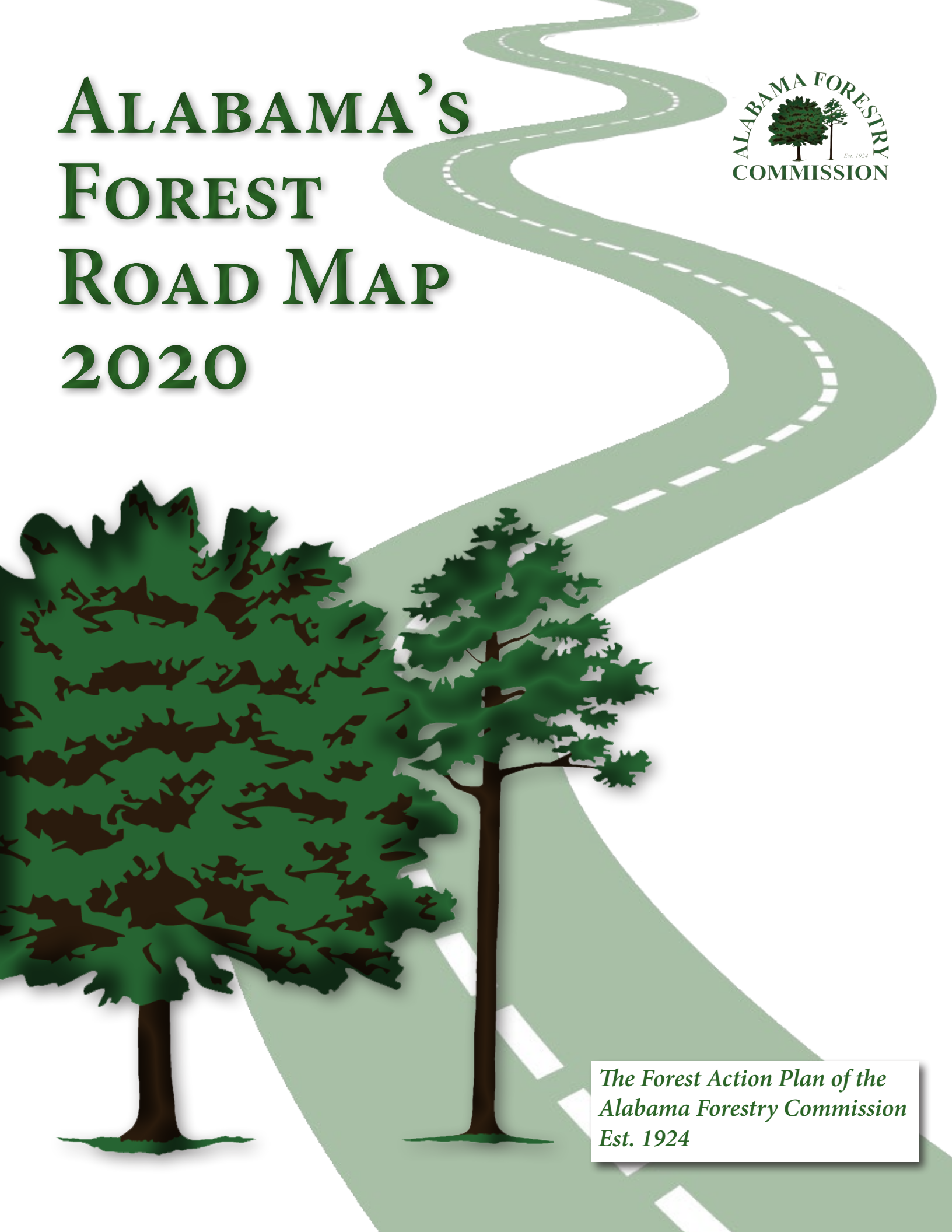
Alabama's Forest Road Map 2020

ALABAMA FORESTRY COMMISSION
Est. 1924



The Forest Action Plan of the Alabama Forestry Commission Est. 1924

Rick Oates,
State Forester

Welcome

from the State Forester

It is interesting how time modifies your perspective. Ten years ago, while working for the Alabama Forestry Association, I was asked to provide feedback in the development of the 2010 Alabama Forest Action Plan, *Forests at the Crossroads*. At the time I did not fully understand the importance of the Forest Action Plan to our state's forest resources.

Fast forward ten years and I am now the State Forester of Alabama, with a much better understanding of what this document means to the state. I now have the responsibility of updating this important plan. As such, it is with pride that I offer the 2020 Alabama Forest Action Plan, *Alabama's Forest Roadmap* as a guide for all forestry stakeholders to reference over the next decade. This guide will serve as a tool to help our state better understand and manage this amazing resource.

Alabama is blessed with abundant forest resources – 23.1 million acres - which cover more than two-thirds of the state. These forests improve water and air quality, provide wildlife habitat, support a growing forest industry and help provide jobs across the state. Without these forests Alabama would be a very different place. As such, we want to see forests remain as working forests in order to continue to accrue these important benefits. That is not to say there are not challenges associated with our forest resource, but the assessment and strategies discussed in this document will be instrumental in raising awareness, implementing solutions and taking a step towards achieving this goal.

Of course, we would not be able to achieve any success without the benefit of our important partners in forest conservation in Alabama. Too numerous to name here, you will see how these many partners will play a critical role in the implementation and success stories that will result over the next ten years. These stakeholder partners, individuals and organizations, have made contributions to this document which have made it a better tool for the citizens of the state. A list of them can be found on page 5.

I also want to recognize the many contributions from the leadership and agency personnel of the Alabama Forestry Commission who have made this document a reality. Perspectives ranging from an agency commissioner to an entry level forester have been incorporated. Because of this, whether your interest is that of a private landowner who loves your family forest, a corporate forest manager who controls thousands of acres of forest land, a naturalist who loves the land for its beauty and intrinsic value, or a wildlife biologist who is improving the forest for the varied fauna that occupy these lands, this document should speak to you and affirm that there are many unique ways to view a forest. Each one of them being essential and important.

Thanks to everyone involved, and let's hope the next decade of forestry in Alabama lives up to the challenges and solutions presented here. It will be interesting to see, ten years from now, when the Alabama Forestry Commission is once again challenged to update this document, how different and hopefully better our forests will be!

Sincerely,

Rick Oates

Rick Oates, State Forester

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Executive Summary

The Forest Action Plan – 2020 is an introspection of the 2010 Plan, *Forests at the Crossroads* and an evaluation of where we are, and where we want to go. There are three priorities in the 2020 Plan:

1. Create a common tool for use by stakeholders from across the state as we seek to conserve and manage working forest landscapes for multiple values and uses.
2. The Alabama Forestry Commission (AFC) must not cease to protect the forest from threats.
3. The overall goal of this plan is to enhance public benefits from trees and forests.

Stakeholder Engagement
The outlining of threats and strategies to address them has been an undertaking which has only been possible by discussion with and input from many quarters. This engagement, which is continuous, was given its official Forest Action Plan-focused kickoff on February 15, 2019.

The Plan is an effort to examine current conditions, trends, threats, and strategies for the AFC to use as a guide to ensure healthy Alabama forests into the future. The Plan is divided into four chapters plus several appendices.

Chapter 1 – Conditions and Trends Affecting Alabama's Forest Resource

Alabama's 23.0 million acres of forests are an abundant, diverse, and treasured resource that provide tremendous economic, environmental, and social benefits and is 93 percent privately owned. These forests have been and continue to be shaped by natural and human influences.

Alabama's forests are growing, up 25 percent since the 2008 survey. Alabama's forests produce a major economic benefit in addition to a wide range of services that are essential to wildlife and human well-being. Aside from direct economic benefits, Alabama's forests provide other values to society. These ecosystem services are forest functions that are critical to our well-being and include regulating air quality, climatic conditions, water quality, and biodiversity.

Chapter 2 – Key Drivers of Change to Alabama's Forest Resource

Direct drivers unequivocally influence the forest. Important direct drivers include land conversion and adverse weather events – hurricanes, tornadoes, tropical depressions, and drought.

Indirect drivers operate by altering one or more direct drivers. Indirect drivers of change include demographic, economic, and technological factors including recreation and transportation.

Chapter 3 – Threats to Alabama's Forest Resource

There are seven major threats identified in the Plan:

Forest Fragmentation - Forests are becoming increasingly fragmented as they become increasingly parceled into smaller sizes. Parcelization of forestland is normally a precursor to fragmentation and often occurs when land ownership changes.
Invasive Species - Both plant and animal.

Changing Markets / Rural Development Issues - Markets allow forest landowners an outlet for an economic return for forest products harvested; a major rural development issue is related to workforce and securing a qualified workforce.

Adverse Weather Events - The frequency of large monetary-damage events has been trending upward over the past few decades, and Alabama is subject to the droughts, floods, freezes, severe storms, tornadoes, tropical cyclones, wildfires, and winter storms that produce devastation.

Forest Health - Forest Health is a broad term that can be defined as production, resilience, and persistence of a forest leading to sustainable ecological conditions that can satisfy human needs. Insects and fungi are a factor associated with the health of a forest.

Loss of Ecosystem Services - The forests in Alabama are critical to the proper function of all the state's varied habitats, terrestrial and aquatic.

Capacity to Fulfill Education Directive - There is the threat that our agency and our many partners will find it increasingly difficult to engage with all the stakeholders. Staffing levels at the AFC and other natural resource agencies may be insufficient to reach a growing audience. Closer interaction with our forest resource partners will be critical in presenting natural resources knowledge to the public.

Chapter 4 – Establishment of Priority Areas

Priority Areas were set at the county level using input from stakeholders, past threat occurrence, and the Southern Forest Land Assessment. There were 13 categories included in the threat matrix to develop the areas of highest priority. *It is important to note that all Alabama Forestry Commission services will be available to all Alabama landowners and properties without regard to where in the state the property is located, limited only by agency funding and staffing capacity.*

Long-term Strategies to Address Threats – To address these broad-based threats, it will take concerted effort from the full assortment of the Forestry Commission and its many partners, all of whom desire a biologically healthy forest resource. The goal of these strategies is that we should direct efforts through "Shared Stewardship" to achieve the most positive outcomes possible through collective endeavor.

Forest Fragmentation – Utilize collective efforts such as The Sustainable Forestry Initiative and African American Land Retention Program, the Federation of Southern Cooperatives, and the Limited Resources Landowner Education Assistance Network (LRLEAN). The Alabama Forestry Commission has a role to play in landowner engagement statewide, as does the NRCS. The Association of Consulting Foresters can provide tailored landowner services, and the Alabama Wildlife Foundation offers non-timber forest expertise. The Alabama Cooperative Extension System already provides a point of contact for many landowners through their existing county offices and outstanding programs and public outreach efforts, which will continue. As a landowner-driven advocacy and mutual-education group, the Alabama Forest Owners Association can likewise serve as a valued resource to members looking to protect the natural values of their properties while implementing best forest practices. The Alabama Farmers Federation can use its considerable reach to speak to the landowning public, and the Alabama TREASURE Forest Committee continues a decades-long involvement with landowners.

Invasive species - The single most powerful weapon natural resource professionals have in the fight against invasive species is education. Public service announcements, articles for print, and online media must be authored to inform the public about invasive exotics. Partnering with the Alabama Invasive Plant Council will likewise inform the public and combat the invasive threat. Regional extension agents also work to further these ends. Partnering across public/private and agency lines is a critical strategy to

maximize reach for activities such as field days and demonstrations. It is a strategic goal to hold an appropriate number of these collaborative field days across the state each year. Direct control is also essential utilizing two full-time positions ranging statewide for control of invasive plants.

Changing Markets / Rural Development Issues – Alabama has embarked on a strategy for workforce development solutions. There is not just one solution – but many: the Alabama Department of Commerce Workforce Development Division, Alabama Industrial Development Training (AIDT); the Alabama Community College System (Alabama Technology Network), universities, private entities such as *Go Build Alabama,* and others. The *Forestry Works!* initiative is a collaborative effort by the Forestry Workforce Training Institute (FWTI) and other partners within the forest industry to develop a pipeline of qualified workers for the logging and wood product manufacturing industries.

Markets rely on current data. The AFC will continue as a dedicated partner in FIA field data collection. This partnership between federal and state resources has been a great success over the past two decades and has never been stronger. Publicizing this information in The *Forest Resource Report* will continue where summaries of business, forest products industry, housing, and broader market updates are given.

Adverse Weather Events – The Alabama Forestry Commission assists landowners in a variety of ways following adverse weather events. Forms of assistance include conducting post-storm aerial reconnaissance, conducting site visits with landowners, and connecting landowners with government-based programs that can provide financial assistance to help the defray costs associated with post-storm forest management.

The key strategy to confronting adverse weather events is the maintenance of a full complement of personnel who can react quickly to catastrophic weather events. The AFC will continue to partner with the Alabama Emergency Management Agency (AEMA) and units of the Alabama National Guard to train for and staff the State Operations Staging Area (SOSA) at Montgomery's Maxwell Air Force Base. The AFC will maintain and strengthen its relationships with the myriad of fire departments across the state and must maintain the role it plays in community wildfire protection plans.

Forest Health – Effective response to wildfire and forest health crises is dependent upon a trained work force. Training is a key component of readiness as well as personnel, fire suppression equipment, and suitable stations for housing in a cost-efficient manner. The AFC will continue to promote and participate in prescribed burning. Additionally, the capacity of the AFC and its partners will be maintained and strengthened in the area of communications to the public. A fully equipped media team must be maintained as the state's information for forest health news.

Loss of Ecosystem Services – The capacity of the land to provide ecosystem services to the people must be maintained in perpetuity. The AFC and partners work tirelessly to ensure this ongoing mission succeeds. The AFC will continue to devote energy toward monitoring logging sites for Best Management Practices (BMP) implementation, spearhead logger education on BMPs, and provide first response to public complaints concerning water quality protection and correct BMP practice. Additionally, the Certified Wildlife Biologist / Threatened and Endangered Species Specialist will broaden the AFC's role, and the AFC's urban foresters will interface with the many municipalities in Alabama.

Sustainable forests must be maintained as working forests. Therefore, the AFC will continue partnering with the Southeast Regional Partnership for Planning and Sustainability (SERPPAS). The agency will also continue actively working with all our partners in the Forest Stewardship Program, the Alabama Tree Farm Program, and the TREASURE Forest program.

Capacity to Fulfill Education Directive – There has been no strategy outlined thus far that did not require continuing or increasing levels of public outreach, communication, and education with our partners. Participation in landowner workshops and field days, FAWN programs, Smokey Bear children's events, and Arbor Week celebrations will retain their importance and multi-agency participation.

There are several other well-known programs that leverage our education directive. These include ForestHER, a program of the Alabama Cooperative Extension System (ACES); Project Learning Tree (PLT), a program of the Sustainable Forestry Initiative (SFI) conducted in Alabama by the Alabama Forestry Association; and Woodscamp, a program of The American Forest Foundation.

Chapter 5 – Incorporation of other plans

Because each threat confronting Alabama's forest resource presents both great challenge and great opportunity, it is vital that all appropriate agencies and groups find common ground to collaborate and share resources. The AFC will utilize the nine partner plans discussed in the Plan. A link to the Alabama Forest Legacy Program Assessment of Need document is available in Appendix 6.

Ten years' worth of growth will see much good come from the professional forestry and natural resource community of the State of Alabama. We as professionals working under the guidance of this plan will continue to strive toward a sustainable future where we might each play our part in delivering upon this promise for the citizens of this great state.

Iconic Pulpit Rock atop Mt. Cheaha, Talladega County – The highest point of elevation in Alabama, Mt. Cheaha rises more than 2,413 ft. above sea level.

Introduction

Alabama's forest is a complex and diverse assemblage of trees and other organisms interacting within the environment. Ever changing, this dynamic forest has evolved and adapted over time in response to a variety of internal and external natural pressures. But the advent of human settlement across Alabama's landscape brought additional pressures to which the forest must continually adapt. Understanding how and why the forest is changing is the key to sustaining it for future generations.

There are three priorities that run like a common thread through this document and can be seen clearly in the selection of goals and actions to be undertaken.

1. The purpose of this plan is to create a common tool for use by stakeholders from across the state as they seek to conserve and manage working forest landscapes for multiple values and uses. Alabama as a whole can never be a hands-off nature preserve any more than it can be viewed as no more than a wood fiber farm. This vast landscape can support abundant wildlife populations, supply clean water, supply sustainable timber and non-timber forest products, all while supporting human habitation, recreation, and employment. It can do all this under a regime of wise multiple-use management, which we must continue to promote as we have for decades.

2. We must not cease to protect the forest from threats. Threats to the forest resource come in many forms, and are detailed at length in the document, where they are both identified and strategies are set out to address them.

3. The goal of this plan is to enhance public benefits from trees and forests. By beginning with a review of the history of the forest in Alabama and continuing through with modern concepts of ecosystem services, it will be seen that this document has made this a priority.

These three priorities serve as guidance to the professional forestry community in the state today as they did in 2010 when the first Forest Action Plan was written, as they did in 2015 when an update report detailing work on these areas was submitted, as they did in 1924 when the Alabama Forestry Commission was founded, and as they did in 1918 when the Alabama National Forest (today known as the Bankhead) was established. All that follows provide detail on how Alabama professionals and citizens alike are partnering to realize these priorities in our state.

"Before the first Europeans arrived in the 1500s, forests covered approximately ninety percent of Alabama. More than half of this forest was a unique ecosystem in which tall, stately longleaf pines shared the soil with a complex meadow understory that was refreshed regularly by fire. For most farmers, though, the trees were an impediment, and they were simply killed and burned to carve out new cropland. Despite fifty years of consumption and clearing, however, large parts of Alabama were still covered by virgin forests when the state began rebuilding after the Civil War" (Bridges, 2016). Although the land that would become Alabama was home to this expansive forest resource, that resource was not what drew settlers to this land. "For American planters, the recently ceded Indian tracts of the Mississippi Territory offered fertile new land for growing cotton. In states along the Atlantic Coast, much of the soil was 'farmed out,' depleted by years of production without renewal. As new land in Alabama was opened for settlement, planters from the older states looked southwestward to start anew, and to make their fortunes" (Bridges, 2016). Cotton, as the foundation of the economy, was the driving force behind the census population, counting both free and enslaved, rising from 1,250 in 1800; to 127,901 in 1820; to 590,756 in 1840; to 964,201 in 1860 (U.S. Census Bureau). Although this "King Cotton" era of agricultural exploitation continued beyond the Civil War, shifting world market supplies meant that Alabama cotton never again brought the vast wealth that it did in the early days, and over time much rural land declined in fertility due to intensive use and devotion to a single crop. Another often overlooked factor affecting the forest brought about through European settlement was domestic animal grazing. Consider this statement concerning a Coosa County tract made in 1905, "Ever since the first settlers came into the country it has been used as a public range, and its constant utilization for the pasturage of cattle, sheep, and hogs, and the repeated annual ground fires, set for the purpose of improving the grazing, have resulted in changing considerably the character of the undergrowth and the ground cover, and in hindering or preventing entirely the reproduction of some of the tree species" (Reed, 1905).

Although expansive acreages remained devoted to agriculture, Alabama became the most heavily industrialized of the Southern states from the period following Reconstruction and leading into the Twentieth Century. It was the railroads that led the way, and they had a very direct impact upon the forest. This change could trace its roots to the Antebellum period. "Starting in 1850, the federal government began granting rail companies sections of land from the public do-

main as a construction incentive. Hundreds of thousands of acres of Alabama forests passed into corporate ownership as rail lines expanded through the state. New lines in turn allowed the lumbermen who cut the forests to ship their wood to distant customers" (Bridges, 2016). Take this Bibb County example from 1905, "Along the line of the Mobile and Ohio Railroad logging has been going on ever since the line was put through, some eight years ago. In sections 1 to 6 of township 23 north, range 7 east, the longleaf pine has been largely removed. … In some instances the cutting extends south into the next row of sections" (Reed, 1905). Advances in technology allowed for gains in productivity, and the forests that had once been viewed as a hinderance to row crop production began to produce a commodity of their own. In 1899, Alabama lumber production had risen to nearly one *billion* board feet per year, and this would further expand to an average of one and half billion per year, which was maintained through the 1920s. Census data from 1910 reported that over 30 percent of Alabama wage earners were employed in the lumber industry in some form, making that industry the state's single largest employer at that time (Bridges, 2016).

Young longleaf pine plantation, Autauga County

A third era for the forest would involve actions designed to conserve and regenerate this over-exploited and depleted resource. A fascinating look back to this time comes through a document whose creation was requested by the Kaul Lumber Company and produced by the U.S. Forest Service as its *Bulletin No. 68*. A team of nine foresters were dispatched to company land in Coosa and Bibb counties to use the latest scientific methods to advise the company on how to produce a second crop of timber off the same land in 25 years' time, a giant leap forward from the 'cut and move on' ethos that had been the rule up until that time (Reed, 1905).

With the eventual harvest of nearly all the 'heart pine' longleaf stands in the state, and their replacement by second-growth forests, the nature of the forestry business changed dramatically.

> By the 1920s the lumber boom was over. Production by the pulp and paper industry was in its infancy. The kraft process, which opened resinous southern pines to the paper industry, offered enormous potential to the South. With the new process, the pulp and paper industry grew rapidly. Because of its reliance on smaller timber, the pulp and paper industry was often criticized for destroying forests before they were mature, especially since people still had vivid memories of the large trees consumed during the lumber boom. The pulp and paper industry developed during the 1930s, '40s, and '50s (Rudis, 1984).

Along with this industry came a new reliance and ever-increasing skill in growing rotations of trees, most often loblolly pine, on large industry-owned tracts dedicated to this purpose. The diversified forest industry of today supports both lumber mills and pulp and paper operations, as a wide range of stand sizes and stand ages are present on the landscape at the same time. In fact, a well-managed stand with ample timber markets will produce a pulpwood harvest through thinning earlier in its life cycle, and a final harvest of sawtimber size trees, possibly including high value pole trees, at maturity.

Public attitudes toward natural resource abundance and ethical stewardship of the land began to change by the early Twentieth Century, in no small part due to catastrophic events that revealed the shortcomings of then-current management practices. The Johnstown, Pennsylvania Flood of 1889 serves as a tragic example. This was a dam failure brought on by heavy rains washing over deforested hillsides which led to many casualties. The much studied 1910 "Big Blow-up" fire of Idaho and Montana, where 3,000,000 acres, including numerous towns, burned over the course of a single weekend, at the cost of 87 lives, is a well-known tragedy. The conservation and wise use movement would gain added momentum with the onset of the Great Depression. This period would lead to the birth of Smokey Bear in 1944, and information campaigns aimed at the public to promote wise use and best practices. The first of the National Forests in Alabama came into being on January 15, 1918, and was named Alabama National Forest. For a time known as the Black

Warrior National Forest, the name would change once again to the Bankhead National Forest, which it is still known as today. The Talladega and Conecuh National Forests would come next, but not until 1936 (Williams, 2003). Active reforestation efforts were begun, often under the administration of federal New Deal agencies such as the Farm Security Administration and the Civilian Conservation Corps, and incentives were paid out to farmers through the Agricultural Adjustment Act which would allow them to conserve soil by removing marginal land from cultivation, much of which found its way back into a forested condition, either through direct tree planting or natural reversion. Usually within three or four years after cultivation has ceased, the ground becomes completely covered with seedlings of loblolly, shortleaf, and longleaf pine, of which the first two greatly predominate over the last. These seedlings develop with great rapidity, within ten to fifteen years forming dense thickets of saplings and small poles. Patches of this old field growth are found in all stages of development around every farm (Reed, 1905). The creation of the Alabama Forestry Commission in 1924, or Alabama State Commission of Forestry as it was then known, is another example of the new spirit of conservation that came into being during that time.

Drained cypress swamp, Coffee County

Alabama is now entering a new era of land use trends with forest sustainability an issue, but in ways not analogous to the past. The volume of all trees is now approximately double what it was in 1972 and increasing steadily year by year. Advances in technology allow for larger, remarkably efficient mills that turn out products that compete successfully on the world stage. Customers, be they large multi-national corporations or domestic end users, demand sustainably-sourced timber.

Alabama's forests are an abundant, diverse, and treasured resource that provide tremendous economic, environmental, and social benefits. These forests have been and continue to be shaped by natural and human influences. Natural phenomena such as fires, hurricanes, tornadoes, and droughts, along with insect and disease outbreaks, generally have short-term impacts on the resilient forest. However, factors that threaten long-term forest integrity and sustainability include land use changes, urban growth, invasive species, and in some cases, fire exclusion to name a few. Prior to Alabama's original settlement, the landscape was nearly completely forested except for scattered prairies, glades, rocky outcrops, and dunes. Today, large areas of former forestland are devoted to agriculture, population centers, industry, transportation corridors, utility transmission rights of way, water reservoirs, and other uses. As Alabama's population growth and urban development clusters in a few select areas, pressures on the forests in and near those clusters will increase. Changing ownership patterns along with changing landowner objectives also have the potential to bring profound changes to the landscape.

Less than a century ago Alabama's forest resources were vanishing at an alarming rate, but the trend was reversed by farsighted individuals and agencies working together to restore our forest. In September 1922 the Alabama Democratic Committee passed the following resolution in Montgomery:

> "A wise policy of conservation of the natural resources of Alabama, and the preservation without waste and damage of the gifts so abundantly given us in trust by the all-wise Creator, is not only our duty but should engage our most serious and thoughtful consideration. Our vanishing forests must be replaced and given care; state forest reserves must be created to protect our watersheds and supply our rainfall. All to the end that we may, as good tenants, deliver over to succeeding generations this land more beautiful, more useful and more tolerable in which to live than when we received it in trust as mere sojourners here for a time."

Within months of the publication of the above statement, Alabama enacted the Forestry Act of 1923, our agency's origin. The State Commission of Forestry began its field work in January 1924 under the capable leadership of Col. Page S. Bunker, who would lead the agency from its creation until 1939 (*A History of State Forestry in Alabama, 1993*).

Our forests are a conservation success story and serve as proof that trees are truly a renewable resource. Not only are the trees renewable, but the presence of forest on a landscape works to restore depleted soil, with many attendant benefits. Following decades where exposed topsoil was washed from the landscape and gullies left to mark this erosion, the soil conservation benefit of forests should not be overlooked.

Alabama's Current Forest Conditions

Tree species and age compositions have changed and continue to change. The following sections examine the condition of today's forest: the area of forested land, the types of forest found in the state, and the diversity of plants and animals they support.

Forest Area

According to the 2018 Forest Inventory and Analysis (FIA) data there are approximately 23.0 million acres of commercial forestland in Alabama. Forests comprise 71 percent of Alabama's land area, or 69 percent of Alabama's total area if you include the 1,677 square miles of water cover. The only states that have more FIA-defined timberland than Alabama are Georgia, Oregon, and Alaska. We lack precise knowledge, with some authorities in the past estimating that up to 32 million acres of forest may have existed within the state's present borders at the time of European settlement. However, as population estimates from that era are themselves the subject of conjecture, and William Bartram, upon his journey through the future Russell County on his way to Mobile, in 1775, commented that the Native Americans' agricultural fields could be viewed "stretching beyond the scope of sight," we may never be certain of the maximum degree of forest cover (*A History of State Forestry in Alabama, p.8, Travels of William Bartram, p. 390*). We do know that clearing for agriculture as well as unsustainable forest management practices resulted in steady losses of forestland that lasted into the 1920s. The tide began to turn once again in the 1930s due in large part to the planting of trees by the Civilian Conservation Corps (CCC). Thousands of acres of devastated forestland were restored. During this same period the field of 'professional forestry' began to emerge. With this emergence, government, corporate, and individual forestland owners were influenced to implement sustainable forest management practices.

A publication that began in 1927 was the *Alabama Forest News*, a monthly Alabama Forestry Commission-published newsletter that took the latest scientific information regarding the state's forest land and transferred it directly to the public. The March 1939 edition provided summary statistics of the first survey undertaken by Forest Inventory and Analysis in 1936. At that time, the forest occupied 18.88 million acres, and lumber production was far below its 1925 peak due to the effects of the Great Depression. Results from the second survey were published in 1954 and reported that forested acres had expanded to 20.76 million, which was then further augmented by the Soil Bank Program of the late 1950s. In the present moment, forest area is remaining nearly unchanged, though it is estimated that, on average over the past five years, more Alabama land is reverting back into forest than is being converted from forestland to other uses. Alabama is currently engaged in the 11th comprehensive survey of its forest resource.

Forest Types

Forest acreages and volumes in Alabama are very dynamic over time. Please refer to Appendix 2 for maps dividing the state into ecoregions, with graphical representation of forest type acres and volumes, and how they have been changing over a roughly 20-year period. Annual inventory data on these changes is important as it informs key decision makers to changes in the forest makeup as they are occurring, offering insights on where losses and gains are taking place within the resource base.

Alabama's 50 forest types are more broadly defined within seven major forest type groups (Table 1). The 'loblolly pine/shortleaf pine' forest is the single most extensive, occupying 9.2 million acres of timberland, up from the 8.2 million acres recorded just ten years ago. The 'oak/hickory' group ranks second and covers 6.9 million acres, which has decreased from 7.3 million ten years ago. All totaled there are slightly more than 12.5 million acres of hardwood dominated and pine/hardwood mixed forest, opposed to slightly greater than 10.4 million acres that display pine dominance. However, in 1936 the balance was weighted heavily toward pine, with 75 percent of acres in the pine or pine/hardwood forest types.

