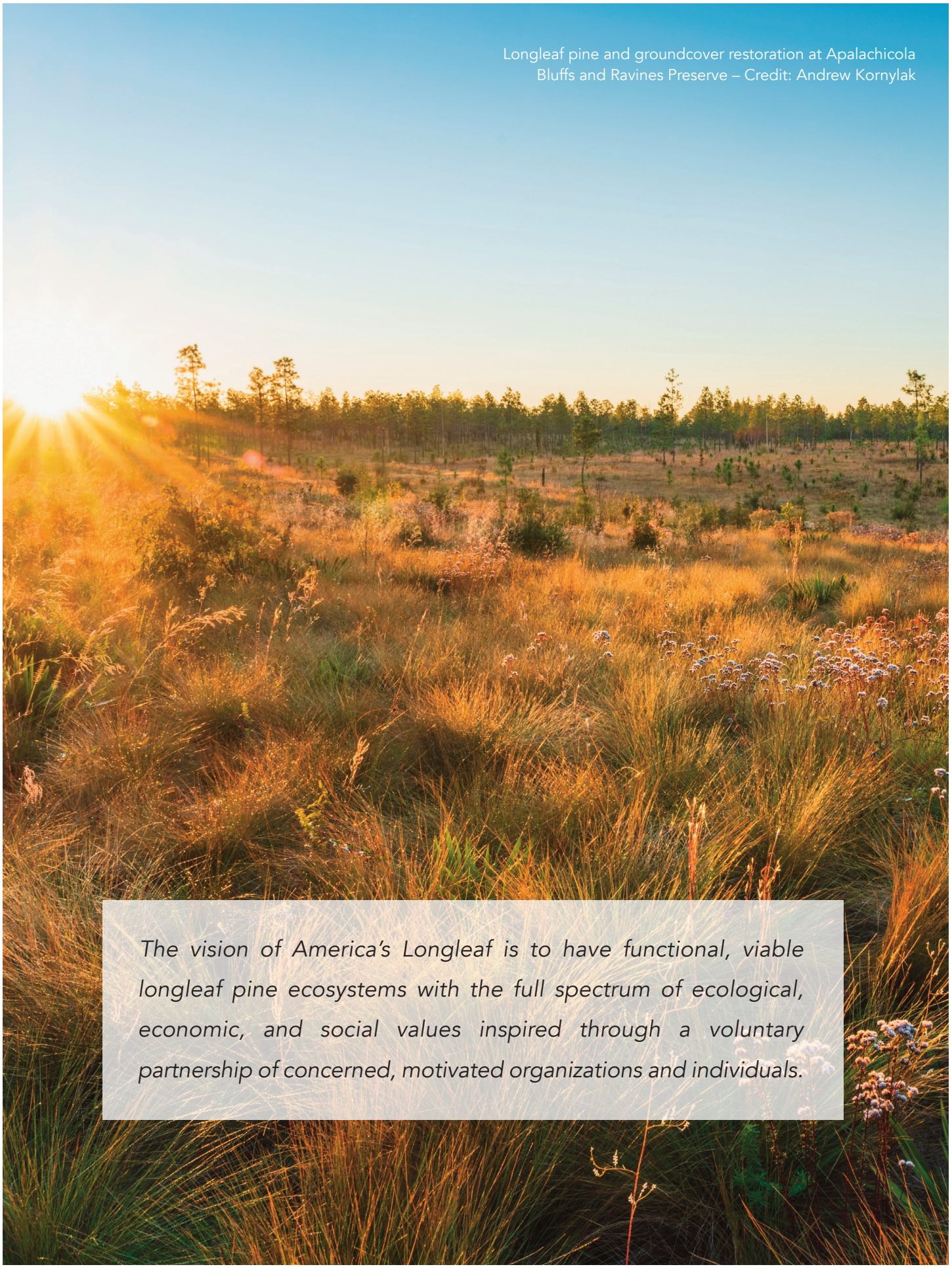
Range-wide Conservation Plan for Longleaf Pine

2025
2040

AMERICA'S LONGLEAF



Longleaf pine and groundcover restoration at Apalachicola Bluffs and Ravines Preserve – Credit: Andrew Kornylak

The vision of America's Longleaf is to have functional, viable longleaf pine ecosystems with the full spectrum of ecological, economic, and social values inspired through a voluntary partnership of concerned, motivated organizations and individuals.

Executive Summary

Longleaf pine *(Pinus palustris)* forests once dominated the landscape of the Southeastern United States. From the Atlantic coastal plain of southeastern Virginia to the West Gulf Coastal Plain of Texas, these forests encompassed over 90 million acres and represented an extraordinary wealth and diversity of cultural, ecological, and socio-economic values.

When America's Longleaf Restoration Initiative (America's Longleaf) was first formed, the extent of longleaf pine forests had been greatly reduced with an estimated 3.4 million acres remaining. Through the collaborative restoration and conservation efforts of partners involved in America's Longleaf, that downward trend has been reversed and the current data indicate that the acreage of longleaf pine has increased to approximately 5.2 million acres. This progress is encouraging, but there is still much work to be done to achieve the restoration goals outlined in this Conservation Plan.

America's Longleaf now serves as a model for other collaborative landscape-level initiatives, but it began as a broad group of individuals and agencies with a shared concern for the decline of the longleaf pine ecosystem. With the formation of the Longleaf Partnership Council in 2011 and the subsequent development of Local Implementation Teams, America's Longleaf developed a system for merging these separate entities into a collaborative framework that has allowed for more efficient use of resources, skills, and relationships to further longleaf restoration goals.

The vision of America's Longleaf is to have functional, viable longleaf pine ecosystems with the full spectrum of ecological, economic, and social values inspired through a voluntary partnership of concerned, motivated organizations and individuals.

This Conservation Plan was developed by a Writing Team assigned by the Longleaf Partnership Council Leadership Team using the original 2009 Range-wide Conservation Plan for Longleaf Pine as a foundation.

Goals

This second iteration of the Conservation Plan guides the continued efforts to reach the goal of eight million acres of longleaf pine forest in the Southeast.

Maintain — The "Maintain" category refers to longleaf forests that meet the criteria for good or excellent condition. The goal of America's Longleaf is to have about three million acres of the eight-million-acre total in good or excellent condition.

Improve — The "Improve" category includes longleaf forests ranked as being in poor or fair condition. A goal of America's Longleaf is to move acres classified as "Improve" to the "Maintain" category.

Restore — The "Restore" category corresponds to the establishment of new longleaf acres through either afforestation in areas with no recent forest cover or reforestation in recently harvested areas. Almost 3 million new acres of longleaf pine need to be established to meet the America's Longleaf goal of eight million acres.

Guiding Principles

- **Strategic, Science-based Approach**—The success of America's Longleaf hinges on a strategic, science-based approach to conservation. The most current scientific information on ecological functions and services, community impacts, and climate will be considered.
- **Site-based Conservation Efforts in the Context of Sustainable Landscapes in the Face of a Changing Climate**—The range-wide conservation of longleaf pine ecosystems is rooted in community-led, site-specific actions that contribute to resilient communities and are aligned with the Conservation Plan.

- **Involvement by Public and Private Sectors**—The conservation of longleaf pine forests demands the combined and coordinated interest and attention of public and private stakeholders and land managers.
- **Partnerships and Collaboration**—A successful partnership will require ongoing cooperation, collaboration, and a perspective that is focused on longleaf pine conservation at the range-wide level. The partners will advance an inclusive approach that broadens and strengthens the partnership while also ensuring that equity is part of the activities.
- **Use the updated Conservation Plan as a Framework and Catalyst**—The original Conservation Plan was intended to provide a range-wide framework for longleaf pine ecosystem conservation by identifying the most significant actions to conserve these systems, and by serving as a catalyst to further conservation actions in a strategic and outcome-oriented fashion. The updated 15-year Conservation Plan will serve the same role and will be developed collaboratively by partners to continue the momentum and progress beyond 2025.

Conservation Plan Implementation

The goals set forth in this updated Conservation Plan remain ambitious and achieving them will require an acceleration of conservation activity by many parties. Implementation is being accomplished at multiple scales through voluntary collaborative efforts of partners represented on the Longleaf Partnership Council, the Federal Coordinating Committee, landowners, other agencies and organizations, private businesses, and research and extension institutions associated with longleaf efforts across the range.

We envision creating 5-year Strategic Priorities and Actions (SPA) Plans beginning in 2025. The SPA Plans will be designed to provide a more focused look at short-term activities needed to advance the goals and objectives of the Conservation Plan.

Strategies for Longleaf Conservation

Within the Conservation Plan are sections that detail strategies, objectives, and key recommendations to achieve the goals for maintaining, improving, and restoring longleaf forests range-wide. Six strategies are listed, but just as with ecosystems, many are interconnected.

The six strategies below identify objectives and key recommendations to address issues, opportunities, and challenges.

- Public Lands Strategy
- Private Lands Strategy
- Longleaf Ecosystem Restoration Strategy
- Prescribed Fire Management Strategy
- Economic and Market-Based Financial Strategy
- Climate Resilience and Co-benefits Strategy

Monitoring and Evaluating Progress

A careful evaluation of progress and outcomes for the Conservation Plan's goals is necessary to determine if America's Longleaf conservation actions are being successfully implemented and if ecological goals are being met. These assessments support more informed management and decision-making at all levels of America's Longleaf. It is also vital to the telling of our story and securing resources for the future. The following sections detail the strategies, objectives, and key recommendations to evaluate progress toward achieving the goals identified in the Conservation Plan.

- Understanding our Baseline
- Monitoring Acreage Goals
- Annual Accomplishment Reporting
- Nontraditional Metrics

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Acknowledgments

This Conservation Plan is the product of many dedicated contributors. We would like to thank the Conservation Plan Writing Team led by Ryan Bollinger and section leads Tim Albritton, Colette DeGarady, Carol Denhof, Jennifer Fawcett, Dan Frisk, Stephanie Hertz, Kevin McIntyre, Lisa Lord, and Matthew Vandersande. The Longleaf Partnership Council members, the Federal Coordinating Committee, and Local Implementation Team members contributed vital feedback and guidance on the Conservation Plan. Thank you to Kathryn Smith, Hannah Sodolak and Sarah Crate for content review and editing.

Thank you to the private landowners, biologists, foresters, birders, hunters, and other longleaf enthusiasts who share a passion for longleaf and have contributed to making America's Longleaf one of the most successful landscape-scale restoration initiatives in North America.

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America's Longleaf

Credit: Carol Denhof

Longleaf pine (Pinus palustris) forests once dominated the landscape of the Southeastern United States. From the Atlantic coastal plain of southeastern Virginia to the West Gulf Coastal Plain of Texas, these forests encompassed over 90 million acres and represented an extraordinary wealth and diversity of cultural, ecological, and socio-economic values. The tree itself, longleaf pine, literally sustained the growth of America with an abundant source of timber and naval stores. It built homes, bridges, ships, and railroads, and symbolized the bounty of natural resources that made the nation prosperous. Although longleaf pine remains a highly valuable commodity in markets today, the value of these forests runs far deeper than economics. Longleaf pines and the systems they support are woven into the cultural fabric of America. Long before European colonization, generations of Native Americans sustained themselves with the natural and spiritual riches these lands offered. Throughout time, nature lovers, sportsmen, photographers, and outdoor enthusiasts have enjoyed an endless array of recreational and aesthetic pursuits tied to the abundance and splendor of these systems.

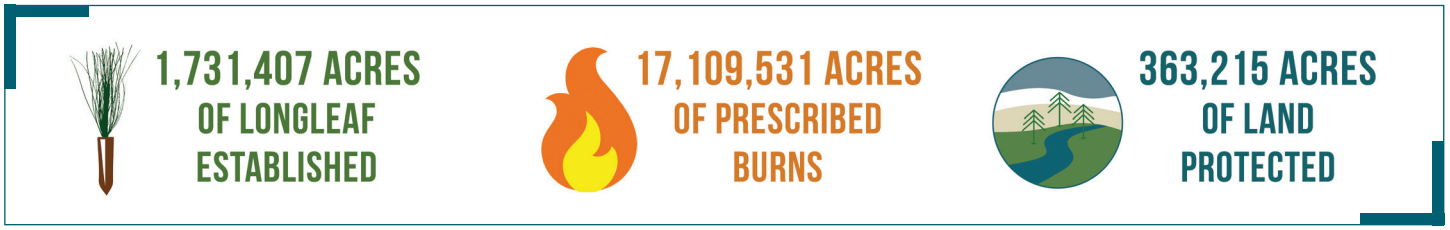
The Longleaf Imperative

When America's Longleaf Restoration Initiative (America's Longleaf) was first formed, the extent of longleaf pine forests had been greatly reduced with an estimated 3.4 million acres remaining. Through the collaborative restoration and conservation efforts of partners involved in America's Longleaf, that downward trend has been reversed and the current data indicate that acreage of longleaf pine has increased to approximately 5.2 million acres. This progress is encouraging, but there is still much work to be done to achieve the restoration goals outlined in this Conservation Plan (Plan).

The major threats facing the future sustainability of longleaf forest systems include land fragmentation, development, conversion to other land uses or vegetative types, non-native invasive species, exclusion of natural fire regimes, and negative economic perceptions. Even though substantial resources are being invested to establish new longleaf stands across the region, the loss of mature stands remains a challenge. The rapid urban development and changing landscape within the Southeast continue to impact our ability to protect existing longleaf habitats, manage forests with prescribed fire, and establish new longleaf stands.

The cumulative worth of longleaf pine ecosystems is great and includes values associated with resilience to wildfire, storms, climate change, insects, and disease. In addition, these ecosystems support national defense by providing compatible land uses near military facilities, provide ecosystem services (e.g., water quality and quantity, clean air, and carbon sequestration), provide food and high-value durable materials, support livelihoods, provide recreational opportunities, and maintain biodiverse landscapes.

Well-managed, high-quality longleaf pine forests are some of the most biologically diverse ecosystems outside of the tropics. It is this ecological wealth that forms the basis for the many values we attribute to longleaf pine ecosystems. From flatwoods and pocosins to sandhills and montane communities, longleaf pine forests occur in a variety of uniquely diverse ecological assemblages. Thousands of species of fungi, lichens, plants, arthropods, amphibians, reptiles, birds, and mammals comprise these ecosystems,



Longleaf pine accomplishments from 2010 - 2022

many of which are found nowhere else on Earth. Coupled with the precipitous decline of these forests, over 40 species associated with longleaf pine ecosystems are now federally listed as threatened or endangered. Progress has been made in safeguarding species such as the Red-cockaded Woodpecker (Leuconotopicus borealis) and gopher tortoise (Gopherus polyphemus). However, strategic, science-based restoration and management efforts must continue to ensure that this extraordinary biodiversity is maintained moving forward.

Preservation of biodiverse landscapes is just one of many important reasons for restoring and managing longleaf pine forests. Conservation of these resilient forests can also provide broad ecosystem co-benefits that lessen the negative repercussions of a changing climate. For example, if managed properly, longleaf pine forests can improve drinking water quality and quantity, provide drought tolerance and resistance to insects and diseases, and enhance the landscape's resilience to windstorms and wildfires. The longleaf pine tree itself has advantages over other southern pine species in terms of its resilience to fire, drought, insect damage, and wind. These characteristics will be increasingly valuable as fire seasons become longer and drought and storm events become more severe and frequent. In the face of these extreme impacts, longleaf pine should be presented and promoted as a better forest option for areas where it is appropriate.

