naturally and artificially.

**Renewable Resource**
A naturally occurring raw material or form of energy that has the capacity to replenish itself through ecological cycles and sound management practices.

**Reptile**
Any of a class of vertebrates that regulates its body temperature externally, has dry, glandless skin covered with scales, breathes through lungs, and lays large eggs that develop on land.

**Resin**
A group of sticky liquid substances secreted by plants that appear on the plant's external surface after a wound.

**Roots**
The underground portion of a tree that helps anchor the tree in the ground and absorbs water and nutrients from the soil.

**Rotation**
The number of years required to establish and grow trees to a specified size, product, or condition of maturity. A pine rotation may range from as short as 20 years for pulpwood to more than 60 years for saw timber.

**Salvage Cut**
The harvesting of dead or damaged trees, or the harvesting of trees in danger of being killed by insects, disease, flooding, or other factors in order to save their economic value.

**Saw Timber**
Wood of large enough size to be used to produce lumber for construction and furniture.

**Scale**
The extent of forest operations on the landscape/certified property.

**Sedimentation**
The deposition or settling of soil particles suspended in water.

**Seed Tree Cut**
A harvesting method in which a few scattered trees are left in the area to provide seeds for a new forest stand. Selection of seed trees is based on growth rate, form, seeding ability, wind firmness, and future marketability. This harvesting method produces an even-aged forest.

**Selective Cutting**
The periodic removal of individual trees or groups of trees to improve or regenerate a stand.

**Serotinous**
Refers to resinous coating on cones such that seeds are not released until resin is melted by fire.

**Shade-Intolerant Species**
Trees that require full sunlight to thrive and cannot grow in the shade of larger trees.

**Shade-Tolerant Species**
Trees that are able to grow in the shade of other trees and in competition with them.

**Shall**
Responsibilities or obligations that include the word “shall” are considered core elements that are required for certification under the American Tree Farm System.

**Shelterwood Cut**
Removing trees in the harvest area in a series of two or more cuttings so that new seedlings can grow from the seeds of older trees. This method produces an even-aged forest.

**Should**
Responsibilities or obligations that include the word “should” are directives that draw on personal and professional judgment of foresters, landowners and assessors. These directives allow for latitude in implementation to the greatest practical extent in given circumstances and are justifiable in a third-party verification process.

**Silviculture**
The art, science, and practice of establishing, tending, and reproducing forest stands of desired characteristics. It is based on knowledge of species' characteristics and environmental requirements.

**Site Index**
A relative measure of forest site quality based on the height (in feet) of the dominant trees at a specific age (usually 25 or 50 years, depending on rotation length). Site index information helps estimate future returns and land productivity for timber and wildlife.

**Snag**
A standing dead or dying tree.

**Softwood**
A tree belonging to the order *Coniferales*. Softwood trees are usually evergreen, bear cones and have needles or scale-like leaves. Examples include pines, spruces, firs, and cedars. See **conifer**.

**Special Sites**
Those areas offering unique historical, archeological, cultural, geological, biological, or ecological value. Special sites include:

A. Historical, archaeological, cultural and ceremonial sites.
B. Sites of importance to wildlife such as rookeries, refuges, fish spawning grounds, vernal ponds, and shelters of hibernating animals.
C. Unique ecological communities such as springs, glades, savannas, fens, and bogs.
D. Geological features such as terminal moraines, cliffs, and caves.
E. Sites of importance to the landowner.

**Species**
A group of related organisms having common characteristics and capable of interbreeding. Loblolly and Virginia pine are common tree species that can interbreed.

**Springwood**
See **earlywood.**

**Stand**
A group of trees that are sufficiently the same in species composition and arrangement of age classes and condition so that they can be managed as a unit.

**Standard**
An overarching principle of sustainability.

**State Forestry Best Management Practices (BMPs)**

Forestry BMPs are generally accepted forest management guidelines that have been developed by state forestry agencies with broad public stakeholder input.

**Streamside Management Zone (SMZ)**
An area adjacent to a stream in which vegetation is maintained or managed to protect water quality.

**Summerwood**
See **latewood.**

**Suppression**
The process by which a tree loses its vigor due to inadequate light, water, and nutrients.

**Sustainability**
The capacity of forests, ranging from stands to ecoregions, to maintain their health, productivity, diversity and overall integrity, in the long run, in the context of human activity (Helms, et al., The Dictionary of Forestry, Society of American Foresters, 1998).