Forest Type	Acres	Percentage
Loblolly / Shortleaf Pine	9,246,165	40.03%
Upland Oak / Hickory	6,859,947	29.70%
Oak / Pine Mixed	2,786,152	12.06%
Bottomland Oak / Gum / Cypress	2,192,940	9.50%
Longleaf / Slash Pine	1,111,927	4.81%
Bottomland Elm / Ash / Cottonwood	612,398	2.65%
Other Forest Types	285,855	1.24%
Total	**23,095,384**	**100%**

Table 1. Forest Type groups of the FIA survey and their estimated Alabama acreages

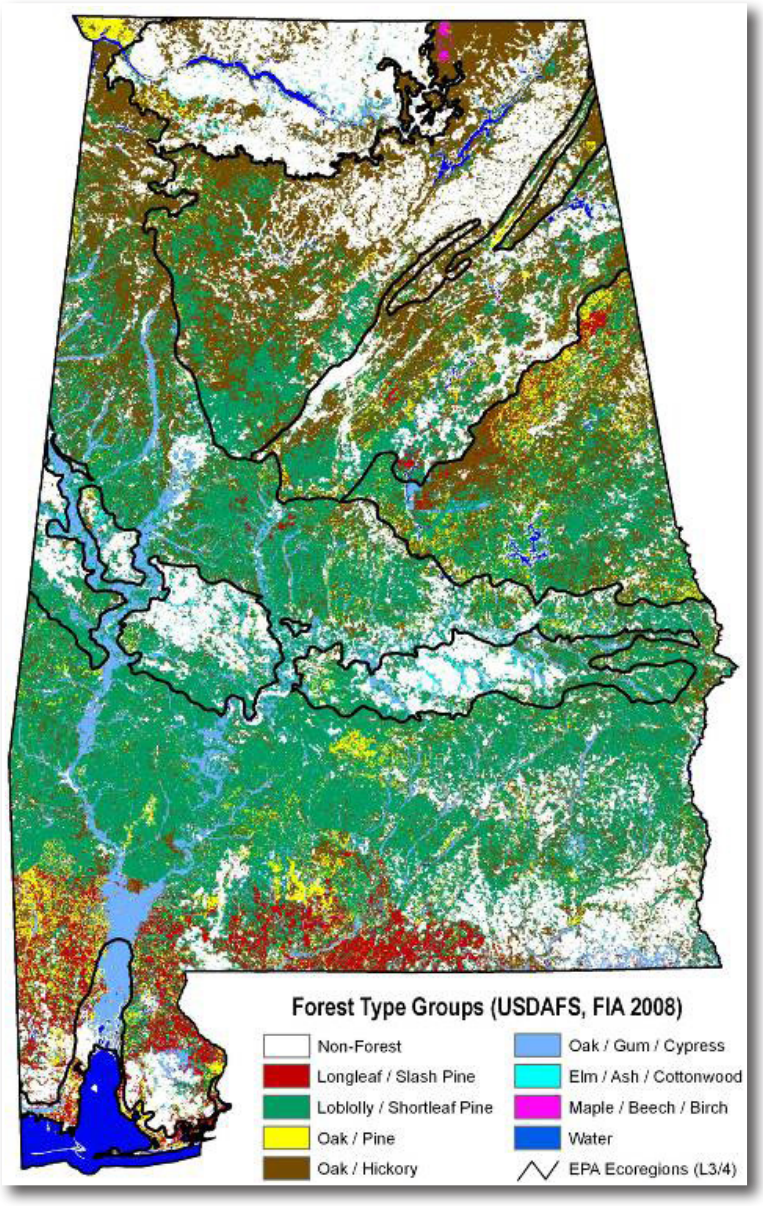


Figure 1. Forest Cover of Alabama by Forest Type Group

Wood Volume and Biomass

Wood volume, woody biomass, and total live biomass are important indicators of the forest's potential to provide various products and services, including carbon sequestration. In 2018, Alabama's total standing volume (aboveground volume of all standing live trees, with diameter at breast height over 5 inches) was estimated to be 41.4 billion cubic feet, up 25 percent since the 2008 survey. To put this in perspective, AT&T Stadium in Arlington, Texas contains approximately 104 million cubic feet of interior space. Alabama forest volume could fill nearly 400 of these stadiums with solid wood. Because growth has exceeded removals since the 1950s, the volume of Alabama's timber has greatly increased over that time. Comparing hardwood and softwood volume growth since the last Forest Action Plan, which utilized the 2008 FIA data, we find that hardwood volume is 15.72 percent more than it was a decade ago, while softwood volume has increased 36.70 percent over the same time frame.

Forest Products and Industry

Alabama's forests produce a wide range of services that are essential to wildlife and human well-being. The major direct financial contribution from these forests is from wood and fiber that is used for a variety of manufacturing, building, paper, pellets and other purposes.

Alabama's forest products industry makes important contributions to the state's economy by supplying wood products, employment, income, and tax revenue. The value of forest products shipments in Alabama reached $16.3 billion in 2017. Although shipments reached a then-high of $15.6 billion in 2005, the protracted economic downturn caused the state to see its values of forest products remain below this record for many years, only recently recovering and surpassing those 2005 records. Industry payrolls totaled $2.2 billion in 2017 and provided 43,111 direct jobs (as of 2nd quarter 2018). Recently this number, provided by the Quarterly Census of Employment and Wages, has trended positively, having added 1,420 jobs since 2nd quarter 2017. Capital investment in new and expanding industry is currently at record levels in the state. For comparison, in 2009, there were 23 total forest product-related projects, both new announcements and expansions of existing industry, in the state, with $103 million in capital investment. In 2018, Alabama had 54 such projects valued at $1.3 billion (Forest Resource Report 2018). See Table 2.

Forest Products Totals for New & Expanding Industry 2009 - 2018

Year	Total Projects	Total Jobs	Total Capital Investment
2018	54	1,975	$1,304,165,269
2017	47	1,464	$1,284,628,303
2016	50	1,005	$1,196,773,911
2015	43	917	$897,061,100
2014	33	799	$640,750,000
2013	35	1,385	$209,526,000
2012	31	1,235	$302,599,400
2011	24	566	$161,297,013
2010	27	348	$118,409,755
2009	23	599	$102,806,380

Table 2. Forest Products Totals for New and Expanding Industry.
Source: Alabama Department of Commerce, Forest Products Development Center, KJM

Year	Number of Primary Mills	Total Roundwood used (billion cu. ft.)	Total Pulpwood (million cu. ft.)	Total Sawing (million cu. ft.)	Veneer Log (million cu. ft.)	Other Products (million cu. ft.)
1997	212	1.35	765	450	93	37
1999	181	1.21	641	426	109	35
2003	178	1.08	521	404	107	45
2005	145	1.14	563	426	93	61
2007	144	1.10	574	413	75	39
2009	120	0.80	515	228	29	31
2013	112	1.10	615	298	40	84
2017	119	1.14	616	337	46	136

Table 3. Alabama's Timber Industry - Timber Product Output
(Source: AFC timber industry survey for the U.S. Forest Service)

As you can see in Table 3 above, which was created using results from the Timber Products Output survey of primary wood-using mills in the state, it has taken the industry years to recover from the downturn. Additionally, hardwood consumption remains flat and well below levels seen in preceding decades. Research from John Greene offers an explanation for this at a regional level by pointing out that there is a structural decline in the market's demand for hardwood-based products. Printing and writing paper demand has shown sustained 6 percent year-over-year declines, and three large pulp mills in the South have converted from hardwood to pine since 2007. Hardwood stumpage prices have found support through dramatic increases of raw log exports to Asia, and China in particular (Greene, 2019). With abundant timber supplies, a statewide economic development strategy that places forest products as one of its seven focus industries, and an established logging infrastructure, the state remains poised to see further growth in the sector.

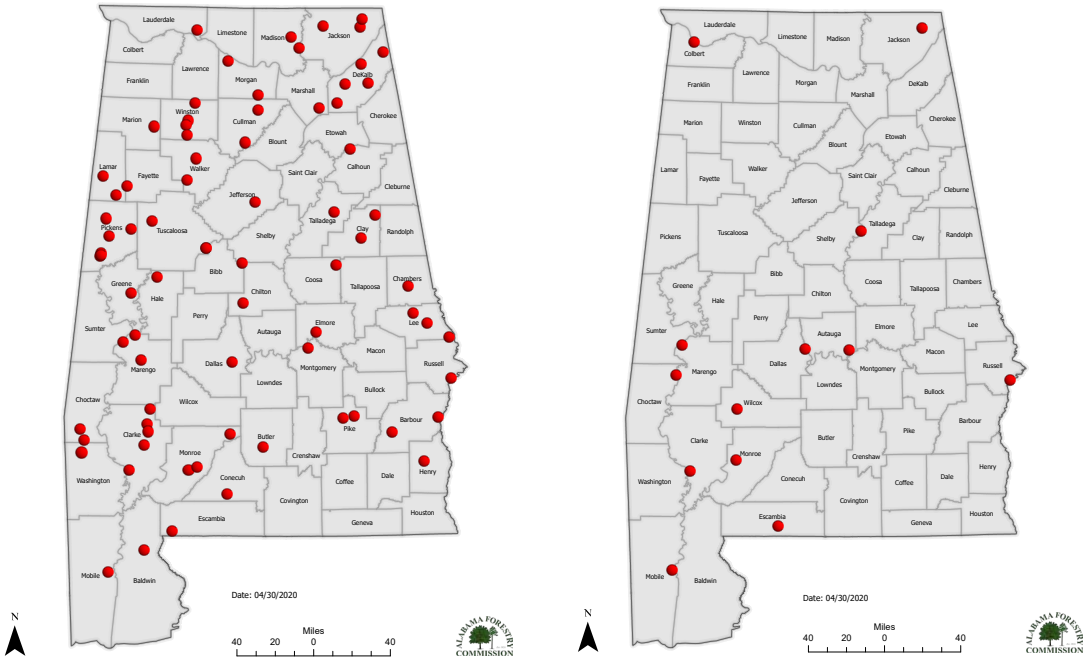


Figure 2. Left map represents location of all active sawmills in the state.
Right map represents pulp, paper, and paperboard facilities.

Forest Ecosystem Services

Aside from direct economic benefits that Alabama's forest provides (timber, non-timber products, biofuels, etc.) there are other values that forests provide to society. Placing a dollar value on these ecosystem services is often difficult. However, these ecosystem services are forest functions that are critical to our well-being. For instance, Alabama forests are important for regulating air quality, climatic conditions, water quality, and biodiversity. Forests are capable of trapping soot and other particles emitted from automobile exhaust or factories that can induce respiratory problems in people. Forests also absorb many airborne pollutants such as nitrogen dioxide and sulfur dioxide. Urban forests may be particularly valuable in this regard. Auburn University conducted a study of trees on campus that quantified the ability of urban trees under differing conditions to store carbon and remove the pollutants CO, O_3, NO_2, PM10, and SO_2 from the ambient air (Martin, 2012), clearly showing how critical these trees are to cities across the South and beyond. Forest cover in urban settings has been shown to lower power costs through the shading of houses and buildings. On a larger scale, Alabama forests contribute to the regulation of atmospheric carbon. Through photosynthesis, forests absorb carbon and store it over long time periods in both aboveground and belowground biomass. Ongoing research is highlighting the role that young forests, such as Alabama's, are playing in the removal of CO_2 from the atmosphere. While even old growth forests have been shown to be accelerating in growth due to elevated levels of atmospheric CO_2, it is the young forests which are apt to sequester carbon at even greater rates. Research from Pugh et al indicates that the greater potential for future carbon storage lies in the temperate forests such as ours, even more so than the tropical forests, which currently sequester much carbon, but show lower potential for storing more (Pugh, 2019).

Although the potential for tradable carbon offset credits has not yet been realized in Alabama, carbon trading has produced income for landowners in other areas of the U.S. In the future, ecosystem services provided by Alabama's forests may result in a marketable value beyond the intangible values that they already provide. For example, purchases of carbon credit contracts in Tennessee and Kentucky by California companies on a 100,000-acre property known as the Ataya tract is now being facilitated, and the consideration of 2 million tons of California-eligible carbon offsets was a leading factor in the property's purchase (The Nature Conservancy, 2019). Similar transactions could be executed in this state in the future.

Maintenance of the natural hydrologic cycle is another important service derived from Alabama's forests. The state's overall average rainfall of 55 inches per year supplies surface water for more than 77,000 miles of perennial and intermittent streams, along with an estimated 563,000 acres of impounded ponds, lakes, and reservoirs, and this in addition to 3 million acres of marsh and wetland (Alabama Department of Conservation and Natural Resources, Division of Wildlife & Freshwater Fisheries, 2015). Intact forestlands allow for the interception, storage, and slow release of water back to streams. When forests are removed from the landscape, water that is normally intercepted and transpired by trees (or stored in their spongy leaf litter) more often runs off the land rapidly and can lead to downstream flooding. Forests also provide the best water quality of any land cover type. Water quality in forested watersheds is maintained by a combination of physical and biological processes that filter water and remove sediments, nutrients, and other potential pollutants before they reach streams. Shading and temperature regulation are also important and contribute to maintaining the health of adjacent aquatic habitats.

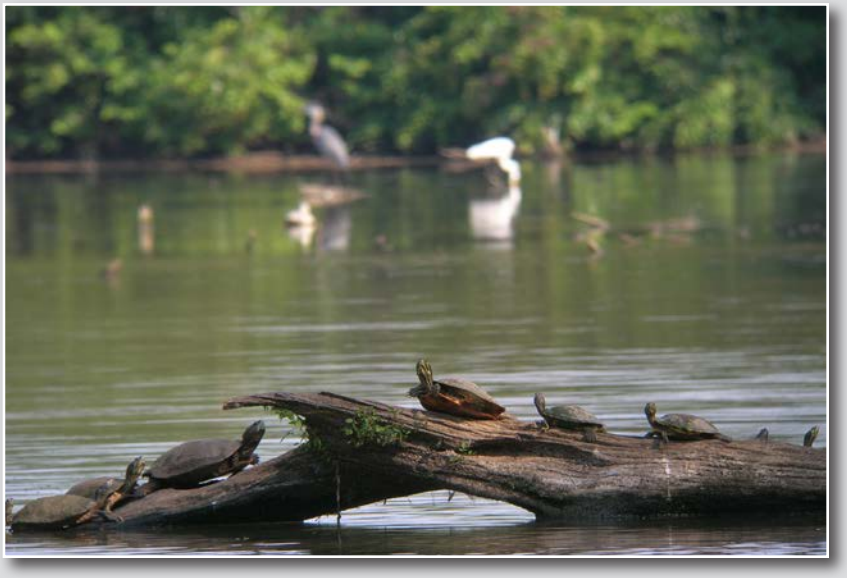
Watershed water quality, Butler County
Eve Brantley, Alabama Cooperative Extension System

These ecosystem services provided by the forest are being applied to one of the most unique hydroscapes in the world. The great diversity of geographic features, range of flows, changes in elevation, stream gradients, and substrate composition make possible this remarkable whole. For example, consider the Cahaba River, which is labeled as one of only eight "Biodiversity Hotspot" rivers in the nation by The Nature Conservancy. The Paint Rock River is home to not only approximately 100 fish species, but also 45 mussel species, and two of those are endemic, meaning they are known nowhere else on Earth. The published work of Boschung and Mayden in 2004 names a total of 42 fish species believed to be endemic to the Mobile River basin (Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries, 2015).

Further, many of Alabama's soils are highly erodible. The Forestry Commission works with many partners to see that Best Management Practices for forestry operations are implemented at the ground level. This begins with the agency's commitment to logger education and the good intentions of the loggers themselves. The *Alabama's Best Management*

Box 1. Forests and Water Quality

Alabama's forests are a vital factor in maintaining and improving water quality. Forested watersheds have consistently been shown to have lower sediment and nutrient yields with better aquatic biological conditions than non-forested watersheds. The primary factor affecting the future of water quality in Alabama is control of nonpoint-source pollution from agriculture and urbanization, primarily urban sprawl. Approximately 850,000,000 gallons of water each day are taken from ground and surface sources, treated, and made available to the citizens of the state. The goal of the Clean Water Act is that the nation's surface waters should be both fishable and swimmable. Without the ecosystem services provided by the forest, this goal would not be obtainable. (*2018 Integrated Water Quality Monitoring and Assessment Report, Water Quality in Alabama 2016 – 2018,* ADEM)



Mobile-Tensaw Delta, Baldwin County

Practices for Forestry guidebook treats topics such as Streamside Management Zones (SMZs), stream crossings, forest roads, timber harvesting, reforestation/stand management, forested wetland management, and revegetation/stabilization. These best practices provide guidance for protecting the water's integrity, and their consistently high rates of implementation provide for sound stewardship of the land in the context of responsible timber harvesting.

The State of Alabama encompasses a wide range of ecological conditions ranging from mountainous terrain in the northern reaches of the state to the coastal regions in the south. Forests provide important habitats that support some of the most diverse regions in North America. Maritime forests along the coast, mountainous hardwood forests, remnant longleaf pine forests, pine-hardwood forests, and bottomland hardwoods support a multidimensional assemblage of flora and fauna and contribute to Alabama's incredible biodiversity. Trees provide the key structural components of forest habitats along with a range of secondary attributes (stream shading, detrital matter, wildlife food) that support both terrestrial and aquatic organisms.

Finally, Alabama forests are valuable for providing recreational opportunities and tourism. These forests provide a setting for a wide array of outdoor activities such as hiking, camping, biking, wildlife watching, and canoeing. The habitat provided by forests and the water quality maintained by forests are important for supporting Alabama's hunting and fishing heritage. Hunting and fishing, activities strongly identified with Alabama, generate tourism and are important contributors to the state's economy.

Biodiversity

Alabama is the fifth most biologically diverse state in the United States in terms of overall species richness. California, Texas, Arizona, and New Mexico are the top four biologically diverse states but also have 2 to 5 times more land mass than Alabama (Stein, 2002). The southeastern United States is the region of the country with the highest aquatic biodiversity and Alabama is the state with the greatest aquatic species richness (Boschung, 2004; Henderson, 2014). Alabama owes its biodiversity to several factors including, but not limited to, geologic variation, location on the planet (climate), and abundant water resources.

Alabama forests deliver critical ecosystem services that benefit our planet and daily lives. Our forests 'filter' our water supply, provide oxygen to breathe, sequester carbon, and control erosion in a manner that maintains ecosystem functionality. These services would otherwise be quite costly and could negatively impact Alabama's economy and quality of life were they not provided ambiently by the forested landscape.

Alabama has approximately 4,000 species of plants (NatureServe, 2009) including nearly 200 native tree species (Mohr, 1901) associated with 63 distinct terrestrial ecological systems (NatureServe, 2009). Fifty-six of the 63 systems are forested to some degree (Appendix 6). Ecosystems provide better quality services when their flora and fauna are intact. Declines in biodiversity, especially species that play significant roles in ecosystem functionality, reduce the ability of our ecosystems to provide the current level of services and are difficult if not impossible to reverse.

Few, if any, of Alabama's terrestrial and aquatic systems have not been impacted by human activities. Aquatic systems in Alabama have been negatively impacted to a greater degree than terrestrial systems as evidenced by the larger number of species that have been extirpated or currently considered as a species of greatest conservation need in those systems (Table 4). These impacts to our aquatic systems have occurred over the past century and were caused primarily by the construction of impoundments and sedimentation. Destruction of shoal habitat by impoundments and channelization of our rivers has been a major cause of population decline in mollusks specifically (Garner, 2001). Many aquatic species cannot survive long periods of elevated temperatures or heavy siltation. This highlights the importance of restoring and maintaining forested buffers along streams.

Taxa	Total Species	Extinct	Species of Greatest Conservation Need			Federally Listed (T or E)
			Extirpated	Priority 1	Priority 2	
Mammals	68	0	4	11	12	7
Birds	256	3	2	8	19	5
Reptiles	115	0	0	13	15	9
Amphibians	79	0	0	10	9	3
Fishes	347	2	8	33	22	17
Mussels	182	24	25	53	22	53
Freshwater Snails	203	37	4	25	23	12
Crayfishes	97	0	0	13	31	0
Other	1,000s	?	1	3	0	2
Plants	≈ 4,000					23
Total		66	44	169	153	131

Table 4. Conservation Status of Alabama's Native Vertebrates, Selected Invertebrates and Plants*
*Table adapted from ADCNR-DWFF, 2015 and updated from USFWS website

Alabama's forested systems have experienced pressures including fragmentation, conversion, invasive species introduction, and a reduction in fire frequency since settlement of our state. Mechanization of agriculture, modern silviculture, and urbanization have expedited the fragmentation process during the past century. A reduction in fire frequency due to increased risks associated with urbanization and smoke management have changed the landscape, especially in the lower coastal plain where longleaf pine was once the dominant overstory tree species. Invasive species such as cogongrass and privet have become a dominant component of our forest understory, especially in unmanaged systems.

Alabama is still a very biologically diverse state but pressures on our terrestrial and aquatic systems place species at risk as evidenced by the increase in the number of "Species of Greatest Conservation Need" and candidate species being petitioned for protection under the Endangered Species Act. A tremendous amount of work is being done in Alabama to protect our biodiversity, species richness, and maintenance of the ecological functionality of aquatic and terrestrial systems. The future of the world in which we live may depend on the success of our ongoing efforts.

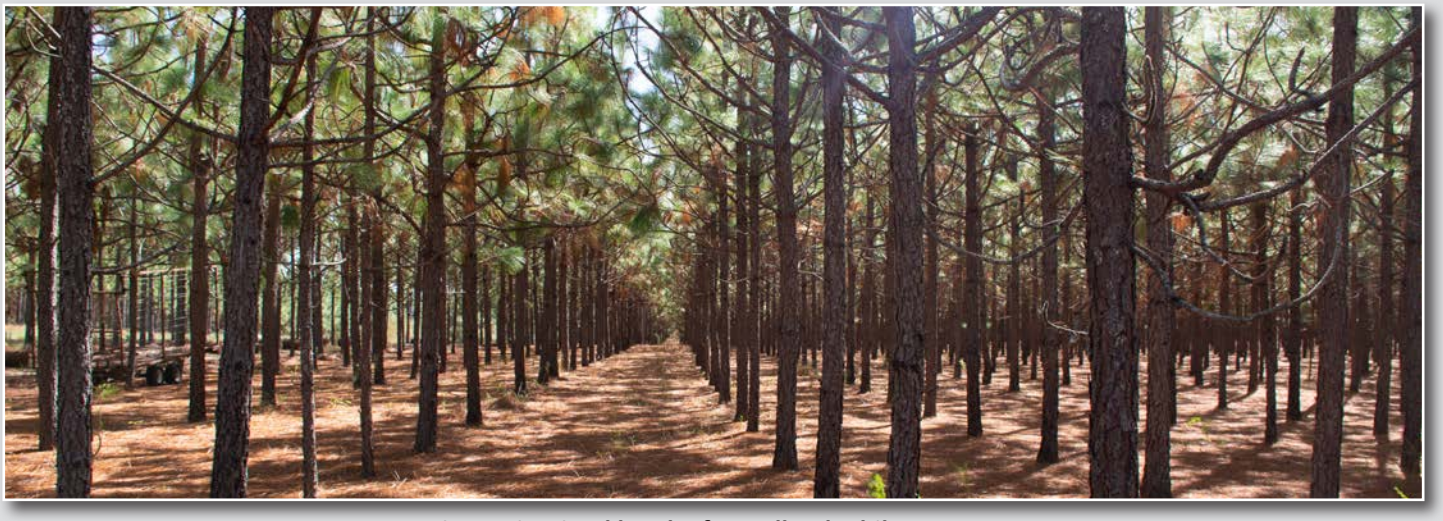
Box 2. Restoring Longleaf

The longleaf-dominated forest (see map, page 49) is a diverse ecosystem that historically covered millions of acres in Alabama. It has declined more than any other forest type and is now among the most endangered ecosystems in North America. Only about three percent of pre-European settlement longleaf pine forest area (natural stands) remains. Although pine forests comprise 45 percent of the state's total forest cover, only three percent (734,000 acres) of the forest is classified today as longleaf pine. This acreage has been increasing by about 6,000 acres per year over the past decade. Those few areas remaining in natural condition harbor a number of rare and imperiled species, including Bachman's sparrow, red-cockaded woodpecker, pine snake, and gopher tortoise.

Longleaf pine forests and savannas were one of the most extensive woodland ecosystems in North America prior to European settlement. Spanning approximately 90 million acres of the Southeast, this ecosystem covered much of what would become Alabama. Longleaf pine forests are rich in biodiversity, particularly due to species richness in the groundcover. These forests include 191 species of rare plants and an understory that can contain 130 species of plants in less than one-quarter of an acre.

Over millennia, longleaf pine forests adapted to fire triggered naturally or by Native Americans. Each stage of the tree's life cycle relates to fire, from the mineral soil required for seedlings to the thick bark that provides insulation and dissipates heat. Because periodic low-intensity fires clear undergrowth, natural longleaf forests are open, airy, grassy savannas, in contrast to dense, closed-canopy hardwood forests.

Thanks largely to the efforts of the Longleaf Alliance, public awareness of both the value and plight of longleaf pine has been raised, improved techniques for planting have been developed, and public funds have been made available for replanting. In 2006, the USDA Farm Service Agency (FSA) unveiled a Conservation Reserve Program (CRP) Longleaf Pine Initiative designed to reforest up to 250,000 acres of longleaf pine forests in nine southern states including Alabama. Assessment of the landscape has shown the opportunity for even greater acreage to be restored to a Longleaf Pine forest type. As part of Region 8 of the Forest Service's Million Acre Challenge, the goal was put in place to raise this acreage on the National Forests of Alabama up to 201,400 by 2025. The Bankhead, Conecuh, Oakmulgee, Talladega, and Tuskegee units are all participating. See page 70 for more details.



Fire-maintained longleaf woodland, Chilton County

Carbon Sequestration

The buildup of carbon dioxide (CO_2) in the earth's atmosphere has generated much interest in using strategies to capture and hold carbon in non-atmospheric formats. One topic receiving significant attention is the ability of trees and forests to sequester atmospheric CO_2 through the photosynthetic process. Alabama has one of the largest forest resource acreages in the nation with a tremendous capacity to store carbon. According to the 2018 FIA survey data, Alabama's forests are sequestering an estimated 624.2 million tons of total carbon in live trees. To put this in perspective, the average coal car on a train carries a 120-ton load, and the typical coal unit train is 120 cars long. Thus, a typical fully-loaded train is hauling close to 15,000 tons. It would take over 41,000 of these trains to transport the carbon stored in Alabama trees. This continues an upward trend in carbon storage beginning in 1936, when the first forest inventory was completed in Alabama, and is up 38 percent in just the last ten years.

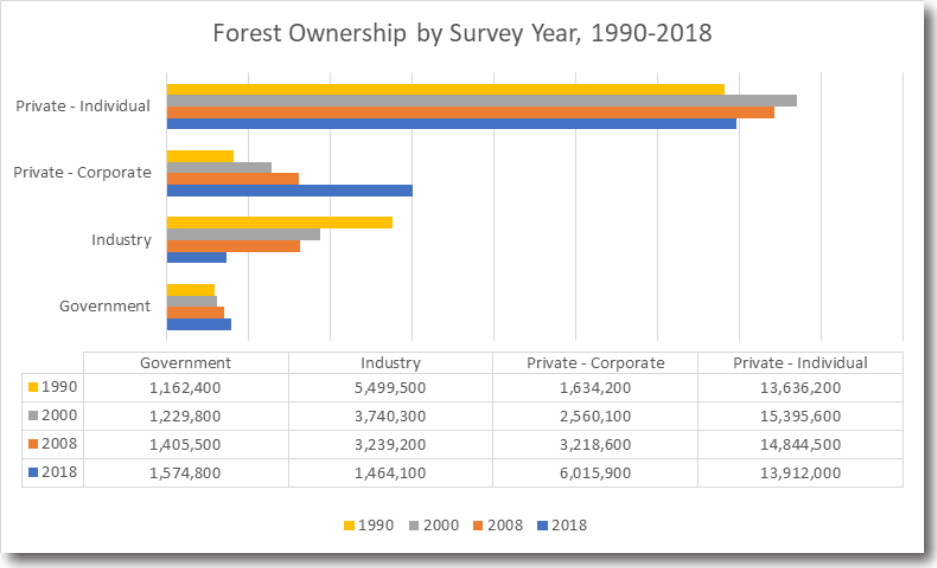
Several dynamics impact the ability of Alabama's forests to sequester carbon. An Auburn University School of Forestry & Wildlife Sciences study (Chen, 2007) showed that "ecosystem carbon storage has changed as a result of multiple stresses and interactions among those stresses including land-cover change, climate variability, atmospheric composition (carbon dioxide and tropospheric ozone), precipitation chemistry (nitrogen composition), and natural disturbances such as fire." The replacement of forests following cropland abandonment and natural storm events has increased carbon sequestration in the state, while growing urban land-use change and rising tropospheric ozone pollution could reduce the capacity of Alabama's forests to store carbon.

AUBURN UNIVERSITY
SCHOOL OF FORESTRY AND WILDLIFE SCIENCES

Recent research has better quantified these findings. Of course, due to differences in climate, species, and age of stand, there is great variability in the amount of carbon captured and stored across forested regions. It is known that plantations of *Pinus* species accumulate relatively large amounts of biomass, in no small part due to the decades of selective breeding and more intensive silviculture that accompanies most plantings of these trees. An experimental planted pine stand was found to have accumulated 250 metric tonnes of carbon per hectare after 100 years, whereas the global average for forests is estimated at 1.0 metric tonnes carbon per hectare per year, and carbon sequestered in a given hectare of pasture or cropland is only a fraction of that (Cunningham, 2015).

Forest Ownership

Forest ownership in Alabama can be divided into four classes (Figure 3): private small-scale (non-industry) family, non-industrial private corporations (i.e., a company or individual without a mill or wood-processing plant), forest industry, and government.



	Government	Industry	Private - Corporate	Private - Individual
1990	1,162,400	5,499,500	1,634,200	13,636,200
2000	1,229,800	3,740,300	2,560,100	15,395,600
2008	1,405,500	3,239,200	3,218,600	14,844,500
2018	1,574,800	1,464,100	6,015,900	13,912,000

Figure 3. Alabama Forest Ownership, 1990-2018. *Source: FIA, National Woodland Owner Survey*

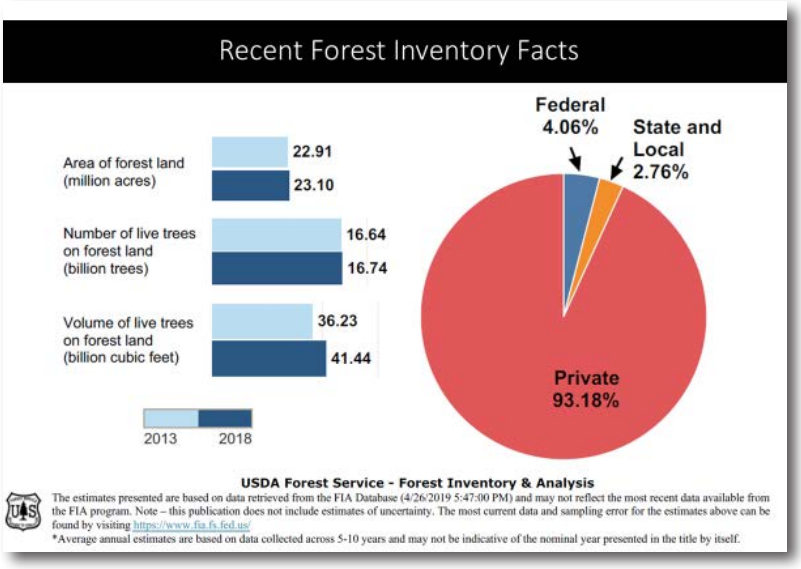


Figure 4. USFS FIA data on tree inventory and forest ownership

Private Non-industry Forestlands

Alabama forests are over 93 percent privately owned. According to the most recently published National Woodland Owner Survey data, covering the years 2011-2013, there were 159,000 separate family forest ownerships in Alabama of 10 acres or greater, with an average holding of 83.4 acres. Owners of Alabama's family forestland cite a number of reasons for having their land, and often have overlapping economic, environmental, recreational, and aesthetic objectives. These include passing on land to heirs, enjoying natural beauty or scenery, privacy, investment, protecting nature and biological diversity, hunting, fishing, or other recreation, and production of timber products. Interestingly, fully 90 percent of the acreage was owned by survey responders who either 'Strongly Agreed' or 'Agreed' that they wanted to see their forest remain as forest, and 55 percent reported having little interest in selling their property even if offered a good price for it. (Butler, 2016). Note that some land that has passed from "Private – Individual" to 'Private – Corporate' from one survey to the next may not have changed ownership, but the owners may have chosen to form an LLC or LP, thus the courthouse record now reflects a corporation as owning the property, although the principals may have been recorded as private individuals in the previous survey. During the past two decades, protecting private land from development through voluntary donations of conservation easements has escalated. This is due to the passage in 1997 of the Uniform Conservation Easement Act, Title 35-18-1, Code of Alabama, 1975 and because of increased incentives for income and estate tax savings. The area protected by conservation easements is expected to keep growing. Many of the private lands under easement are managed as working forests and continue to contribute forest products and other revenues to local communities.