To realize these benefits at scale, sustainable forest management must be promoted on both public and private lands. Public lands play an important role in providing long-term sustainability of ecosystem values, especially as these values relate to rare species management and landscape-level conservation. However, a higher percentage of existing longleaf stands, as well as those sites appropriate for restoration, are privately owned. Engaging both large and small private forest owners in the America's Longleaf effort is essential for making substantial progress toward the range-wide restoration goals.

Economics generally figure heavily into a forest owner's land management planning. Longleaf pine restoration provides both premium forest products and ecosystem services, which can be an opportunity to engage more forest owners that are looking to derive both income and environmental benefits from their land. Substantial advances have been made since the 1990s in longleaf pine establishment techniques, application of prescribed fire, groundcover restoration methods, and mapping technologies. These developments have made a positive impact on the participation in and overall success of restoration efforts to date.

With an expanding set of diverse stakeholders involved in longleaf forest restoration and growing financial support for longleaf pine-related projects, the future is bright. However, more strategic allocation of restoration resources and targeted collaborative efforts that engage private forest owners, including disadvantaged landowners and communities, and public forest owners are needed to take advantage of this momentum and to ensure the long-term sustainability of this important forest ecosystem.

America's Longleaf Restoration Initiative

Community is a common thread that is woven through the story of longleaf. Whether this refers to plant or animal communities, human communities that benefit from well-managed forests, or the community of partners who are working together under the umbrella of America's Longleaf to bring back longleaf, this sense of community drives our resolve to restore and protect longleaf ecosystems. This resolve has led to the planting of over 1.6 million acres of longleaf pine forest, the prescribed burning of approximately 1.3 million acres per year, and the long-term protection of over 325,000 acres of longleaf pine ecosystem since 2010. These accomplishments have resulted in positive impacts that benefit local economies, national defense, threatened, endangered, and at-risk species, recreational

opportunities, forest resilience, wildfire risk, clean air and water, carbon sequestration, and climate change mitigation.

America's Longleaf now serves as a model for other collaborative landscape-level initiatives, but it began as a broad group of individuals and agencies with a shared concern for the decline of the longleaf pine ecosystem. With the formation of the Longleaf Partnership Council (LPC) in 2011 and the subsequent development of Local Implementation Teams (LITs), America's Longleaf developed a system for merging these separate entities into a collaborative framework that has allowed for more efficient use of resources, skills, and relationships to further longleaf restoration goals. As of 2022, over 115 representatives from more than 60 organizations have served on the LPC, bringing diverse perspectives and expertise to the table that make America's Longleaf a truly collaborative effort. The forward momentum of extensive partnerships continues with many organizations prioritizing longleaf restoration and healthy fire management strategies to meet ecological, climate, and community health goals. Drawing from lessons learned since the inception of America's Longleaf, a writing team worked collaboratively to update the 2009 Range-wide Conservation Plan for Longleaf Pine (2009 Conservation Plan). This document guides the work of America's Longleaf by setting goals, objectives, and recommendations for the next 15 years and beyond. While we are still focused on many of the recommendations included in the original plan, some priorities have shifted over the years due to new and changing needs and challenges. With this update, we have the opportunity to be more strategic with our goals, utilize innovative tools for measuring success, and incorporate science-based approaches to expanding longleaf restoration across the landscape in the context of climate resilience, all while bringing a wider variety of partners into the endeavor.

Vision

The vision of America's Longleaf is to have functional, viable, longleaf pine ecosystems with the full spectrum of ecological, economic, and social values inspired through a voluntary partnership of concerned, motivated organizations and individuals.

Meeting this challenge will require the strategic coordination of science-based conservation actions among many partners and sectors that influence land use, to ensure long-term sustainability and resiliency of these systems and their constituent biodiversity.

2023 Longleaf Partnership Council Members

The Conservation Plan (2025-2040)

This Conservation Plan was developed by a Writing Team assigned by the Longleaf Partnership Council Leadership Team using the original 2009 Range-wide Conservation Plan for Longleaf Pine as a foundation.

Fundamentally, the Conservation Plan calls for strategic coordination of science-based conservation actions among many partners and stakeholders, with the goal of ensuring long-term sustainability and resiliency of the diverse longleaf systems — socially, economically, and ecologically. The Conservation Plan spans complex and inter-connected activities, programs, policies, and research that operate from the local level to the national arena. Organizing such an endeavor within a written document to catalyze and deliver range-wide strategic actions and on-the-ground results is a daunting task.

This Conservation Plan borrows from the general framework of the original 2009 Conservation Plan and is organized into the following sections:

- **Goals**—what implementation of the Conservation Plan is designed to achieve
- **Guiding Principles**—what approach America's Longleaf and the Conservation Plan takes
- **Conservation Plan Implementation**—who brings the Conservation Plan to life
- **Strategies for Longleaf Conservation**—why and how conservation actions are recommended
- **Monitoring and Evaluating Progress** – how we will assess progress toward our Goals
- **Appendices**—additional information

This Conservation Plan is intended as a dynamic document, subject to revision, particularly as local efforts adapt, and additional information becomes available and is considered during implementation of the Conservation Plan.

Goals

When America's Longleaf launched in 2009, there were an estimated 3.4 million acres in longleaf forest types according to estimates from the U.S. Department of Agriculture (USDA) Forest Service's Forest Inventory and Analysis (FIA) plot data. The original Conservation Plan set a goal of increasing longleaf to eight million acres. In 2023, we estimate the total acreage of the longleaf pine and longleaf pine/oak forest types to be approximately 5.2 million acres (see Appendix A). These gains reflect the work of America's Longleaf and the growing popularity of longleaf pine as a management option for landowners and managers. This second iteration of the Conservation Plan guides the continued efforts to reach the goal of eight million acres of longleaf pine forest in the Southeast.

The original Conservation Plan characterized the condition and, by inference, management needs of longleaf pine forest as belonging to one of three categories: maintain, improve, or restore. In the intervening years, considerable effort has gone into refining metrics of community composition and structure. Simple definitions of the "maintain" category were put forth and adopted by the LPC in 2014, and a detailed approach that included distinct definitions for community types and a four-tiered ranking system was published by NatureServe in 2016. Despite these advances, it is currently not possible to accurately delineate and calculate the acreage of longleaf pine forest for each of these categories. Development of a more rigorous and thorough inventory and monitoring system is needed to assess and track longleaf pine forest condition over time.

The Southeast Longleaf Ecosystem Occurrences (LEO) Geodatabase project began in 2018 and is a stand-level inventory of known longleaf pine forests. This project is a critical foundation for beginning to understand the status of the resource in greater depth. The LEO Geodatabase represents the first systematic survey of extant longleaf pine forests and includes some level of information about condition for some stands. Continued refinement and investment in accounting for the amount and condition of longleaf pine ecosystems, such as the LEO Geodatabase project and its potential to serve as an ongoing monitoring framework, is imperative to help us understand progress toward these goals. The NatureServe work on condition

class, referenced above, allows us to employ a more nuanced and descriptive system for this iteration of the Conservation Plan with a ranking system for existing longleaf based on quantitative data that ranks stands as poor, fair, good, or excellent. For consistency, we retain the original classification terminology but crosswalk it with categories that reflect the refinement of condition class definitions.

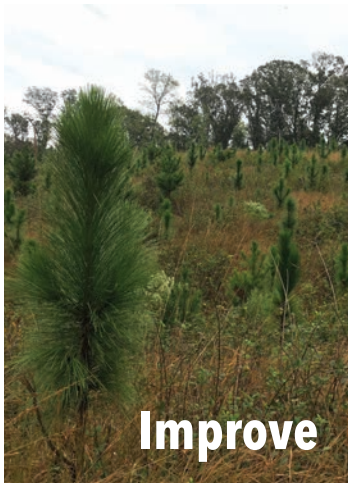
Specific goals to "Maintain", "Improve", and "Restore" longleaf in the Southeast are as follows:

Maintain — The "Maintain" category refers to longleaf forests that meet criteria for good or excellent condition. The goal of America's Longleaf is to have about three million acres of the eight-million-acre total in good or excellent condition. The focus of this category is to maintain conditions that reflect both the forest canopy and understory conditions that currently or will provide ecosystem functions, processes, and assemblages of representative plant and animal species. The retention of forests within this condition is a priority.

Improve — The "Improve" category includes longleaf forests ranked as being in poor or fair condition. A goal of America's Longleaf is to move acres classified as "Improve" to the "Maintain" category. This category will include a range of site conditions, from degraded or fire-suppressed mature stands to recently established plantations with no mature trees or other desired conditions for longleaf ecosystem structure. Investments in moving acres from "Improve" to "Maintain" are well-suited for public lands, where agencies have identified restoration as a high priority, particularly to support endangered species recovery.

Restore — The "Restore" category corresponds to the establishment of new longleaf acres through either afforestation in areas with no recent forest cover or reforestation in recently harvested areas. Almost 3 million new acres of longleaf pine need to be established to meet the America's Longleaf goal of eight million acres, assuming losses are stemmed. Since the original Conservation Plan was drafted, approximately 2 million new acres of longleaf pine have been established. Private lands initiatives play a key role in achieving our goals through the conversion of other forest types to longleaf pine and from other land uses such as agriculture. Expanded efforts are needed to continue converting acreage from other land uses and forest types to meet the eight-million-acre goal.

Credit: Kevin McIntyre



Credit: Kevin McIntyre (left), Sarah Crate (right)

Credit: Fort Moore Natural Resources Management Branch

Guiding Principles

In addition to acreage, it is essential to recognize the importance of broader guiding principles to achieve our shared vision of functional, viable longleaf pine ecosystems with the full spectrum of ecological, economic, and social values inspired through a voluntary partnership of concerned, motivated organizations and individuals. These guiding principles shape how America's Longleaf approaches the range-wide conservation of longleaf ecosystems and are intrinsic to the recommendations, organization, and content of the Conservation Plan:

- **Strategic, Science-based Approach**—The success of America's Longleaf hinges on a strategic, science-based approach to conservation. The most current scientific information on ecological functions and services, community impacts, and climate will be considered.
- **Site-based Conservation Efforts in the Context of Sustainable Landscapes in the face of a Changing Climate**—The range-wide conservation of longleaf pine ecosystems is rooted in community-led, site-specific actions that contribute to resilient communities and are aligned with the Conservation Plan.
- **Involvement by Public and Private Sectors**—The conservation of longleaf pine forests demands the combined and coordinated interest and attention of public and private stakeholders and land managers.
- **Partnerships and Collaboration**—A successful partnership will require ongoing cooperation, collaboration, and a perspective that is focused on longleaf pine conservation at the range-wide level. The partners will advance an inclusive approach that broadens and strengthens the partnership while also ensuring that equity is part of the activities.
- **Use the updated Conservation Plan as a Framework and Catalyst**—The original Conservation Plan was intended to provide a range-wide framework for longleaf pine ecosystem conservation by identifying the most significant actions to conserve these systems, and by serving as a catalyst to further conservation actions in a strategic and outcome-oriented fashion. The updated 15-year Conservation Plan will serve the same role and will be developed collaboratively by partners to continue the momentum and progress beyond 2025.

Bee visiting lupine – Credit: Brady Beck

Eastern bluebird returns to its nest with food for its young – Credit: Brady Beck

Conservation Plan Implementation

The goals set forth in this updated Conservation Plan remain ambitious and achieving them will require an acceleration of conservation activity by many parties. Implementation is being accomplished at multiple scales through voluntary collaborative efforts of partners represented on the Longleaf Partnership Council, the Federal Coordinating Committee, landowners, other agencies and organizations, private businesses, and research and extension institutions associated with longleaf efforts across the range.

While action at the regional or national scale is important, most implementation of this plan will occur through grassroots local and sub-regional actions. It will require active involvement by landowners, resource managers, forestry professionals, scientists, and policymakers. This Conservation Plan envisions local teams as the leaders to implement restoration activities, conduct local inventories and assessments, establish locally based priorities, apply regional guidance and scientific developments such as the Longleaf Sustainability Analysis (LSA; Appendix B), and involve other players important for longleaf pine restoration and management. The governance structure of America's Longleaf has taken on three different tiers, outlined below, which create the enabling conditions to carry out the work of the Conservation Plan. While we remain flexible and open to change as appropriate, this model is working and has remained consistent since the inception of the original Conservation Plan.

Federal Coordinating Committee

In June 2010, the Departments of Agriculture, Defense, and the Interior formalized their commitment to America's Longleaf and the goal of restoring eight million acres in a Memorandum of Understanding (MOU). This landmark agreement also established the Federal Coordinating Committee (FCC), a committee to coordinate efforts among federal agencies to restore the longleaf pine ecosystem. These federal agencies work alongside a variety of stakeholders who are actively engaged in the restoration effort and meet at least once a year. Each agency has a longleaf restoration-focused, top-down plan that aligns with the Conservation Plan. The commitment and collaboration by these agencies in this formal way provide a clear message of dedication that enables federal resources and policy to be mobilized to help achieve the stated objectives of America's Longleaf.

Longleaf Partnership Council

The Longleaf Partnership Council, established in 2011, is comprised of 33 members representing non-governmental organizations (NGOs), state and federal agencies, implementation teams and other collaborative efforts, private industry, universities/research/extension, and private landowners. Its purpose is to promote effective communication and collaboration among the large number of partners working to conserve longleaf pine ecosystems across the South. It provides a forum where diverse partners can bring their different objectives, missions, responsibilities, and contributions required to make the conservation implementation efforts successful and demonstrate collective progress. The LPC also hosts a number of Working Groups that bring together experts and other interested people to focus on issues that are critical to longleaf ecosystem restoration. These Working Groups offer an opportunity for anyone, not just LPC members, to get involved and contribute their expertise.