**Sustainable Forest Management (SFM)**
Sustainable forest management is a holistic approach defined as the stewardship and use of forests and forestland in a way and at a rate that maintains their biodiversity, productivity, regeneration capacity, vitality and potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national and global levels and does not cause damage to other ecosystems (Programme for the Endorsement of Forest Certification, Sustainable Forest Management, PEFC ST 1003:2010).

**Thinning**
A tree removal practice that reduces tree density and competition between trees in a stand. Thinning concentrates growth on fewer, high-quality trees, provides periodic income, and generally enhances tree vigor. Heavy thinning can benefit wildlife through the increased growth of ground vegetation.

**Third-Party Assessor**
A qualified natural resource professional who has completed ATFS-required training for third-party assessors and is contracted or employed by an International Accreditation Forum (IAF)-accredited certification body.

**Threatened or Endangered**
Defined and listed under the U.S. Endangered Species Act (ESA) and listed under applicable state or provincial laws as requiring protection.

**Transpiration**
The loss of water through leaves.

**Tree Caliper**
A metal or wooden device consisting of an arm and two prongs one of which is free to slide

along a graduated scale on the arm. The prongs are placed against opposite sides of a tree to read its diameter on the scale.

**Turpentine**
A distilled chemical produced from tapping into a living pine and harvesting the sap.

**Understory**
The area below the forest canopy that comprises shrubs, snags, and small trees. Because the understory receives little light, many of the plants at this level tolerate shade and will remain part of the understory. Others will grow and replace older trees that fall.

**Visual Quality Measures**
Modifications of forestry practices in consideration of public view, including timber sale layout, road and log landing locations, intersections with public roadways, distributing logging residue, tree retention, timing of operations and other factors relevant to the scale and location of the project.

**Wildlife**
A broad term that includes non-domesticated vertebrates, especially mammals, birds, and fish.

**Wood**
The solid interior of a tree.

**Xylem**
The part of a tree that transports water and nutrients up from the roots to the leaves. Older xylem cells become part of the heartwood. Also called sapwood.

## 8.0 Abbreviation Table

| Abbreviation | Name |
|---|---|
| 021 Form | ATFS Inspection Form |
| ACES | Alabama Cooperative Extension Services |
| ACF | Association of Consulting Foresters |
| AFC | Alabama Forestry Commission |
| AFF | American Forest Foundation |
| AFF Standards | AFF Standards of Sustainability |
| ATFS | American Tree Farm System® |
| BMP | Best Management Practice |
| CGPS | Cypress-Gum Ponds and Stringers |
| DBH | Diameter at Breast Height |
| DCNR | Department of Conservation and Natural Resources |
| DLG | Digital Line Graph |
| ECOS | Environmental Conservation Online System |
| EPA | Environmental Protection Agency |
| EQIP | Environmental Quality Incentives Program |
| ESA | Endangered Species Act |
| ETDM | Efficient Transportation Decision Making |
| FHTET | Forest Health Technology and Enterprise Team |
| FORI | Forest of Recognized Importance |
| GIS | Global Information System |
| GPS | Global Positioning System |
| IAF | International Accreditation Forum |
| IOBC | International Organization for Biological Control |
| IPM | Integrated Pest Management |
| KBDI | Keech-Byram Drought Index |
| LMP | Landscape Management Plan |
| MFW | Mixed Forested Wetland |
| NFWF | National Fish and Wildlife Foundation |
| NGO | Non-Governmental Organization |
| NNIA | Non-Native and Invasive Animal |
| NNIP | Non-Native and Invasive Plant |
| NNIS | Non-Native and Invasive Species |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NTFP | Non-Timber Forest Product |
| NWF | National Wildlife Federation |
| NWOS | National Woodland Owner Survey |
| OHV | Off-Highway Vehicle |
| OSB | Oriented Strand Board |

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| OSFT | Other Southern Forest Types |
| PEFC™ | Programme for the Endorsement of Forest Certification |
| RH | Relative Humidity |
| SAF | Society of American Foresters |
| SER | Society of Ecological Restoration |
| SFC | Southern Forestry Consultants, Inc. |
| SHU | Strategic Habitat Unit |
| SIC | Sustainable Forestry Initiative Implementation Committee |
| SFM | Sustainable Forest Management |
| SMZ | Streamside Management Zone |
| Support Committee | Landscape Management Plan Development Support Committee |
| T&E | Threatened or Endangered Species |
| TNC | The Nature Conservancy |
| USDA | U.S. Department of Agriculture |
| USFS | U.S. Forest Service |
| USFWS | U.S. Fish & Wildlife Service |