Forest Industry Lands

Due to changing markets, cost and tax structures, and unprecedented timber availability, the vertically-integrated forest industry (i.e., those with mill processing facilities and the timber land base needed to supply the mill) has been in the continuous process of divesting itself of vast tracts in Alabama and the Southeast. From 1990 to 2000, forest industry lands in Alabama decreased 22 percent to 3.7 million acres (Hartsell, 2002). From 2000 to 2008, industry lands decreased an additional half million acres, a 15.6 percent decline. Between 2008 and 2018, greater than half the remaining acres were divested, leaving less than 1.5 million under direct forest product producer ownership (FIA Alabama 2018 data).

Corporately-Owned Forestlands

Over the past two decades, significant changes in forest ownership have occurred as the large-scale divestiture of landholdings by forest industry has resulted in the shift of vast areas of land from the forest industry to timber investment management organizations (TIMOs), real estate investment trusts (REITs), pension funds, and others. From 1990 to 2008, corporately-owned forestlands in Alabama nearly doubled to 3.2 million acres. This total has nearly doubled again since 2008, and now stands at approximately 6.0 million acres.

Box 3. TREASURE Forest

In the 1970s, forestry was under siege in Alabama and across the country. The public was questioning traditional forest practices. Natural resource professionals quarreled over management objectives. Landowners often found themselves caught in the middle of competing values, agencies, and professionals. It was in this turmoil that former Alabama State Forester C. W. (Bill) Moody developed the idea of a program to recognize landowners managing their properties for **t**imber, **r**ecreation, **e**nvironment, and **a**esthetics, all as a **s**ustainable **u**sable **re**source. He called it TREASURE Forest. In 1973, the Alabama Forestry Planning Committee (today the Alabama Natural Resources Council) adopted the program and became the official sponsor.

TREASURE Forest Property

Alabama's TREASURE Forest program continues to fulfill its mandate as a voluntary program seeking to promote sound and sustainable, multiple-use forest management. It encourages landowners to use their forests wisely to meet their own needs while at the same time protecting and enhancing the environment. The TREASURE Forest program promotes this management ethic through education and recognition. Education is provided through information and on-the-ground technical assistance from the member agencies and groups of the Alabama Natural Resources Council.

Nationally, the TREASURE Forest program has made an impact. In the late 1980s the U.S. Forest Service was eager to start its own landowner recognition program and met with Alabama representatives to learn how and why this program works. In 1991, the Forest Service unveiled its own Forest Stewardship program which is modeled after TREASURE Forest.

Publicly Owned Forestlands

Between six and seven percent of Alabama's forestland is publicly-owned, with roughly half of that in four National Forests, collectively administered as "The National Forests in Alabama." Federally-owned forestland is also held by the U.S. Department of Defense, Tennessee Valley Authority, and U.S. Fish and Wildlife Service. The Alabama Department of Conservation and Natural Resources (ADCNR) State Lands Division manages approximately 38,000 acres of forested state-owned lands that are not being used for other specific purposes. The State Lands Division also administers the 'Forever Wild' Land Trust program, which conserves (either through direct ownership or long-term leases) more than 268,000 acres of forestland; most of which is available for public use.

The Forest Legacy Program (FLP) is a program of the U.S. Forest Service supporting state efforts to conserve environmentally sensitive forestlands, particularly working forests in areas threatened by fragmentation, urban expansion, and conversion to non-forest uses. In Alabama, the AFC administers the FLP and since 2002 this program has acquired seven tracts covering 13,354 acres. These working forests protect water quality and provide wildlife habitat, forest products, opportunities for recreation, and other public benefits.

Box 4. Forever Wild Land Trust Program

The Forever Wild Land Trust Program was established by constitutional amendment in 1992 and conserves forestland with funding from interest earned from offshore oil and gas royalty revenues. Since its inception, the program has acquired 172 tracts totaling greater than 268,000 acres lands for general recreation, nature preserves, and additions to Wildlife Management Areas and state parks., including more than 220 miles of recreational trails. The Trust is administered by a fifteen-member appointed board with programmatic responsibilities being implemented by the ACDNR State Lands Division. With the exceptions of nature preserves and parks, Forever Wild acquisition does not take lands out of traditional forest management.

A prescribed burn on Forever Wild land, Bullock County

Forest Resource Management Practices

A 2019 update reflecting 2018 prices by the Alabama Cooperative Extension System (ACES) to the region-wide survey of public, industrial, and private forestland managers provided insight into the ten most common forestry practices in the South (Maggard & Barlow 2019). Of those practices, managers reported 1) chemical herbicide treatments, 2) timber cruising, 3) tree planting, 4) mechanical site preparation, and 5) prescribed fire, as the most commonly occurring forest management practices in the region. Table 5 shows price trends for these practices.

Results of ACES's Survey of Common Forestry Practice Costs: 2018			
Forestry Practice	**1998**	**2008**	**2018**
Chemical control of undesirable trees	$72.32	$48.82	$77.09
Prescribed burning	$16.58	$29.31	$31.92
Mechanical site preparation	$122.14	$157.32	$130.45
Planting			
by hand	$0.0670	$0.1079	$0.12
by machine	$0.0593	$0.1386	$0.09
Timber cruising	$4.10	$6.28	$12.27

Table 5. Survey of average cost of forestry practices ($/acre or $/seedling) in the South from 1998-2018. All costs are per acre except for planting which is dollars per seedling planted. Tree seedling costs are not included.

Timber cruising, or forest inventory, is a common forest management activity used to identify the volume and estimate the monetary value of forest and timber assets. Depending on landowner objectives, a timber inventory may be conducted to determine size and approximate value of standing timber for management purposes, or prior to selling or purchasing a parcel.

Tree planting is the artificial regeneration of a stand with tree seedlings after the overstory trees have been removed. Seedlings may either be planted by hand or with a machine and may be bare root or container grown. In the ACES survey, bareroot loblolly pine was by far the dominant species and seedling type artificially regenerated, representing 74 percent of the reported acres.

Finally, prescribed fire continues to be an important management tool in the region. With an increase in acres reported over the prior period, prescribed fire is a cost-effective tool for controlling unwanted vegetation and understory debris whether used following a chemical site preparation treatment or for mid-rotation hardwood control. The average cost of burning per acre has decreased over the last few years. Prescribed fire also has many ecological and wildlife habitat benefits.

The forest management practices outlined above are just a few of the most commonly reported practices in the Southeast. Many other options are available to landowners. Whether land ownership objectives are for timber, wildlife, recreation, or maintaining your family farm, active management is vital to a healthy and productive forest.

Prescribed Burning

Alabama's upland forests are fire dependent. Fire has been used as a tool to manage the forest for thousands of years, first by Native Americans and subsequently by European immigrants. In recent years, prescribed fire has been used in a safe way to apply a natural process to the landscape, ensure ecosystem health, and reduce wildfire risk. Prescribed burning is a management tool that is employed statewide and the AFC is responsible for issuing burn permits throughout the state (Figure 5). In FY 2018, burn permits were issued on nearly one million acres of land, much of that being forestland. Prescribed burning promotes healthy forests which in turn provide clean air, clean water, and conserves soil as well as providing recreational opportunities for Alabama's citizens and visitors.

Prescribed burning is necessary to maintain healthy ecosystems, particularly longleaf pine, and in many cases to meet requirements of the Endangered Species Act. The gopher tortoise, a threatened species in Mobile and Washington counties, has been petitioned for listing throughout its Alabama range. Federal property managers in the listed portion of its range use prescribed fire to enhance its recovery. Gopher tortoises are considered a keystone species and their burrows are utilized by more than 360 other animal species. Increased prescribed fire activities could improve tortoise habitat throughout its range and possibly preclude the need to expand the listed range or provide protection under the Endangered Species Act for other species.

Prescribed fire is an important tool to maintain habitat for popular and economically important game species, such as the northern bobwhite quail, wild turkey, and white-tailed deer, and features prominently in the National Bobwhite Conservation Initiative's Range-wide Plan for Recovering Bobwhites (The National Bobwhite Technical Committee, 2011). Fire plays a vital role in statewide wildlife management goals and has been recognized as one of the highest priority conservation actions in Alabama's State Wildlife Action Plan.

Prescribed burning, Geneva State Forest

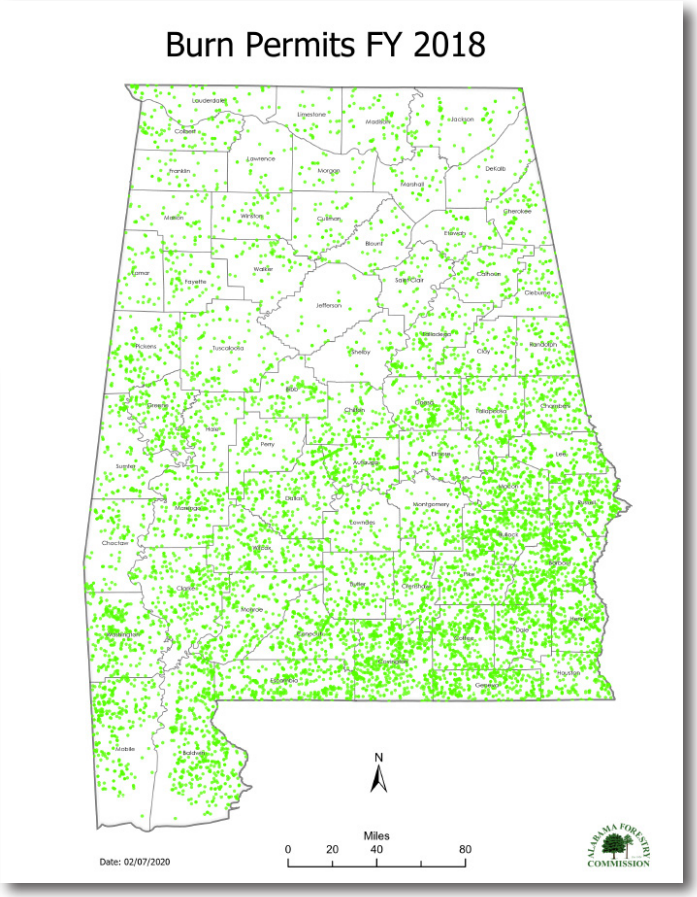


Figure 5. Burn Permits issued in FY 2018: 12,092 permits covering 936,691 acres

Reforestation

Tree planting trends in Alabama once tended to mirror the economy, but this is no longer the case. The acres planted annually rose steadily through the 1970s and into the late 1980s, peaking in 1986 at 393,000 acres planted. Cost-share programs such as the Forest Incentive Program (FIP) started in the mid 1970's and contributed significantly to reforestation efforts. The Conservation Reserve Program (CRP) began in 1986, taking highly erodible cropland out of agricultural production and converting many acres to woodlands to help promote wildlife habitat. There has not been a trend up or down in replanted acres over the past decade; however, there has been a notable uptick in acres regenerated cost-effectively through natural means. Although these stands may never produce the volume of timber obtainable through more intensive methods, the lower up-front costs can make this reforestation method an attractive choice for many landowners.

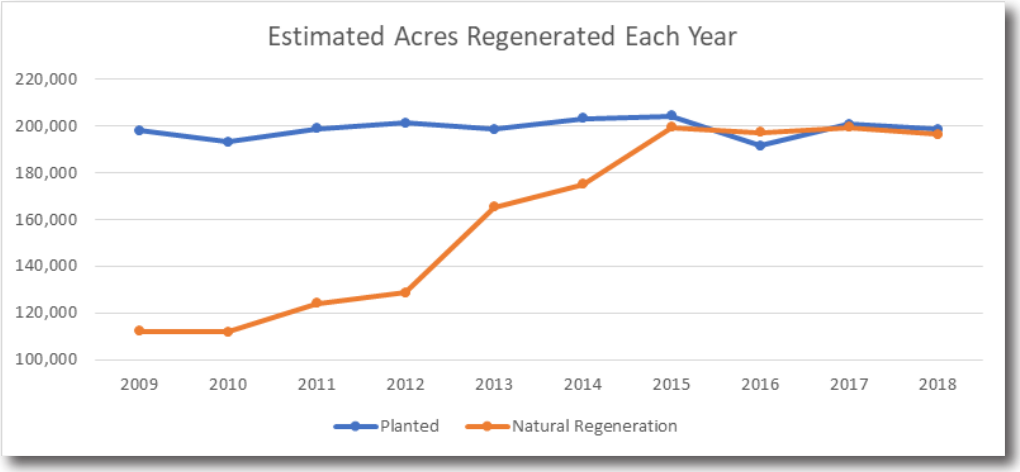


Figure 6. Artificial and Natural Regeneration in Alabama: 2009 - 2018 (FIA)

Urban and Community Forestry

Urban and community forests are the network of trees that grow in and around places where people live, work, and play. Trees in the urban forest can be publicly or privately owned. They can be intentionally planted or naturally occurring. Whether a single street tree by a bus stop or a small grove in a city park, the trees in urban forests provide tremendous benefits to the municipalities and people who live among them. In addition to the natural beauty of trees, these economic, environmental, and social benefits include:

- Reducing the urban heat island effect
- Improving water supply and water quality
- Mitigating stormwater runoff and flooding
- Improving air quality
- Sequestering carbon
- Producing food
- Conserving energy
- Increasing jobs, business, and the green economy
- Providing wildlife habitat
- Enhancing community cohesion
- Improving human health and well-being
- Increasing property values

Tree planting event, Lagoon Park, Montgomery County

Unlike the largely rural forests that produce Alabama's fiber and timber, the urban and community forest is a very different ecosystem with distinct products, ownerships, and management strategies. Urban forests in Alabama are found in large and small parks, cemeteries, greenways, neighborhoods, along city streets, and on former industrial sites. Thus, the composition of the urban forest is quite varied. While most municipalities lack a complete inventory of their urban forest, the findings from inventories of the forests of Auburn University and the cities of Auburn and Gainesville, Florida, can be considered typical in that they identified many different species across the landscape with a few being predominant. For Auburn University, these numbers were 139 different species of which nine are predominant. Similarly, the condition of Alabama's urban forests is varied. Within the same community exist healthy and stressed trees (Martin, 2012). Nevertheless, the urban forest provides significant benefits to the citizens of the state.

Alabama's citizens place a great value on urban trees. Across multiple demographics, individuals prefer to live in homes and communities with abundant tree cover (Bin, 2011). Likewise, local governments have begun taking steps to actively manage their urban forests. One indicator of this is the steady growth of organized community tree programs springing up across the state such as Tree City USA. This Arbor Day Foundation program gives national recognition to communities that budget at least $2 per capita for tree care, celebrate Arbor Day with a proclamation, and have a tree ordinance and tree board. In 1979, Mobile became the first Alabama city to attain Tree City USA status. In the four decades since, 149 cities and towns across the state have been recognized as Tree City USA communities. Similarly, the population of Alabama that lives in a Tree City USA has steadily risen. See Figure 7.

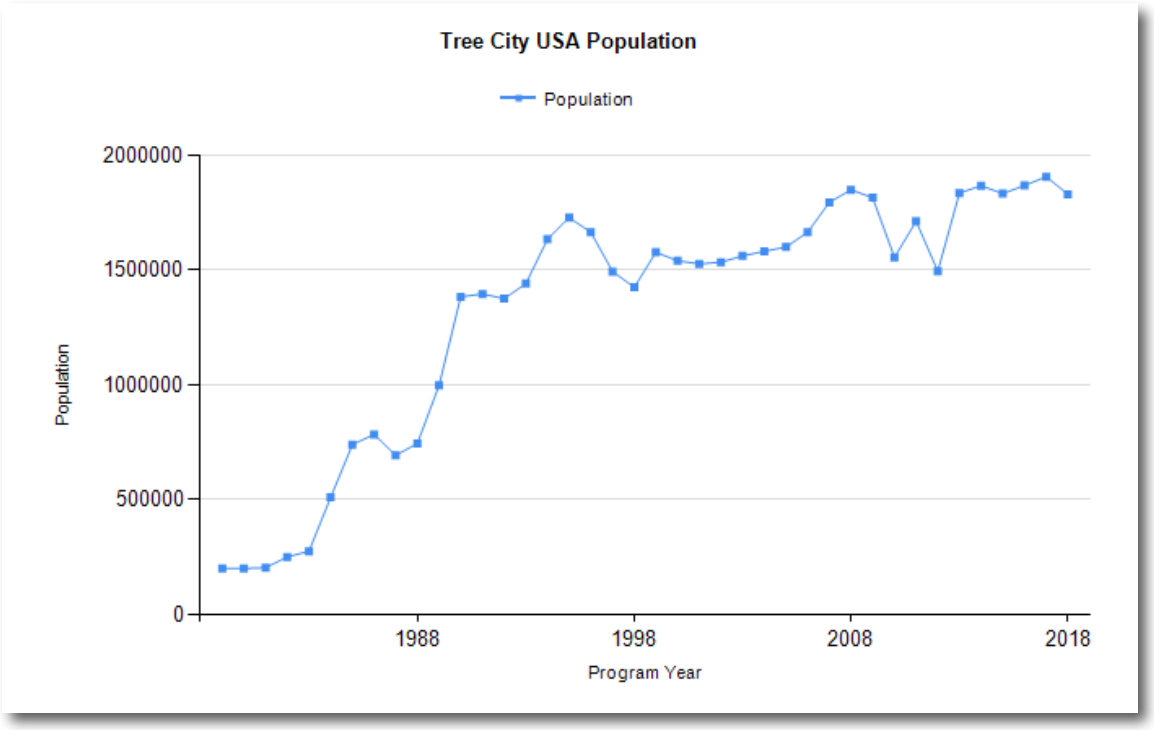


Figure 7. Alabama population living within a Tree City USA Community.

This increase is not surprising. The 2010 census indicated that 59 percent of Alabamians live in urban areas. This was an 18 percent increase in urban population over the 2000 census, accompanied by a nearly 30 percent increase in urban land area. (U.S. Census Bureau). As the urban population increases, so will the need to understand, manage, and protect the urban forest. Increasing impervious areas and conversion to grass in our urban landscapes will likely continue without intervention by urban foresters, planners, and municipal managers (Nowak 1, 2018).

Across Alabama, the Forestry Commission can be the leader in innovative projects to promote the management and utilization of Alabama's community forests. The continued expansion of urban areas combined with contraction of urban forests could cost our state millions of dollars annually (Nowak 1, 2018); however, with attention to these threats as well as the insects, diseases, and invasive species that also impact the rural forest, the Alabama Forestry Commission can shepherd Alabama into its next century of statehood with vibrant, resilient forests throughout its communities keeping them cool, clean, and prosperous while upholding a continuous working relationship.

TREE CITY USA®

Box 5. City of Auburn Incorporates Urban Forest Canopy Stormwater Mitigation into Green Infrastructure Master Plan

Photo courtesy of alabamaliving.com

From 2017-2019, the City of Auburn worked with the Green Infrastructure Center of Charlottesville, Virginia, to map, assess, and plan trees within their city limits and optimize the amount of stormwater intercepted with the goal of slowing the "flushing" impact of storm events. An $87,000 Landscape Scale Restoration grant from the USDA Forest Service, awarded by the Alabama Forestry Commission, was used to fund the ecosystem services project. This analysis of trees and their effects on stormwater management will result in cleaner water in the streams and creeks within Auburn's city limits.

High-resolution tree canopy mapping was converted to an ArcGIS geodatabase and indicated that following a 10-year storm event the trees in Auburn take up an average of 297.5 million gallons of water; enough to fill 450 Olympic-sized swimming pools. Auburn now enjoys a higher than average 55.4 percent tree canopy coverage, but there are still ample potential planting spots available. The contractor provided a detailed graphic highlighting the optimal tree planting locations for stormwater infiltration.

Auburn is one of twelve cities in six states across the southeastern U.S. to have performed the tree canopy and stormwater analysis. Additional benefits from this study are a list of suggested improvements to tree protection ordinances and a 'stormwater calculator' spreadsheet that assists city engineers in preparing annual reports to E.P.A. Both the ordinance list and stormwater calculator are available from the AFC Urban and Community Forestry Group.

Forest Health

Even with the presence of native and non-native pests, Alabama forests are resilient. Land management has a significant influence on the health and sustainability of our forests. Information and research on integrated pest management, early detection, rapid response, and prevention of harmful agents also aid in sustaining healthy forests in our state.

The evidence of a healthy forest is lush vegetation and abundant wildlife flourishing in a sustainable ecosystem. In most areas, Alabama's forest is generally healthy. Occasionally adverse conditions alter the natural function of a forest. Forest pests such as destructive insects, infectious diseases, invasive species, incinerating wildfires, natural disasters, and climatic variations can all impact the existence of a thriving forest environment. Abiotic pests such as environmental changes (i.e. prolonged drought) and catastrophic events (i.e. storms) can initiate damage or stress to trees. Exemplifying subtle signs of tree disturbance, they can increase the tree's susceptibility to surrounding opportunistic biotic pests such as fungi, bacteria, viruses, and insects. These pests can have a significant impact on the health and vitality of trees, but non-native invasive pests are usually more resourceful and detrimental. They spread aggressively through host species causing significant destruction or mortality in the forest landscape. Their encroachment can displace native plant composition and disrupt regeneration of indigenous species. Both native and non-native pests can impede land management

objectives, economic development, and ecological diversity. Forestry and natural resource agencies are continuously implementing efforts to detect, identify, and monitor harmful pests to ensure sustainable forest ecosystems in the state. Forest pests that affect Alabama are by no means destroying all of our trees. However, forest pests are inevitable. There will always be some sort of pest affecting some type of tree. Some years are obviously worse than others. There are a few pests that periodically advance to epidemic levels killing a significant number of trees, but this forest occurrence is infrequent. Most damaging pests affect a small percentage of the total forests in the state.

Forest pests are persistent agents that can impact the normal function of trees. Ultimately, growth and survival of trees are adversely affected. Not all outcomes of a pest occurrence, however, are detrimental to the forests. In some instances, forest pests receive unfair negative connotation. Some pest events can favorably alter a forest ecosystem. There are various pests that influence forest succession, site regeneration, nutrient recycling, plant decomposition, and other stand characteristics. Native pests evolve with our forests and some can be beneficial. For example, native bark beetles usually attack declining or dying pines. Pines that are injured or extremely mature, or pines in stands that are overstocked and very stressed may be attacked by these bark beetles. Such infestations aid in the mortality of these trees and encourage the growth of newly-established forests.

Engraver Beetle, *Ips* spp.:

In the later months of 2016, Alabama experienced complications from an intense drought that continued well into the fall season causing extreme stress on all vegetation. By December, there were numerous reports of dying trees, especially pines in northern Alabama where the drought was most severe. Aerial surveys were initiated in January 2017 to detect beetle infestations and other drought-related pests. Of the 22 counties surveyed, 465 beetle spots were detected infesting 19,550 pines. Most of the detected spots were caused by the pine engraver beetle. By the end of May 2017, reports of large-scale pine engraver beetle infestations subsided. Alabama received a significant amount of rain and warm temperatures throughout 2017 and 2018 that allowed these affected trees to recover from the devasting drought. With pines regaining their vigor, fewer and fewer pine engraver beetle infestations were occurring. By 2018, only a few pine engraver beetle infestations were reported, a significant difference from 2017.

Southern Pine Beetle, *Dendroctonus frontalis:*

In early 2017, there were a limited number of southern pine beetle infestations documented; however, by June, new reports emerged about the rapid expansion of pine mortality from bark beetles. This time, the concerned area of the state was central Alabama and the pest was the southern pine beetle. Starting in late spring, aerial surveys were initiated for southern pine beetle infestations. The contributing factors for the southern pine beetle outbreak were quite complicated. The drought was a factor which caused pines to become stressed and more susceptible to a beetle attack. Another factor was the mild winter that increased the survival of overwintering beetles. Overstocked stands and over-mature pines were additional contributing factors that increased the susceptibility of already compromised pine stands. When temperatures increased during the summer months, so did the southern pine beetle activity. By mid-summer of 2017, Alabama was experiencing heightened southern pine beetle infestations with over 100 detected spots in several counties. In all, the Alabama Forestry Commission detected 2,322 spots from aerial surveys, infesting 212,135 pines. See Figure 8. The mild climate persisted from 2017 to 2018 reducing susceptibility of a southern pine beetle attack. As predicted, the number of southern pine beetle infestations drastically decreased. There was still a significant number of spots detected on National Forest lands. In 2018, Alabama detected 299 beetle spots, infesting 8,013 pines with more than half of these infestations occurring on National Forests.

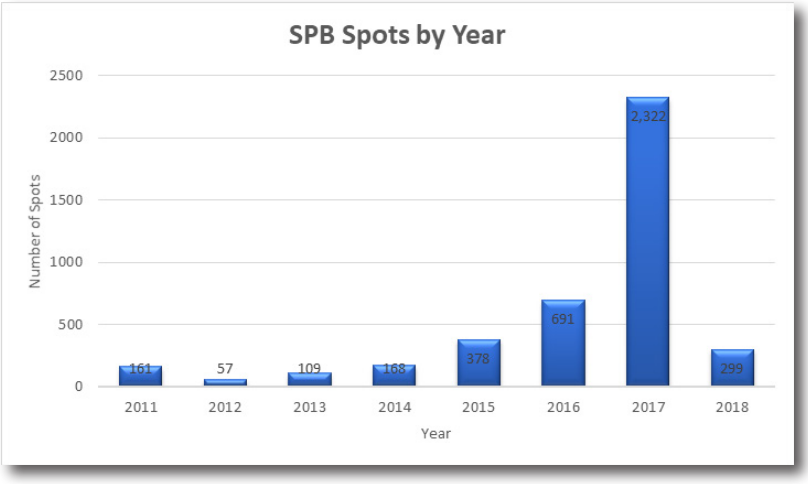


Figure 8. Reported Southern Pine Beetle Spots in Alabama, 2011 - 2018

Black Turpentine Beetle, *Dendroctonus terebrans*:

During the start of 2017, black turpentine beetle infestations were prominent. The 2016 drought caused stress on all trees, especially pines. These infestations were more aggressive than usual. Some black turpentine beetle infestations were spreading like a southern pine beetle spot, with neighboring trees being attacked. Many of the identified spots had at least 20 to 30 infested pines. A favorable climate with significant amount of rain and warm temperatures persisted for most of 2017 resulting in a decline of beetle infestations by 2018. New infestations from the black turpentine beetle were limited, but old infestations still existed. Since an infestation from the black turpentine beetle does not immediately cause mortality, landowners started noticing the damage months after the drought. Most of the black turpentine beetle infestations existed on the edge of an inactive southern pine beetle spot.

Pine Needle Diseases, *Coleosporium* **spp.,** *Lophodermium* **spp.,** *Dothistroma* **spp.,** and *Lecanosticta* **spp.:**

After the extended drought of 2016, the following year started with significant amount of rain. This weather trend continued into 2018. Certain species of trees were vulnerable to these climatic variations. There was one group of pests, leaf fungal diseases, that was the most noticeable in 2018. Fungal diseases associated with wet conditions started to manifest. Leaf spot, leaf anthracnose, needle cast, and pine needle rust were reported in Alabama. Needle diseases, however, were the most concerning. Needle cast and pine needle rust that are generally weak pathogens were quite virulent. Loblolly pine plantations were the most affected by these pests. Some infections were so severe that several pines succumbed to these needle diseases.

Oak Decline, a Disease Complex:

Other forest pests were reported in Alabama because of the 2016 drought. Red oak species, especially in the northern part of the state started showing signs of decline by late summer of 2016. Leaves were turning brown and defoliating early. By late winter, some of the drought-affected hardwoods were succumbing to Hypoxylon canker. As the 2017 summer months progressed, more and more reports of dying hardwoods, especially red oaks were confirmed. Most of these red oaks were infected with Hypoxylon canker and other pests such as wood borers that are associated with decline. Reports of red oak mortality continued in 2018 but at a much lower rate. By 2018, most trees in the state had recovered from the 2016 drought.

Emerald Ash Borer, *Agrilus planipennis*:

Emerald Ash Borer Adult

In the fall of 2016, the emerald ash borer was confirmed in northeast Alabama after adult beetles were identified in survey traps in Calhoun County. In February 2017, the regulatory agencies (Alabama Department of Agriculture & Industries and the USDA Animal and Plant Health Inspection Service) finalized a quarantine for Calhoun, Cherokee, and Cleburne counties. As a non-native invasive wood borer that attacks all species of ash, dead and declining ash trees were observed in Calhoun and neighboring counties by 2018. The regulatory agencies continued to deploy over 400 traps annually throughout the state to monitor the presence and spread of the emerald ash borer. Despite early detection, monitoring efforts, and public outreach, this exotic wood borer continued to spread with no effective control management or eradication treatment. Therefore, the Animal and Plant Health Inspection Service submitted a proposal in 2018 to remove domestic quarantine regulations for the emerald ash borer. The proposal declared to redirect funding allocated for quarantines and regulatory efforts to state research and control management of the pest. Since the initial discussion of deregulating the emerald ash borer in 2018, the decision has not been finalized.

Laurel Wilt Disease, *Fungus-Raffaelea lauricola,* and **Redbay Ambrosia Beetle,** *Xyleborus glabratus*:

Since its confirmation in 2011, the non-native invasive pest laurel wilt disease has spread significantly and now exists in 11 Alabama counties - Marengo, Mobile, Baldwin, Washington, Sumter, Greene, Hale, Wilcox, Dallas, Perry, and Bibb. This disease, vectored by the redbay ambrosia beetle, has infected and killed redbay, swamp bay, and sassafras trees in impacted areas of the state. With limited effective control treatments to curtail the spread and to prevent the devastating loss of laurel species, other management and monitoring activities were being implemented. In 2018, several southeastern states participated in a forest health project administered by the USDA Forest Service to monitor the spread and impact of laurel wilt disease in sassafras beyond the Gulf-Atlantic Coastal Plain. This project has collected useful information on the rate of natural spread, the biology of the redbay ambrosia beetle, and potential management options for control.

Wildfires:

Late summer of 2016, Alabama started experiencing complications from a severe drought. In the latter part of September, the extensive drought was causing a significant number of wildfires in the state. The extreme dry conditions continued well into the fall season. By October 2016, wildfires were ravaging forest stands throughout the state, especially in the northern counties. From October 1 to October 26, 2016, there were 1,028 wildfires consuming 11,232 acres. On October 27, a Drought Emergency Declaration was put into place that prohibited outdoor burning for 46 counties in north and central Alabama. A Fire Alert was also established restricting outdoor burning for the remaining 21 counties in the state. The drought situation persisted and on November 7, the 'No Burn' declaration was placed on all counties in Alabama. Starting at the latter part of November, Alabama received some relief from the drought. Periodic rainfall occurred throughout the state and continued for the next several weeks. On December 5, the 'No Burn' declaration was lifted for the entire state. Periodic rainfall continued for the remaining year. Adequate rainfall that started in 2017 continued throughout most of 2018. This warm wet climate influenced wildfire behavior in the state, decreasing the number of occurrences in 2017 and 2018. In 2018, there were 967 wildfires that burned 11,312.57 acres, a significant difference from 2016.