The LPC is governed by a chair, chair-elect, and past chair, with each serving a one-year term. This 3-part leadership model, along with the consistent federal partners on the leadership team, helps ensure continuity. The LPC typically meets face-to-face biannually to provide a platform for shared learning, planning, collaboration, and recognizing

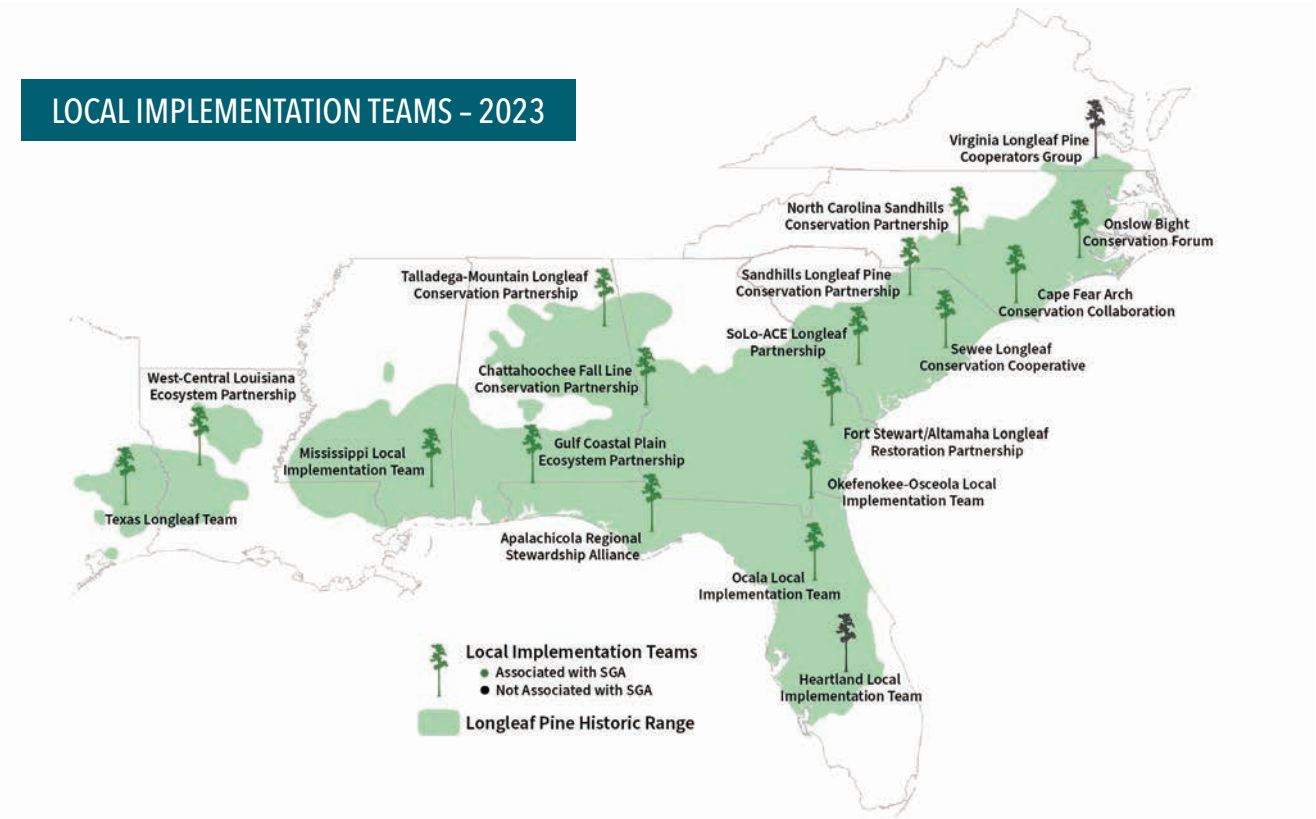
achievements. All are welcome at LPC meetings, but the council members have voting and decision authority. These open meetings allow transparency and engagement by multiple levels of America's Longleaf partners.

Local Implementation Teams

LITs comprised of public and private landowners and managers interested in restoring and maintaining longleaf forests, were assembled around SGAs to accomplish the work on the ground. Each LIT has a coordinator which is an essential ingredient to champion and maintain coordinated momentum. There are currently 18 LITs recognized by America's Longleaf which have individual conservation plans to prioritize actions on the ground and make best use of available resources. LIT partners use an adaptive management approach to periodically re-evaluate priority areas and update plans based on new opportunities. All LITs can apply for dedicated annual funding through the National Fish and Wildlife Foundation (NFWF) Longleaf Landscape Stewardship Fund. This consistent funding is a key driver for continued and long-term success of the partnership.

Strategic Priorities and Actions

In 2013, America's Longleaf recognized the need to step down the overarching goals of this plan into specific implementation actions. This resulted in the development of Strategic Priorities and Actions (SPA) documents that were developed every 3 years by assessing progress, new research and data, challenges, and opportunities. This



Significant Geographic Areas (SGAs) were created in the original Conservation Plan as a framework for a landscape level approach to the strategic, science-based conservation of longleaf pine ecosystems and their component species. A foundational premise was that, given limited resources, expertise, partners, and policy implementation should be prioritized in areas with aggregations of extant longleaf ecosystems of sufficient size, integrity, protected status, and connectivity potential to sustain functional landscapes and populations of target species into the future. LITs organized around these SGAs and defined larger landscape boundaries surrounding them in which to work.

LITs are supported by an LIT Consul who facilitates best practices and communicates guidance and information between the LPC and LITs through opportunities like LIT Summits. Coordinators gather at Berry College to learn about montane longleaf restoration efforts. – Credit: Ryan Bollinger

review has provided critical evaluation of existing work and allows for adjustment and communication of updated strategies and actions as needed for the partnership at large. For the next 15 years, we envision creating 5-year SPA Plans, with the first 5-year plan to follow the most recent 2022-2024 SPA document. The SPA Plans will be designed to provide a more focused look at short-term activities needed to advance the goals and objectives of the Conservation Plan. More specifically, the purpose of SPA Plans will be to:

- Identify strategic priorities and recommend actions needed over the next five years that continue progress of America's Longleaf toward the restoration goals in this Conservation Plan.
- Integrate the latest technology, science, and knowledge into our landscape-scale approach.
- Provide mechanisms and metrics to track, measure, and demonstrate progress toward these goals.
- Provide outreach information describing America's Longleaf accomplishments to LPC members and other interested parties.
- Affirm and potentially expand the roles and contributions of current LPC members and supporters.
- Identify opportunities to engage additional partners in the longleaf conservation effort as well as opportunities to align with and leverage complementary conservation efforts beyond America's Longleaf.

Funding

The success of America's Longleaf depends on consistent funding to drive the work across all scales. Investment in longleaf pine ecosystem restoration and management comes from a broad array of contributors, ranging from federal, state, and local government agencies to conservation non-profits to individual landowners. Collectively, these investments contribute to the collaborative approach to landscape-scale restoration of this ecosystem. One example of this approach to longleaf funding is the Longleaf Landscape Stewardship Fund, a public-private funding partnership administered by NFWF. From 2012 to 2023, the Longleaf Landscape Stewardship Fund has awarded over 40 organizations more than $75 million in funding. We are thankful for the investments from federal partners, private foundations, and others that have generated over 21.6 million acres of accomplishments under America's Longleaf since 2010. To achieve our future goals, America's Longleaf must continue to grow and diversify its funding sources.

Strategies for Longleaf Conservation

The following sections detail strategies, objectives, and key recommendations to achieve the goals for maintaining, improving, and restoring longleaf forests range-wide. Six strategies are listed, but just as with ecosystems, many are interconnected.

The six strategies below identify objectives and key recommendations to address issues, opportunities, and challenges:

- Public Lands
- Private Lands
- Longleaf Ecosystem Restoration
- Prescribed Fire Management
- Economic and Market-based Financial
- Climate Resilience and Co-benefits

Pine barrens treefrog resting on a pitcher plant – Credit: Kameron Burgess

Public Lands Strategy

Issues, Opportunities, and Challenges:

Public lands continue to offer tremendous opportunities to contribute to landscape-scale conservation for longleaf. Inventories currently show that an estimated 37% of the existing acres in longleaf forest types occur on state and federal lands. Public lands are "core" areas for SGAs and can contribute to substantial gains in longleaf ecosystem conservation within National Forests, Department of Defense (DoD) lands, State Forests and Wildlife Management Areas, National Wildlife Refuges, and other public lands. Public lands also serve as important demonstration areas for longleaf ecosystem conservation and showcase management methodologies for private land managers.

Federal and state agencies play an important role in inspiring collaboration among partners and bringing coordinated conservation to the ground. Since the publication of the 2009 Conservation Plan, agency programs for fire suppression, prescribed burning, wildlife habitat, imperiled species management (to include at-risk, threatened, and endangered species), timber management, and plant ecology have become more integrated. This inclusive planning and program delivery accounts for the interrelated nature of land management. Integrated

Longleaf pine forests on public lands are used for a variety of purposes, including military training exercises. – Credit: Fort Moore Natural Resources Management Branch

programs are now reflecting a commonly defined set of desired conditions. However, opportunities still exist to better integrate and align programs to achieve desired conditions, gain efficiencies, and improve program delivery within longleaf forests. Execution of these programs relies on careful budget development to support the necessary conservation efforts.

Many of the existing longleaf forests with intact groundcover occur on public lands. These areas provide important ecological values and can serve as seed sources for understory plant material and source populations of wildlife species (e.g., Red-cockaded Woodpeckers and gopher tortoises). Efforts to inventory and manage intact groundcover to maintain their values allow these areas to continue to serve as sources of plants and animals for restoration. Inventory, implementation, and monitoring will work more effectively when conducted at the local level through stakeholder groups working collaboratively.

Many publicly owned land tracts are administered by different agencies. The tracts can be somewhat fragmented, of insufficient size to fully contribute to overall restoration goals, or inefficient to manage at a landscape scale. However, partners have been successful in connecting and building upon "core" public lands through interagency collaboration, the purchase of key additional lands from willing sellers, and the establishment of conservation easements through public or private efforts. More collaboration and integration between public lands, private lands, and LITs is needed to continue these successes in the future, maximize outcomes, and achieve landscape-scale benefits.

In 2017, the LPC assembled a Public Lands Task Force to explore the potential for increasing longleaf ecosystem restoration on public lands. The USDA Forest Service (USFS) responded by conducting an in-depth analysis on USFS land to determine 1) existing acres of longleaf pine; 2) acres with a minor component of longleaf pine; and 3) acres with the biological potential for longleaf pine (i.e., where longleaf pine should be). From this process came the Million Acre Challenge, a commitment by USFS to put one million additional National Forest System acres on the path to longleaf restoration based on specific criteria. Other public agencies are exploring similar processes to look for additional opportunities to restore longleaf ecosystem. As demonstrated through the Public Lands Task Force, restoration on suitable public lands has accelerated but needs to continue to be prioritized and appropriately funded. Increased capacity for training and staffing is also a priority to enable public land managers to more effectively manage lands that are suitable for longleaf pine.

Kisatchie National Forest – Credit: Randy Tate

Northern pine snake – Credit: Brady Beck

Objective A *Land management agencies (local, state, and federal) support longleaf pine ecosystem restoration on public lands and invest in appropriate management structures to accomplish work consistent with their mission.*

Key Recommendations

1. Integrate public lands programs to prioritize and support longleaf restoration, particularly in fire and smoke management, tree planting, forest management, seed production, nursery operations, and non-native invasive species control.
2. Prioritize land management and conservation actions at a landscape-scale that build resilient corridors, support and recover imperiled species, provide ecosystem services, reduce wildfire risk, enhance recreational opportunities, and increase resilience to climate change.
3. Continue to assess and quantify acres of longleaf that exist on public lands and seek additional opportunities for restoration where suitable and appropriate.
4. Promote the use of silvicultural practices to convert existing mixed stands with a minor manageable component of longleaf pine to longleaf-dominant stands.
5. Expand training for resource professionals in management and restoration techniques for longleaf.
6. Prioritize the identification, inventory, and maintenance of forests with intact high-quality groundcover for seed collection and restoration on public and private lands.
7. Support increased public land and easement acquisitions from willing sellers, especially where such acquisitions would enable management at the landscape level.

Objective B *Public land managers and local representatives in SGAs play a leadership role in implementing collaborative planning and management of longleaf pine ecosystem at the landscape scale.*

Key Recommendations

1. Continue to support LITs under America's Longleaf as a structure and mechanism to guide restoration through public/private coordination within SGAs and priority areas identified within the LSA.
2. Work with federal agencies at the regional and/or national level to support increased and improved cooperation and coordination for planning and management. Amend policies or authorities to allow management activities across jurisdictional boundaries by public and private parties.

Objective C *Land management agencies (local, state, and federal), longleaf partners, policymakers, and the general public understand the importance and role of public lands to longleaf restoration and the associated cultural, ecological, economic, and social values.*

Key Recommendations

1. Continue to engage with the Communications Working Group to maintain and build awareness and institutional and financial support needed to support longleaf restoration and management on public lands.
2. Maintain and create new communications materials and tools to secure the necessary engagement and support from a range of key external and internal decision-makers and allies.
3. Host demonstration days on public lands as an outreach and education tool to show private landowners what can be achieved in actively managed longleaf pine ecosystems.
4. Promote community forests (e.g., held by counties, cities, and educational institutions, including historically black colleges and universities) for accessibility and reaching citizens at a broader level, as well as the educational and recreational opportunities these forests provide.

Private Lands Strategy

Issues, Opportunities, and Challenges:

Privately-owned lands account for approximately 86% of all forested land in the South and represent the greatest opportunity to achieve the Conservation Plan's acreage goal. Private forest owners can be divided roughly into two groups: small forest owners and large forest owners. Small forest owners are also sometimes referred to as family forest owners, though family ownership is part of both groups. For this discussion, small forest owners can be considered those that own less than 100 acres. Large forest owners range from individuals to institutions. Historically, vertically integrated forest products companies owned most of the large parcels in the region (i.e., industrial private forests), but more recently, that has shifted to publicly owned Real Estate Investment Trusts (REITs) and Timber Management Investment Organizations (TIMOs).

The development of the Private Lands Strategy is focused primarily on small forest owners because they own approximately two-thirds of forested lands in the Southeast, generally have more flexibility to make land use changes, and have more opportunities and quicker timelines to restore or improve longleaf pine forests. However, this also means more opportunities to quickly lose longleaf acres when a parcel is harvested for any number of reasons. Large private forest owners, including REITs and TIMOs, offer landscape-scale opportunities for ecosystem restoration. Southern forests are considered the wood basket of North America, and planted loblolly pine stands contribute substantially to the region's ability to produce raw material for traditional wood products. However, advances in longleaf pine genetics, improved understanding of tree growth and yield, and site-specificity make longleaf pine a very viable option on an increasing number of privately held acres.

The Private Lands Strategy is a crucial component of this Conservation Plan because the actions by private forest owners affect most of the other plan strategies. While private lands represent the greatest opportunity, the conservation actions on their lands are inherently voluntary and, therefore, it is incumbent that small private forest owners are aware of the range of benefits that a healthy longleaf pine ecosystem provides beyond high-quality merchantable timber (e.g. native wildlife habitat, recreational opportunities, protection of the water supply, natural beauty) as well as the periodic maintenance and adaptive management activities required to restore and maintain healthy longleaf pine forests. Raising the awareness of all the benefits and challenges of managing longleaf pine ecosystems requires coordinated outreach, education, and technical assistance efforts by the partners. Before pursuing large private landowner projects, it is important to understand the scope and scale of the potential outcomes as well as the fiduciary constraints and corporate responsibilities.

Since America's Longleaf began reporting annual accomplishments in 2010, private lands have accounted for

The Hodges Model Farm was established to demonstrate sound stewardship practices and provide landowner-to-landowner learning experiences – Credit: Tiffany Woods

Credit: Henderson Family Trust

approximately 83% of the newly established acres. The rate of establishment on private lands will need to increase over the next 15 years to achieve the Conservation Plan's acreage goal. An increase in the rate of establishment means that many thousands of previously uninvolved landowners will need to become new participants, and a key demographic of these new participants will need to be historically underserved forest landowners. Engaging new participants often requires multiple points of engagement by practitioners, including meetings with prospective landowners, education about longleaf pine ecosystems, technical assistance with developing a forest management plan, and financial assistance to implement the restoration work.

Both the private forest owners and the agencies or organizations that may be assisting them share in the investment in longleaf pine ecosystem restoration. Selecting where to invest is critical to the success of the Conservation Plan because it has both upfront and long-term maintenance costs. The most successful efforts occur when the landowner has favorable site conditions and is committed to managing their longleaf pine and herbaceous understory as a longleaf pine ecosystem. The agencies and organizations providing technical and financial assistance need to prioritize where they invest their limited funding and incentivize specific management actions that will deliver the greatest conservation benefits. A complementary approach for long-term maintenance is to invest in community-led organizations that promote self-sustaining healthy longleaf pine ecosystems without future financial support.

Since the original Conservation Plan was developed in 2009, America's Longleaf has grown substantially and with it so have the opportunities provided by the partners to support small private forest owners. Support by partners comes in three general forms: education about longleaf pine ecosystems, technical assistance in planning and management, and financial assistance to help cover some of the cost of implementing conservation practices. One of the strengths of the partnership is that support to small private forest owners can come from a variety of sources including federal agencies, state agencies, NGOs, private granting programs, and dedicated individuals who care about longleaf pine ecosystems. Matching an individual or family with the right type of support takes a concerted effort by all the longleaf practitioners. Large forest landowners are generally not eligible for the same technical and financial assistance as small forest owners due to eligibility requirements. However, the opportunity for large forest landowners to deliver conservation benefits across a large landscape with a single agreement highlights the need to explore innovative collaborative approaches.

One of the main sources of support for small private forest owners comes from the USDA and the programs under Farm Bill authorities. Since 2009, the scope of these programs and agencies providing support has grown. For example, NRCS created the Longleaf Pine Initiative in 2010 and Working Lands for Wildlife - Gopher Tortoise in 2012 as Landscape Conservation Initiatives to focus agency resources for conservation actions in the longleaf pine range. Other federal agencies such as the USFS, U.S. Fish and Wildlife Service (USFWS), and DoD have also dedicated programs to support private forest owners in the Southeast. Along with the federal programs, there are many other incentives offered by states, municipalities, and NGOs to private landowners to help restore longleaf pine ecosystems.

Table 1

Federal Technical and Financial Assistance Programs for Private Forest Owners	
Conservation Reserve Program (CRP)	Farm Services Agency
Conservation Reserve Enhancement Program (CREP)	
Environmental Quality Incentives Program (EQIP)	NRCS
Conservation Stewardship Program (CSP)	
Conservation Innovation Grants Program (CIG)	
Forest Stewardship Program (FSP)	USFS - State, Private, and Tribal Forestry Program
Partners for Fish and Wildlife Program (PFW)	USFWS
Land Protection Programs	
Healthy Forest Reserve Program (HRFP)	NRCS
Agricultural Conservation Easement Program (ACEP)	
Forest Legacy Program (FLP)	USFS - State, Private, and Tribal Forestry Program
Proposal-Based Programs for Landscape Scale Projects	
Readiness and Environmental Protection Integration Program (REPI)	DoD
Sentinel Landscapes Partnership	
Longleaf Landscape Stewardship Fund	NFWF
America the Beautiful Challenge	
Joint Chiefs' Landscape Restoration Partnership	NRCS & USFS
Regional Conservation Partnership Program (RCPP)	NRCS

Table 1: Examples of Programs and Other Funding Opportunities on Private Lands as of 2023

Smoke from prescribed burning on private property – Credit: Richard Broadwell

While tremendous accomplishments have been made on private lands since 2009, many challenges still exist in reaching the Conservation Plan's goals. Land ownership dynamics are often overlooked in relation to implementing conservation programs but are critical to getting work done. For example, as land is bought and sold, or passed down from generation to generation, the maintenance of, connection to, or the land itself may erode. In the case of heirs' property, the situation could be so complicated that the eligibility for federal assistance may be confusing, or the decision-making process too contentious for long-term planning. Also, absentee landowners can be difficult to reach and support. This can lead to landowners not implementing the necessary maintenance practices after restoration and the deterioration of longleaf stand conditions.

As discussed previously, the costs to restore and maintain longleaf pine ecosystems have been rising. Because of this, contractors may not be willing to take on the work if the parcel is too small to be economically viable, especially in the more remote places across the longleaf range. In other places, contractors may not be available to carry out the necessary work or there may be a lack of forestry professionals to develop a sound forest management plan. Even when a landowner has a forest management plan and the resources to carry out the work, there may be a lack of available seedlings for planting or there may not be the specialty market for them to sell their high-quality timber when the time comes for harvest. To overcome these new and growing challenges, novel solutions may be needed to supplement the tried and tested approaches that have been developed over the past 15 years.

Objective A *Small private forest owners are prioritized in strategic locations for financial assistance.*

Key Recommendations

1. Prioritize financial assistance to private forest owners in locations that have existing site conditions most suitable for restoration, can support desirable plant or wildlife species, will be managed in the long-term as high-functioning longleaf pine ecosystems, or connect two or more established high-functioning longleaf pine forest stands.
2. Incentivize management practices (e.g., prescribed burning) to support the long-term maintenance of healthy longleaf stands to private forest owners.
3. Provide incentives to private forest owners to keep healthy mature longleaf stands on their property rather than clearcutting.

4. Offer flexibility in financial assistance programs (e.g., planting densities, supplemental understory plantings) when the individual objectives would contribute to the long-term goals.
5. Encourage coordination between financial assistance and other incentive programs to offer alternatives to private forest owners seeking to restore longleaf pine ecosystems (e.g., Farm Bill programs vs. private carbon markets).

Objective B *The scope and scale of outreach and education to small private forest owners and forestry service providers is expanded.*

Key Recommendations

1. Encourage engagement between locally led organizations (e.g., LITs and private forest owners).
2. Share information with private forest owners on the range of benefits and tradeoffs of restoring longleaf pine ecosystems.
3. Promote private forest owner participation in management activities and peer-to-peer knowledge sharing (e.g., learn-and-burn workshops, prescribed burn associations).
4. Strategically focus outreach efforts on geographic places (e.g., regional corridors) identified as key to supporting the Conservation Plan goals.
5. Continue to improve upon an inclusive approach to providing equitable delivery of outreach and education to historically underserved family forest owners.
6. Support and share research and development to provide landowners the best available science-based information pertinent to family forest owners (e.g., growth and yield studies, tree improvement, silvicultural management techniques).

Objective C *The scope and scale of technical assistance to small private forest owners interested in longleaf pine ecosystem conservation is expanded.*

Key Recommendations

1. Encourage the development of forest management plans that consider the range of landowner objectives and contribute to the Conservation Plan goals.
2. Engage with forestry professionals (e.g., certified, registered, licensed, and consulting foresters) about the benefits and tradeoffs of longleaf pine forests when writing forest management plans.
3. Promote the inclusion of prescribed burning in forest management plans for the long-term maintenance of longleaf pine ecosystems.
4. Develop and share technical guidance on management alternatives (e.g., mechanical vs. chemical) with associated cost estimates for forest owners planning to maintain, improve, and restore longleaf pine forest stands.
5. Promote long-term estate planning for family forest owners that support the Conservation Plan goals (e.g., marketable carbon sequestration and water supply).

Objective D *Longleaf pine ecosystem restoration goals are coordinated with other federal, state, and local governments during strategic planning processes.*

Key Recommendations

1. Encourage stakeholders to participate in NRCS State Technical Committees, related subcommittees, or local work groups.
2. Coordinate interagency development and messaging about policy, recommendations, and cost structures.
3. Assess, update, and promote the role of longleaf pine ecosystems in the respective state planning documents (e.g., Forest Plan, State Wildlife Action Plan, climate plan, and water resources plan).
4. Coordinate inter-state planning with regional goals and logistics (e.g., nursery capacity to produce seedlings).
5. Facilitate cross-boundary demonstration site visits on public lands (e.g., national forests) to show landowners what can and is being done to restore healthy longleaf pine ecosystems.
6. Provide foundational training and on-boarding learning opportunities for new staff at partner agencies to facilitate knowledge sharing about the Conservation Plan.

Objective E *Investments in longleaf pine ecosystems are protected and preserved through expanded use of conservation easements.*

Key Recommendations

1. Provide information to private landowners on the options available for conservation easements (e.g., maintain an up-to-date listing of options based on geographic location).
2. Engage with large private forest owners to develop innovative conservation easements to support working lands and advance plan goals.
3. Encourage land trusts, government agencies, and other easement entities to consider prioritizing restored longleaf pine ecosystems.
4. Provide outreach to specific small private forest owners with high functioning longleaf pine forest stands about the availability and benefits of a conservation easement.
5. Enhance funding opportunities within the Farm Bill or other legislative programs nationally or locally within states that provide funding for conservation easement programs.

Objective F *Participation in longleaf restoration by large private forest owners is expanded through the development of new approaches.*

Key Recommendations

1. Actively engage large private forest owners as partners in America's Longleaf.
2. Provide education and outreach to large private forest owners focused on the advantages of longleaf pine forest management.

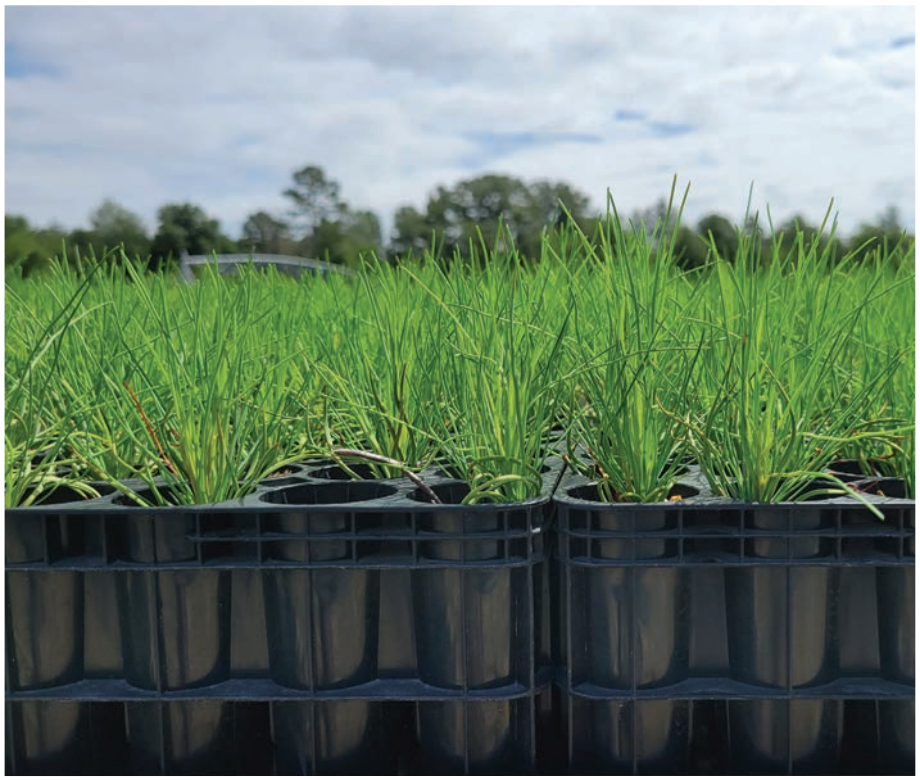
Longleaf Ecosystem Restoration Strategy

Issues, Opportunities, and Challenges:

Reaching the longleaf acreage goals set forth in this Conservation Plan is contingent on the successful reforestation (or afforestation) on an additional 2.8 million acres of land across the range, restoring or enhancing groundcover along with trees, and managing and conserving existing longleaf forests with an eye on maintaining ecosystem function. This approach employs techniques that maximize survival and growth of the trees, maintains the species rich groundcover layer to support biodiversity and prescribed fire, and ensures that the forests thrive over a long period of time as to fully realize their ecosystem benefits. The societal benefits of restoring healthy longleaf forests include economic and environmental benefits partially recognized today, and greater resilience for a more challenging world ahead.

Communication, technical assistance, and demonstration of best practices are key tools that can be used to ensure long-term restoration success. Demonstration and reference sites provide real land management examples that are needed to assist landowners and technical service providers with learning opportunities. By working with policymakers to expand cost-share programs, making landowners aware of available assistance, and providing training to those delivering restoration services could make this component of restoration more accessible to those in need.

Range-wide restoration of longleaf pine ecosystem is a high priority for dozens of federal, state, industry, and NGO partners, but progress is currently limited by every aspect of the reforestation pipeline. These limitations arise from the very starting point, from cone production through collection, and then in seed extraction, processing, and storage, carrying over into nursery capacity and production. In addition, longleaf pine tree improvement is foundational to our ability to produce high-quality, well-adapted seedling selections. Quality and quantity limitations directly impact site preparation and planting decisions. Addressing bottlenecks at each step of the supply chain will accelerate the restoration of longleaf pine and the unmatched diversity of longleaf pine ecosystems.



Longleaf pine seedlings – Credit: Carol Denhof

Tiger swallowtail visiting blazing star – Credit: Carol Denhof

Restoring longleaf is typically more expensive than other southern pines and that cost difference can be a stumbling block in engaging private landowners. Because of the higher price tag, incentives play heavily into land management decisions for private landowners, and the financial assistance programs that support longleaf restoration and management practices are crucial to continuing success. Policy makers have the opportunity to maintain or expand these programs in tandem with the expansion of tree production capacity. These programs can be improved to be better aligned with tree nursery and silvicultural practice schedules to increase landowner engagement and, in turn, boost nursery production confidence.

Besides providing essential fuels for prescribed fire management, understory communities in longleaf forests provide a number of ecosystem services impacting biodiversity, water quality, soil health, and carbon storage. Cost of seed, access to appropriate seed and plant material, and limited technical capacity for implementing groundcover restoration continue to be restrictions for landowners that are interested in restoring this key component.

Through either commercial seed producers or wild seed collections, supplies of ecologically appropriate native seed are increasingly available for most longleaf pine ecosystem communities across the range. To expand this even further and working within SGAs, LITs have the opportunity to work cooperatively to share collected seed supplies, seed harvesters, and planting equipment.

High quality groundcover sites that are suitable for seed collection are limited and can only supply a small portion of the needed seed for restoration. Borrowing from agricultural practices such as those that are used for production of food crops, partners across the range have cultivated native seed production fields to meet seed collection needs. Strategically converting former agricultural or otherwise disturbed sites to this use could be an effective strategy in ensuring appropriate seed availability within priority landscapes.

Objective A *Awareness and involvement among resource managers and landowners in efforts to manage and restore functioning longleaf pine ecosystems is increased.*

Key Recommendations

1. Provide technical assistance, outreach, and training that emphasize the importance of using an ecosystem approach to longleaf establishment and management. Specifically address best management practices needed for maintaining forest health, retaining quality groundcover, and controlling non-native invasive species.
2. Provide technical assistance and outreach to landowners and land managers in guiding the maintenance of existing high-quality longleaf forests to reduce continued loss of habitat.
3. Establish new and utilize existing demonstration areas that serve as reference sites for longleaf restoration projects.
4. Promote the use of compatible practices in production of both timber and non-timber forest products (e.g., pine straw) that can support ecosystem function while delivering economic benefits to the landowner.
5. Promote longleaf for reforestation following disaster-related events and work with funding agencies to offer flexible, cross-boundary incentives to offset expensive costs of cleanup.
6. Utilize communication and outreach tools to market the advantages of the longleaf ecosystem with the goal of attracting more landowners to choose longleaf over less resilient pine species.
7. Support workforce development for critical restoration contractors (i.e., planting crews, prescribed fire applicators, site prep contractors.)

Objective B *Tree seedling quality and quantity are substantially increased to meet the planting goals of the Conservation Plan while ensuring that financial assistance and incentives for landowners, agencies, and those in the private sector are maintained or increased.*

Key Recommendations

1. Leverage public-private partnerships to build nursery capacity and confidence.
2. Expand longleaf tree seedling production capacity in the public and private sectors.
3. Improve the genetic quality of longleaf pine seed and seedlings produced for restoration through the implementation of a Longleaf Tree Improvement Program.
4. Increase seed production capacity (e.g., maintain existing and establish future seed orchards, update seed collection equipment, and ensure availability of multiple dedicated contractors for wild collections)
5. Increase capacity and locations for seed processing and storage.
6. Increase skilled workforce capacity in public and private sectors for all stages of seed and seedling production.
7. Identify and utilize appropriate private lands for longleaf pine seed collection.