Linden Looper, *Erannis tiliara*:

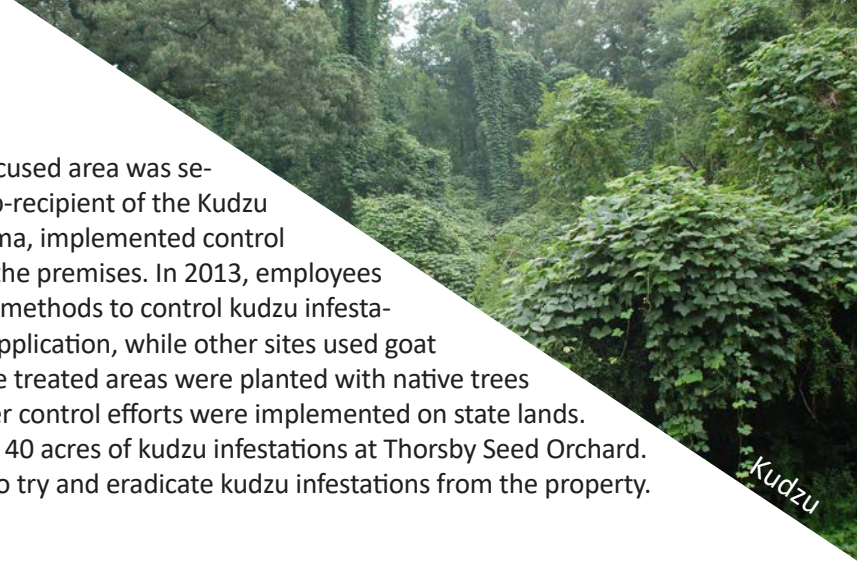
In 2011, the periodic native pest, linden looper infested host hardwoods in northern Alabama for the third consecutive year. The population declined from the previous year, but was significant enough to defoliate leaves on oaks, maples, and hickories on a noticeable scale. Most of the affected host trees were located on ridge tops. By June 2011, damaged trees recovered, growing new foliage and regaining their vigor. The years following 2011 had no significant reports of linden looper infestations in the state with no serious concerns of host trees being harmed by the forest pest.

Cogongrass, *Imperata cylindrica*:

With Mobile, Alabama, having recorded the first known introduction of cogongrass in the United States, this non-native invasive plant has spread up to areas of north Alabama making control efforts an ongoing task. Collaborative work with other entities has been implemented to ensure success of controlling and eradicating cogongrass. Several grants and funding sources have been used to identify, record, and control this noxious weed. The American Recovery and Reinvestment Act - Cogongrass Grant ended in 2012 with over 24,000 infestations treated for control and eradication. The Cogongrass Redesign Grant with the Alabama county road departments ended in 2015. This grant financially assisted 11 county road departments in the state to spray/treat infestations along rights-of-way. Approximately, 1,700 spots were treated encompassing over 38 acres. In 2018, several agencies worked together on the Gulf Coastal Plain Ecosystem Partnership for Coordinated Cogongrass Control Grant to financially assist non-industrial private landowners in Covington County. Under this grant's incentive program, over 28 acres were treated with herbicide application. Other cogongrass control projects entailed spray treatments of infestations on state lands. Herbicide applications at Little River State Forest and Johnson-Gjerstad State Forest were conducted for several consecutive years to control their cogongrass infestations.

Cogongrass

Kudzu, *Pueraria montana*:


Kudzu

With kudzu infestations thriving throughout the state, a focused area was selected for control treatment and public education. As a sub-recipient of the Kudzu Redesign Grant, Red Mountain Park in Birmingham, Alabama, implemented control and eradication efforts of this non-native invasive vine on the premises. In 2013, employees and volunteers at Red Mountain Park used various control methods to control kudzu infestations. Some areas were plowed followed by an herbicide application, while other sites used goat grazing and herbicide treatments. The following year, these treated areas were planted with native trees and vegetation to prevent re-establishment of kudzu. Other control efforts were implemented on state lands. Starting in 2014, herbicides were applied to approximately 40 acres of kudzu infestations at Thorsby Seed Orchard. Spray treatments have been applied in consecutive years to try and eradicate kudzu infestations from the property.

Hurricanes, Tornadoes, and Storms:

Climate variation from 2011 to 2019 created atypical weather patterns even during the most unconventional time of the year. For example, in December 2015, the warmest temperatures on record since 1895 occurred in Alabama. Exceptionally cold or abnormally warm temperatures dominated the 2017-2018 winter season that resulted in Mobile and Baldwin counties recording measurable amounts of snow in December of 2017. Tornadoes were occasionally descending and traversing the state in the months of December, January, and February, well outside the normal storm season. The following storm systems on January 23, 2012; January and February 2013; December 24, 2015; February 2, 2016; February 15, 2016; and January 20, 2017 spawned several tornadoes in Alabama that caused measurable timber damage.

There were instances, however, where certain climatic events were expected. During Alabama's tornado season of March and April, several tornadoes rated an EF-1 to an EF-4 on the Enhanced Fujita Scale. Two separate storm events occurred in 2011, one on April 15th and the other on April 27th that pummeled 39 counties in Alabama. Other tornadoes that occurred in March and April were the following: central and north Alabama tornadoes on March 2, 2012, Winston and Pickens counties tornadoes on April 11, 2013, and north Alabama tornadoes on April 28, 2014. One recordable storm system occurred on Monday, March 19, 2018 that moved from Mississippi into Alabama with forceful winds and heavy precipitation. The northern half of the state received noticeable damage from hail, straight-line winds, flash flooding, and tornadoes. The most concerning property damage occurred in Jacksonville, Alabama, when an EF-3 tornado descended and traversed across the city. Scattered areas of the city around Jacksonville State University were ruined with more than 400 trees destroyed by the storm. Another tornado event that received national attention occurred on March 3, 2019. A low-pressure storm system from Texas moved east bringing strong winds, precipitation, and tornadoes. Once the storm traversed over Alabama, tornadoes descended in Macon and Lee counties. The first tornado traveled from Beauregard, Alabama, into Georgia as an EF-4. The second tornado started in Macon County and traveled through Beauregard as an EF-2.

During the 2018 hurricane season, Alabama was impacted by one of the most destructive hurricanes to hit the continental United States and the strongest one to move across this country in October. Fall of 2018 was unusually warm, creating a favorable climate for hurricanes. On Wednesday, October 10, 2018, Hurricane Michael came from the Gulf of Mexico across the Florida panhandle and over southeast Alabama. Hurricane Michael, a category 4 storm, was fierce but moved rather quickly through the Southeast simultaneously decreasing in strength. Extreme damage occurred in Houston County with over 42,000 forested acres demolished by the storm.

Forest Health Conclusion

During the last ten years, the presence of endemic pests was standard with only few exceptions of increased populations of insects or sudden virulence of pathogens. Exotic invasive pests, however, have spread further into the state, causing irreversible harm to certain forest types. With the confirmation of laurel wilt disease in 2011, redbay and sassafras trees started disappearing in impacted areas. In 2016, the emerald ash borer was confirmed in northeast Alabama, resulting in ash mortality in the immediate landscape. There have been normal variations in the climate which cause periodic, short-term forest pest problems. The extended drought in the fall of 2016 influenced the heightened populations of southern pine bark beetles in 2017. There have been some years with warmer than normal temperatures and greater than normal amount of precipitation, influencing the virulence of pathogenic pests such as pine needle diseases. Warm, wet winters increased the vigor of trees and caused early emergence, but these abnormal conditions also increased the survival of overwintering insects. Exceptionally warm temperatures outside of the normal season had significant influence on the number of highly destructive storms. More calamitous tornadoes traversed across the state and hurricanes registered as a category 4 and 5 pummeled the Southeast.

CHAPTER 2: KEY DRIVERS OF CHANGE TO ALABAMA'S FOREST RESOURCE

A driver is any natural or human-induced factor that directly or indirectly causes a change to the forest resource. As a rule, such changes are a result of interactions among many factors—social, ecological, economic, climatic, and biophysical.

Direct Drivers

Direct drivers unequivocally influence the forest. Important direct drivers include land conversion and adverse weather events.

Land Use Change

The most important direct driver of change in forest ecosystem services in the past century has been land cover change. In 1950, over 20 million acres of Alabama were classified as part of active farms (Vanderberry), while the figure given in the 2012 Census of Agriculture is just 8.9 million. Of that land, 2.76 million acres were classed as cropland, down from the 3.14 million recorded just five years earlier in 2007. By size, the absolute number of farms with harvested acreage 499 acres or less fell in every acreage size category between 2007 and 2012, while the absolute number rose in every size category of 500 acres or greater, signifying the difficulty inherent in profitably managing a small farm. Rural land not maintained for crops or pasture will tend toward reverting to forest. According to FIA data, over the past five years, on average the state is gaining more forestland through reversion than it is losing to development or conversion into agriculture. This is contrary to our neighboring states of Mississippi, Tennessee, Georgia, and Florida, all of which are showing a net loss of forest due to conversion of forested land to other uses.

Adverse Weather Events

Weather events impact Alabama's forests in a variety of ways. The ability to be resilient to and recover from these forest impacts will benefit Alabama's forest landowners. The weather events with the most severe impacts to Alabama's forests are discussed below.

- ***Hurricanes, Tropical Storms and Tropical Depressions***

The weather-related event with the greatest potential to affect Alabama's forests are hurricanes, which usually enter along the Gulf Coast region either directly into the state or through Mississippi or the Florida panhandle. Fortunately, no Category 4 or 5 storms have ever made direct hits on the state in the years since record keeping has begun, but there have been six recorded Category 3 landfalls. The intensity of hurricanes can vary along with their impact on the state's forest resource. Rainfall, floods, and high winds associated with hurricanes have profound effects that can result in tree mortality, storm damaged trees, and a stressed forest ecosystem. The state's extensive coastal urban forest is highly vulnerable to ocean-driven hurricanes. High population densities and urban-built infrastructure within the urban forest increases the risk associated with storm-damaged trees. Baldwin County, with the state's fastest growing population and severe development pressures, and heavily-industrialized Mobile County, faces acute risks. In the case of both urban and rural forests, hurricane impacts are both economic and ecological and can linger well beyond the storm event itself. The United States Landfalling Hurricane Probability Project examined the data for the years 1856 through 2008, tallying a total of 26 hurricane-force storms hitting the state, and calculated that, for an average year, there is a 16 percent probability for a hurricane impact to Alabama, and a 3 percent probability for a major hurricane impact. Hurricane Ivan in 2004 was one of the three most significant hurricanes to hit the Alabama coast in more than a century. Only Frederic (1979) and an unnamed 1926 hurricane were as destructive. In 2005 Hurricane Katrina struck coastal Mississippi as a near-Category 4 storm, causing severe damage in Alabama as well. Table 6 shows the impact of Ivan and Katrina on Alabama's timber resources. Hurricane Michael (2018) brought catastrophic destruction to the forest resources of the Florida panhandle and southwest Georgia. Damage to Alabama timber was largely confined to Houston County, but nevertheless the storm served as a reminder of the power of these forces of nature. Landowner assistance programs to aid forest landowners in recovery of their forest resources remains an important tool, as well as presence of healthy and growing markets to provide an outlet for forest resources.

	Ivan, 2004	Katrina, 2005
Softwood timber mortality	603 million ft^3	126 million ft^3
Hardwood timber mortality	414 million ft^3	91 million ft^3
Total timber mortality	1017 million ft^3	217 million ft^3
Source: U.S. Forest Service Forest Inventory and Analysis		

Table 6. Effect of Hurricanes Ivan and Katrina on Alabama's timber resources

- ***Tornadoes***

Like hurricanes, tornadoes are capable of major rural and urban forest disturbances, but usually on a smaller scale. Unlike hurricanes, tornadoes occur with greater regularity and are likely to affect the entire state. From 1950 through 2002, Alabama averaged 23 tornadoes per year. The greatest number in a single year was 55 in 2001. All of this history was rewritten on April 27, 2011, when Alabama experienced the devastation of a Super Outbreak, with 62 tornadoes coming in two distinct waves on the same day, including multiple EF-5s and EF-4s, resulting in 238 fatalities and 2000 reports of injuries (National Weather Service, 2019). Tragedy struck again on March 3, 2019, a day which saw 41 tornadoes touch down across four states, the worst of which was an EF4 that left a path of destruction through Lee County, ultimately claiming 23 lives and injuring over 100 more. Tornadoes remain a major threat to all areas of the state.

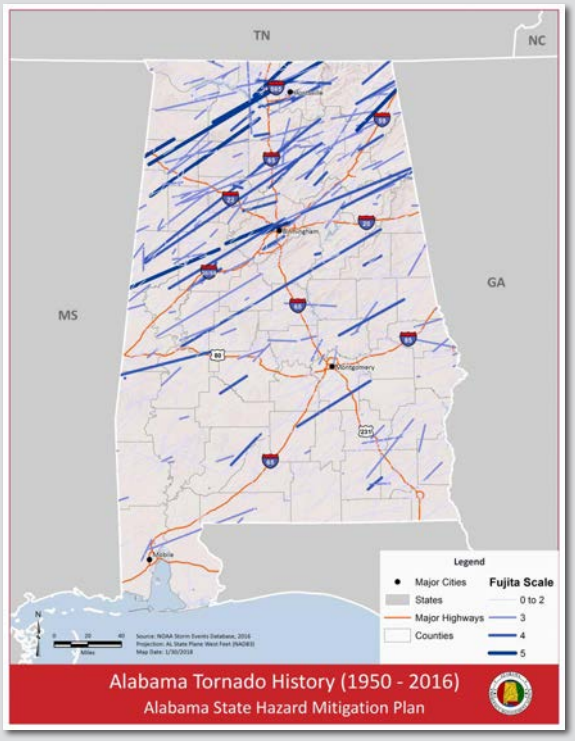


Figure 9. Alabama Tornado History.
(from page 149 of the *Alabama State Hazard Mitigation Plan*)

- ***Drought***

Rainfall (and on rare occasions, snow) varies seasonally, annually, and geographically. Unusual dry periods sometimes affect specific portions of Alabama more than others. Such dry periods are a normal component of the climate system. Forests are adapted to survive episodic droughts. In normal conditions, the impact may be slower growth, susceptibility to certain insects, and increased fire risk. Under more severe conditions, drought impacts are magnified and can even affect healthier trees. Drought is especially a concern In urban situations because of added stresses which reduce a tree's resilience.

Droughts affect trees by decreasing resistance to disease and insects, decreasing growth rates, and increasing wildfire risks. Frequent droughts may influence forest species composition. Most droughts in Alabama begin with decreased precipitation during the winter and spring, when soil moisture is being recharged. The combination of decreased precipitation and cloudiness, increased solar radiation, and extreme heat resulting from decreased evaporation dries and hardens the soil. When rainfall occurs, the hardened soil hinders recharging of the soil moisture.

Using tree ring analysis, Cook et al. demonstrated that prolonged droughts have impacted Southeastern forests several times since 1680 (Cook, 1999). Analysis of this data by Georgia's state climatologist led to the conclusion that on average, the region experiences a major drought lasting three or more years about once in 40 years (Stooksbury, 2003). In 2007, Alabama recorded its driest January-August in the last 100 years. Montgomery, Alabama, had 12 consecutive days (August 6 to 17, 2007) above 100 degrees Fahrenheit, breaking the previous record by five days (Fuchs, 2008). In 2016, the state experienced a record streak of rainless days, with Birmingham registering 61 consecutive days without rain, and other cities reaching a similar total. As expected, wildfire activity during the dry period presented challenges to state and local resources charged with wildfire protection.

In one recent study (Klos, 2009), data from Alabama, Georgia, and Virginia were examined for drought effects on mortality and growth rate of three species groups: pines, upland oaks, and mesophytic species (those adapted to moderately moist environments). The pines and mesophytic species were found to be sensitive to drought, while upland oaks were

significantly more drought tolerant. These differences among species groups may alter the composition of Alabama forests if drought episodes become more frequent and/or intense in the future. Because stand conditions can have significant effects on drought responses, forest management may be used as a tool to mitigate drought effects.

Indirect Drivers

Indirect drivers operate by altering one or more direct drivers. Indirect drivers of change include demographic, economic, and technological factors.

Demographic

The characteristics of Alabama's human population, especially its size, growth, density, distribution, and statistics regarding birth, marriage, disease, and even death has an impact on the state's natural resources. As populations increase, so does density of urban and suburban land use patterns. The parcelization and subdivision of previously rural areas of the landscape and its associated expansion of the wildland / urban interface can bring homes and people into areas where forests and agriculture had been long dominant. This has the potential not only to degrade natural resources, but to restrict traditional forest benefits and uses. Many new residents to this interface may not have experience living apart from cities and their associated services and may not be well acquainted with the management of land. For example, they may not even consider creating defensible space around the home as a precaution against wildfire.

According to the official 2010 U.S. Census, the population of Alabama was 4,779,736 as of April 1 of that year. The 2010 census population was 7.5 percent greater than it had been in 2000. However, in recent years this rate of growth has slowed. The most recent Census estimate available is for July 1, 2018, and it places the population at 4,887,871, an increase of only 2.3 percent in eight and a half years. For perspective, the nation's population as a whole has grown 6.0 percent over the same period.

While the majority of Alabama counties did show some positive growth in the decade between 2000 and 2010, that can no longer be said. Of the state's 67 counties, 45 are showing negative growth rates. The positive growth areas are Baldwin County, Greater Huntsville, Shelby County, Tuscaloosa County, and Lee County. The especially hard-hit Black Belt counties of Dallas and Macon have lost 12 and 14 percent of their respective populations since 2010, and 10 rural counties lost more than one percent of their populations between the 2017 and 2018 estimates.

Alabama's population is aging. From 2000 to 2010, the median age of Alabama residents increased from 35.8 to 37.9 years, and in the latest 2018 census estimate it has increased again to 39.2 years. Tellingly, the population under the age of 18 is smaller currently than it was in 2010 by over 42,000 persons, while the segment of the population aged 65 or older has grown by 169,000. A fast-growing segment of the population are those individuals aged 85 and older, which is up nearly 19 percent since 2010, and currently numbers approximately 90,000 residents.

Culture, as represented by the beliefs, customs, practices, and social behavior of particular groups of people, is another piece of the demographic puzzle that can influence or shape the way Alabama's forest resource is perceived and utilized.

Alabama is continuing to see a move toward a more diverse population. In 2018, whites continued to comprise the largest proportion of Alabama residents at 69.1 percent, followed by African Americans at 26.8 percent. In terms of Hispanic / Latino population, Alabama stands at 4.4 percent, and the percent of foreign-born persons is 3.5 percent. These last two are much lower than the national figures of 18.3 percent Hispanic / Latino and 13.4 percent foreign born persons.

Economic

Economic change across Alabama, the nation, and the world has far-reaching implications for the future of our forests and forest resources. In the short-term past, the sharp downturn in the national economy which occurred in 2008 and continued for many no-growth or slow-growth years brought about a recession in housing construction that bottomed out in April of 2009, when the national annualized rate for housing starts was 478,000. For reference, Census data placed the annualized rate of housing starts at 1,162,000 for March 2019; the U.S. average for 1959-2019 at 1,430,390; and the all-time high at 2,494,000 in January of 1972. Since lumber is a major component of new housing construction, periods of slack housing demand considerably depress lumber prices. Up until 2012 there was, not surprisingly, a strong correlation between the price of lumber and the price of sawtimber stumpage. After that point in time the demand for sawtimber in the American South has failed to keep pace with the increasingly expanding supply, and advances in technology and efficiency have forced a consolidation of the lumber industry into fewer, albeit larger-capacity operations. Therefore, owners of timberland have not seen stumpage values rise in lockstep following stronger lumber markets such

as those encountered during the latest economic expansion seen in 2017-2018. From the perspective of industry, vast timber supplies available at favorable prices, along with an established logging infrastructure and business-friendly climate, continue to make Alabama a competitive choice for new forest product projects as well as reinvestment of capital at existing mills.

Recreation

Forest-related recreation is important to Alabama's citizens. The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Department of the Interior, 2018) places Alabama in its East South Central Region, along with Mississippi, Tennessee, and Kentucky. Of all such regions in the country, this one had the highest percentage of the population taking part in fishing, with 20 percent participating, and the highest percentage of the population taking part in hunting, at 8 percent.

The U.S. Fish and Wildlife Service maintains ten National Wildlife Refuges in Alabama, most of which support forest recreation activities such as nature study, fishing, hunting, picnicking, and hiking. Through the concept of multiple use management on National Forests, the Forest Service is very much involved in outdoor recreation on the 667,000 acres of its land in Alabama.

The Alabama Department of Conservation and Natural Resources (ADCNR) maintains 21 state parks, most of which feature forest-related activities such as hiking trails and nature photography. ADCNR's Wildlife Management Area (WMA) program provides 34 areas managed for public hunting, encompassing over 721,000 acres. These areas provide recreational opportunities for a large number of resident and non-resident hunters. In addition to hunting, the WMAs also offer primitive camping, hiking, nature study, and photography. Most of the management areas are located on lands that are leased from other government agencies, corporations, or private individuals. A large portion of the state-owned acres are the result of acquisitions approved by the Forever Wild Land Trust, Alabama's successful program to acquire and manage natural lands.

Prescribed burning, Wilcox County

Transportation

Development of new roads and expansion of existing transportation corridors consumes land and impacts forest sustainability through increased sprawl, fragmentation, impervious pavement, air pollution, and impeded water quality. Large sums of federal, state, and local dollars are spent each year to improve, develop, and expand the state's transportation network. The Alabama Department of Transportation will be seeing improved revenues as a result of the passage in 2019 of legislation raising the tax on gasoline for use in road and bridge projects. The primary objectives for transportation investments are to provide safe, reliable, and convenient transportation for the state's population and its businesses. Polling data of business executives consistently return the result that highway accessibility is the number one concern when it comes to siting new facilities. A look at where the available industrial development sites in the state are will clearly show that they tend to cluster near interstates, and to a lesser extent other primary highways. Many economically depressed areas of the state have limited access to these transportation corridors which are critical to economic prosperity. Many of these areas are also where Alabama's best and most intact forest resource can be found. Connecting these economically depressed areas to regional and national transportation corridors with projects such as the construction of Interstate 22 is viewed as a strategic tool to stimulate employment, education, leisure, and other services.

The Alabama Department of Transportation (ALDOT) is required to carry out an Environmental Impact Statement (EIS) when a proposed undertaking is known to have significant and direct impact on the quality of the environment. New highways, highway re-alignments, and other projects that involve acquisition of large amounts of new right-of-way require an EIS. The EIS fully documents the purpose and need of a new project, alternatives, the affected environment, impacts and consequences of proposed alternatives, extensive feedback from affected agencies and citizens, justification of the final project decision, and proposed impact mitigation activities. A broad array of potential impacts are discussed including: land use, social and economic, bicycle and pedestrian interactions, air quality, noise, water quality, wetlands, wildlife and endangered species, and sites of cultural or historic importance.

CHAPTER 3: THREATS TO ALABAMA'S FOREST RESOURCE

Looking ahead over the next decade, the forest resource faces a number of threats. These threats vary in severity that will impact the ability of Alabama's forests to remain productive and support economic, ecological, and social benefits. With input from stakeholders, we developed the suite of threats that follow in this chapter. These seven threats are not given in any particular order, and all are acknowledged as important. In fact, the discussion of any one area is likely to lead into considerations highlighted by others.

For ease of reference, the following threats to be discussed are:

- Forest Fragmentation
- Invasive Species
- Changing Markets / Rural Development Issues
- Adverse Weather Events
- Forest Health
- Loss of Ecosystem Services
- Capacity to Fulfil Education Directive

The AFC recognizes that the fragmentation of large forest tracts into smaller ones, along with an increasing number of owners (often absentee) can be a direct threat to optimal forest management practices. We recognize that invasive species cause a great deal of ecosystem disfunction in the state, and potential future introductions causing potentially even greater harm. Uncertainties are associated with the state's timber markets, industry, and associated rural development, such that ongoing positive action by the agency and resource stakeholders needs to be directed toward these concerns.

Broadly speaking, the long growing seasons, abundant average rainfall totals, and mild winters in Alabama are very well suited to timber growth and maintaining diverse forest types across our highly varied landscape. However, the state is subject to several weather events, from violent frontal episodes that spawn tornadoes and sustained hurricane events impacting the coastal region, to extreme droughts that harm the forest resource. Threats to forest health can take many forms including wildfire, pine beetle outbreaks, stressed urban trees, and invasive insects such as emerald ash borer, and more.

Threats to the forest usually include threats to the ecosystem services they provide. This is a forest benefit where our knowledge and understanding is steadily increasing, although much remains to be learned.

Finally, and touching upon everything mentioned up to this point, is the concept of outreach and education for landowner and the public. While accepting the importance of this concept, we face the potential lack of agency capacity, and more broadly partner and stakeholder capacity. We must reach an ever-growing, ever-shifting population through a variety of methods. Keeping in step with changing landowner demographics, while continuing to provide core services with current staffing levels will challenge this agency to constantly adapt and find efficiencies wherever possible.

Forest Fragmentation

The Southern Forest Resource Assessment defined forest fragmentation as the breaking up of large, contiguous forested tracts into smaller or less contiguous tracts. Further, to quote Albers et al:

> Habitat fragmentation is the process of dividing a contiguous area of natural habitat into smaller, more isolated patches. Patches are separated by lands that are either degraded or transformed by land use change, which limits ecological interactions among patches. Natural events including wildfire, windfall, and disease can cause fragmentation, but the largest driver is human-induced land use change (Albers, 2017).

Forests become islands and peninsulas – patches of woods disconnected by roads, farms, suburbs, cities, and other human activities. Forests are becoming increasingly fragmented as they become progressively parceled into smaller sizes. Parcelization of forestland is normally a precursor to fragmentation and often occurs when land ownership changes. Mehmood and Zhang's research tells us:

> Studies have found that timber supply has a positive relationship with holding size. However, the average parcel size has been steadily declining and the number of forest landowners increasing since the early 1900s. In more recent years, forest ownership has grown 1.6 times faster than the population, and most of this increase has been in the ownership of parcels of less than 100 acres (Mehmood, 2001).

In Alabama, forest parcelization and fragmentation are increasingly common along the periphery of towns and cities, particularly in the piedmont and coastal regions where urban growth is most common. The U.S. Forest Service estimates

that up to 31 million acres of forest in the Southeast U.S. will be converted to urban land use by 2040 (Wear, 2002). Along with reduced forest area, fragmented forests are further altered by their proximity to new human-dominated land uses. For instance, fragmented forests may present increased fire suppression complexities, face increased pollutant exposure, and endure hydrologic alterations. Consequently, parcelization and fragmentation represents a critical threat to Alabama forests.

Estate tax laws often have the effect of forcing forest fragmentation. A generation changes roughly every 25 years. When large land tracts are inherited by the next generation they are often parceled out to the owner's offspring. Inheritance taxes have to be paid so keeping the land as a working forest may, without proper planning, no longer be economically feasible. However, legislation in Alabama works to protect the forest landowner to a degree not present in all of our neighbor states. There are states where the new landowners are faced with selling the parcel or using the land for some other 'highest and best use,' or face being taxed at that elevated rate while the land remains in timber. Thus forests often become fragmented and converted to non-forest uses.

Fragmentation of Alabama forests can also have significant effects on biodiversity. When forests become fragmented, both wildlife and plant populations become increasingly isolated. This may lead to negative genetic consequences and in some cases local extirpation of remnant populations. Current research indicates that these pressures may be even greater upon plant populations than upon wildlife (Schlaepfer, 2018). Increasing fragmentation may also change the condition of forests by increasing the amount of edge habitat and reducing the amount of forest interior. When edges are created, forests become increasingly drier (due to increased solar radiation and wind), and the incidence of predation and parasitism increases. These conditions often favor edge-adapted species (e.g., deer, raccoons) at the expense of forest-interior species (e.g., ground-nesting birds). Wildlife in fragmented forests is often exposed to other animals associated with human-dominated conditions (e.g., feral cats/dogs, pigs) that can increase predation pressures and sometimes change habitat conditions. In addition, fragmented forests become increasingly less suitable for larger fauna by decreasing habitat space, reducing food supplies, and increasing their exposure to human caused mortality.

Forest fragmentation can also alter water flows and reduce water quality. Forests provide excellent water quality, however where forests are fragmented by urban lands there can be a reduction in the water-filtering processes that they provide. Additionally, increased impervious surface that accompanies urbanization can increase surface runoff and substantially impact aquatic habitats. Water flows can also be altered when forests become fragmented. It has been shown that forested landscapes provide for rainfall interception, water transpiration, and the gradual release of water to streams.

When forests become fragmented and replaced by other land uses, the capacity of these lands to regulate water is reduced. For instance, when forestland is converted to urban lands, there is normally an increase in impervious land surface which reduces water storage and can lead to increased surface runoff, thereby increasing the potential for downstream flooding and habitat degradation (Faulkner, 2004).

Invasive Species

- Invasive species, both plant and animal have been strongly identified as a major threat to Alabama's forests during our partner input session. Dueñas et al. in the journal *Biodiversity and Conservation* states the problem clearly:

  > Biological invasions are considered a major part of global change. Invasive species can significantly alter ecosystem processes and functions. This can result in major environmental damage and economic losses, amounting to $120 billion annually in the United States alone. They also cause declines in biodiversity and affect disturbance regimes. Invasive species are responsible, alongside overexploitation, for half of species extinctions for which cause is known (Dueñas, 2018).

- The federal response to invasive species, as outlined in the National Invasive Species Council's most recently published Management Plan 2016-2018, is guided by the following principle:

  > The diversity and severity of the impacts of invasive species are often the result of the effects that invasive species have on a wide range of ecosystem services that underpin human well-being and economic growth. By driving the endangerment and extinction of a wide range of plants and animals; degrading freshwater, marine, and terrestrial ecosystems; and altering ecological cycles, invasive species adversely influence a wide range of human necessities. Ultimately, invasive species undermine security – the security of individuals, communities, and nations (National Invasive Species Council, 2016).

- Several invasive plant species are commonly found in statewide surveys. The most commonly detected invasive plant species in Alabama is Japanese honeysuckle (*Lonicera japonica* Thunb.), located on nearly half of all forested

FIA subplots, although generally in low concentrations. Various privet species are found almost as often, but sometimes can be the dominant plant in a given location. These greater densities on inventory sample plots are reflected by an estimated 1.2 million acres of cover. See Figure 10. Cogongrass (*Imperata cylindrica* (L.) P. Beauv.) was estimated to have infested 40,000 acres a decade ago, and that number has risen to 70,000 acres by 2018, in spite of a $6.3 million federally funded control effort that was published in 2009. The coastal counties of Baldwin and Mobile are the hardest hit. Chinese tallowtree (*Triadica sebifera* (L.) Small) has similarly shown its estimated forest cover expand from 22,500 acres in 2008 to nearly 34,000 by 2018. Again, Baldwin and Mobile counties show the greatest area cover from this noxious tree.

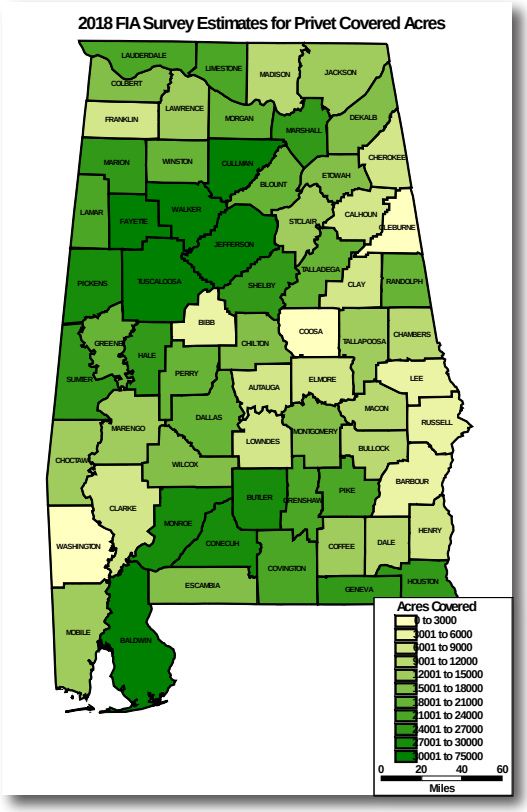


Figure 10. Estimated acres, by county, covered by invasive privet. FIA data, 2018.

- Fauna can also be an invasive problem. The feral hog (*Sus scrofa*) has been in the Southeast since the 1500s when it was introduced by Spanish explorers. In more recent times sportsmen have introduced populations of Russian boar and deliberately moved feral hogs into unoccupied areas. High reproductive rates and adaptability have allowed feral hog populations to soar, posing serious problems for landowners and managers. Hogs have devastating effects on forest ecosystems. When foraging for food, wild hogs overturn large areas of ground leaving a considerable area without vegetation. Understory vegetation in forests is greatly affected as are ground-nesting birds, reptiles, amphibians, and invertebrates.

- Both native to Asia, the combined introduction of the Redbay Ambrosia Beetle (*Xyleborus glabratus*) with the fungus *Raffaellea lauricola* has resulted in Laurel Wilt Disease. The first discovery of this dual threat was made in Port Wentworth, Georgia, near Savannah, in May of 2002, and within months near-total mortality of redbay trees greater than 1 inch in diameter was found in locations along the Georgia and South Carolina coasts, with rapid advancement into additional counties. See Figure 11. Beyond the redbay tree itself, this invasive combination of insect vectors carrying mortality-bringing fungus threatens the sassafras tree in Alabama and the commercially important avocado trees in locations where they are cultivated.

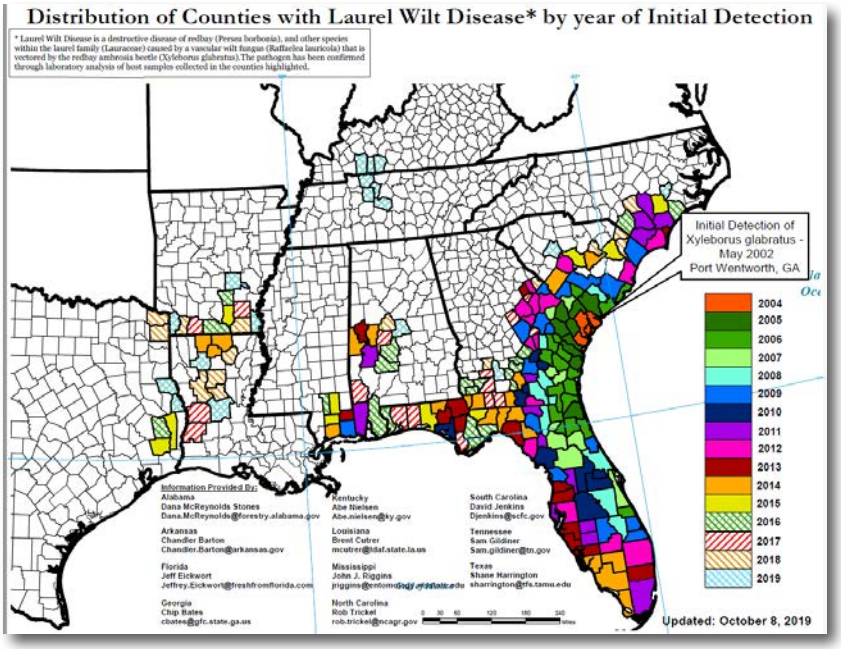


Figure 11. Laurel Wilt Distribution, by County and Year of first detection.

- Forest management practices can be severely impacted by invasive species. Cogongrass infestations on sites most favorable for its spread can render a forested site lost to productive use following timber harvest. The dense underground root mats inhibit the ability to replant a stand, and chemical control of cogongrass, to be effective, must extend over multiple growing seasons. Cogongrass is poor forage and will only be grazed by domestic livestock as a last

resort. Further, this grass, when ignited, burns at a very high temperature, with the potential to damage crop trees or create control problems during prescribed fire, and following a fire, is one of the first species to re-sprout. Implementing effective control measures against cogongrass is one of the greatest challenges now facing land managers across the Southeast.

- Until recently, few tree species were featured on lists of the most widespread and damaging invasive species. Invasive trees differ from other non-native invasive plants in that they are long-lived and large in size. As a result, invasive tree species are able to dominate native vegetation and fundamentally alter community structure, function, and ecological processes. The most influential invasive plant species are those that are able to transform the communities they invade. Chinese tallow is such a species (Pile, 2017).

- In the same paper, it is stated that traits needed for successful invasion of non-native species include rapid growth, high specific leaf area, high levels of reproductive output and dispersal, degree of invasibility of potential host communities, and propagule pressure. Tallowtree's inherent properties, combined with Alabama's landscape characteristics and climate, especially at elevations below 50m in gently sloping terrain, allow this species to be a successful invader. Additionally, its tenacity and ability to resprout following chemical or mechanical disturbance make this species an increasingly critical forest management challenge. Left unchecked, this tree will alter ecosystems and crowd out native communities.

- Invasive species are a threat to Alabama's forest resource. They are detrimental to native landscapes, plants, and animals. Control measures for invasives tend to be expensive, labor intensive, and needed repeatedly. Exotics remain one of the greatest management challenges to landowners, land managers, natural resource agencies, conservation entities, and the public in general.

Changing Markets / Rural Development Issues

Conversations involving the state of forests and forestry in Alabama inevitably return to concern over markets. Markets allow forest landowners an outlet for an economic return for forest products harvested from their land. Market impacts are driven by many considerations. For example, at the landowner level it may be difficult to move pine pulpwood or low value hardwood at any price due to absence of a local market. Even in areas of greater timber demand there is often widespread dissatisfaction over the inability of stumpage prices to advance to a level that landowners would find acceptable to encourage investment in forest regeneration and continued management. As timber supplies continue their increasing volume trend, there is the threat of simple supply and demand dynamics depressing stumpage prices into the foreseeable future. With the tepid recovery in housing meeting headwinds such as below-historical rates of family formation, rising non-mortgage debt burdens, affordability issues, changing consumer demand, and more, the threat that long-term downward pressures on the lumber industry will be felt by Alabama landowners is very real. On a positive note, the state is well positioned relative to other regions in North America to rebound and remain a low-cost supplier of raw material. Thus, it can be attractive to future investors to build wood products manufacturing facilities. In fact, we have been experiencing increasing investment with three consecutive record years of $1 billion+ forest industry announced investments in new and upgraded facilities in Alabama.

From a forester's perspective, the presence of healthy timber markets is needed for optimum forest management. Typically, the cost to re-plant a harvested stand of timber is taken from the income from the sale of the previous stand. In fact, an important incentive to many landowners in making the decision to keep their land ownership as forest is the prospect of future income to be derived from the replanting of the harvested tract. Mid-rotation treatments may be made affordable through mid-rotation thinning income. This mid-rotation thinning income, as it comes on a shorter time horizon than an end-of-rotation harvest, is very important when creating net present value calculations and using other tools to lend financial guidance to forest management decision makers.

While it is true that a greater share of landowners today report being driven less by purely monetary incentives than in years past, it is also true that a total absence of markets may make it unfeasible to properly manage a stand. An example would be the lack of pine pulpwood markets in select areas of the state, making it impossible to thin planted pine that, when initially planted, was projected to be thinned multiple times over the course of its growth and ultimate development into sawtimber and potentially utility poles. If left unthinned, the stand will likely stagnate due to overstocking, self-thin through mortality of slower-growing and suppressed trees, and become vulnerable to attacks from insects attracted to weakened targets. Fuel loading and wildfire become increased threats as well. Income will be missed when thinnings do not occur and will be lost as the stand never reaches its potential.

Lack of markets for low-value hardwoods also impact the hardwood manager. Regeneration and upward recruitment of desirable species often require density control for sunlight to reach the young desirable species. For example, under a dense mid-story of shade tolerant maples and beeches, white oak seedlings are unlikely to mature into saplings, and

thus into crop trees. While treatments such as chemical control of this mid-story are available to the forest management practitioner, they are expensive, often labor intensive, and yield no immediate income. Harvest of the low-value trees for market would be a more economic option to encourage recruitment of upland oaks. Lacking a market, timber harvest is not usually an available tool to the manager.

Another market threat that is very real and being reported more frequently concerns issues related to workforce. In a tight labor market, and with a population migrating out of the rural counties where most forestry work takes place, it is increasingly difficult to secure a qualified workforce, especially among younger workers. The logging industry is a perfect illustration of this point as logging contractors face increasing difficulties in finding qualified operators.

Workforce shortages also make it difficult to move forward with rural development projects, including forest product manufacturing projects. Investors require a viable workforce with the requisite skills located within commuting distance from a potential industry site. The state's leadership is aware of these challenges and recently appointed a dedicated Rural Development Manager within the Alabama Department of Commerce. Within the private sector, the Alabama Forestry Association has launched an innovative project known as *Forestry Works* to facilitate young peoples' exposure to careers in the forestry field and assistance with the training needed to begin a career.

Forest markets face threats at multiple levels, but large stocks of accessible and expanding timber will provide opportunities for future manufacturing investment. This expansion can serve as an excellent engine for economic growth and prosperity in rural Alabama.

Adverse Weather Events

Extreme weather affects the entire state of Alabama. Tornadoes, drought, floods, hurricanes, intense rainfall events, and intense heat must be considered when looking at threats to the forest. The National Oceanic and Atmospheric Administration (NOAA) data reveals that nationwide in 2018 there were 14 separate natural disasters that tallied up $1 billion+ in damage. In 2017 there were 16 such events. See Figure 12. Even correcting for inflation, these two years alone saw more such catastrophes than the entire decade of the 1980s in total (Smith, 2019). Owners of the forest must not fail to account for and mitigate where possible the threats posed by weather events.

While it may be true that much of these high damage totals relate to the higher costs associated with damage to the increasing amount of human infrastructure, the potential damage to timberland owners can be severe and catastrophic to a private forest owner. Most recently, Hurricane Michael's passage through heavily wooded counties in Alabama, Georgia, and the Florida Panhandle reflected heavy timber loss that is largely uninsured. As the following charts indicate, the frequency of large monetary-damage events has been trending upward over the past few decades.

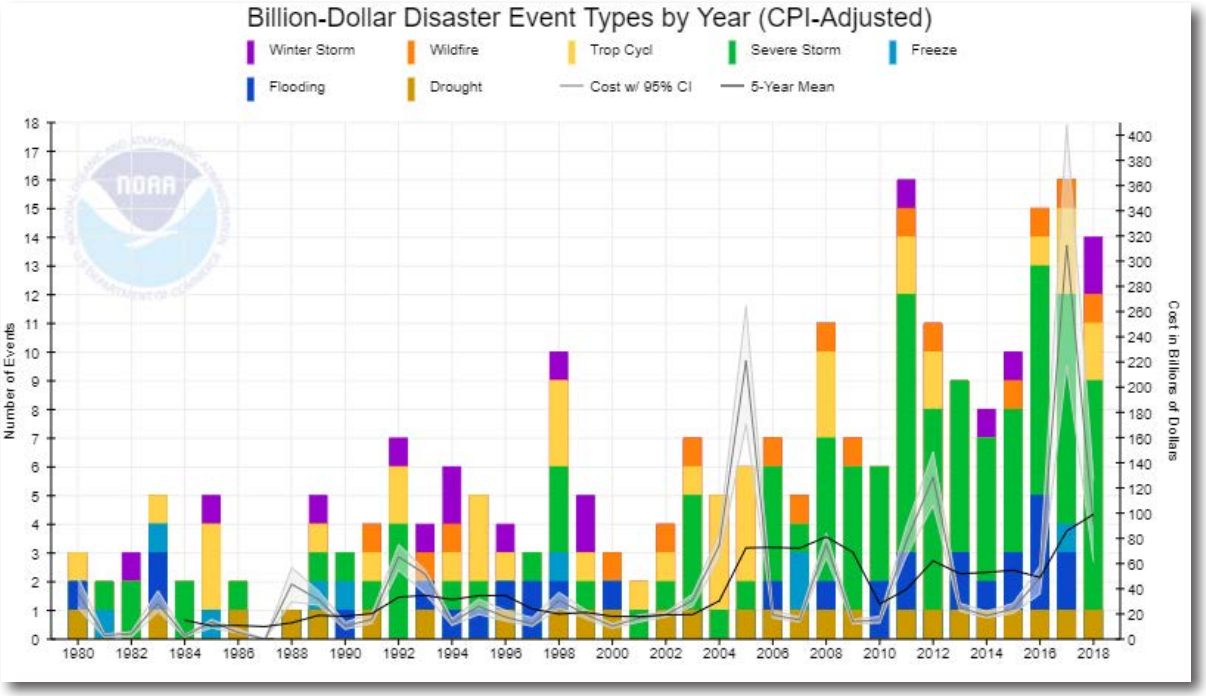


Figure 12. Billion Dollar Disaster Event Types by Year. From NOAA.

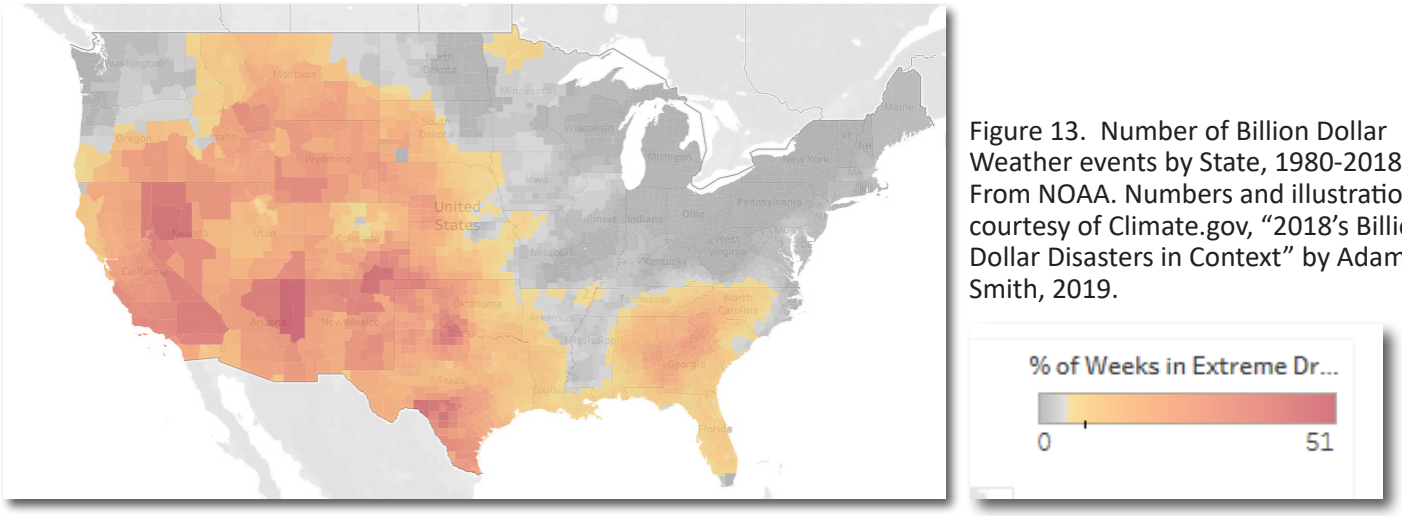


Figure 13. Number of Billion Dollar Weather events by State, 1980-2018. From NOAA. Numbers and illustration courtesy of Climate.gov, "2018's Billion Dollar Disasters in Context" by Adam B. Smith, 2019.

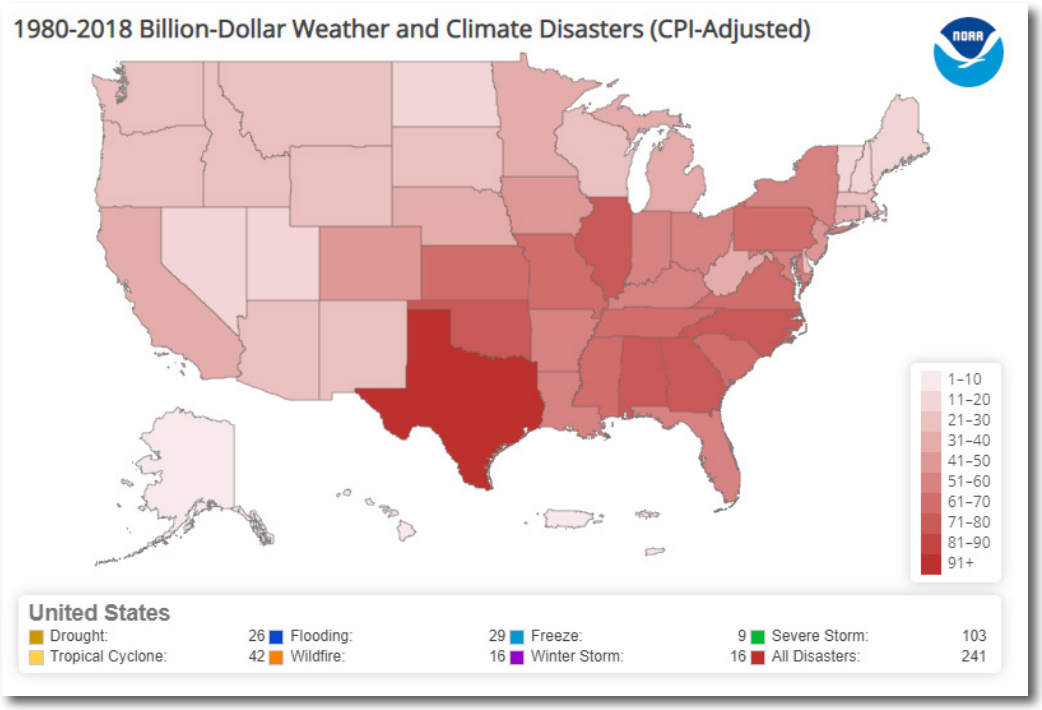


Figure 14. Extreme Drought Map, by County, 2000-2019. From NOAA.

The above map, from https://public.tableau.com/profile/chad.mcnutt#!/vizhome/DroughtMonitor_NoWeeks/Sheet4, accessed 9/20/2019, shows that all of Alabama is subject to D3 and D4 level drought. The United States Drought Monitor uses a five-level scale to classify degrees of drought, ranging from D0 – Abnormally Dry up to D4 – Exceptional Drought. This map uses data 2000-Present and is updated periodically. It tells us that Lee County has been, on average, the most prone toward severe drought since 2000, with 271 total weeks spent at drought level D3 or greater.

Although it is a commonly-held belief that southern pine beetle outbreaks are more likely to occur following periods of drought, the current research science suggests a more nuanced picture. See cited journal articles from Vose et al. 2015 and Kolb et al. 2016.

Drought is not a healthy condition for trees, but there is great variation attending to season, severity, and duration. As a result, there is no single drought response that the forest undertakes during rainless periods, and reporting estimated drought impacts will remain an inexact science. Even acute weather events, such as tornadoes and ice storms, leave both clear immediate impacts in the form of snapped limbs and root-sprung trees, while also introducing stressors that can bring tree mortality long after the initial weather event has passed. In Alabama, we will be monitoring the storm path of the 2019 Lee County tornado, as well as the parts of Houston County where Hurricane Michael passed, and the

aftermath of future weather events, because although significant clean-up efforts follow these storms, forest impacts will be felt for years to come. Often trees do not succumb to a single cause, but a collection of stresses that ultimately overcome a tree's resiliency. Adverse weather can serve as an initial stress, and weather events can place this stress over a large area that can threaten the overall forest. Travelers to the areas of the American West devastated by drought and the insects that follow will attest to weather's ability to decimate entire forested landscapes. We must remember, though, that weather disturbance is natural to the forest. The sunlight made available to a forest floor following the loss of canopy trees will transform it, encouraging the growth of not only previously suppressed trees, but a wide array of early-successional grasses, vines, and shrubs. Education and management can seek to mitigate adverse impacts to the forest brought about by weather.

Forest Health

Forest Health is a broad term that can be defined as production, resilience, and persistence of a forest leading to sustainable ecological conditions that can satisfy human needs. What is covered in the umbrella term of forest health are events that cause a change (good or bad) in the health of the forest.

Insects and fungi are a factor associated with the health of a forest. There are insects and fungi that benefit trees and make them healthier, but there are also those species that can cause injury or death of a tree, especially when other environmental stressors are at work. Insects and fungi often accompany various diseases that impact trees such as fusiform rust, annosum root rot, galls, and cankers. Most of the AFC's forest health program is focused on the negative aspects that threaten the forest. Detection and mitigation of these threats through public information campaigns related to specific forest health concerns is one of the key AFC missions. Additionally, landowner assistance with efforts such as contacting and advising control prescriptions to landowners when pine beetles are spotted on their property through aerial detection flights can greatly reduce impacts of an outbreak.

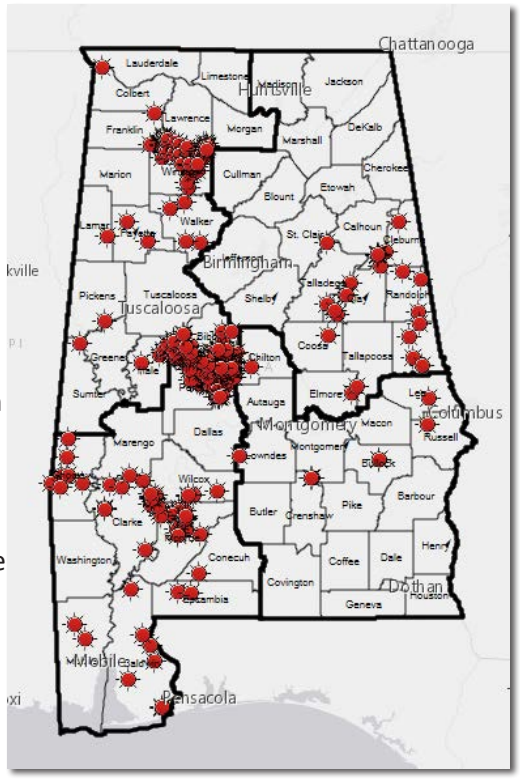


Figure 15. Insect and Disease Cases Spotted by or Reported to the Alabama Forestry Commission, 2018

A forest health concern encountered by certain Alabama landowners has been Southern Pine Decline (SPD). This particular threat has been a difficult one to successfully diagnose, as usual obvious causes of mortality, such as insect attack, lightning strike, or fire are not present. However, Alabama is at the center of the area of concern. The very first instance of observation of SPD occurred on the Oakmulgee District of the Talladega National Forest during the 1950s, and a major study of declining loblolly pine was carried out in Alabama around the year 2000. Some of the best published research available tends to point to a combination of root infections from *Leptographium* species and poor pine sites, while steeper slopes and south/southwestern aspects have also been proposed as contributing factors. All of these factors alone would stress a tree, while in some combination may be enough to harm entire stands. Of course, the effect of periodic drought events cannot be discounted (Coyle, 2015). A GIS mapping project completed by Auburn University researcher Matthew Bryan Meyerpeter in 2012 overlaid layers of risk to map locations where the threat of SPD could be expected to be most severe, and Alabama features a large percentage of its forest in the higher risk zones (Meyerpeter, 2012). This issue is one that has been known and researched for many years, and this will continue. This threat will be monitored and new findings for best practices made available to the public as they become available.

Wildfires are also a factor to be considered in forest health. These uncontrolled fires can cause massive amounts of damage and lead to weakened ecosystems that are open to harmful insects and fungi. Decades of fire prevention policy have contributed to fuel buildup that can lead to destructive fire occurrence. Intense wildfires have the potential to damage or kill trees, destroy understory vegetation, and disrupt nutrient cycles. With the ground cover gone, erosion may increase, especially on steep terrain when there is a significant rain event. Contrast this with use of prescribed fire under the proper conditions. Use of a low-intensity fire under the proper conditions can, depending upon site, improve wildlife habitat, raise soil fertility, and bring about positive ecological benefits.

Wildfire has always been a part of the Alabama landscape, but its role and impacts have changed greatly over time. Alabama's earliest inhabitants both in the Coastal Plain and upland regions of the state are believed to have used fire frequently to achieve a multitude of desired outcomes. Later settlers continued these widespread burning practices before a change in attitudes and governmental condemnation of fire sought to eliminate fire from the landscape to the greatest

extent possible. Greater investments in fire suppression personnel and equipment, including the proliferation of volunteer fire departments, account for the state's ability to reach most fires while they are small, and limit their size through timely suppression efforts. Although a continuing threat that requires vigilance from the public and dedicated professionals, wildfire threats can be mitigated through public outreach and forest management practices such as the installation of pre-suppression fire breaks and fuel management. Much of the danger from wildfire results when multiple threats combine, such as when drought finds stands left unthinned through lack of markets. The addition of homes and other out-buildings into a fragmented forest landscape carrying such wildfire risks multiplies the threat to property, creating the potential for tragic outcomes.

Wildfires along Interstate 85 during the 2019 fall wildfire season

Maintaining resources ready to respond to the various threats to forest health is a basic mission of the AFC. Landowner outreach that multiplies our efforts by educating our many stakeholders is essential. Additionally, methods of detection, prevention, and mitigation of threats, such as from emerald ash borer, to when and where elevated fire danger is cause for concern. As an example of multiplying our resources, the AFC partners with the Alabama Prescribed Fire Council to train Certified Prescribed Burn Managers, who in turn are able to apply best practices to prescribed fires carried out across the state.

Native	**Type**
Annosus root rot	Disease
Brown Spot needle blight	Disease
Decay	Disease
Fusiform rust	Disease
Littleleaf disease	Disease
Loblolly pine decline	Insect/disease combination
Oak decline	Insect/disease combination
Pine tip moth	Insect
Pitch canker	Disease
Reproduction weevils	Insect
Southern pine/bark beetles	Insect
Non-native	**Type**
Asian long horned beetle	Insect
Emerald ash borer	Insect
Gypsy moth	Insect
Hemlock wooly adelgid	Insect
Laurel wilt disease	Insect/disease combination
Sirex woodwasp	Insect
Sudden oak death	Disease

Table 7. Major Insect and Disease Threats

Loss of Ecosystem Services

This discussion of ecosystem services embraces the dual concepts of positive impacts that forested landscapes bring to the larger ecosystem, and the potential for economic returns to forest owners. The forests in Alabama are critical to the proper function of all the state's varied habitats, terrestrial and aquatic. Threatened and endangered species and candidate species, such as gopher tortoise (threatened and candidate in different areas), red-cockaded woodpecker (endangered), and the endemic red hills salamander (threatened), tend to have very specific habitat needs that often must be actively managed if these species are to be conserved. Multiple groups across the state are working to document and conserve suitable habitat for these and other species of concern.

"Trees improve air quality by removing pollution primarily by uptake via leaf stomata, though some gases are removed by the plant surface. Trees also remove pollution by intercepting airborne particles. Some particles can be absorbed into the tree, though most particles that are intercepted are retained on the plant surface" (Nowac, 2002). These processes are carried out with pollutants such as nitrogen oxides, ammonia, sulfur dioxide, and ozone, as well as particulate matter. Trees participate in gas exchange during photosynthesis whereby carbon dioxide is taken in and oxygen is excreted. Air quality is an important topic in Alabama's largest metropolitan areas, with emphasis on Birmingham / Hoover and Mobile / Baldwin counties. The American Lung Association's State of the Air report cited Birmingham / Hoover for having the nation's 14th-worst year-round particulate air pollution. In the past, these minimum standards were not met, providing evidence that improvement is not only possible, but is occurring, thanks in no small part to the contributions of the urban forest. Likewise, Mobile, under threat of missing Evironmental Protection Agency (EPA) targets for air pollution compliance in 2011, has now achieved healthier results. Further positive news from the American Lung Association's report was that a number of Alabama cities showed up on their "Cleanest Cities" list (American Lung Association, 2019). Maintenance of a healthy urban forest plays a role in keeping the city breathable.

Research is widely ongoing to better quantify the ecosystem services component of trees and forest, with much research focusing on the ecosystem services provided by urban forests. While much of what is accomplished by an urban forest is accomplished likewise in rural settings, the impacts can be magnified by the greater number of people impacted within urban and suburban zones. Consider an Alabama cityscape that had no trees. Pedestrians would be exposed to greater sun and heat intensity. The surprisingly complex biodiversity housed in urban forest habitats would be lost. Increased cooling costs would result from the lack of shade, and the urban heat island effect would be much more intense. Particulate air pollution, present under any set of conditions, would be worse if unrelieved by urban forest trees. Impervious surfaces in an urban environment contribute to flash flood conditions during severe storms, whereas areas of more pervious ground and tree cover work to lessen this negative impact, through rainwater interception on leaf surfaces, percolation into the soil, and transpiration of captured water, as well as by other pathways. The urban forest, through its uptake of excess nutrients and ground pollutants in this way is able to improve water quality and quality of life for citizens. As stated, such ecosystem services are not unique to the urban forest, but certainly do make invaluable contributions to ever-growing numbers of people inhabiting the urban space (Livesley, 2016).

Threats to the ability of both the rural and urban forest to meet the ecosystem demands placed upon it are real and come in the forms of the threats listed above, from fragmentation to invasive species, and from market challenges to weather events. Striving to protect the positive values we receive from the forest is at the heart of the activities of this agency, its partner entities, and concerned stakeholders.

Capacity to Fulfill Education Directive

It is a great privilege and responsibility for natural resource professionals, both private and public, to be able to serve the citizens of this state day in and day out. However, there is the threat that our agency and our many partners will find it increasingly difficult to engage with all of the stakeholders that we need to, and this is due to several reasons. First, as mentioned earlier in this chapter, there are simply more landowners to reach as parcel sizes trend smaller. Second, an audience of small landowners has different needs and limitations than an audience of large landowners, who are better able to take advantage of economies of scale when it comes to managing land. Reaching out with one-size-fits-all solutions to forest management challenges will not be effective with the wide variations present in the resources available to different landowners. It is a challenge to meet landowners where they are with advice and services that are tailored to their specific circumstances. Third, traditional modes of outreach, such as printed publications, landowner tours and in-person information sessions, may need to adapt to a younger generation who is less apt to attend such events, and who may be satisfied with gleaning information (which may or may not be applicable, or even accurate) directly through online searches or other forms of web-based education. Finally, public sector staffing levels at the AFC and other natural resource agencies may be sufficient to meet the significant challenges posed by day-to-day operations but may be insufficient to reach a growing audience with current staffing. Closer interaction with our forest resource partners will be critical in presenting natural resource knowledge to a public inundated with more and more information of variable value.

CHAPTER 4: ESTABLISHMENT OF PRIORITY AREAS

It is important to note that all Alabama Forestry Commission services will be available to all Alabama landowners and properties without regard to where in the state the property is located, limited only by agency funding and staffing capacity. However, the state forestry agencies are required by the federal government, who provide grant funds to the agency, to designate 'Priority Areas' where certain factors may create more intense threats. The AFC will continue to serve landowners outside of federally-funded priority areas.

Through discussion within our AFC Task Force, it was decided that, because services are delivered and tracked at the county level, it would be most effective to set Priority Areas at the county level. To make this process as fair as possible, a matrix was developed with our forest resource threats and services in mind. The Southern Forest Land Assessment was included with a GIS analysis of threats that were scored on a seven-step scale. This allowed our analysis to be tailored to needs and priorities in Alabama.

The following are the categories used for matrix inputs and are a major part in the operations of the Alabama Forestry Commission. The matrix itself is linked in Appendix 4.