Objective C *Native groundcover seed and plant material production capacity is expanded and supported to meet increased demand for affordable, diverse, and ecologically appropriate materials for restoration. Information is communicated to landowners, managers, and agencies to promote the importance of groundcover restoration in longleaf management.*

Key Recommendations

1. Provide communication on the values, benefits, and estimated cost of restoring native groundcover in longleaf pine forests targeting landowners and policy makers.
2. Expand financial assistance programs to provide greater support for groundcover restoration on private lands.
3. Support the further development of a native groundcover seed market by promoting commercial seed producers, Plant Materials Centers, and other nurseries that are growing plant materials from longleaf ecoregions (i.e., ecotype seed).

4. Establish seed co-ops to identify and share needs, monitor collection areas, share collecting and planting equipment, and manage the distribution of seed collection in priority landscapes.
5. Establish seed collection fields in areas such as former agricultural lands or utility/industrial rights-of-ways that can improve efficiencies for native species seed collection.
6. Provide technical assistance and outreach to educate landowners, managers, and contractors on best management practices for groundcover collection and planting.
7. Coordinate with nurseries to expand capacity for growing groundcover plant materials for restoration.

Prescribed Fire Management Strategy

Issues, Opportunities, and Challenges:

Nature and humans have a long history of shaping the longleaf ecosystem and its ecological processes through fire. Longleaf pine ecosystems were historically maintained by frequent fire (every 1-5 years on average) from both natural and Native American ignitions and burned at large scales across an unfragmented landscape. Today, the Southeast is fragmented, and land use changes have altered natural fire patterns. Applying appropriate fire regimes in longleaf forests at site and landscape scales is essential in achieving the goals of this Conservation Plan.

Restoring natural fire regimes at scale involves many challenges. Some are regulatory, such as the need to address air quality. Other challenges are more practical, such as the lack of capacity to conduct burns, applying fire in the growing season, or burning in increasingly urban and fragmented landscapes. Further, increasing temperatures and changes in the climate are narrowing the opportunities to conduct burns. Even more fundamental is the widespread lack of public understanding of the positive role of fire. Neither the essential, ecological role of fire nor the tradeoffs between prescribed fire smoke and wildfires are universally recognized. To meet the goals of this Conservation Plan, each of these challenges must be addressed and solutions found to allow the expanded use of prescribed burning.

Estimates of longleaf pine forest extent and condition, such as those found in the LEO Geodatabase, are needed to plan, implement, and monitor goals for fire under this Conservation Plan. These types of inventories are also essential for understanding and addressing potential air quality impacts.

Under the federal Clean Air Act, states are required to prepare air quality plans called State Implementation Plans (SIPs) that include the regulations and actions each state decides are necessary to protect air quality. Smoke from wildland and prescribed fire contains substantial amounts of particulate matter and other pollutants which may adversely impact air quality. Therefore, states may evaluate the air quality impacts of current and projected future prescribed burning activities and will decide if limitations are needed.

The many benefits of a natural fire regime include scarifying and enriching soils, promoting seed germination, reducing vegetative competition, controlling insects and disease, diversifying forest structure, enhancing wildlife habitat, moderating fuel loads, and reducing catastrophic wildfire risk.

Prescribed fire on Eglin Air Force Base – Credit: Alexis Feysa

In some areas and situations, smoke impacts on air quality may restrict prescribed burning. Air quality agencies, fire managers, and land managers should communicate and collaborate regarding burn management practices, expectations, and processes for gathering and sharing information to minimize the air quality and human health impacts of prescribed fire smoke. It is well-recognized that intentionally planned and well-managed prescribed burns generally produce far less air emissions than uncontrolled wildfires. The U.S. Environmental Protection Agency's (EPA) 2016 Exceptional Events Rule encourages prescribed burn practitioners to use basic smoke management practices (BSMPs) or to follow state-specific Smoke Management Programs (SMPs) to protect public health and welfare by mitigating the impacts of air pollutant emissions on air quality and visibility.

Liability for smoke and escaped fires is an important consideration and a great concern for fire practitioners. Many states have no system to manage liability exposure from an escaped prescribed fire. Legislation exists in some states to provide fire management service providers, either public or private, some protection from liability provided those service providers are trained, certified, and conduct their activities in accordance with acceptable standards. This legislation has not been widely tested in courts. Minimizing the risk of liability will require increasing the understanding of—and perhaps modifying—prescribed fire laws, developing robust and affordable liability insurance, and promoting public communication and outreach to alleviate concerns about fire-related risks.

Dependable and accessible sources of sustained funding is needed to engender large numbers of private landowners

Burn crew member laying fire on private land – Credit: Randy Tate

Young gopher tortoise in recently burned habitat – Credit: Reese Thompson

to prescribed burn at a frequency needed to have lasting impacts on restoration goals. Restoring fire use is inexpensive compared to other treatment methods. However, costs can still be prohibitive for some. Upfront costs, such as those needed to establish fire breaks or reduce large fuel loads in long-unburned stands, are greater than the recurring costs which could diminish over time with repeated burns. Still, for most private landowners, the repeated costs of applying fire at the frequency required to maintain longleaf ecosystem conditions are not recovered until a traditional timber harvest is conducted well into the future. While many financial incentive programs for landowners exist to offset costs, some programs limit the number of applications accepted, cap funds for distribution, or lack funds to offset repeated prescribed fire treatment costs. Options for landowners to conduct cost-effective repeated burns could include sharing of resources, bundling contracts for an economy of scale, or utilizing shareable equipment trailers. While the social and ecological services provided by private landowners who apply fire management are important, not enough is being done to incentivize these treatments and address the cost to landowners.

The Southeast has a shortage of prescribed burning practitioners and services. Capacity to conduct prescribed burning rests mostly with federal and state agencies and select NGOs. Although private family forest owners and managers may conduct their own burning, the necessary training and experience can be difficult for them to obtain. Consultants and other service providers are not numerous enough to achieve restoration and maintenance goals across the longleaf range. They too could benefit from increased training and are faced with obtaining liability insurance that is often prohibitively expensive. On days when the weather is conducive to burning, burn managers and equipment are pulled in a multitude of directions and are often unable to meet the demand. Opportunities may exist to increase prescribed burn capacity by expanding ecoregional fire management strike teams and organizing local fire management cooperatives. Community-based cooperatives such as Prescribed Burn Associations can play a vital role in both applying prescribed fire and education to the larger community.

Increasing the acreage of longleaf maintained by fire is not only a matter of increasing practitioners and resources, but

also increasing the ability to burn larger acreage, burn within embedded natural communities (such as isolated wetlands) over time, and take advantage of good fire weather conditions year-round. Strategically developing fire plans over time could include growing season and night-time burning, when feasible, and increasing the acreage burned with the same resources by reducing fuel loads, eliminating interior fire breaks, using innovative ignition techniques, and taking advantage of wildfire.

While control of wildfire is a major effort of federal, state, and local entities, their strategies often fail to explicitly address the relationship of wildfire control and prescribed burning. Furthermore, prescribed burning services offered by state agencies are often limited by budget constraints. Assessments of capacity and funding for wildfire control offer opportunities to leverage resources and provide for more integrated planning to achieve multiple objectives and to better integrate wildfire suppression and the application of prescribed fire.

We continue to build upon our understanding of the role of fire in our communities and landscapes. The effort to restore healthy forests through prescribed burning will require a combination of science and traditional fire knowledge (i.e., fire-related knowledge, beliefs, and practices that have been developed and applied to specific landscapes for specific purposes by long-time inhabitants). While the science of prescribed fire is well understood, applying traditional fire knowledge to a landscape that is largely owned by diverse private landowners will require a long-term approach.

Objective A *Ample institutional capacity is available for prescribed burning, particularly in SGAs.*

Key Recommendations

1. Increase access to, communication about, and the number of hands-on, classroom, virtual, and hybrid training opportunities for practitioners.
2. Leverage wildland fire control resources to expand planning and application of prescribed fire.
3. Expand the prescribed fire workforce, particularly in wildland-urban interface areas that need additional technical assistance and community planning.
4. Foster cross-agency working relationships in implementing prescribed burns.
5. Build strong partnerships, especially with state forestry agencies, to advance prescribed fire implementation at a sustainable fire return interval across the longleaf range.

Objective B *Prescribed burning is conducted at the levels needed to maintain, improve, or restore the longleaf pine ecosystem on private lands.*

Key Recommendations

1. Increase financial incentive opportunities to conduct burning at the appropriate scale and frequency on private lands.
2. Increase training and services to facilitate private landowners' ability to apply prescribed fire treatments.
3. Increase landowner access to available experienced certified burn managers to meet their prescribed fire needs.

Objective C *Regulatory and land management agencies and other prescribed fire stakeholders will effectively collaborate to facilitate the continued use of prescribed fire as a land management tool.*

Key Recommendations

1. Build upon existing and create new messaging, education, and outreach campaigns to increase understanding, acceptance, and application of prescribed fire.
2. Identify appropriate changes in federal, state, and local laws and policies needed to address constraints or impediments in the application of prescribed fire.
3. Work cooperatively with the EPA and state air quality agencies to facilitate using prescribed fire to its fullest extent while complying with state air quality laws.
4. Encourage the use of basic smoke management practices by prescribed burners.
5. Ensure coordination and collaboration at the regional, state, and local levels to implement this Prescribed Fire Management Strategy.

Objective D *Models and tools are used to better target where and how prescribed burning resources should be invested.*

Key Recommendations

1. Use tracking systems, decision support tools, and mapping to assist with the prioritization of fire implementation needs.
2. Encourage and provide support for states to collect consistent burn data, including tracking where and when agencies, organizations, and individuals have burned.
3. Use smoke models or other tools to investigate the expansion of burn windows, including growing season and night burning considerations, where applicable.

Economic and Market-Based Financial Strategy

Issues, Opportunities, and Challenges:

Longleaf pine forests provide landowners and managers with a variety of economic opportunities, and among all southern yellow pines, longleaf forests best combine economic and environmental benefits. Because many of the environmental benefits, such as wildlife habitat, water quality and quantity, and carbon sequestration, accrue with time, longer rotation lengths can be made more feasible with the production of premium economic products. When managed properly, longleaf pine excels in the production of premium products compared to competing southern yellow pines, and the strength and yield of timber products also improve substantially beyond age 40.

Tongue and groove longleaf heartpine flooring – Credit: Ad Platt

Longleaf can and does appear in every commodity market locally available to other southern pines including pulpwood, chip-n-saw, or conventional sawtimber. Due to its inherent superior wood quality, longleaf is desirable and excels beyond commodity applications and markets, and the greater strength, heavier weight, and higher durability of longleaf pine wood make it preferred for premium load-bearing products such as poles, pilings, flooring, and machine stress-rated (MSR) lumber. Premium products from younger stands may include longleaf pine straw, which can be managed ecologically to preserve desirable understory or managed intensively to maximize income. Longleaf pine straw can command a premium price because of its durability and ability to retain a desirable color longer.

There is a high degree of variability and availability of markets for older wood in the southeast, and stronger markets are needed in many parts of the longleaf range. Today, longleaf lumber often goes offshore for cabinetry, as do other premium-grade logs. Because of an increasing surplus of timber and insufficient market demand, lumber prices have become decoupled from stumpage prices paid to landowners. A highly experienced and connected professional forester can sometimes negotiate a better price for premium wood where markets exist for premium products. There is also a need for improved marketing to buyers and end users to articulate the benefits of older stands, simultaneously providing both economic and environmental benefits.

The wood pellet industry continues to expand in the southeastern United States. Pellet or biomass production creates a new opportunity for longleaf stand management, enabling the removal of low-grade hardwood and offsite pine competing with longleaf. Having a market for thinning material changes a cost into an opportunity and is a

In addition to traditional timber-based income, longleaf forests provide opportunities for landowners to participate in new and emerging markets such as carbon and water – Credit: Lisa Lord

Outdoor enthusiasts are a driving force in conservation and represent an important income opportunity for landowners – Credit: Lynn Norman

potentially game-changing development for landowners and longleaf restoration. Post-harvest, planting harvested areas in longleaf pine and/or properly managing them after vegetation is removed is critical.

A noteworthy development in the wood industry is the rapid expansion of mass timber (GluLam, cross-laminated timber (CLT), etc.) in the South as an alternative to steel and concrete construction. This is driven by the massive advantage of long-term sequestration of renewable carbon in long-lasting wood construction. Targeted outreach to designers, builders, and architects could potentially lead to an increase not only in mass timber products but also in longleaf pine products for their beautiful aesthetic qualities.

Payments for ecosystem services (PES) programs are emerging through a variety of public and private market financing mechanisms and private and corporate investments. Many corporations are looking for sustainability within their supply chains, and as a result, have developed sustainability goals. Longleaf forests can help meet many of their objectives. Optimizing longleaf forest management to fulfill several co-benefits is preferred and will realize the greatest benefits to society in lieu of maximizing one benefit over others. Biodiversity credits are largely conceptual but continue to develop. Other ecosystem service markets have increased substantially over the last decade. Water markets have developed or are developing in several local watersheds across the Southeast. Carbon offset programs have experienced the largest growth with several programs and term lengths available to landowners. A trend to watch is the increasing choice of corporations to own forests for their carbon value, as opposed to purchasing carbon offsets through agreements with forest landowners.

Local communities benefit from their close association with longleaf forests through enhanced real estate and recreational values, and lower wildfire, windstorm, insect, and disease risks. Also, niche markets offer opportunities for specialty products like honey, wildcrafting, and ecotourism. Silvopasture systems are being tested and research is ongoing to inform and promote combined longleaf and forage production. Training of consulting and service foresters in these specialty markets continues to be expanded.

Hunters, anglers, and outdoor enthusiasts comprise the centerpiece of a powerful economic engine that has helped to place the United States as the world leader in conservation. In addition to building our nation's conservation network, sportsmen and women, landowners and managers, and outdoor enthusiasts are on the front lines of climate change, often witnessing declines in landscape health and resiliency as well as impacts on our nation's fish and wildlife resources. In 2021, the U.S. Department of the Interior reported that spending

associated with hunting alone generated more than $185 million per day, and over 100 million Americans in the last five years have participated in hunting, fishing, and wildlife watching. This group represents 40% of the U.S. population aged 16 and older. Hunters and anglers have been a driving force in conservation for decades and represent both an important income opportunity for landowners and a key audience to support the continued efforts of America's Longleaf.

Land ownership and landowner demographics continue to change, as do their objectives in owning land, increasingly towards recreation and wildlife or as a retreat. There continues to be a need to understand current and emerging landowner objectives and goals and to engage with their needs for economic return, particularly of those with large ownerships in SGAs. Landowners continue to face economic barriers with longleaf forests as with other forest management. The lack of strong market competition in many locations means landowners must work with the market they can reach. These valuable stands generally require greater investment to establish, higher management costs, particularly with fire, and longer investment horizons to recover these costs. Carrying these costs must be offset by early or periodic income and stacking multiple income streams through time. Specialty and emerging markets, coupled with public and/or private payments to enhance public benefits, can offer economic returns to overcome management costs.