- Growth/Fragmentation based on 6 percent or greater population growth
- Greatest volume of timber severance, limited to 1,000,000 tons+ per county per most recent year, as reported by the Alabama Department of Revenue
- Longleaf Pine EQIP Project county
- Gopher Tortoise Focal Area county
- U.S. Endowment for Forestry county
- Alabama Strike Force county
- Bobwhite Quail Pine Savannah Restoration county
- EQIP 2018 Shortleaf Initiative county (range closely overlaps with White Oak focus counties)
- Cogongrass present on Forested FIA plots in county
- Chinese Tallowtree present on Forested FIA plots in county
- Privet cover acreage estimated at 20,000+ in county
- Southern Forest Land Assessment score (1-7)
- Incidence of Southern Pine Beetle spots recorded by agency in county (2016, 2017, 2018)
- Incidence of reported Wildfires in county (2016, 2017, 2018)
- Presence of Impaired Waters Cover greater than 10 percent
- Tree Cities and Tree Campuses
- Area covered by Stewardship Forests by county
- Counties adjacent to Fort Rucker (due to possible future SERPPAS work)

Scene from Choccolocco State Forest

Counties achieved total scores based on the full matrix and were ranked by score to determine Priority Areas. In the following, the counties scoring between 11 and 19 points in the matrix are described as 1st Priority, between 9 and 10 points are described as 2nd Priority, and 8 points or fewer are described as State Eligible, again to highlight that there are no diminution of services to any county, but a focus on Priority Areas.

This exercise has highlighted the areas where threats are most pressing and assets most present or most lacking. By compiling this information in one place and sharing it with the many partners and stakeholders who we work alongside, it is our goal to better locate the needs and target the efforts of all those concerned with Alabama's forest resource.

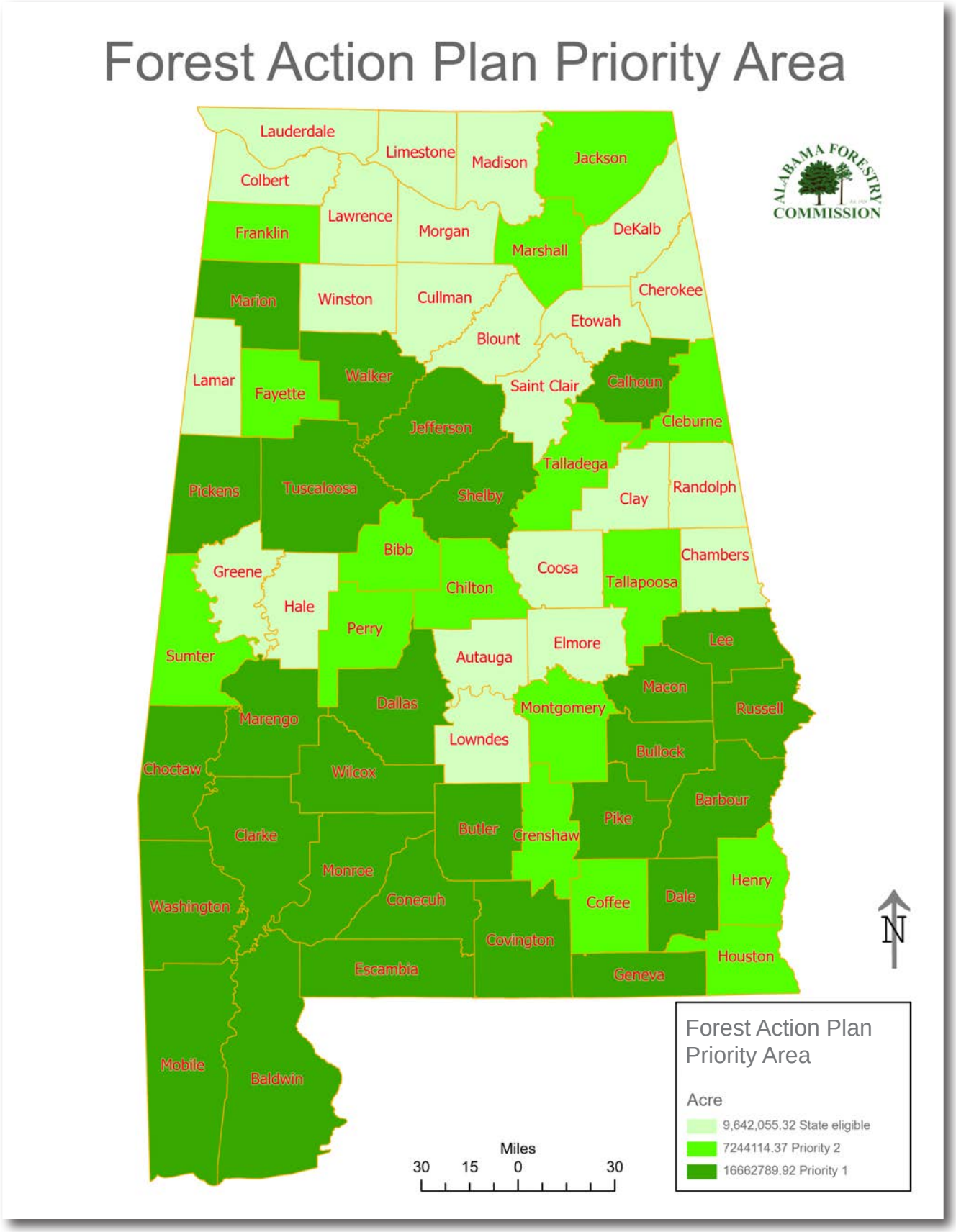


Figure 16. Alabama map highlighting Priority Counties

Multi-State Priority Areas

Those employed in authoring the last Forest Action Plan located four areas where the nature of the threats involved necessitated multi-state cooperation to address the threat. Multi-state Landscape Scale Restoration grants create the best opportunity for cross-state partnerships. While action has been devoted to addressing these threats over the last 10 years, these threats are such that continued action, often at the region level, is required to bring about successful outcomes.

Multi-State Priority Area: Cogongrass

Description: Cogongrass (*Imperata cylindrica*) is a warm-season, perennial grass that originates from Asia. It was first introduced into the United States through Mobile in the early 1900s as packing material for oranges. Cogongrass is one of the 10 worst weeds in the world. It is steadily marching through Alabama and into neighboring states (Mississippi, Louisiana, Florida, Georgia, South Carolina, and Tennessee). See Figure 17. This highly invasive pest permanently alters plant and animal communities, increases fire frequency and intensity, and requires extensive investment to control. In other areas of the world cogongrass has destroyed entire landscapes, creating a 'sea' of cogongrass with no other plants. Domestic food and fiber supplies are negatively impacted by cogongrass through reduction in wildlife food sources and killing or injuring valuable cash crops such as corn, cotton, and trees. Cogongrass exists on rights-of-way, forests, agricultural, residential, commercial, and industrial areas. Because it is found in so many areas, there is a need for a large-scale, concerted effort to effectively control it. Although this is a region-scale priority, it will still be actively addressed at the local level. The need for local partnerships, such as with the Alabama Cooperative Extension System (comprised of Auburn University and Alabama A&M University), and Tuskegee University Cooperative Extension, will continue to be key in treating cogongrass across all ownerships at a focused scale.

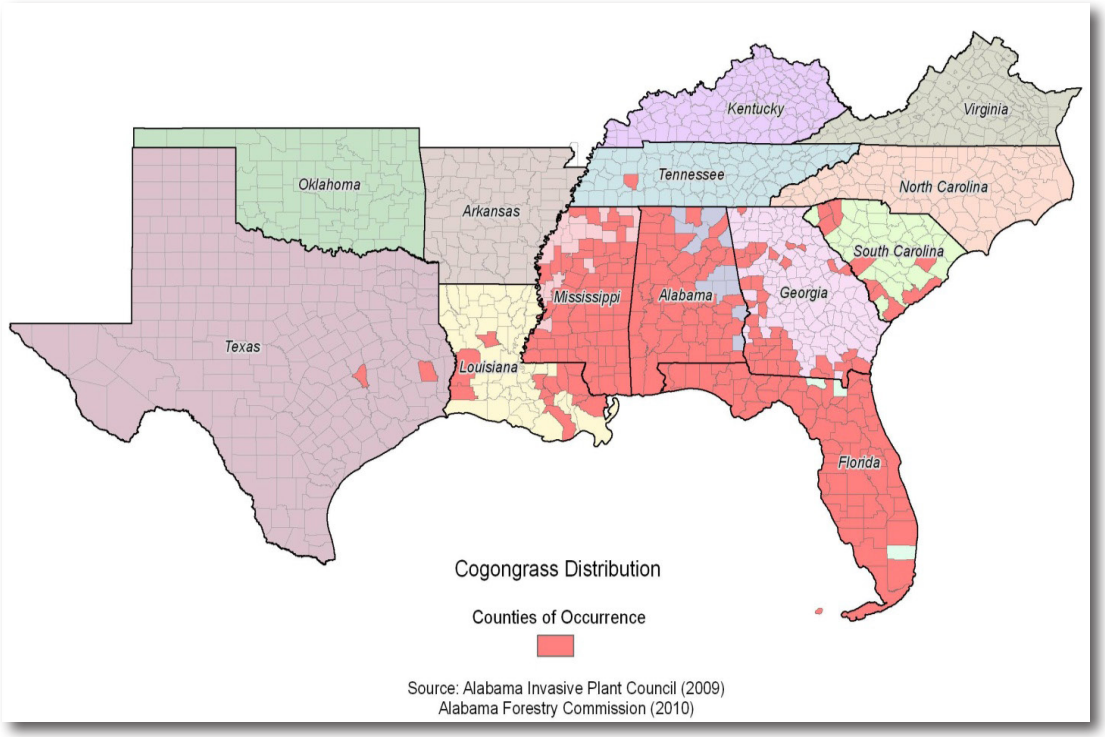


Figure 17. Cogongrass distribution

Multi-State Priority Area: Longleaf Pine

Description: Longleaf pine (*Pinus palustris*) was once a dominant fixture of the early Southeast American forest ecosystem. At one time, the longleaf pine forest is estimated to have occupied 60 million acres, stretching from eastern Texas to the southeast corner of Virginia. See Figure 18. Its adaptation to conditions in its natural range made it less vulnerable to normal pests, strongly resistant to fire, and a relative low risk to manage.

Because of intensive harvesting practices during the late 19th and early 20th centuries and reforestation with other pine species during reforestation, the natural range of the longleaf pine remains in roughly three percent of its former landscape. The reduction in acreage has produced fragmented longleaf pine stands, reduced forest product opportunities, lower populations of wildlife dependent on longleaf pine, and increased forest management costs of replacement pine species. Concerning wildlife, of particular importance is the gopher tortoise, whose characteristic dens occur across this forest and act as a micro-habitat exploited by a range of species. A healthy longleaf ecosystem needs viable populations of overstory longleaf pine trees, native understory vegetation, and native fauna. For the latest information as of time of writing, see *America's Longleaf Restoration Initiative Longleaf Partner Council: Strategic Priorities and Actions 2019 – 2021* (2018).

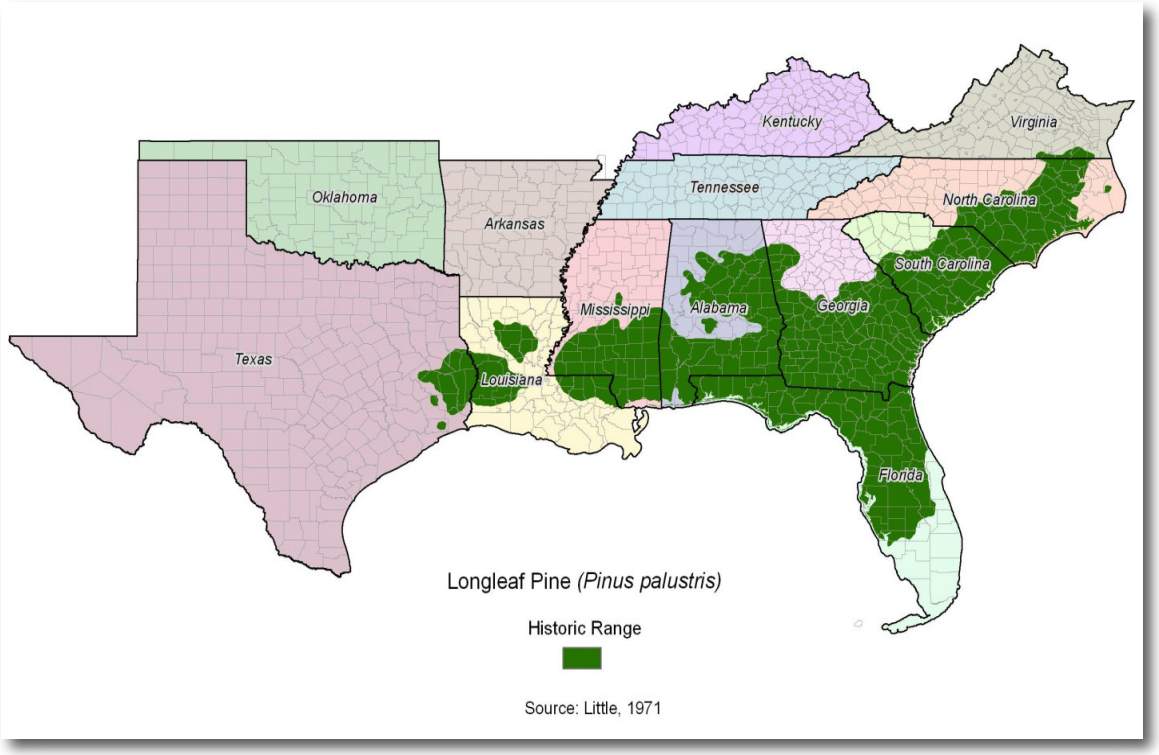


Figure 18. Distribution of Longleaf Pine

Multi-State Priority Area: Water Quality

Description: Alabama's river basins and abundant water resources makes it one of the state's most valuable natural resources. The Mobile-Tombigbee and Alabama River Basins, which covers some two-thirds of the state, have a greater yield of water per square mile of land than any other basin in the United States, including the Mississippi River. Alabama's springs, streams, rivers, lakes, and wetlands are home to more species of aquatic and semi-aquatic animals than any other state in the union. The abundance and high-quality of Alabama's water resources have contributed significantly to the economic development of the state and will be a catalyst in Alabama's future growth and prosperity.

The six major drainage basins of Alabama have linkages to all four surrounding states (Mississippi, Tennessee, Georgia, and Florida). See Figure 19. Efforts to sustain working forests will become increasingly important as pressures build to provide clean and dependable water so as to support watershed ecosystems and satisfy the demands of a rapidly growing human population.

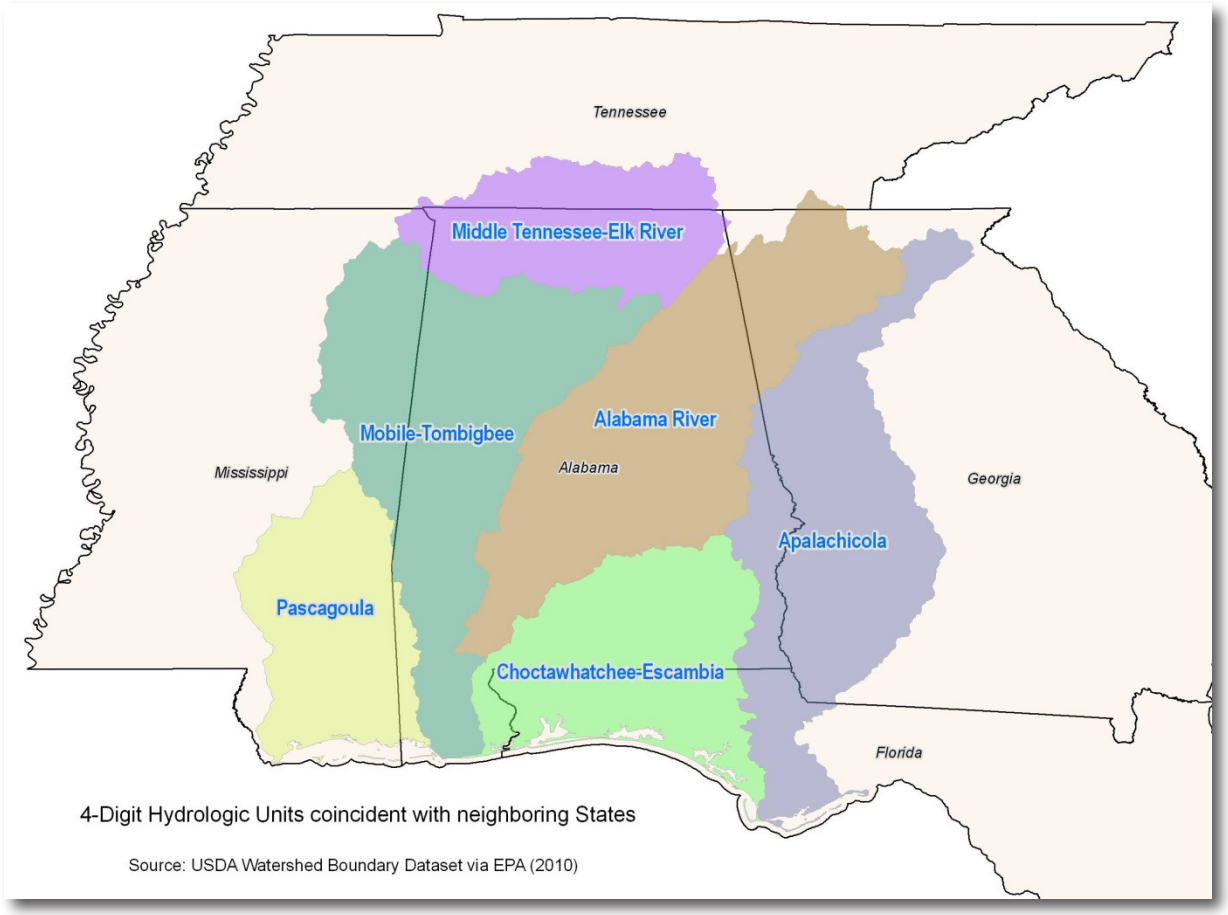


Figure 19. Major River Basins of Alabama

Multi-State Priority Area: Urban Mega-regions

Description: Urban growth and development is primarily driven by economic progress. It is a process that influences social interactions and migration patterns. As a result, the nation is witnessing urban growth and development at regional scales far beyond traditional municipal, county, and state boundaries. In the US, this demographic trend has been classified into 11 distinctive mega-regions. The purpose is to provide a new way to better define regionalism and to help policymakers make good land-use decisions. The concept also recognizes that large-scale urban growth and development patterns are an engine driving future expansion that is land consumptive and threatens forest resources. Alabama shares two mega-regions with other contiguous states. See Figure 20.

The Piedmont Crescent is a geographical region encompassing the Tennessee Valley counties and running from Birmingham, Alabama, through Georgia, South Carolina, North Carolina, and parts of Virginia. As expected, some of the highest population growth in the southern region has occurred in metropolitan areas located within this area (Birmingham, Atlanta, Columbia, Charlotte, and Raleigh-Durham). The Piedmont Crescent has a high concentration of forest loss due to urban land growth. It is also at risk to forest fragmentation.

The Gulf Coast Corridor runs west from the Florida panhandle through Alabama, Mississippi, Louisiana, and Texas before ending at the Mexican border. Projected urban growth and development in this mega-region poses great threats to wetlands and imperiled species, increased air pollution, and alteration of rare forest communities. Recent hurricanes are displacing coastal populations further stretching this mega-region northward into the interior forested landscape.

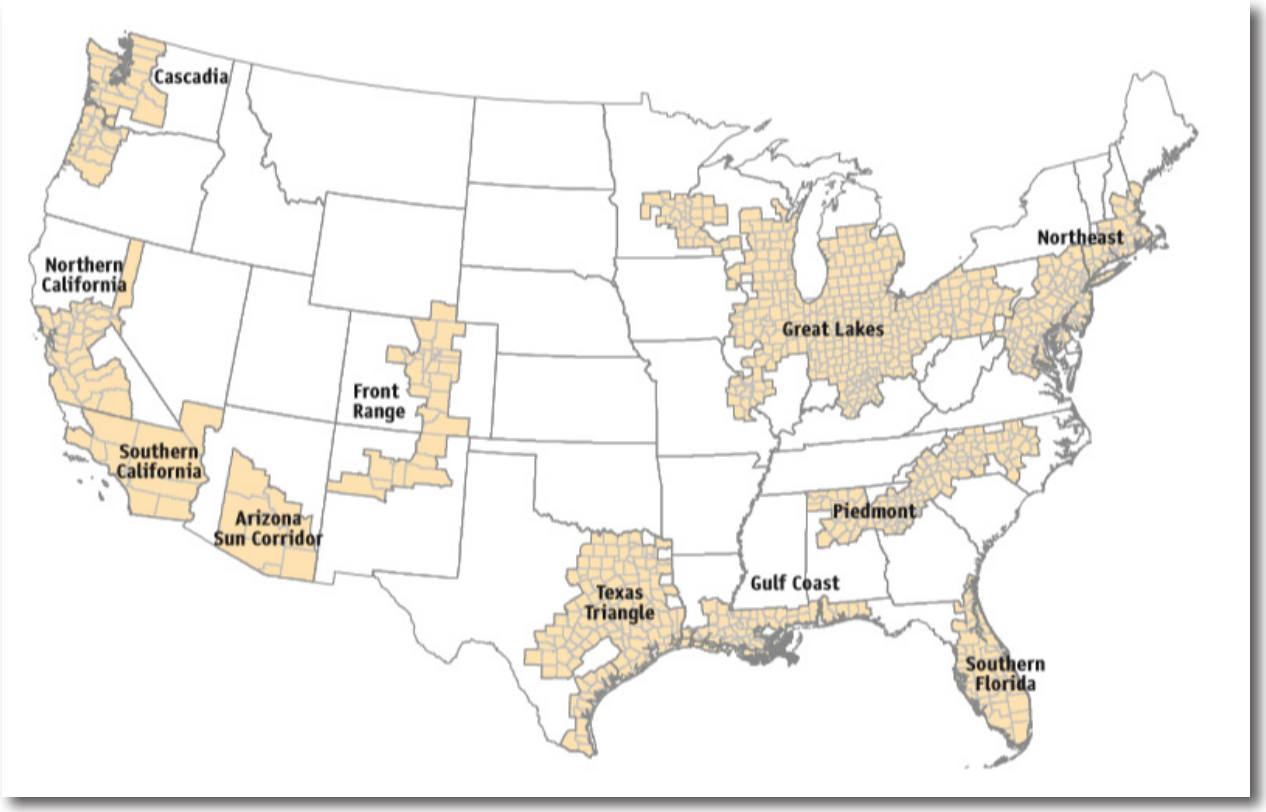


Figure 20. Alabama's Urban Mega-regions: Piedmont and Gulf Coast. (Hagler, 2009)

Multi-State Priority Area: White Oak Initiative

Another effort that is multi-state, multi-agency, and public/private/non-profit is the White Oak Initiative. While focusing on *Quercus alba*, the broader focus of the initiative is the upland oak and mixed hardwood forest that is widespread across the eastern and midwestern United States. Although large in extent, much of this forested landscape has been degraded over the past century through 1) poor timber harvest practice that repeatedly took the superior trees while leaving the inferior; 2) attempting the total exclusion of fire, which has been detrimental to the regeneration of fire-adapted species such as white oak but beneficial to thin-barked, shade tolerant, non-fire adapted species such as red maple; and 3) high deer densities which put browse pressure on white oak seedlings before they can emerge into saplings and trees.

Realizing the importance of a healthy upland hardwood ecosystem, and the fact that without action the course of events has been presenting increasing challenges to this ecosystem, 17 state forestry agencies from across the eastern U.S., including the Alabama Forestry Commission, have combined efforts to support the establishment of a dedicated White Oak Initiative. The American Forest Foundation is providing leadership, with the USDA's Forest Service and Natural Resources Conservation Service firmly on board. Private industry that relies upon a healthy and productive mixed upland hardwood forest has been generous in its support, and research universities led by the University of Kentucky and its extension service are serving this cause. The Wild Turkey Federation and an ever-growing list of partners are adding their strength to this truly boundaryless effort.

The challenges faced by the White Oak Initiative are daunting, and solutions will have to be applied over a long period of time. However, as the initial years of this effort have already proven, there is a will to move ahead despite the challenges inherent that have led to the current issues related to regeneration of a quality future oak forest. The energies and resources of Alabama's forestry community must be marshalled in support of the White Oak Initiative over the long term.

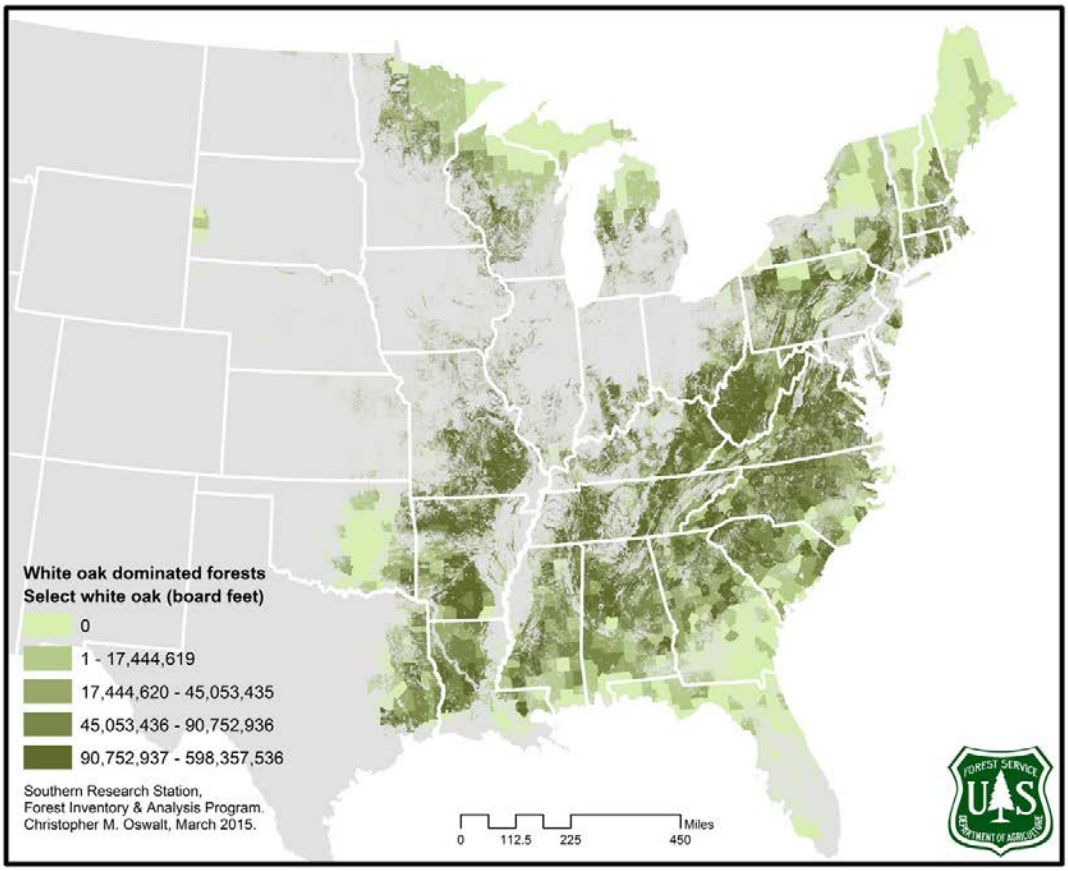


Figure 21. White Oak Dominated Forests estimated using FIA data.

Long-term Strategies to Address Threats

The previous chapter provided an overview of threats to the forest resource that have been highlighted by forestry professionals and stakeholders from around the state. To address these broad-based threats, it will take a concerted effort by all of the stakeholders involved with forestry in Alabama. This is the only way to produce a biologically healthy forest resource that will be a state asset for generations to come. The goal of these strategies is to direct efforts that yield the most positive outcomes possible.

The concept stated above is known as "Shared Stewardship." State forestry agencies such as the AFC have been providing 'boots on the ground' service to citizens for almost 100 years. As previously demonstrated in Alabama, private forestland dominates the landscape. In the Western United States, most forestland is federally owned and managed. As forest threats – such as those outlined in this document – tend to ignore jurisdictional and ownership lines, it is imperative that all concerned meet these challenges with a sense of shared responsibility (National Association of State Foresters, 2019). This concept will be evolving over the life of this document. The long-term strategies as presented here seek to put the ideas of Shared Stewardship into practice.

Forest Fragmentation

Smaller average timberland tract sizes in Alabama are a fact. However, the societal trends that are an unavoidable cause of forest fragmentation are beyond the scope of this document. What this document will seek to do is to provide guidance toward mitigating the worst impacts of fragmentation that have taken place and are expected to continue.

A prime threat that must be addressed with respect to shrinking tract sizes is that, beyond certain minimum thresholds, it is not economically feasible to have forest management work done. For a given activity such as a thinning operation, it is much more economical to treat a contiguous 200 acres owned by a single entity, versus treating the same 200 acres broken down into 20-acre blocks with ten separate ownerships. Scattered small tracts may not be marketable at all, especially for lower-value products. A blueprint for encouraging good forest management exists, despite small tract sizes in traditionally underserved communities and has been documented by Schelhas et al. in the November 2018 edition of the *Journal of Forestry*. The Sustainable Forestry and African American Land Retention Program comprises eight community-based projects across seven southern states. The projects found that prioritizing relationships was critical. Combining legal assistance with forestry outreach created synergies that enabled landowners with heirs' property to implement forest management practices. Forestry technical and financial assistance services were provided collaboratively by federal, state, and private organizations. Workshops and peer-to-peer learning allowed landowners to learn and share experiences. Visible local projects led to progress (Schelhas, 2018).

This research notes that the Federation of Southern Cooperatives based in Epes and the Limited Resources Landowner Education Assistance Network (LRLEAN) based in Demopolis are two Alabama collaboratives that have been at the forefront of addressing natural resource needs that had long gone unmet within the community of traditionally underserved-landowners. Five major constraints were noted that had to be overcome to move properties toward sustainable forest-management. Not all of these constraints may be faced by all small landowners. While a legacy of additional barriers has only increased challenges to the traditionally underserved, these constraints nevertheless will to some measure act to add to the challenges of good forest management across fragmented landscapes:

1. Lack of awareness and knowledge
2. Ownership and heir's property issues
3. Inexperience with forest management
4. Underutilization of financial assistance programs
5. Low returns from timber harvests

Based on the research presented by Schelhas et al. and institutional knowledge, the best practices for combating the threats brought about by forest fragmentation and parcelization will involve forming focused partnerships between landowners and the array of service providers that are out there but may be poorly known by many landowning citizens. The Alabama Forestry Commission has a role to play in landowner engagement statewide, as does the Natural Resources Conservation Service. The Alabama Forestry Association serves to link landowners to available programs that help them better meet their goals. It also advocates for programs that better serve landowners at the local, state, and federal levels. The Association of Consulting Foresters can provide tailored landowner services, and the Alabama Wildlife Federation offers non-timber forest expertise. The Alabama Cooperative Extension System already provides a point of contact for many landowners through their existing county offices, outstanding programs, and public outreach efforts. As

a landowner-driven advocacy and mutual-education group, the Alabama Forest Owners Association serves as a resource to members looking to protect the natural values of their properties while implementing best forest practices. The Alabama Farmers Federation can use its considerable reach to speak to the landowning public, and the Alabama TREASURE Forest Association continues a decades-long involvement with landowners motivated by the desire to be good stewards of the land.

To be recognized as an Alabama TREASURE Forest, it is not necessary to be a large landowner; 10 acres is the minimum ownership required. As a strategy to reach out and better engage the small landowner, and to receive the positive media coverage for doing so, this plan proposes a discussion with the Alabama Natural Resources Council and appropriate stakeholders to seek a new category of 'Shared TREASURE Forest.' While up until now it has been appropriate to award the coveted TREASURE Forest recognition to outstanding individual landowners and their families, it is necessary to foster greater person-to-person cooperation by broadening the scope to encompass cross-ownership forests that collectively achieve forest management objectives. While it is not practical to expect all forest landowners to aspire to this recognition, it is an important strategy. This will highlight ways and means that allow the fragmented forest to act like its unfragmented antecedent. Highlighting successes with well-earned TREASURE Forest designations will provide success stories and leadership for what is possible.

The state's Black Belt provides an excellent focus area for these efforts, as it has already been in the forefront with outreach, education, and landowner collaboratives. Because the coastal counties of Baldwin and Mobile face very real threats from forest fragmentation and conversion to non-forest uses, and because the AFC is receiving funding through the Gulf of Mexico Energy and Security Act (GOMESA) program, it is appropriate to focus effort to address change patterns of forest ownership and manangement in Baldwin and Mobile counties. Finally, the counties of the Southeastern corner of the state, known locally as the Wiregrass, deserve attention. Agriculturally-dominated landscapes typically feature highly-fragmented forests. However, there is a great need to support those forests for the services they provide to water quality and wildlife populations.

Work will be performed to nurture partnerships between landowner and landowner, landowner and agency, landowner and private service provider, and even inter-agency. Results will be measured through increases in acres under management and TREASURE Forest certifications. Tracking these results across the focus counties will serve to show us where we are succeeding and where we need to refocus efforts. The strategic goal is to find what works and what does not work in combating the adverse impacts of the fragmented forest, learn from our experiences, and export best practices statewide over the course of this document's lifetime.

This threat will require the creativity of agency resources to meet, as many of the drivers of forest fragmentation are beyond the scope of what the agency can confront. However, as mentioned in the strategy above, there are patterns for successful landowner interactions that can, given time and attention, slow the trend toward the fragmentation of ownership and the proliferation of difficult-to-manage tracts. The resource shown to have the greatest impact is that same resource which is always in short supply, that of personnel time, and the personnel itself.

Based upon the matrix produced to define Alabama's priority counties, which included values targeted toward accounting for counties at highest risk of experiencing forest fragmentation, emphasis concerning this threat will be focused upon the counties labeled as 1st and 2nd Priority, although all counties will receive attention as resources allow.

The success of these approaches in confronting the threat posed by forest fragmentation will show itself by having served to both conserve and move into a state of management these working forest landscapes for multiple values and uses. The forests will have a greater level of protection from numerous threats, and the public benefits from trees and forests will be enhanced.

Over the life of this document, the AFC will actively pursue grant funding opportunities and partnerships that are consistent with its overall mission and will further goals associated with the threat of forest fragmentation.

Invasive Species

While eradication of invasive species from the state would be ideal, the reality is that the most widespread exotics are likely established beyond the point of possible elimination, and we must learn to manage them as best we can under the resource constraints that we face.

Education is an important tool in the fight against invasive species. An educated populace can take steps to stop the spread of current known invaders and prevent the intentional introduction of additional non-native plants, animals, and pathogens. It would be a frustrating task to employ staff to combat a pest species that others within the community intentionally plant as an ornamental or were unintentionally transporting seed, but such has happened in the past and continues today. As a strategy, the previous Forest Action Plan suggested creation of public service announcements to better inform the public on the appearance of and impact caused by cogongrass. This strategy should be renewed for the coming years. Articles for print and online media must be authored to inform the public about exotics such that uninformed members of the general public are not worsening seed spread and infestations through lack of knowledge. Beyond that basic knowledge, we must share with the public the known ranges where we have proof that these species occur and provide the interested landowner with best practice control measures. The AFC provides these services now, and it must remain a long-term strategy to continue to provide these services.

The Alabama Invasive Plant Council likewise shares the mission to inform the public and combat the invasive threat through its possession of scientific expertise and promotion of effective on-the-ground control measures. Regional extension agents also work to further these ends. Partnering across public/private and agency lines is a critical strategy to maximize reach for activities such as field days and demonstrations. It is a strategic goal to hold an appropriate number of these collaborative field days across the state each year. The message that "not everything green is good" is one that must be shared as broadly as possible.

Field of invasive cogongrass

A concept that this state will be watching closely and is eager to be supportive of is that of the 'endocide.' Pioneering work continues to be undertaken by Dr. Shiyou Li, the Director of the National Center for Pharmaceutical Crops, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University. Endocide itself is a new word coined by Dr. Li and his staff and is a short name for 'endogenous biocides.' This work has the potential to be the quantum leap forward that will ultimately turn the tide in the battle against invasive exotic species. To quote from Dr. Li's abstract to his "Endocide concept and applications in control of invasive species" presentation to the Innovations in Invasive Species Management Conference, Nashville, Tennessee, December 12-14, 2018: "We coined the term endocides (endogenous biocides) to describe such metabolites that can poison or inhibit the parent via induced biosynthesis or external applications. Endocides are more toxic to the parent species over non-closely related species. Based on these discoveries, we have developed the technology to control invasive or any unwanted species by selectively eliminating the parent or other individuals of the same species and its relatives by external applications of endocides" (Li, 2018).

Dr. Li's research has yielded 17 issued or pending patents. Natural resource agencies in Alabama will be advised to follow the latest research and encourage this promising emerging technology where possible.

This threat will require the resources of dedicated personnel, training, transportation equipment, spraying equipment, herbicide, and agency time. Alabama's climate and landscape have proven highly conducive to the spread of a multitude of invasive/exotic species across vast acreages. Limited resources will not be able to eliminate this threat, but targeted resources that knock back known infestations and better education of entities known to act as invasive vectors will make a positive contribution toward holding the line on the invasive/exotic threat to the forest resource. That being the case, any additional federal or outside resources, such as the ACDNR, ACES, or U.S. Forest Service, willing and available to partner with the AFC's staff experts, will make impacts greater than would be possible should those entities act in isolation from one another. Coordinated action concerning the threat posed by invasive species will yield the greatest output per unit of resources expended.

Based upon the matrix produced to define Alabama's priority counties, which included values targeted toward accounting for counties at highest risk of experiencing invasive species infestation, emphasis concerning this threat will be focused upon the counties labeled as 1st and 2nd Priority, although all counties will receive attention as resources allow.

Success confronting the threat posed by invasive species will be evident as affected landscapes are treated and actively managed. Invasive species degrade the land and can prevent its ecosystems from functioning properly. With treatment and ongoing control, the forests will have a greater level of protection from numerous invasive/exotic threats, and the public benefits from trees and forests will be enhanced.

Over the life of this document the AFC will actively pursue grant funding opportunities and partnerships that are consistent with its overall mission and will further goals associated with the threat of invasive species.

Changing Markets / Rural Development Issues

It is difficult to overstate how crucial workforce development is to a state's economic health. Alabama's Workforce Council recommends training and hiring 500,000 new high skilled employees into the workforce by 2025. Wood-based industries are a significant component of Alabama's workforce. Despite productive timberland management that yields subsequent large inventory surplus, available site locations, and a positive market economy, a lack of skilled workforce can be an impediment for retaining, expanding, and attracting wood-based manufacturing opportunities. How important is Alabama's forest industry? The state's wood-based sector has achieved a national industrial footprint as second in pulp production, second in paper & paperboard, third in lumber, and sixth in wood panel production. Further, it is estimated that Alabama's wood-based job concentration is 2.55 times similar U.S. job industrial sector concentrations. Therefore, workforce development is critically important for the sustainment of Alabama's economic landscape for wood-based manufacturing.

The forest industry of the U.S. South needs workers. It needs individuals who are passionate about the outdoors, passionate about sustainability, and those who are passionate about their careers. Some of rural America's highest paid jobs are in forestry and the forest product manufacturing sector. The forest industry is one of the South's largest regional industrial manufacturing sectors.

Alabama is blessed with innovative leaders who have facilitated an effective strategy for Workforce Development solutions. And to their credit, there is not just one solution – but many. For example, The Alabama Department of Commerce Workforce Development Division is dedicated to assisting the growth of Alabama businesses and the workers that sustain their operations. The Division has five areas of responsibility. Of greatest direct interest is AIDT (Alabama Industrial Development Training). This is Alabama's premier workforce training incentive that offers job-specific training to new and expanding industries in Alabama and expanded job opportunities to its citizens. This section has been very effective at making partnerships with forest industry and preparing workers with the specific skills that employers demand. Besides offerings through the Department of Commerce, there are other opportunities available within Alabama such as those offered by the Alabama Community College System (Alabama Technology Network), universities, private entities such as *Go Build Alabama,* and others.

Alabama is also meeting the Workforce Development challenge for our wood-based industry with a unique, progressive and successful initiative that is changing the opportunities for our state's forestry sector – *Forestry Works!* The initiative, sponsored by the Alabama Forestry Association, is a collaborative effort by the Forestry Workforce Training Institute (FWTI) and other partners within the forest industry to develop a pipeline of qualified workers for the logging and wood product manufacturing industries. The program educates students, parents, and teachers about careers and job opportunities in the forest industry and provides interested individuals with resources to help them along their career path. It is FWTI's mission to provide the next generation with resources, skills, and guidance to join the forestry and wood products manufacturing workforce. The hardest jobs to fill in the forest industry are log truck drivers, maintenance technicians,

saw filers, equipment operators, and electricians. By partnering with education and private business within Alabama and the Southeast's forest industry, FWTI cultivates careers, fosters community development, and stimulates local economies. At time of writing**,** the *Forestry Works!* program has impacted 39,539 total individuals to date. The FWTI has continuing projects including a logging equipment operator school, high school forest worker CRI (Career Readiness Indicator) program, career fair outreach, and log truck driver recruitment campaign. Further, projects in development include a high school forest industry maintenance technician CRI program, log truck driver training program, forest worker apprenticeship program, and a multi-state workforce development model.

The Alabama Forestry Commission and the Alabama Forestry Association will continue to work cooperatively in various programs for young adults to educate future generational assets. These initiatives include Forestry Career Days (high school), FAWN (Forestry Awareness Week Now) involving 6th graders, Natural Resources Camps (6th graders), Project Learning Tree, and the Alabama Forestry Association's Teachers Conservation Workshops, among other education programs.

All of these efforts work together to keep our existing industry vibrant while providing opportunities to our citizens, rural economy, and businesses not yet operating in our state. Potential new industry will be attracted both to our abundant forest resource and quality human resource, ready to meet the demands of the 21st Century workplace.

Several organizations from around the state are partnering in an effort led by the Economic Development Association of Alabama (EDAA) to catalyze forward momentum in rural economic development. Under the metrics used on this project, 40 of Alabama's 67 counties are classed as rural, and 17 of these are set to receive special attention through this program, where top professionals from multiple economic development realms will come together to lend focused attention to rural county clusters. It is not the intent of this effort to infringe upon any local efforts at development. The intent is to augment local resources, which may be deficient in certain facets, with a deeper reservoir of talent than is typically available. A region-wide team approach is being stressed, as opposed to narrow local focus. The AFC is partnering with the EDAA, the Alabama Department of Commerce, and local chambers of commerce and industrial development boards to highlight the timber resource base present in each locality, and to bring this knowledge in front of key persons who otherwise have no access to it. Like many strategies, this one is long term in scope. The demographic and structural shifts that are currently hampering successful efforts at rural development cannot be dismissed lightly. Ongoing support will be required for years to come, although using this program to try out bold steps, create new partnerships, and spark innovative thinking is the strategy at this point. Future efforts and strategic thinking on this issue will evolve from the lessons learned on the ground.

Because important decisions in many areas, not the least of which being economic development, hinge upon timely and accurate resource data, Alabama will continue to supply the U.S. Forest Service's Southern Research Station's Forest Inventory and Analysis program with a dedicated partner in field data collection. This partnership between federal and state resources has been a great success over the past two decades and has never been stronger. All parties should continue to bring to the table the monetary, technical, and most importantly human resources that supply Alabama's contribution to the nation's forest census, while looking for ways to deliver products even better in precision and accuracy as technology continues its forward march. Alabama's program is proud to report that it has been first in the nation to see its yearly surveys published in 2017, 2018, and 2019, giving the state an advantage, as practitioners see the commitment the state has shown in providing the most current resource data possible. The Alabama Forestry Commission will strive toward continued leadership in this field. The benefits of timely resource data are apparent in their use throughout this document, and in their frequent use in the many resource data requests directed to the AFC. Full funding for the inventory on a seven-year cycle should be maintained by the Forest Service as this investment is known to pay ongoing dividends.

FAWN
FORESTRY AWARENESS WEEK NOW

A FAWN event in Marion County

A publication of longstanding that requires continued support is the annual *Forest Resource Report*, issued yearly by the Alabama Forestry Commission. This document summarizes in chart form and in maps the most current Forest Inventory and Analysis and other relevant data. Summaries of business, industry, housing, and broader market considerations are given, as are Alabama forest products industry updates. This publication provides a quick answer to the many resource data requests that the AFC receives, while providing fuel for additional thought, consideration, and questions that can later be answered in greater detail. While published for general consumption, the detailed data will be of most practical use to professional practitioners and rural development specialists. As the pace of events within this field moves very quickly, this AFC product should be maintained as an annually-updated resource.

This threat of changing markets and rural challenges, which also presents many opportunities, will require the resource of a continued investment of agency time. Over the period of the last Forest Action Plan there has not been the funding present in the budget to fund a full-time Services, Utilization, Marketing, and Ecosystem Services forester, let alone a staff as is present in some states. Nevertheless, core functions of such a position have been carried out in a committee fashion. The agency has made the strategic decision, much as it has with the Certified Wildlife Biologist / Threatened and Endangered Species Specialist, to recently begin to self-fund an Economic Development Specialist position because the need is so acute.

The recent growth in demand for wood pellets, not only in Europe but in East Asia as well, will present opportunities moving forward for additional utilization of small-diameter wood and mill residuals. A strong economy, with data supporting increased home buying by the large Millennial generation will continue to support the state's dimensional lumber producers while also sustaining momentum for the construction of new high-efficiency mills. There is good reason to be optimistic concerning timber markets and rural development in the years to come.

Success confronting the threat posed by changing markets and rural development issues will be evident by maintaining the forest as a source of wealth generation, which in turn provides a greater level of protection from numerous threats due to continued monetary incentive. Public benefits will be enhanced, including good jobs and a strengthened rural economy from trees and forests.

Over the life of this document the AFC will actively pursue grant funding opportunities and partnerships that are consistent with its overall mission, and will further goals associated with the threat of changing markets and rural development issues.

Adverse Weather Events

The Alabama Forestry Commission assists landowners in a variety of ways following adverse weather events. Forms of assistance include conducting post-storm aerial reconnaissance, conducting site visits with landowners, and connecting landowners with government-based programs that can provide financial assistance to help the defray costs associated with post-storm forest management.

Post-storm aerial reconnaissance is conducted for a variety of reasons including development of damage assessments caused by tornadoes, hurricanes, severe thunderstorms, straight-line winds, and other forest health-related issues such as southern pine beetle (*Dendroctonus frontalis*) infestations. Aerial imagery and mapping resulting from these reconnaissance efforts are also useful for related forest management purposes.

Site visits conducted by Alabama Forestry Commission personnel with landowners are important in developing recommendations for tract-specific forest management practices following severe weather. Practices such as salvage cuts, thinning operations, and clearcutting are possibilities after severe weather events and these are determined with the assistance of trained foresters. These activities can benefit the landowner by helping the landowner recover some of their investment and improve the health of their forest stand.

There is always a cost that comes with forest management. The Alabama Forestry Commission can help there as well. It is our job to educate and distribute information on state and federal financial assistance programs that benefit the landowner. We serve as technical service providers for these government programs including the Farm Service Agency's (FSA) Restoration Program, the Natural Resources Conservation Service's (NRCS) Environmental Quality Incentives Program, and the Emergency Forest Restoration Program. These programs are designed to help ease the financial burden many forest owners may face following adverse weather events. The best way to get involved in these programs is to contact a local county Alabama Forestry Commission office.

The key strategy to confronting adverse weather events is the maintenance of a full complement of tractor operators, chainsaw operators, and assorted support personnel who have the ability to react quickly to catastrophic weather events. The Alabama Forestry Commission, along with sister agencies, has long been on the frontline of natural disaster

response and recovery efforts, and operational capacity must be maintained and augmented if possible.

Wildfire danger can increase dramatically in areas where massive amounts of combustible fuels have been laid down, making it imperative that the agency maintain staffing and fire suppression equipment equal to the task of confronting periods of increased risk due to hurricane or tornado aftermath. The continuous pursuit of funding opportunities that translate this goal into reality will remain strategically important to the AFC.

AFC employee assessing storm damage with a landowner

One example of a partnership in disaster response is the Commission's partnering with the Alabama Emergency Management Agency (AEMA) and units of the Alabama National Guard to train for and staff the State Operations Staging Area (SOSA) at Montgomery's Maxwell Air Force Base. Should the need arise within the state to activate, the SOSA will coordinate the receiving and distribution of aid trailers stocked with relief supplies. The operation of such a dynamic staging area requires a commitment of personnel to train before the need arises so that the operation of the SOSA will be as smooth as possible under the stresses of an actual emergency. This partnership with AEMA and the Alabama National Guard should be maintained, and periodic trainings continued to maintain response readiness.

In the aftermath of a destructive weather event in the South, there is a narrow window of opportunity within which the salvage of timber can take place. State resources, along with partners, should make every effort to aid in the salvage of timber to the extent possible. This includes actions ranging from using equipment to open public access to damaged stands, to working to obtain special declarations allowing log trucks to carry greater weights for the duration of salvage operations. Timber salvage harvesting, where appropriate, can be a far superior response from a land management perspective, versus simply leaving damaged stems in place.

We have seen unprecedented federal responses to recent natural disasters that likely foreshadow the responses of the future. Relief payments to impacted landowners, not just of agricultural crops but of timber as well, are now being considered and even implemented. The AFC will provide technical assistance in these instances. Coordination with the USDA and neighboring states will likely be a feature of these efforts and must be supported by Alabama natural resource practitioners and agencies to procure the maximum relief possible for state stakeholders.

The Alabama Forestry Commission must maintain and strengthen its relationships with the myriad of fire departments across the state and the role it plays in community wildfire protection plans. These detailed plans are prepared with the buy-in of community representatives that review and agree to act as implementation leaders. These include the local fire department, local AFC personnel, as well as other concerned stakeholders. Beginning with a detailed assessment of the community's infrastructure and population, along with the area's history of wildfire, it is then possible to work out goals and objectives that the plan aims to accomplish, with action items numbered to provide direction for next steps. By establishing the funding needed and a feasible timetable, concrete actions can be undertaken and records kept of accomplishments. In addition to this, a detailed fire suppression plan is created for the subdivision or development, saving valuable time in the event that it ever needs to be employed.

Using the resources of its team dedicated to the acquisition of Federal Excess Personal Property (FEPP) and Department of Defense Fire Fighter Property (FFP), the AFC will work to find low-cost equipment solutions that strengthen our volunteer fire departments (VFDs). This partnership is beneficial to the state as the VFDs often catch many small wildfires before they grow into large ones. The roles of the AFC's Fire Operations Chief and Volunteer Fire Assistance Coordinator will be maintained as the linking pins between state wildfire response resources and the resources present at the community level. Collaboration between the AFC and VFDs will fortify the first response capability of local resources who are crucial in preparing for and responding to weather events and wildfire emergencies.

The state forester, as the executive ultimately entrusted by law with the identification of threats to the forestland of the state and the mitigation of those threats, must have sufficient resources at hand to formulate strategy, maintain staff, and deploy those resources to any point within the bounds of Alabama. The Alabama Forestry Commission employs approximately 225-230 staff at all levels, and this level needs to be maintained and augmented as funding allows. The agency gathers funds from multiple sources, principle among them are the State General Fund, the earmarked dollars of the Forest Product Severance Tax, and federal monies, with the USDA Forest Service being the largest single source of federal support. Through these funds the state forester is able to pay salaries, operate transportation vehicles, operate fire suppression equipment, support forest management efforts, support insect and disease identification/mitigation, maintain emergency dispatch centers and a statewide radio network, maintain a maintenance shop for state vehicles, purchase modern communication devices and computers, maintain the integrity of structures, maintain needed account-

ing staff, and otherwise administer an agency with a broad mandate and statewide reach. This document will not list specifics such as number of tractor/plow units needed or specifications and rotation schedule of pick-up trucks. However, it can be stated that current agency funding levels, with incremental increases to account for the natural rise in prices over time, should be viewed as the minimum necessary to deliver services at the level to which the public is accustomed over the next ten years.

Finding the education and outreach channels necessary to reach landowners, land managers, school groups, and all stakeholders will be important in advancing the state's response to these events. It is important to communicate a coherent message to the people of this state and stand ready to respond in force.

The ability to plan and train for adverse weather events involves the investment of scarce agency resources, personnel, time, and equipment. Being able to staff work units to the point where resources committed to training can be covered by sufficient fire suppression resources at the home unit is a continuing challenge. The AFC's base wildfire response capacity remains at a critical threshold. Each two-person initial attack fire crew is tasked with an average protection burden of 275,000 acres. That acreage is more than 100 percent greater than the South-wide average, and acts as a constraint upon additional training, as pulling resources only enlarges the responsibility of the resources available for dispatch. Funding levels that would allow for greater fire response staffing would also allow for greater sharing of wildfire coverage responsibility, and thus a greater reserve of resources that would allow for increased training outside the home unit. Coordinated response to large weather events, including drought and weather driven multi-day, multi-agency wildfires, is an area where greater base capacity, leading to greater training capacity, would lead to overall agency gains in response to adverse weather events.

The success of these approaches to confronting the threats posed by adverse weather events will show themselves by the forest having a greater level of protection from numerous weather threats, and the public benefits from trees and forests will be enhanced, as will recovery efforts in the wake of these devastating occurrences.

Over the life of this document, the AFC will actively pursue grant funding opportunities and partnerships that are consistent with its overall mission, and will further goals associated with the threat of adverse weather events, both preparation for and in response to such events.

Forest Health

As monumental western wildfires are now televised and covered by online media to a degree not possible before, debates as to the role that poor forest management and poor forest health play in these tragic events continue as topics of popular discourse. The public understandably wants assurances that proper forest health monitoring and proper response capacity for wildfire is being maintained here at home. These concerns are paramount in the minds of AFC decision makers as we strive to deliver peace of mind and effective emergency response to the people of Alabama.

Effective response to wildfire and forest health crises is dependent upon a trained work force. Training as a key component of readiness will be supported to the greatest extent possible at all levels of the agency, from new hires on up. Although there is no substitute for a ranger or forester's on-the-job training, where opportunities can be found or created, it is imperative that fireline and fire management training be supported and pursued.

Ongoing needs for fire suppression equipment and suitable stations for housing this equipment and response personnel must be met. This must be done in a cost-efficient manner, utilizing new equipment purchases where appropriate and the Federal Excess Personal Property (FEPP) and Department of Defense Fire Fighter Property (FFP) Programs. Initial attack capability for wildland fire must be maintained through appropriate staffing and filling critical vacancies when they occur. Ongoing evaluation will continue to ensure that equipment and offices are located strategically to best meet objectives in facilities that are well-maintained and provide the implements needed to service suppression and mitigation equipment.

Prescribed burning in Gulf State Park in Orange Beach, Alabama

State wildfire dispatch centers will remain a key tool in taking in information from the public and other emergency dispatchers, and then relaying this information to AFC fire suppression personnel. They will maintain contact with deployed resources and keep records of which personnel has been dispatched and their locations. As appropriate, these centers will be upgraded as improved technology becomes available.

The AFC will continue to promote and participate in prescribed burning. This activity, when properly applied by trained persons under the correct environmental conditions, serves numerous purposes. These include hazard mitigation; ecosystem maintenance/restoration; control of certain invasive species; wildlife habitat improvement; silvicultural practices including site preparation, restoring native plant communities, and oak regeneration; management activities for rare, threatened, and endangered species; watershed management; and forest health practices (Northeast-Midwest State Foresters Alliance, 2018). As experts with the needed experience and tools, the AFC, along with partners such as the Nature Conservancy and the Department of Conservation and Natural Resources, will provide prescribed fire assistance to the landowners of the state. Further, the AFC will partner with the Alabama Prescribed Fire Council in events such as their "Learn and Burn" series, where landowners acquire the needed experience to become safe, effective prescribed fire practitioners. The AFC will support the Certified Prescribed Fire Manager program, whose innovative state-legislated mandate seeks to create knowledgeable landowners and professionals who are able to take stock of a given piece of property, create a burn plan taking into account the diverse factors at play when crafting a prescription, and then select a day where weather factors such as humidity, temperature, and predicted wind speed and direction fit within the parameters of the prescription. The legislature of this state made it a stated goal to further prescribed fire in the state for the reasons noted above, and the AFC and concerned stakeholders will continue to work toward accomplishment.

A special collaborative firefighting effort that the AFC has long been associated with, and will continue to be, is the Fire Dawgs. This is the student wildland fire team of Alabama A&M University. Located in Huntsville, and hosting one of the state's two forestry schools, Alabama A&M is well positioned to provide interested students with the opportunity to take their first steps into the world of wildland fire fighting. After completing the NWCG (National Wildfire Coordinating Group) Basic Wildland Firefighter Courses, these students, who are fully-outfitted with the needed equipment, assist with fire suppression when the need arises. Being only one of three such teams in the Southeastern United States, students receive hands-on learning opportunities, and the AFC benefits when resources become stretched and hand crews are required to suppress fire in difficult terrain.

To support a historical record, wildfire numbers, locations, and sizes will be tracked and this information made available to the public. Successes or struggles can be calculated through tracking trends in wildfire numbers and average sizes, and any alarming trends be quickly spotted and mitigated.

The capacity of the AFC and its partners must be maintained and strengthened in the area of communications to the public. A fully equipped media team must be maintained as the state's information source for forest health news. Be it information on drought, or weather-triggered outdoor burning bans, or insect pest outbreaks, it is critical that a media team be in place to move information out into the public sphere. Although press releases for acute situations are envisioned, we cannot neglect the responsibility to raise the broad level of forest health knowledge across the state. Offering an attractive print and online magazine to any interested recipient in Alabama has proven to be a winning long-term strategy when it comes to addressing forest health concerns head on, and this strategy should be maintained into the future. *Alabama's TREASURED Forests* meets this need, as it has since the early 1980s. Long-term strategy dictates the continued publication of this magazine.

To echo thoughts from above, communication to the public is at the heart of the state's wildfire prevention strategy. From Smokey Bear programs in schools, to Smokey Bear public service announcements on billboards and on radio, the trusted mascot of wildfire awareness will continue his 75-year plus mission to educate the public, starting with the youth, on the dangers associated with human-induced fire, and the simple steps that all citizens must take to minimize these risks and the subsequent occurrence of unintended wildfire ignitions.

The National Fire Prevention Association sponsors the Firewise USA program, which is coordinated in-state by the Forestry Commission. This program helps to educate property owners as to the risks associated with wildfire to their personal property, and how preventative actions taken by themselves and in cooperation with neighbors can work to greatly mitigate risks associated with wildfire to their homes. The Firewise program encompasses best practices for mitigating threats within the immediate, intermediate, and extended zones around a home and the concept of creating defensible space when combatting wildfire. It also offers a checklist to consider when taking steps to fire-proof a dwelling. Assistance with achieving these important steps is available through the AFC's Fire Coordinator and local resources. Having this valuable program and a coordinator to spearhead sharing it with the public is a strategy that will be continued.

A Community Wildfire Protection Plan (CWPP) is developed using a collaborative framework, bringing together state government, tribal government, local government, local fire departments, other stakeholders, and federal land management agencies where appropriate, within the vicinity of a planning area. A CWPP identifies and prioritizes areas for hazardous fuel reduction treatments, and recommends the types and methods of treatment on federal and non-federal land that will protect one or more at-risk communities and essential infrastructure, and recommends measures to reduce structural ignitability throughout the at-risk community. A CWPP addresses issues such as wildfire response, hazard mitigation, community preparedness, and structure protection. See link to the "Community Guide to Preparing and Implementing a Community Wildfire Protection Plan" https://www.forestsandrangelands.gov/documents/resources/communities/CWPP_Report_Aug2008.pdf . The AFC works with interested communities in initiating and completing CWPPs. See link to https://forestry.alabama.gov/Pages/Management/WUI.aspx where Wildland Urban Interface issues are discussed on the AFC website, and a link is provided to the CWPP template that we offer. In addition, a copy of this template is provided in Appendix 7. Any interested party can begin the process of working with the AFC to create a CWPP by contacting the local office in their county or the Director of the Forest Protection Division at the State Office in Montgomery.

A tool that has seen a great deal of investment from the Southern Group of State Foresters (SGSF) is the Southern Wildfire Risk Assessment Portal, known as SouthWRAP. Use of this tool is designed to "create awareness among the public and to arm state and local government planners with information to support mitigation and prevention efforts." Alabama and 12 other member states of the SGSF are covered under this tool, which places the Southern states at the forefront of national leadership in wildfire protection planning. The homepage for SouthWRAP can be found here: https://www.southernwildfirerisk.com/.

Invasive species are a forest health issue, but of such critical and continuing importance that they have been treated in their own section. An emerging threat to Alabama, the emerald ash borer has been identified in small numbers, but the potential impact of the insect to the state's forest health is of major concern and will be monitored closely. This monitoring by traps, and by positive identification of impacted trees, will continue over the course of this strategic plan. Landowners will be kept informed of the pest's movements, and of any effective control measures that may arise for pre-treatment or salvage of trees. Detailed records will be kept adding to the scientific record of this destructive invasive insect.

Attempting to reach a diverse assemblage of nearly five million residents is a task too large for any single team. For this reason, strengthening outreach partnerships with likeminded entities will be the only strategy with likelihood to succeed. As the Alabama Cooperative Extension System shares an outreach directive with the Forestry Commission, there is a natural gain to be had from working in close collaboration, both by sharing internal information and partnering to better reach general audiences of stakeholders ranging from students to retirees. Seeking to nurture this interrelationship will be a strategic aim of both organizations in the years ahead. Tracking the number of events where both agencies supply speakers and/or event organizers will provide a helpful metric to chart positive accomplishment of this strategy.

Success will be evidenced by working forest landscapes that may otherwise be degraded and lost for multiple values and uses coming under increased management, the forest gaining a greater level of protection from numerous forest health threats, and enhancement of public benefits from trees and forests resulting from the above-mentioned gains.

Over the life of this document the AFC will actively pursue grant funding opportunities and partnerships that are consistent with its overall mission, and will further goals associated with the threats posed to forest health by insects, disease, wildfire, or any causal agent that is having or has the potential to have negative influence upon the health of the forest resource.

Loss of Ecosystem Services

The capacity of the land to provide ecosystem services to the people, such as discussed in Chapter 1, must be maintained in perpetuity. The AFC and partners work tirelessly to ensure this ongoing mission succeeds. Both within and without the agency, examples abound of leadership roles being taken to protect our properly functioning ecosystem. What follows are strategies to continue moving forward.