Longleaf pine ecosystem resilience and co-benefits including carbon sequestration are addressed in the Climate Resiliency and Co-benefits Strategy section of this Conservation Plan.

Objective A *Awareness and understanding of current and new financial-based market opportunities for longleaf forests and products is increased among communities and sectors of interest including private landowners.*

Key Recommendations

1. Communicate relevant and current information on market opportunities, economic incentives, and the economic, social, and ecological trade-offs of longleaf pine forest management through outreach to landowners and land managers, consulting foresters and resource service providers, public audiences, and other communities of interest.
2. Continue studies and research to understand financial-based markets and the economic interests of landowners and communities that are key to sustaining longleaf restoration.
3. Develop risk avoidance analysis for longleaf resiliency (wildfire, insects and diseases, windstorms) and alternate silvicultural treatments.

Objective B *Economic opportunities and access to new and existing markets for longleaf forest products is increased for all forest landowners, communities, and society.*

Key Recommendations

1. Assist in the development of new ecosystem service markets for longleaf forests and other financial markets for premium longleaf products.
2. Promote the development, acceptance, and use of ecosystem market payments or conservation banking instruments for longleaf forests and their associated values.
3. Promote the development, acceptance, and application of new economic models that incentivize longleaf restoration at landscape scales and models that can capture public-private ventures, cross multiple ownerships, and provide longer-term stability to restoration.
4. Assess developing and emerging industries, their impacts on longleaf restoration, and opportunities to make them more compatible with longleaf restoration.
5. Remove barriers to market access for all landowners and provide increased assistance and resources for historically underserved landowners to better access economic markets.
6. Maintain or expand cost-share and incentive programs for landowners to support the implementation or initiation of longleaf restoration on their land and maintain longer rotations, including stands of high conservation value.

Climate Resilience and Co-benefits Strategy

Issues, Opportunities, and Challenges:

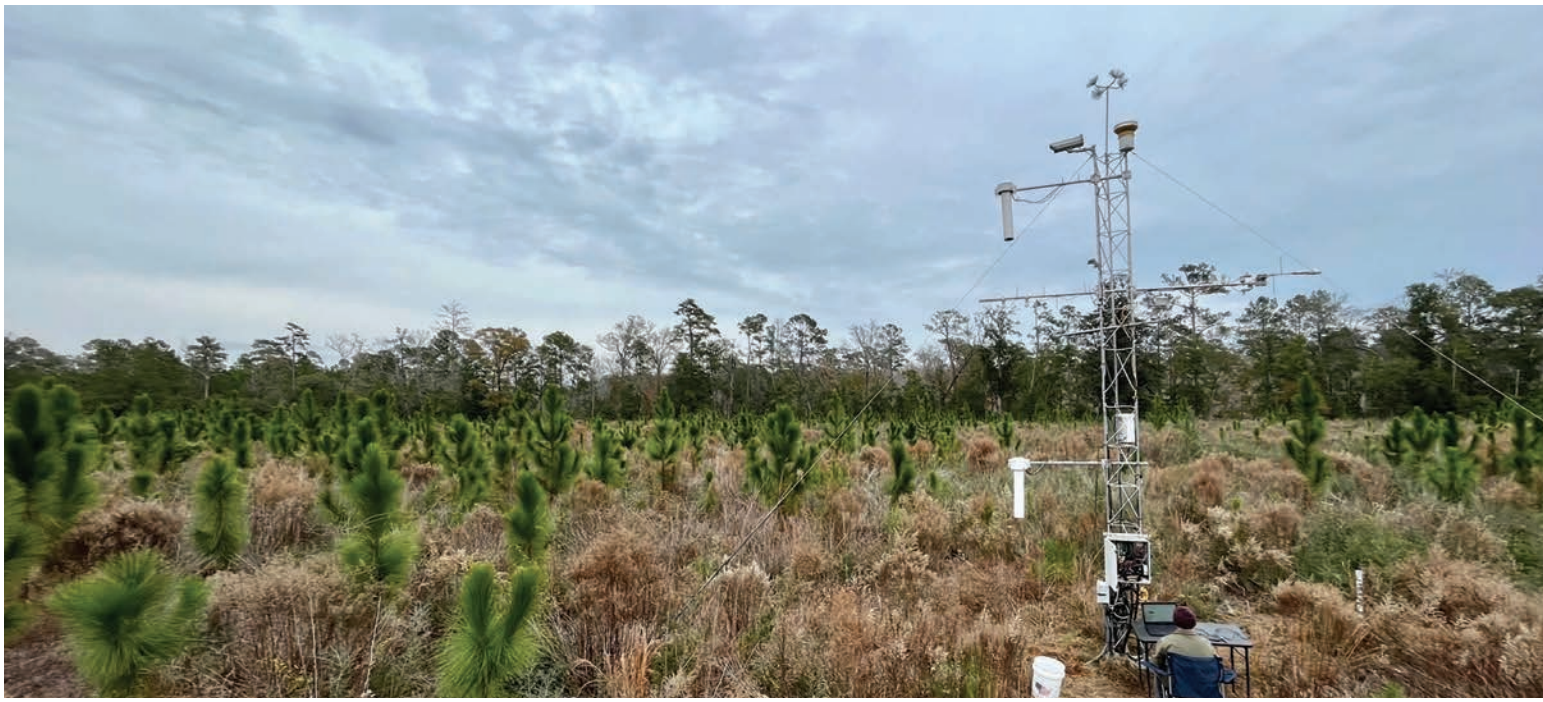
In a region shaped by fires, hurricanes, floods, wind events, and droughts, longleaf is a species built to thrive in harsh and variable environments. Restoring the ecosystem on the landscape is an ecologically and economically important strategy for preparing southern forests and the human communities that depend on those forests for a challenging climate future.

Forest resilience is the ability of a forest stand to withstand or bounce back after being affected by a stressor. Longleaf pine trees are resilient in a healthy forest, and prescribed fire management practices help strengthen the resilience of the forest stand. However, it is important to maintain intact longleaf forests and corridors of adequate size to create optimal resilience and space for species movement. Intensive forestry practices and fire exclusion over the past century have enabled loblolly (Pinus taeda) and slash (Pinus elliotii) pines to displace longleaf pine and become the preferred and promoted southern pine species of the forest industry. While these species are the foundation of the forest industry of the Southeast, research suggests longleaf can outperform loblolly and slash pine on appropriate sites in certain environmental stress conditions that may become more frequent over time. ***The traits of longleaf that combat those stressors include the following:***

a) **Drought Tolerance**—Climate models for the Southeast predict higher temperatures and intensification of the water cycle, meaning more periods of intense rain and flooding as well as dry periods with more intense drought. Mature longleaf have greater drought tolerance than other southern yellow pines.
b) **Fire Tolerance**—Longleaf pine seedlings and mature trees are significantly more fire tolerant than loblolly and slash pine. Fire tolerance is two-fold; the tree is more tolerant, and the way we apply fire and manage the stand adds to the degree of tolerance and risk reduction.
c) **Wind Resilience**—Modeling by the National Oceanic and Atmospheric Administration (NOAA) predicts that anthropogenic warming will intensify tropical storms in the Atlantic, with an even larger percentage increase in the destructive potential per storm. Studies on the aftermath of Hurricane Katrina and Hurricane Hugo have demonstrated longleaf can experience reduced rates of mortality and damage in comparison to slash and loblolly pine.
d) **Insect and Disease Resistance**—When trees become stressed, they are more susceptible to attacks by insects and pathogens. Research suggests that longleaf pine's copious resin production enables greater resistance to southern pine beetle (Dendroctonus frontalis) and other boring beetles han loblolly and slash pine.

In addition to the healthy habitat and biodiversity benefits that well-managed longleaf pine forests are known to provide, there are other co-benefits that make longleaf a useful forest type in the face of a changing climate. Lower basal areas that are characteristic of longleaf pine savannas and woodlands have lower evapotranspiration rates than densely stocked pine plantations, resulting in greater water yield. Modeling studies of a pine-dominated watershed in central Florida suggest management of longleaf pine savanna at a scale of 60,000 acres can yield tens of millions more gallons of water per day than densely planted pine stands. For localities where water availability is a concern, shifting forest management towards longleaf pine savannas holds potential as a water-conservation strategy.

As a species, longleaf pine has attributes that make it a good candidate for long-term carbon sequestration. It is longer lived than other pines and grows more vigorously later in its lifespan. Longleaf pine trees likely sequester carbon from the atmosphere at the same rate as other pine species; however, studies have shown that longleaf can sequester more carbon in their large taproots underground. Additionally, when high quality longleaf lumber is used in furniture, flooring, or other building materials, this prolongs the carbon storage value. Longleaf stands managed for lower basal area can result in trade-offs between carbon sequestration and conservation goals. In a well-managed longleaf forest stand, prescribed burning transfers some carbon back to the atmosphere that would otherwise partially work into soils. However, the carbon release of a catastrophic wildfire is much higher than smaller releases of an effective prescribed fire regime. Given the greater



Eddy Flux tower taking atmospheric measurements to understand the role of longleaf pine forests in carbon sequestration. – Credit: Tom O'Halloran

resilience and important co-benefits highlighted here, longleaf pine forests may be regarded as providing a more secure and valuable carbon credit compared to other forest types. These traits, combined with longleaf forests' habitat value, offer opportunities to mitigate the current challenges of the global climate and biodiversity crisis in southeastern United States forests.

Ecosystem markets and biomass are addressed in the Economic and Market-Based Financial Strategy section of this Conservation Plan.

Objective A *The effects of climate change on the longleaf pine ecosystem as well as the role longleaf restoration can play in mitigating climate change or adapting to such change is better understood.*

Key Recommendations

1. Promote more extensive scientific study of the potential effects of climate change on the longleaf ecosystem, including the tree species, plants and animals, movement of longleaf, and the importance of intact ecosystems to resilience.
2. Promote further study of the contributions that longleaf restoration and management (including prescribed fire) could play in carbon sequestration and adaptation to climate change. Review and understand the most current Climate Forestry reporting from agencies.

Objective B *A long-term vision of the beneficial role that longleaf forests play in ecosystem health and adaptation is well understood in the face of a changing climate.*

Key Recommendations

1. Promote the resilience and co-benefits of longleaf pine forests.
2. Monitor and communicate federal legislative proposals to assess opportunities (as well as possible constraints) presented to private landowners and the landscape-level initiative to restore longleaf.
3. Understand which corporations align with America's Longleaf goals and incorporate as champions/supporters of longleaf restoration and management when appropriate.
4. Provide consistent messaging and resources regarding the resilience, co-benefits, and adaptation value of longleaf forests.

Monitoring and Evaluating Progress

LEO field assessment – Credit: The Longleaf Alliance

A careful evaluation of progress and outcomes for the Conservation Plan's goals is necessary to determine if America's Longleaf conservation actions are being successfully implemented and if ecological goals are being met. These assessments support more informed management and decision-making at all levels of America's Longleaf. It is also vital to the telling of our story and securing resources for the future. The following sections detail the strategies, objectives, and key recommendations to evaluate progress toward achieving the goals identified in the Conservation Plan.

Understanding our Baseline

An important challenge for America's Longleaf has been the lack of consistent range-wide data on existing longleaf forests and their condition. The historic range is immense and ongoing forestry practices change forest structure and composition constantly. Without accurate data, it is difficult to understand baseline conditions and measure success at large scales. However, lack of data shouldn't paralyze a collaborative but instead inspire a method to collect it. FIA data was a key source of information during the inception of America's Longleaf and continues to be a valuable and consistent resource to estimate the extent of longleaf. Fortunately, a focus on developing innovative new tools and data products in recent years has bolstered our ability to understand our baselines and strategic priorities. Through leveraging tools such as the Southeast LEO Geodatabase and Southeast FireMap, America's Longleaf was able to develop a Longleaf Sustainability Analysis (Appendix B), which is a longleaf ecosystem-centric spatial analysis designed to facilitate the strategic, transparent, and evidence-based identification of the "right work" in the "right places" across the historic range of longleaf pine ecosystem. The LSA will support and guide America's Longleaf priorities and actions moving forward. We also recognize future progress and envision technology and new remote sensing tools will enhance or even replace our efforts to measure the extent and condition of this ever-changing longleaf landscape over the next 15 years.

Objective A New approaches and methodologies are explored and implemented for assessing extent of current longleaf pine ecosystems range-wide.

Key Recommendations

1. Work with FIA, LEO, and other appropriate projects and partners to improve methodologies and estimates of longleaf pine ecosystem acreage.

Objective B Measures are integrated into conservation outcomes for the America's Longleaf condition class metrics (Maintain, Improve, Restore) of longleaf pine ecosystems at both the stand/site/landscape and programmatic levels through a collaborative approach.

Key Recommendations

1. Establish a methodology to define and summarize longleaf pine forest stand condition class metrics using the LEO Geodatabase.
2. Identify the most important monitoring and research questions for the LSA (and potential future iterations) and invest resources to ensure prioritization of the "right work" in the "right places".
3. Support an increase in adequate funding levels for maintenance and enhancement of LEO as well as improved monitoring by all land managing agencies.

Monitoring Acreage Goals

As a next step to Understanding our Baseline, we also need to track progress and change. Based on FIA data, we recognize that losses are occurring across that range, but the root causes and scale of these losses are not yet known. A better understanding of losses and gains may lead to changes in strategies and key recommendations. Updates and monitoring with tools like FIA, LEO, and remote sensing products could answer our questions and help us track progress towards America's Longleaf Goals.

Objective A Improved monitoring methodology allows for tracking progress towards America's Longleaf extent and condition class goals.

Key Recommendations

1. Collaborate with FIA and other appropriate partners to improve longleaf ecosystem monitoring.
2. Using LEO as a platform, invest in further development of a statistically rigorous monitoring program that enables assessment of changes in range-wide extent and condition.
3. Invest in new technologies to better understand where change in longleaf extent is occurring and why.

Annual Accomplishment Reporting

To measure success, America's Longleaf has developed an annual approach to collecting metrics data from LITs, states, and agency staff. This approach has been adapted over the years to improve accuracy and ease of assembly. The primary metrics for America's Longleaf include acres of longleaf established (i.e., planted), longleaf gained through silviculture, prescribed burning accomplished, maintenance activities, and longleaf protected via easements or acquisition. Although time consuming and complex, this annual assembly of metrics is incredibly important to help evaluate progress, steer future work, and provide accountability for resources dedicated to America's Longleaf.

Objective A Longleaf accomplishment data are tracked annually across the range.

Key Recommendations

1. Collect partner accomplishment data and produce an annual Accomplishment Report.

Nontraditional Metrics

While not measured as a unit of success for America's Longleaf, there are other factors that could be considered as metrics for a successful collaboration such as partner engagement, landowner and community engagement and support, and climate mitigation. These could include different scales of work (local, statewide, and regional) and the number of engaged partner organizations. As of 2023, over 115 representatives and 60 organizations have served on the LPC, bringing diverse perspectives and expertise to the table that makes America's Longleaf a true collaborative effort. Another indicator of success is the number of partners/organizations with changed behavior through engagement in America's Longleaf.

America's Longleaf partners assemble metrics on human dimensions such as number of landowners with changed behavior (e.g., created forest management plan for longleaf or utilized a cost share program), number of people reached (e.g., participated in educational meetings, trainings, or technical assistance), number of people targeted (e.g., those landowners who receive mailings or are targeted through social media), and number of jobs created. Potential future metrics could include factors tied to community engagement such as underserved landowners supported through assistance programs or climate mitigation measured as carbon storage, wildfire reduction, and water quantity/quality. Prioritization should be given to metrics for which measurement is practical and attainable.

Objective A Nontraditional Metrics are integrated into America's Longleaf monitoring and planning efforts.

Key Recommendations

1. Identify metrics to be tracked through annual accomplishment reporting and SPA Plans and include nontraditional metrics where appropriate and achievable.

LPC Working Groups offer an opportunity to increase partnership engagement. For example, the Longleaf for All Working Group strives to advance an inclusive approach that increases minority participation in forestry-related programs, practices, and activities, and helps landowners reap the economic, ecological, and cultural benefits of owning forested land.

Lopsided Indiangrass – Credit: Randy Tate

Appendix A

METHODOLOGIES FOR ESTIMATING CURRENT LONGLEAF EXTENT

When America's Longleaf Restoration Initiative launched in 2009, there were an estimated 3.4 million acres in longleaf forest types according to 2008 estimates from the FIA plot data (2009 Conservation Plan). In 2023, continuing remeasurement of FIA plots bring the longleaf pine forest types total to 4.65 million acres. However, other data outlined below support an estimate of 5.2 million acres.

FIA recognizes two longleaf pine forest types; longleaf pine (pine > 50% of stocking, longleaf is dominant pine species) and longleaf pine/oak (pine species 25-50% stocking, longleaf is dominant pine species). Together, those two forest types comprise what is reported as "longleaf pine". FIA reports data from both analysis of plot data and "field call" estimates from survey crews and/or photointerpretation by FIA staff.

FIA field call data (FIA 2023), which summarizes the estimate of the forest composition in the broader area surrounding the plots, suggests the total of longleaf forest types to be 5.7 million acres. Taken together with the latest plot data, these numbers indicate that the current acreage falls somewhere in between 4.65 and 5.7 million acres, likely in the middle part of that range, or approximately 5.175 million acres.

Another way to arrive at an estimate of current longleaf pine forest acreage is to add the documented establishment acreage to the 2008 FIA plot data starting point of 3.4 million acres. Documented longleaf establishment from 2008 through 2022 is approximately 1.95 million acres, which suggests that there should now be 5.35 million acres of longleaf pine forest. However, FIA data also suggests that one of the two longleaf types, the longleaf-oak forest type, has lost approximately 170,000 acres since 2010. Subtracting this figure from 5.35 million leaves 5.18 million acres, remarkably consistent with the average of the plot data and field call data from FIA.

The Southeast Longleaf Ecosystem Occurrences (LEO) Geodatabase project is an inventory of known and potential longleaf pine forest acreage. Surveys initially focused on the Significant Geographic Areas (SGA) but are also now substantially complete in focal areas outside of SGAs. This database represents the only systematic survey of extant longleaf pine ecosystems and includes some level of information about condition. This project, while still incomplete, is a critical foundation for beginning to understand the status of the resource in greater depth, suggested as a priority in the original Conservation Plan. Some polygons remain to be surveyed, many potential sites cannot be accessed to survey, and known gaps exist in the database such as planted longleaf pine forest stands established outside of incentive programs. As of July 2023, the LEO Geodatabase project confirmed approximately 5 million acres of longleaf, with about 90% reported as dominant or codominant stands.

LEO has the potential to serve as a foundation for a more robust ongoing "dashboard" of longleaf pine ecosystem status. Also, the development of a formal monitoring and inventory program for longleaf pine ecosystem can complement and integrate with ongoing data collection efforts such as FIA and America's Longleaf establishment data to provide more accurate estimates of restoration progress in the future.

Appendix B

LONGLEAF SUSTAINABILITY ANALYSIS VERSION 1 EXECUTIVE SUMMARY

The Longleaf Sustainability Analysis (LSA) is a longleaf ecosystem-centric map analysis designed to facilitate the strategic, transparent, and evidence-based identification of the right work in the right places across the historic range of longleaf pine. The LSA combines map data about extant longleaf, suitable sites for restoration, landscape connectivity and other factors related to sustainability to prioritize areas on the landscape for implementation of restoration and conservation actions. The resulting priority maps are intended to support the objectives of the Range-wide Conservation Plan for Longleaf Pine (2025-2040) and other conservation work for the next 15 years.

In the 2009 Conservation Plan, America's Longleaf outlined the need for a long-term, science-based sustainability assessment, but also recognized that this work would require inventories and assessments that were not yet in place. With the recent development of the Southeast Longleaf Pine Ecosystem Occurrences (LEO) Geodatabase, the Southeast Fire Map, and other tools we now have sufficient information about the spatial extent, arrangement, and condition of extant longleaf pine to fulfill this need. The LSA approach also builds off the work and expertise of other regional prioritization projects like the SE Conservation Blueprint (SECAS 2022), Florida Critical Lands and Waters Identification Project (Oetting et al. 2016), and The Nature Conservancy's (TNC) Resilient and Connected Landscapes (Anderson et al. 2016). The LSA is unique, however, because it is longleaf-centric, range-wide and integrates a multi-faceted sustainability analysis into the priority maps. The LSA v.1, completed in summer 2023, was developed by Florida Natural Areas Inventory (FNAI) and University of Florida-Center for Landscape Conservation Planning (UF-CLCP) with funding from USDA NRCS through The Longleaf Alliance and U.S. Endowment for Forestry and Communities.

The LSA contains 3 categories of analysis that interact to prioritize places for both conservation and restoration of longleaf pine (Figure 1):

1) Extant Longleaf Significance: A map layer of longleaf pine sites with 'significance' values based on factors related to ecological condition, wildlife value, and landscape context.
2) Sustainability Factors: A sustainability map layer that weights and combines factors for landscape integrity, connectivity, ability to burn, and climate change resilience (Figure 2).
3) Longleaf Pine Suitability: A range-wide map layer of suitability values based on longleaf observation data and a combination of environmental variables including substrate, hydrology, fire regime, land cover, and climate.

The above analyses are combined to create 2 primary prioritization products for the LSA (Figure 1):

1) Priority Areas for Conservation and Management: A map layer of priority classes for extant longleaf pine ecosystems derived from the overlap of extant longleaf significance and sustainability.
2) Priority Areas for Restoration: A map layer of prioritized potentially restorable longleaf ecosystems derived from the overlap of longleaf suitability and sustainability.

The LSA v.1 Priority map layers (Figures 3 and 4) highlight areas for strategic investment of restoration and management resources, a need identified in the Conservation Plan. The LSA was designed and conducted at range-wide scale. The results may not align with local knowledge or priorities. Users are encouraged to review the LSA report to understand the methods and appropriate uses of the data and provide feedback to inform a next version of the LSA. We expect this work to evolve with future iterations as additional data become available, new analyses are conducted, and additional vetting occurs.

FIGURE 1

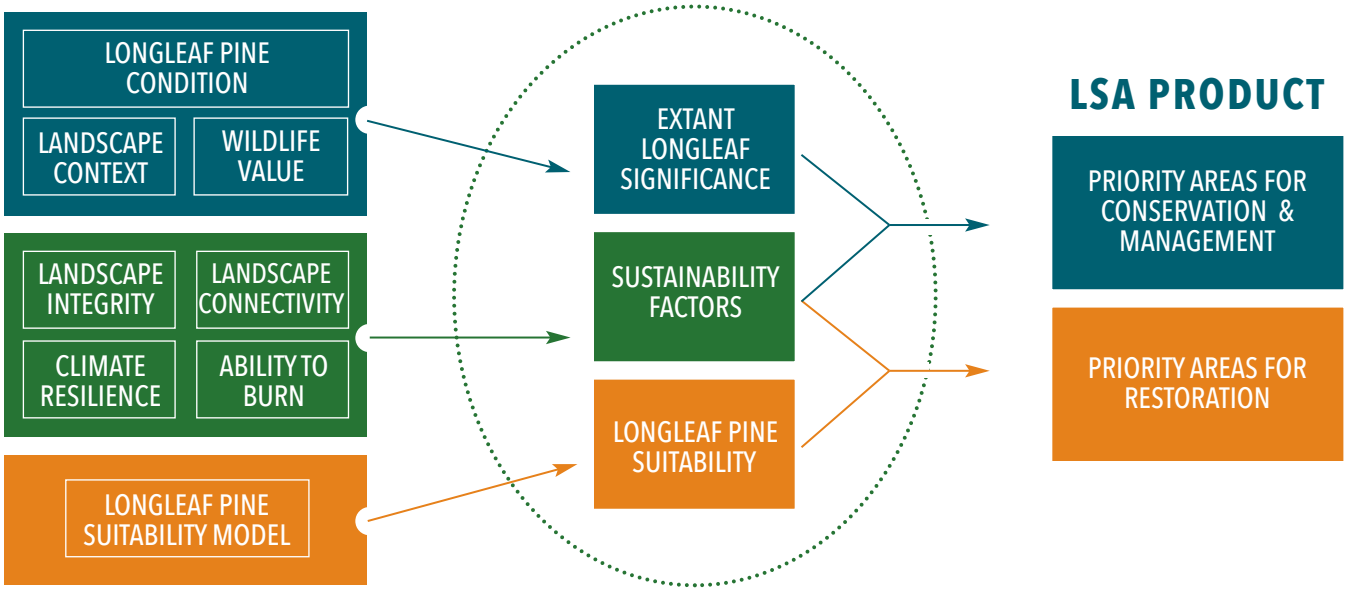


FIGURE 2

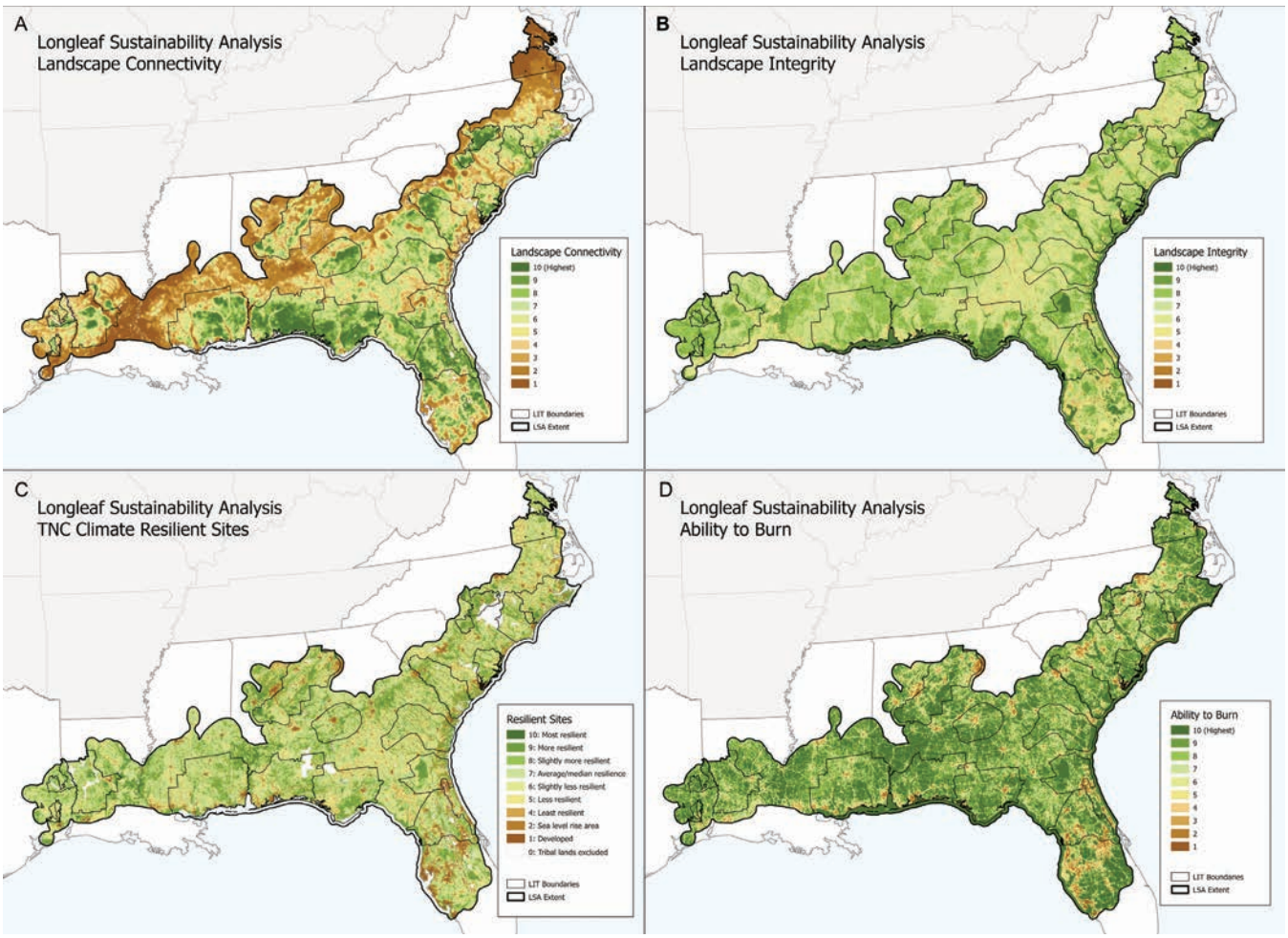


Figure 2. Map components used in the LSA Sustainability weighted overlay analysis: A) Longleaf Landscape Connectivity; B) Landscape Integrity; C) TNC Climate Resilient Sites; D) Ability to Burn.

FIGURE 3

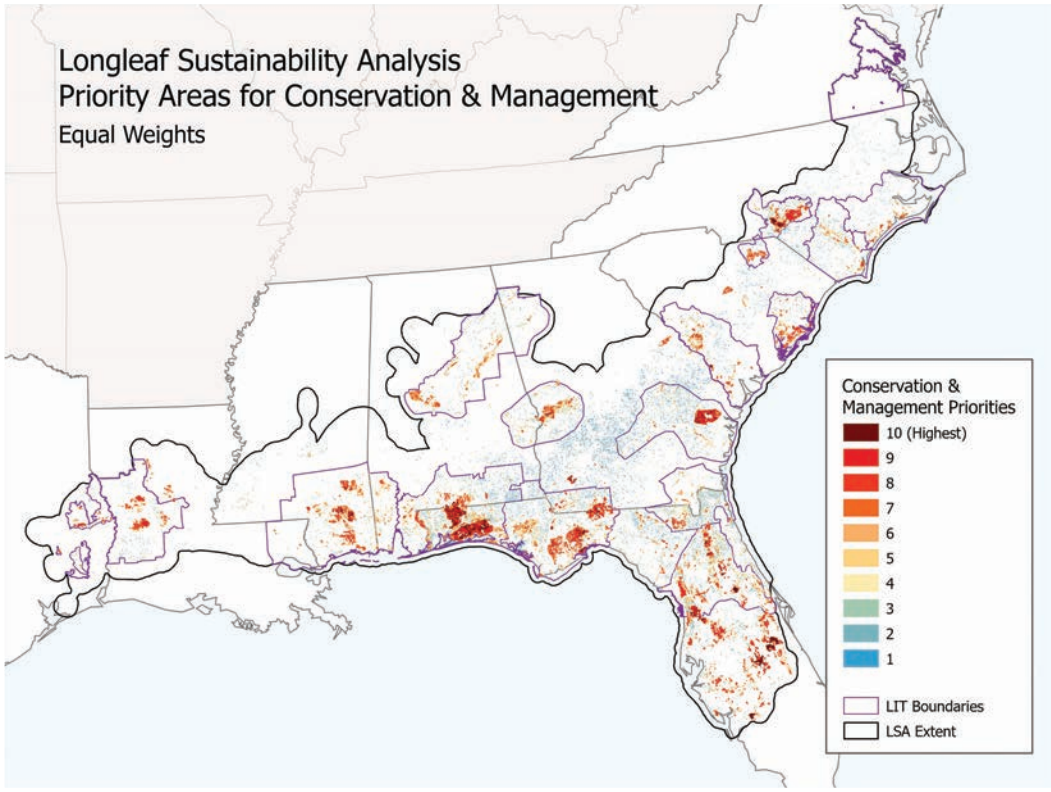


Figure 3: Priority Areas for Conservation and Management of extant longleaf pine.

FIGURE 4

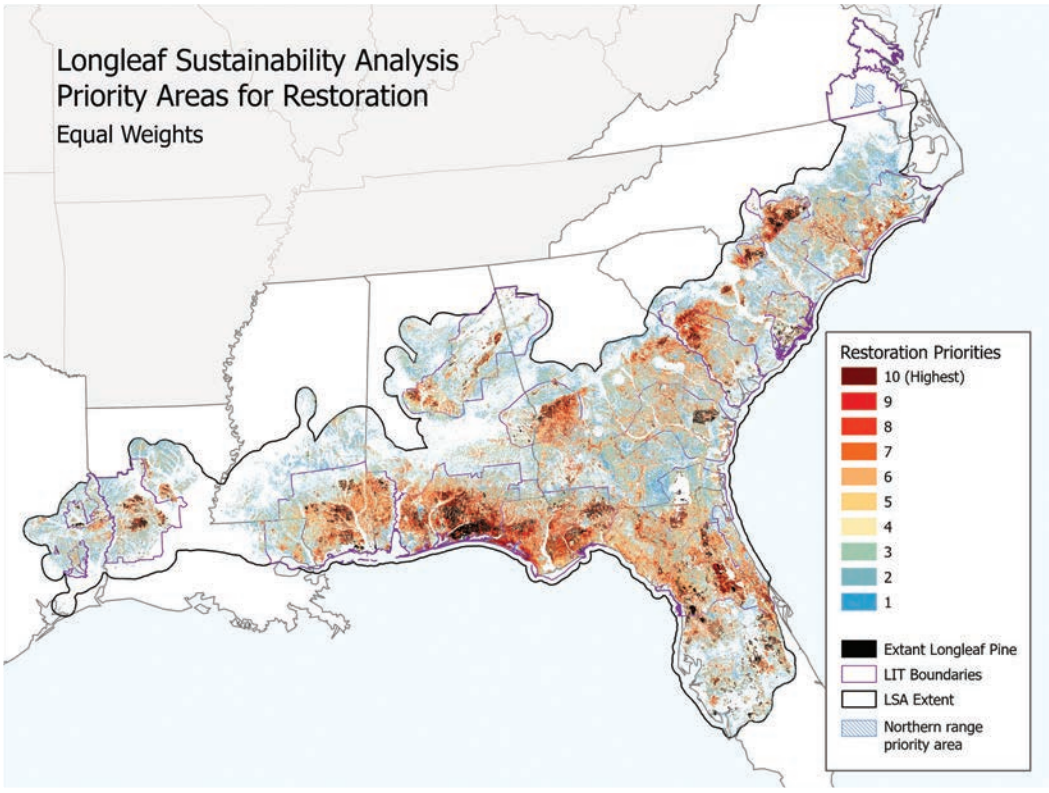


Figure 4: Priority Areas for Restoration of longleaf pine based on habitat suitability and sustainability.

Appendix C

AMERICA'S LONGLEAF KEY MILESTONES AND ACCOMPLISHMENTS

2007

A Regional Working Group comprised of 22 agencies and organizations forms, identifying the need for a range-wide conservation effort.

2008

A planning charrette involving over 100 natural resource professionals and landowners was held to begin the scoping process for the strategic plan.

2009

The Range-wide Conservation Plan for Longleaf Pine was released at the North American Wildlife and Natural Resources Conference in Washington, DC, and the America's Longleaf Restoration Initiative was launched.

An $8.9 million American Recovery and Reinvestment Act (ARRA) Regional Longleaf Restoration Project was awarded, resulting in approximately 70,000 acres of improvements on state-owned and private lands.

2010

An MOU was signed by the Departments of Agriculture, Defense, and the Interior during an America's Great Outdoors listening session, committing the signatories to implementation of the Conservation Plan and establishing the Federal Coordinating Committee for longleaf pine.

The Osceola National Forest was awarded a Collaborative Forest Land Restoration (CFLRP) project totaling between $1.5 and $2 million annually to restore longleaf pine.

2011

Conservation leaders across the South created the Longleaf Partnership Council, which includes 33 members representing federal agencies, state agencies, NGOs, private industry, universities, and private landowners.

State Coordination Teams were formed in Texas, Louisiana, Mississippi, Alabama, and North Carolina.

Florida, Georgia, Virginia, and South Carolina began efforts to formalize similar teams.

Eleven Local Implementation Teams began working in Significant Geographic Areas and Significant Sites identified in the Conservation Plan. Eventually, more LITs were formed to cover all these areas.

The USDA NRCS Wildlife Habitat Incentive Program provided approximately $30 million for longleaf restoration in 2010 and 2011, resulting in over 150,000 acres of longleaf improvements on private lands.

2012

The USDA Forest Service designated the America's Longleaf Restoration Initiative as a High Performance Partnership within its Public-Private Partnership Strategy.

USDA announced that the Desoto National Forest was awarded $2.7 million for an accelerated landscape longleaf restoration project, closely coordinated with the Mississippi Army National Guard and The Nature Conservancy.

The National Fish and Wildlife Foundation (NFWF) announced the establishment of the Longleaf Stewardship Fund, with $3 million in funding from USDA, DOI, DoD, the Southern Company, and NFWF, available for the 2012 grants. Over 40 preproposals totaling $7 million and 95,000 acres of proposed restoration activities were submitted.

The America's Great Outdoors initiative was formed, and the longleaf pine ecosystem was one of five focal landscapes highlighted in the report.

2013

The Longleaf Partnership Council released its first 3-year action plan (Strategic Priorities and Actions 2013-2015) that established priorities for capturing and reporting range-wide restoration progress.

NRCS began implementing the Working Lands for Wildlife Program, which enabled landowners to receive technical and financial assistance for voluntarily restoring and improving longleaf habitat on their land for the gopher tortoise.

The Longleaf Partnership Council released the Longleaf Pine Planting Density Fact Sheet to clear up widespread misconceptions and help guide landowner longleaf pine planting rate decisions.

International Paper and NFWF announced the Forestland Stewards Initiative, a $7.5 million effort aimed at restoring and protecting landscapes in three priority regions in the South over a five-year period. This Initiative will benefit longleaf restoration efforts in the Carolina Lowcountry (both NC and SC) and the Piney Woods of TX and LA.

2014

NRCS announced the establishment of the Regional Conservation Partnership Program (RCPP), a comprehensive and flexible program that uses partnerships to stretch and multiply conservation investments and reach conservation goals on a regional or watershed scale. The longleaf pine ecosystem was one of eight Critical Conservation Areas designated by the Secretary of Agriculture for greater emphasis under the RCPP.

The Longleaf Partnership Council adopted Longleaf Pine Maintenance Condition Class Definitions: A Guide to Assess Optimal Forest Habitat Conditions for Associated Plant and Wildlife Species to help guide restoration efforts.

The Longleaf Partnership Council released the 2013 Range-wide Accomplishment Report, the first of comprehensive annual accomplishment summaries. This first report documented 156,000 acres of longleaf establishment and 1.38 million acres of overall longleaf ecosystem improvement activities.

The longleaf cone crop was one of the most prolific in recent years at an estimated 98 cones/acre. This near-bumper crop helped relieve seed shortages range wide.

A ceremony to mark the Five-Year Anniversary of the release of the ALRI Range-wide Conservation Plan took place in Washington, DC. An estimated 200 participants attended the Progress and Promise themed events to celebrate ALRI's past successes and look to the future for ways to maintain the momentum needed to achieve the eight-million-acre restoration goal.

2015

The Longleaf Partnership Council's 2014 Range-wide Accomplishment Report documented 153,000 acres of longleaf establishment and 1.5 million acres of overall longleaf ecosystem improvements.

The Department of the Interior awarded $770,000 to implement prescribed fire in longleaf ecosystems in the South Atlantic Landscape

Conservation Cooperative through its Resilient Landscape program.

The Longleaf Stewardship Fund expanded to provide a total of $4.6 million in funding available for longleaf restoration efforts.

2016

The Longleaf Partnership Council's 2015 Range-wide Accomplishment Report documented 151,000 acres of longleaf establishment and that restoration activities were reported on 1,926,456 acres of public and private lands. Approximately, 1.58 million acres of prescribed burning was reported in longleaf pine for all ownerships.

The Longleaf Partnership Council released its second 3-year action plan (Strategic Priorities and Actions 2016-2018) that established priorities for capturing and reporting range-wide restoration progress.

The U.S. Departments of Agriculture, Defense, and the Interior, through the Sentinel Landscapes Partnership, designated Eastern North Carolina and Avon Park Air Force Range, Florida, as Sentinel Landscapes.

The documentary, Secrets of the Longleaf Pine, was released by Red Sky Productions and premiered on Public Broadcasting System in Georgia, Alabama, and South Carolina. Directed by Rhett Turner, the documentary went on to receive the Southeast Regional Emmy Award in 2016. The documentary is available at http://longleafpine.org/

2017

The Longleaf Partnership Council's 2016 Range-wide Accomplishment Report documented that 139,500 acres of longleaf pine were established (an 8% decrease from 2015) and more than 433,000 acres of prescribed burning was reported on private lands in 2016, an increase of 88,000 acres over the record total reported in 2015. This increase can be directly attributed to improved reporting by the State of Georgia, which began its first full year of a revised prescribed fire permitting process that specifically asked whether the planned operation would take place in longleaf pine stands. Total restoration activities were reported on a record 2,023,214 acres of public and private lands.

Recognizing the need to reinvigorate and accelerate the pace and scale of restoration to achieve the eight-million-acre goal by 2025, the Longleaf Partnership Council identified and released seven "Game Changers," defined as specific, action-oriented strategies that will significantly accelerate the pace of restoration.

NFWF announced that $5.5 million in grants awards to support the restoration of the longleaf ecosystem in nine states. NFWF's Longleaf Stewardship Fund reached a historic milestone, surpassing 1 million acres of longleaf pine restored or enhanced.

The U.S. Departments of Agriculture, Defense, and the Interior, through the Sentinel Landscapes Partnership, designated a significant southern part of Georgia as a Sentinel Landscape. The state of Georgia and a number of private conservation organizations have identified about 1.3 million acres as critical to important natural resources, working economies, and military readiness within the landscape's boundary.

2018

The Longleaf Partnership Council's 2017 Range-wide Accomplishment Report documented 131,000 acres of longleaf establishment, 1.37 million acres of burning in longleaf stands, and 1,703,391 acres of overall longleaf ecosystem improvements.

The USDA Forest Service launched the "Million Acre Challenge" to put an additional 1 million acres on the path towards longleaf restoration.

NFWF announced a record $6.5 million in grants to benefit longleaf pine forests and wildlife in eight states across the Southeast. Twenty-eight grants will support efforts to conserve more than 350,000 acres of longleaf pine habitat and recover populations of at-risk wildlife.

2019

The Longleaf Partnership Council's 2018 Range-wide Accomplishment Report documented 130,314 acres of longleaf establishment, 1.63 million acres of prescribed burning in longleaf stands, 22,414 acres of lands protected, and over 1.8 million acres of overall longleaf ecosystem improvements.

2020

ALRI celebrated 10 years of accomplishments in 2020. Between 2010-2020, partners established over 1.4 million acres of longleaf pine, conducted prescribed burns on over 13 million acres of longleaf stands, and protected over 270,000 acres of land. These accomplishments translate to positive outcomes for local economies, national defense, rare species, recreation, forest resiliency, wildfire risk, clean air and water, carbon sequestration, and climate change mitigation.

The Longleaf Partnership Council's 2019 Range-wide Accomplishment Report documented 133,414 acres of longleaf establishment, 1.4 million acres of prescribed burning in longleaf stands, 39,727 acres of lands protected, and over 1.7 million acres of overall longleaf ecosystem improvements.

The LPC launched a new working group, Longleaf for All, as an ongoing commitment to be an advocate and partner for minority landowners, professionals in the field of forestry and longleaf restoration, and recreationists by increasing minority participation in forestry-related programs, practices, and activities and helping landowners reap the economic, ecological, and cultural benefits of owning forested land.

2021

The Longleaf Partnership Council's 2020 Range-wide Accomplishment Report documented 138,283 acres of longleaf establishment, 1.4 million acres of prescribed burning in longleaf stands, 34,790 acres of lands protected, and 1.9 million acres of overall longleaf ecosystem improvements.

2022

The Longleaf Partnership Council's 2021 Range-wide Accomplishment Report documented 2.29 million acres of longleaf management activities across the Southeast – the most acreage since America's Longleaf was formed in 2010.

The Longleaf Partnership Council released its fourth 3-year action plan (Strategic Priorities and Actions 2022-2024) designed to provide a more focused look at short-term activities needed to advance the goals and objectives of the 2009 Conservation Plan.

The Northwest Florida Sentinel Landscape was officially designated by the Sentinel Landscapes Partnership program, joining the Avon Park Air Force Range Sentinel Landscape, the Eastern North Carolina Sentinel Landscape, and the Georgia Sentinel Landscape in improving longleaf pine habitat and ensuring national security.

Appendix D

LIST OF ACRONYMS USED

ACEP	Agriculture Conservation Easement Program
BSMPs	Basic Smoke Management Practices
CLT	Cross-laminated Timber
CRP	Conservation Reserve Program
CREP	Conservation Reserve Enhancement Program
CSP	Conservation Stewardship Program
DoD	Department of Defense
DOI	Department of the Interior
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FCC	Federal Coordinating Committee
FIA	Forest Inventory Analysis
FNAI	Florida Natural Areas Inventory
HRFP	Healthy Forest Reserve Program
LEO	Longleaf Ecosystem Occurrences
LIT	Local Implementation Team
LLPI	Longleaf Pine Initiative
LPC	Longleaf Partnership Council
LSA	Longleaf Sustainability Analysis
MSR	Machine Stress-rated
NFWF	National Fish and Wildlife Foundation
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
PES	Payments for Ecosystem Services
RCPP	Regional Conservation Partnership Program
REIT	Real Estate Investment Trust
REPI	Readiness and Environmental Protection Integration
SECAS	Southeast Conservation Blueprint
SGA	Significant Geographic Areas
SIP	State Implementation Plan
SMP	Smoke Management Plan
SPA	Strategic Priorities and Actions
TIMO	Timber Management Investment Organization
UF-CLCP	University of Florida-Center for Landscape and Conservation Planning
USDA	U.S. Department of Agriculture
USFS	USDA Forest Service
USFWS	U.S. Fish and Wildlife Service
WLFW	Working Lands for Wildlife

The America's Longleaf Restoration Initiative is a collaborative effort of multiple public and private sector partners that actively supports range-wide efforts to restore and conserve longleaf pine ecosystems.

americaslongleaf.org