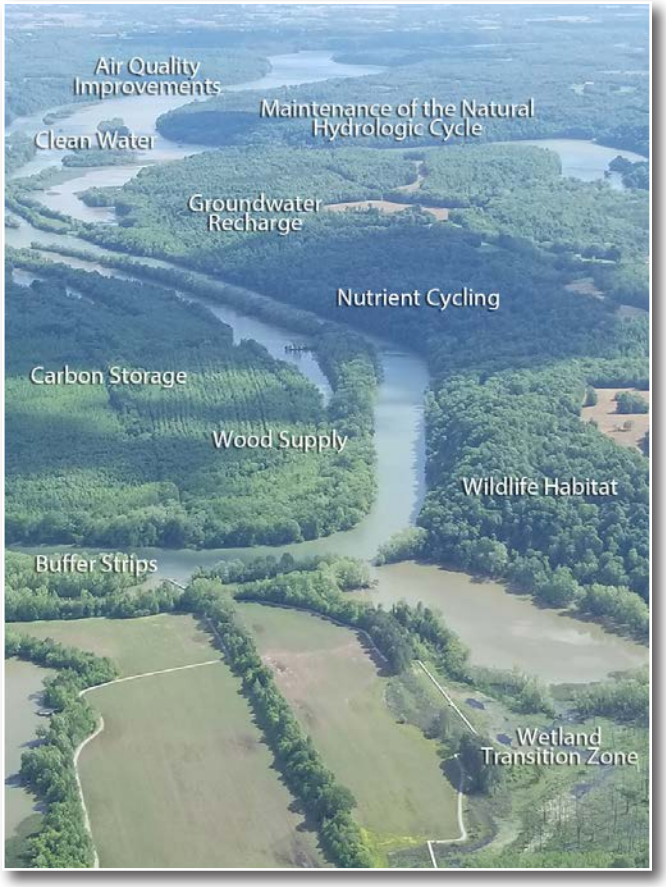


Figure 22. Typical Forest Functions and Values
Elk River, Limestone County

In the interim between the creation of these 10-year Forest Action Plans, the Alabama Forestry Commission made an important strategic addition that has paid great dividends to the state, and as a strategy must be maintained into the future. At the time of the last plan, the AFC did not have a Certified Wildlife Biologist / Threatened and Endangered Species Specialist position on staff. This position has since been created. The value of this staff position has made itself apparent time and again. First, this position is a key speaker in many agency outreach efforts. As wildlife and forestry are joint concerns of the vast majority of landowners we interface with, having the voice of a knowledgeable expert in matters of both game and non-game species is invaluable when speaking to the public. Second, as the agency maintains an outreach presence in print and online, the services of a Certified Wildlife Biologist's pen are required frequently to address broad public concerns through those mediums. Third, the existence of this position has allowed the AFC to be a better State Wildlife Action Plan participant by being able to self-monitor wildlife populations on the agency-administered State Forests. Led by the biologist, the ongoing gopher tortoise habitat-improvement practices and population surveys at Geneva State Forest form an excellent example of the importance this position plays within our agency as these efforts bear fruit that all of Alabama benefits from. When it comes to concrete actions for the preservation of ecosystem services over the years ahead, one action must be to maintain a home for a certified biologist at the AFC for all of the key reasons mentioned above, not the least of which is to act as a linking pin with the Alabama Department of Conservation and Natural Resources.

One example where multiple partners are working along shared lines is the Bobwhite Quail Southern Pine Savannah Restoration Project. Wildlife biologists from the Alabama Department of Conservation and Natural Resources (ACDNR), providing technical assistance to landowners, are, through this Natural Resources Conservation-funded program, able to bring about the management needed to work toward restoring optimum pine savannah habitat for bobwhite quail and associated species. As prevailing land use patterns have changed greatly over the last century, these once-abundant savannahs have degraded and largely disappeared. Their restoration provides habitat benefits not only for quail, but for numerous songbirds, rabbits, wild turkey, whitetail deer, and more. The Alabama Farmers Federation gave coverage to this program in their well-read outreach publication and through the work of their Forestry and Wildlife Division. As pine savannah is a fire-adapted landscape, the AFC will play a role in assisting many participants in such programs by providing services such as plowing pre-suppression fire breaks and application of prescribed fire. This broad approach will bring meaningful improvement to landscapes and protect the ecosystem services they provide. Although in this instance the ACDNR was the lead agency in supplying the state government contact for this federally-funded cost-share assistance program, in many instances the AFC is the go-to contact for help in navigating the federal cost-share requirements. The AFC will continue to provide cost-share assistance to landowners, because in the end, regardless of the source of the help, the goal is to get the money and knowledge out to the field where positive outcomes occur. Fostering strategic partnerships where each party is able to offer access to their particular expertise is the model we will follow into the future.

Best Management Practices (BMPs) for timber harvests are known to protect water quality and provide proven methods for safeguarding the land while harvesting timber in a responsible fashion. In Alabama, the lead agency tasked with monitoring all Non-Point Source water pollution is the Alabama Department of Environmental Management. However, as has been the theme repeated time and again, only through partnerships can this task be carried out adequately. The AFC also partners with forest industries through Sustainable Forestry Initiative (SFI) to ensure loggers are implementing effective BMPs. This partnership about education and implementation demonstrates the effectiveness of a voluntary BMP Program.

In partnership with industries and the environmental management community, the Alabama Forestry Commission will continue to monitor logging sites for BMP implementation, spearhead logger education on BMPs, and provide first response to public complaints concerning water quality protection and correct BMP practice. The AFC is aware of the importance of this mandate and of the absolute need to maintain its leadership role in the monitoring of silvicultural sites for best management practice implementation. Being able to inspect harvest operations in all 67 counties while striving to maintain implementation rates of at least 98 percent is a hefty burden. Ecosystem protection begins with water quality and soil protection, demanding our utmost efforts.

The urban and suburban landscape is home to an increasing share of the nation's people, and this is true of Alabama as well. The urban forest presents a challenge to professionals whose schooling and experience has prepared them for careers in traditional forestry. Whereas timber value and wildlife concerns may have been paramount in traditional forestry, it is the ecosystem service component of urban forests, and even individual trees, that is paramount in that arena. Having expert staff in-house to address the needs of the urban forest has proven an invaluable resource to the state, and this unique role will be carried forward. Likewise, the need is great for a specialist to interface with the many municipalities in Alabama, one who can lead towns and cities to achieve recognition as a Tree City USA. The annual count of enrolled locations is an effective barometer of this effort. Tree Campus USA is a sister program for the nation's college campuses, and a running tally will be kept of these as well. Should opportunities arise to partner with municipalities, then we must consider these and move on projects where the funding and scope of work fall within acceptable parameters. The AFC's urban foresters have been leaders on disaster response Urban Forest Strike Teams. Utilizing special training, these team members are dispatched to urban settings that have had large numbers of trees adversely impacted due to an event. They examine damaged trees and assess chances for tree recovery, providing guidance to clean-up and salvage crews as to which trees survive, and which trees are hazards that need to be brought down. This response capacity will be maintained within the agency and within the state. Successful urban forestry programs greatly increase the quality of life for city dwellers who may take for granted the role that even relatively small areas of urban tree cover play in maintaining ecosystem balance and function.

Urban and community foresters of this state encourage tree planting state wide. Not only are trees planted, which is important, but the outreach that accompanies the build-up to Arbor Week in the last full week of February comprises an even greater opportunity to communicate a conservation mindset. From sponsored seedling giveaways to school group interaction, conservation and natural resource professionals should make a point to maximize the public forums granted by the statewide observances of Arbor Week. Although this may be stating an obvious conclusion, it is one that bears repeating, as no single annual event garners the forestry community the same degree of positive public outreach opportunities as does the honoring of Arbor Week.

State Forester Rick Oates and a member of the U.S. military 'scoping' a gopher tortoise burrow with a camera at Geneva State Forest

An opportunity that Alabama is privileged to participate in is SERPPAS. The Southeast Regional Partnership for Planning and Sustainability (SERPPAS) is a unique six-state partnership comprised of state and federal agencies that promote collaboration in making resource-use decisions supporting national defense, conservation of natural resources, and sustainable working lands and communities in the Southeast US (Southeast Regional Partnership for Planning and Sustainability, 2019). Where SERPPAS has already been actively engaged, gopher tortoise conservation and prescribed fire has been heavily promoted, and there is a clear convergence of objectives between this collective and Alabama stakeholders. SERPPAS works to promote Sentinel Landscapes in the Southeast and the Sentinel Landscapes Partnership. This idea dates back to 2013 and brings together the Department of Defense, Department of Agriculture, Department of the Interior, as well as state and local governments. Priority is given to assisting private landowners in proximity to military installations who want to use forest or agricultural practices that maintain these lands in a more natural state that will not hamper the military mission. Deepening ties with SERPPAS in the years ahead and working to further joint goals will be a strategic aim of this action plan, thus protecting a wide array of ecosystem services. The AFC maintains a partnership with the Pelham Range facility of the Alabama Army National Guard, which is a portion of the larger Fort McClellan located near Anniston. Partnering with the Range, the agency provides services such as firebreak construction, application of prescribed fire, wildfire suppression, and timber inventory. The AFC maintains an office, equipment, and personnel on the facility, protecting the delivery of ecosystem services across many thousands of forested acres.

Interfacing directly with landowners to assist them with management decisions and implementation has been a primary role of the practicing professional forester for decades. Whether serving the populace from the private or the public sector, foresters form the bridge between forest knowledge and silvicultural action. As is true when working with any system as complex as that of a working forestland, the creation of a viable plan is a prerequisite for success to move from the present conditions at Time A into the hoped-for conditions at Time B. Foresters aid landowners by talking to them,

finding out what their objectives are, and working to chart that path. For many landowners, the Forest Stewardship Program provides their first written plan to serve as a roadmap, giving the landowner valuable prescriptions for what treatments are needed at what time in order to reach the stated objectives.

Because the potential for landscape-scale gains to be made through the tools and personnel hours made possible through the Forest Stewardship Program are so great, every effort must be made to nurture strategies that will increase public knowledge of, public support for, and private sector interaction with this program. As more landowners are engaged, and more acres come under management, the AFC will realize its goal of greater technical transfer of information to the ground level, where it can do good for the individual private landowner and their land. Although each of Alabama's 67 counties is endowed with a remarkably diverse forest base, and all will receive stewardship plan assistance where requested, work is underway to develop 'Priority Areas' where the Stewardship focus will be especially strong.

Private lands, as they account for 93 percent of the state's forested acres, will remain the backbone of planning efforts, although cooperation with public sector land holders will be pursued where synergies exist. Natural resource professionals must keep their options open with respect to developing relationships with non-governmental organizations and other partners who may share conservation goals while themselves holding title to an increasing share of the forest. Despite operating in a dynamic environment when it comes to the Forest Stewardship Program, Alabama will continue to support the state's private landowners with the Forest Stewardship plans that have done so much to get sound information to the decisionmakers on the land. The causes of multiple use management and protection of ecosystem services will be furthered.

The American Tree Farm System has as its Alabama branch the Alabama Tree Farm Committee. By meeting the program's Standards of Sustainability that have been developed, participating landowners will be managing their property for the present and for the future. This state saw its first non-industrial private certification back in 1943. The program provides a time-tested path toward sustainable forest management for the private landowner and will continue to be supported by the state's natural resource community.

The professional consulting foresters who serve clients in Alabama will play a major role in furtherance of these same goals. As a group represented by the Alabama Chapter of the Association of Consulting Foresters, these trusted service providers represent their client's interests during timber sales and fill the management planning role. Consulting foresters provide expert assistance while adhering to strict ethical standards to ensure the best outcomes. By combining knowledge with the core values of multiple-use conservation management, healthy ecosystems will be maintained on property under the active management of a consulting forester.

In Alabama, the word TREASURE has a very special meaning within the forestry community. It is **T**imber **R**ecreation **E**nvironment **A**esthetics **S**ustainable **U**seable **RE**source. The TREASURE Forest program is a voluntary program sponsored by the Alabama Natural Resources Council (ANRC) (see appendix 5 for list of members) and the Alabama Forestry Commission that seeks to promote sound and sustainable, multiple-use forest management. This type of management encourages landowners to use their forests wisely to meet their own objectives while at the same time protecting and enhancing the environment. The TREASURE Forest Award is earned by landowners who display their commitment to the TREASURE Forest ethic through the physical management that takes place on their land.

TREASURE Forest recognition will continue to be sought in Alabama by individuals who want to make their properties into locations where they can display with pride the results of good management meticulously carried out. These locations make excellent sites for landowner tours which promote more relationship building and good forest management practices. Landowners learn by seeing, and these opportunities supplement classroom experiences. For that reason, and many more, the ANRC members must maintain their commitment to ensure that TREASURE Forest retains its vibrancy for years to come.

There are many resource priorities that need funding under the heading of protecting ecosystem services. Urban and community foresters are needed to conduct outreach and interface with municipalities and citizens statewide, as well as to administer the specialized urban forestry-themed grants that focus upon those priority forests. Staffing is needed to keep dedicated water quality / BMP foresters, whose timely response to complaints statewide is very taxing upon their limited resources of time and capacity. The agency must devote considerable attention to the federal Stewardship program, along with the programs of TREASURE Forest and Tree Farm. Having the services of a certified wildlife biologist to head efforts concerning Threatened and Endangered Species has been a major step forward for our agency.

The success of these approaches to confronting the threat posed by the loss of ecosystem services will be shown in multiple ways. Additional working forests and urban forests will move into a state of management so that they will not be degraded and lost for multiple values and uses. The forest will have a greater level of protection from numerous threats to its vibrancy and effectiveness. Further, the public benefits from trees and forests will be enhanced.

Over the life of this document the AFC will actively pursue grant funding opportunities and partnerships that are consistent with its overall mission, and will further goals associated with the threat of losing the ecosystem services provided by the forest as a whole or from any sub-part of the greater forest ecosystem resource. This can include but is not limited to threats to species diversity, wildlife health, water quality, soil quality, air quality, and tree health. Further, support for forest certification and recognition efforts should be sought as long as it is consistent with agency goals.

Capacity to Fulfill Education Directive

There has been no strategy outlined thus far that did not require continuing or increasing levels of public outreach, communication, and education. Yet there is a critical mass of staffing that must be maintained to make that vision a reality. After all, these commitments represent large investments of time, and professionals have many commitments all demanding their time. Strong leadership and wise resource allocation will be needed to meet all commitments and supply the public with the natural resource information that plays such a critical part in decision making.

Natural resource-focused agencies need to keep open channels of communication going with natural resource institutes of higher learning. A pipeline of newly minted graduates must be nurtured as a source of replacement for retiring personnel. Experience has shown that internship programs can be an effective means for finding job fits without either party fully committing to employment. Where funding can be found, these college intern programs should be kept and expanded if possible.

Smokey Bear visits young future firefighters at Riverwalk Stadium in Montgomery for his 75th birthday celebration

Existing commitments to landowner workshops and field days will be maintained. Forestry Awareness Week Now (FAWN) Days and Smokey Bear children's events will retain their importance and multi-agency participation. Arbor Week celebrations will be supported statewide. Multi-state, multi-agency milestone events such as Smokey Bear's birthday will be promoted widely. Over the course of this Forest Action Plan, the Alabama Forestry Commission will celebrate its 100th birthday with fitting ceremony. Although we whose livelihoods depend upon forestry may take the public's knowledge of our good work for granted, that complacency could prove to be a costly error. As more of the state's residents become less connected to the land, a shrinking percentage of the public knows who their forestry agency is, or what purpose it serves. The very viability and independent survival of such agencies necessitates reaching the urbanizing and sub-urbanizing population with the news of how forestry plays a role in the life of the state and in their individual lives. Every single professional in the natural resource fields now finds themselves in the public relations business full-time. Most did not choose a career in this field with that thought in mind, but that is reality. Stressing the importance of this fact to each new agency hire should be high on the list of orientation priorities and will be a strategy for improving the delivery of our education directive.

One rising group of people needing information on managing property are women owning land, either inheriting it or wanting to get involved in land management. One program that gives these women the opportunity to learn proper management is the ForestHER program headed by the Alabama Cooperative Extension System. These workshops provide a chance to learn skills that can help them realize the value of their land such as taking tree heights, how to measure diameter at breast height, and how to read maps. Other topics such as thinning, prescribed burning, and wildlife management are covered.

Making the most of the time we do have educating youth is critical. Fortunately, the North American Association for Environmental Education has created a *Guidelines for Excellence* series, with materials geared toward doing just that. Combining professional experience with highly-touted educational materials will be an effective strategy for engaging young people in educational events that will prove beneficial to them.

Another program targeted at educating young people is through the Sustainable Forestry Initiative, Inc (SFI). The program, Project Learning Tree (PLT), has been around since the late 1970s with the goal to teach students K-12 about the environment and how they can conserve it. It delves into wildlife, forestry and other aspects in a way kids can have fun while still learning. Training workshops are put on around the state for teachers to attend, so they can take it back to their students. The more that young children are taught about the environment, the more they will understand about our natural resources. This nationwide program has had countless successes, reaching millions of kids, and will continue to do so into the future.

Strategic plans to grow and protect Alabama's forest resources require sustained, and where possible increased, levels of public outreach, communication, and education through collaborative partner efforts. The SFI/PLT *Forest Literacy Framework, A Guide to Teaching and Learning about Forests*, provides deliberate direction for establishing forest knowledge, awareness, and understanding with stakeholders for future sustainability. The Forest Literacy Framework highlights the when, where, and with whom in order to apply the right level of forestry education at the appropriate time.

The Alabama Forestry Commission maintains a website which is a valued resource to our stakeholders as it gives access to a wealth of forestry information and contacts. This will be maintained and updated to stay relevant to our many users. Beyond this, the agency will communicate using modern social media tools to increase outreach potential and share the good news story that forestry is to our state.

The Alabama Forestry Commission's public awareness campaign continues to evolve in promoting the state's forests and their benefits to forest landowners, legislators, and the general public. In addition to attaining positive media coverage through the traditional avenues of news releases and media advisories, the Media/Publications Team reaches large audiences through the agency's social media networks, including Facebook, Twitter, and YouTube. The AFC's Facebook page audience continues to steadily increase with 11,570 followers and 11,503 likes at the end of FY19. Post Reach, or the number of people who saw any of our posts at least once, is estimated at 74,046, with an all-time high of 287,221 views. The Media Team also continues to publish *Alabama's TREASURED Forests,* in its 38th consecutive year. Published since 1982, the magazine continues to provide landowners with forest stewardship principles and management techniques/advice. Current circulation remains at approximately 13,500.

The American Forest Foundation has rolled out an innovative online tool for engaging landowners. This free online tool is named Woodscamp, and it brings people together. Landowners may come to the table with a willingness to learn, but lacking knowledge of how to get started, on a forest management journey. Existing forestry and conservation organizations know that the world is full of forest landowners but may not be able to reach them effectively. It is at this point where the ease and familiarity of working with online tools comes in to bridge the gap. Landowners can find their location on a map and give some basic details in return for guidance on the contacts needed to take next steps. On the other side, organizations now may be able to more easily direct their attention toward leads who are interested in services. This tool is active and serving landowners in Alabama. This example compliments many other online resources from professional natural resource organizations. Reaching forest landowners in the digital realm will become even more important in the future. This innovation could prove of lasting value to the education of and outreach to the state's growing number of forest landowners.

The success of these approaches to confronting the threat posed by the potential loss of the ability to fulfil the education mission of the agency will be reflected in the conservation and improved management of working forest landscapes. The forest will have a greater level of protection from numerous threats due to an increased level of public awareness, and the public benefits from trees and forests will be enhanced and shared with the public that is gaining those benefits. Education to enlighten landowners and the public about forest sustainability will provide lasting results.

Over the life of this document the AFC will actively pursue grant funding opportunities and partnerships that are consistent with its overall mission, and will further goals associated with the threat of a diminishing capacity to fulfil the mission to provide the best public education possible concerning the forest and associated natural resources.

CHAPTER 5: INCORPORATION OF OTHER PLANS AND RELEVANT AFC PROGRAM AREAS

Because each threat confronting Alabama's forest resource presents both great challenge and great opportunity, it is vital that all appropriate agencies and groups find common ground to collaborate and share resources. This will not only result in more efficient and effective delivery of services, it will also make them more relevant to the many people, professions, and organizations that depend on and benefit from a sustainable forest resource.

An all-lands vision for conservation must recognize the value of all forests and trees—rural and urban, public and private. It also requires strong support for the Forest Service State and Private Forestry (S&PF) mission, interagency collaboration, effective delivery of Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA) forestry funding assistance, and a commitment to state and private partnerships.

Other plans include:

- Alabama State Wildlife Action Plan
- A Management Guide for Invasive Plants of Southern Forests
- Alabama Emergency Management Agency Hazard Mitigation Plan
- Alabama NFS Land and Resource Management Plan
- Accelerate Alabama 2.0 Economic Development Strategy
- Alabama Statewide Comprehensive Outdoor Recreation Plan (SCORP)
- Community Wildfire Protection Plans

State and Private Forestry Programs:

- AFC: Forest Stewardship
- AFC: Wildfire
- AFC: Forest Health
- AFC: Urban and Community Forestry
- Stakeholder Engagement

Alabama State Wildlife Action Plan

This document describes a strategy for the comprehensive conservation of Alabama's wildlife by addressing specific components required by the State Wildlife Grants federal program through the U.S. Fish and Wildlife Service (USFWS), Office of Federal Assistance.

Alabama's State Wildlife Action Plan (SWAP) identifies the need for numerous forest-related conservation actions as well as those agencies with which it may partner to achieve conservation goals for species identified as being of greatest conservation need. A summary of those actions for which the AFC and/or USFS are identified as potential partners is presented below.

Opportunities for Collaboration

- Protect existing large, unfragmented significant tracts of forest. Acquire or purchase conservation easements to protect significant blocks (>1,000 acre parcels) of high-quality examples of this habitat. Provide incentives and information to landowners for long-term conservation.
- Avoid/discourage conversion of natural forest to other types.
- Promote low-intensity controlled burns where ecological, safety, and property protection considerations allow.
- Control exotic plant and animal species.
- Avoid or minimize plowed fire lines when possible; place fire lines where disturbance to sensitive natural groundcover can be avoided or minimized. Restore topography and natural vegetation where emergency plowed fire lines disrupt natural areas.
- Investigate effects of season and intensity of prescribed fire as a management technique.
- Collaborate with other agencies to provide landowners information on both forest management and improvement of wildlife habitat.

A Management Guide for Invasive Plants of Southern Forests

This U.S. Forest Service book provides information on accurate identification and effective control of the plants or groups invading the forests of the 13 Southern States. It lists and explains control recommendations and selective application procedures.

Opportunities for Collaboration

- Cooperative knowledge networks that link stakeholders, land managers, scientists, policy makers, and political representatives at the … state, multi-county and county levels and that provide real-time information and connectivity.
- Collaborative strategies and programs to prevent spread through: (1) laws, policies, and public education; (2) promotion of new corporate and personal ethics to not sell, buy, and plant invasive plants; (3) sanitization of personnel, equipment, and animals that move from or among infested sites; and (4) prohibitions against the sale and transport of contaminated products such as extracted native plants, potted plants, fill dirt and rock, and mulch.
- Effective and efficient early detection and rapid response networks to identify and map sites of new high-risk introductions, verify the invasive species, communicate to others about the newly-identified sites, eradicate the infestations, and restore plant communities resistant to re-invasion.
- Creation and maintenance of a Web-accessible survey, inventory, and mapping system to corporately track existing and spreading invasions (e.g., Southeast Exotic Pest Plant Council's Early Detection and Distribution Mapping System, http://se-eppc.org/).
- Formulation of coordinated control, containment, and eradication programs, including cycles of integrated vegetation management treatments along with monitoring and corporate sharing of both successes and mistakes.
- The spread of invasive plants from state to state means that every state (including Alabama) must have in place an invasive plant management plan.


Kudzu

Alabama Emergency Management Agency Hazard Mitigation Plan

This document lists goals, objectives, and mitigation actions to reduce risks through collaborative actions and policies that limit the effect of natural hazards on the citizens and physical assets of Alabama.

Opportunities for Collaboration

- Identify communities at risk to wildfire; complete a minimum of one Community Wildfire Protection Plan in all 67 counties.
- Identify and prioritize urban development and infrastructure at risk to storm-damaged forests.
- Increase accessibility to new information, such as Tree Emergency Plans, at local level as trees are a major source of damage and injuries during storm events.

Alabama NFS Land and Resource Management Plan

The 2005 Revised Land and Resource Management Plan guides all natural resource management activities and sets management standards for the National Forests in Alabama for the following 10 to 15 years.

Opportunities for Collaboration

Goal 3 – Manage existing forest communities to reduce risks from insects and diseases

Goal 4 – Watersheds are managed and/or restored to provide salient and stable conditions to support the quality and quantity of water necessary to protect ecological functions and support intended beneficial water users

Goal 5 – Maintain or improve water quality to meet state and federal standards and to provide for the beneficial uses of water

Goal 8 – Riparian ecosystems, wetlands, and aquatic systems are managed and/or restored to protect and maintain soil, water, vegetation, fish, and wildlife associated resource values

Goal 10 – Lakes, ponds, and reservoirs support balanced, productive recreational fisheries to the extent of appropriate native aquatic species viability, threatened and endangered species, state and federal water quality standards, funding, and public demand

Goal 12 – Contribute to the conservation and recovery of the red-cockaded woodpecker (*Picoides borealis*), a federally listed, endangered species through the implementation of forest population and management practices de scribed in the Revised Recovery Plan and RCW ROD

Goal 17 – Achieve a balance between suppression, to protect life, property, and resources, and fire use, to regulate fuels and maintain healthy ecosystems. Use wildland fire to protect, maintain, and enhance resources, and, as nearly as possible, allow fire to function in its natural ecological role

Goal 21 – The Forest Service will annually review the status of counties near the National Forest regarding their attain ment of NAAQS. Where a non-attainment area is formally recognized, the Forest Service will participate in SIP modification to bring the area back into attainment status

Goal 47 – Increase public awareness, knowledge, understanding, appreciation, and involvement in Forest Service natural resource management activities

Goal 48 – Engage the public and other agencies in cooperative, collaborative efforts that win their trust and support while helping to meet the desired future conditions

Goal 49 – Encourage cooperation and partnerships with individuals, nonprofit organizations, other agencies, special interest groups, clubs, and others to achieve the Forest's interpretive activities

National Forests in Alabama Strategy to Participate in R8 Million Acre Challenge

This document is concerned with Region 8 of the USDA Forest Service, beginning in October 2017, challenging itself to place one million additional acres of National Forest System land on the path toward longleaf pine forest restoration and regeneration in collaboration with America's Longleaf Restoration Initiative.

On October 23, 2017, the Southern Region issued the Million Acre Challenge to put an additional one million acres of National Forest System lands on the path towards longleaf restoration. As part of the Southern Region's goal of one million acres, the National Forests in Alabama was assigned a goal of 40,970 acres.

This strategy uses an integrated approach based on specific action items in current and future NEPA decisions that implement the National Forests in Alabama Revised Land and Resource Management Plan (RLRMP). The National Forests in Alabama Restoration Strategy focuses on areas with opportunities to achieve multiple goals and objectives, such as restoring forest health and resilience, red-cockaded woodpecker habitat, open woodland structure and native, fire-maintained ecosystems and watersheds, by the application of timber harvests and prescribed fire. This will serve as a roadmap for achieving the goals outlined in the Million Acre Challenge. Our partners are a key component in our ability to be successful and this strategy responds to the concerns of our key stakeholders as we take steps to reach our shared goals of longleaf restoration in the Southern Region's Million Acre Challenge. This also represents collaboration across the range of longleaf through America's Longleaf Restoration Initiative.

Accelerate Alabama 2.0 Economic Development Strategy

State law mandates regional councils to "prepare regional plans consistent with state comprehensive planning." The Alabama Department of Economic and Community Affairs and the Alabama Association of Regional Councils collaborated to develop this plan for state economic development.

- Forest Products was cited as one of seven targeted industry sectors for statewide growth
- Alabama has key location assets such as:
    1. Availability of Raw Materials
    2. Proximity to Markets
    3. Affordable, Available Workforce
- Timber, agriculture, forestry, raw materials, and environmental assets, particularly rivers, are consistently listed by the regions as strengths.
- The state has higher education advantages in this sector due to:
    1. The School of Forestry and Wildlife Sciences at Auburn University offering bachelor's, master's, and doctorate degrees across several related disciplines
    2. The Forestry, Ecology, and Wildlife Program of Alabama A&M University, which offers bachelor's degrees and is the only professionally-accredited forestry program at an Historically Black College and University (HBCU)
    3. The Forest Products Development Center at Auburn
    4. The Alabama Consortium on Forestry Education and Research at Tuskegee University, which focuses on researching the role of forests on rural economics, forest management, and the overall social and economic importance of the industry

TUSKEGEE UNIVERSITY

Alabama Statewide Comprehensive Outdoor Recreation Plan (SCORP)

This statewide strategy identifies recreation opportunities in order to ensure relevant, influential, and timely planning for the state's use of Land and Water Conservation Fund (LWCF) apportionment.

Opportunities for Collaboration

Partner, as appropriate, with other agencies and groups to achieve Alabama's outdoor recreation goals as defined by the SCORP.

Community Wildfire Protection Plans

Community Wildfire Protection Plans are authorized in Title I of the Healthy Forests Restoration Act (HFRA). It provides an incentive for the USDA Forest Service, the Bureau of Land Management (BLM), and State Foresters to assist local communities as they develop and implement forest management and hazardous fuel reduction projects. In order for a community to take full advantage of this new opportunity, it must first prepare a Community Wildfire Protection Plan (CWPP) which addresses issues such as wildfire response, hazard mitigation, community preparedness, or structure protection. At this time Alabama's CWPPs are prepared on a county-wide basis except for the larger, hotter counties by the Alabama Forestry Commission. CWPPs also involve collaboration with county leaders, the US Forest Service, and other partner groups.

Unlike other organizations' planning documents, CWPPs are tools that target local development in the wildland urban interface. As a tool, it is best suited to this assessment as a specific strategy that mitigates the risk of wildfire to encroaching urban development. To help assure that this Farm Bill requirement is met, the Alabama Forestry Commission's person responsible for promoting CWPP in the state was added to the subject matter experts group that developed the wildfire goals, objectives, and strategies. The concept of CWPPs are addressed as a specific measurable strategy in the "Strategies: Wildfire" section.

Wildfire in Sumter County caused by lightning strikes

Alabama Forestry Commission: Forest Stewardship

Alabama Issues:

- Contribution to Climate Change Mitigation and Adaptation
- Contribution to Water Quality and Supply
- Contribution to Development of Biomass Energy Facilities and Markets
- Emphasizing Program Delivery in High Priority Areas
- Improving Spatial Analysis and Reporting Capability through U.S. Forest Service WebDET
- Monitoring Forest Stewardship Plan Implementation
- Coordinate with NRCS on Farm Bill Delivery
- Review Outreach Performance Measures and Effectiveness Monitoring
- Streamline Certification Process
- Longleaf Restoration
- Cogongrass Control
- Wildland Urban Interface
- Outreach to Underserved Landowners
- Collaborate with Tree Farm Program

Alabama Forestry Commission: Wildfire

Alabama Issues:

- Address the role of remote sensing as a means of early wildfire recognition that results in reduced acres burned and contributes to safer and more effective wildfire suppression
- Reduction of timber damage, injuries, and property loss due to wildfire
- Increased use of prescribed burning
- Enhance fire prevention through education, law enforcement, training, and targeting communities at risk
- Improve capacity of volunteer fire departments

Alabama Forestry Commission: Forest Health

Alabama Issues:

- Collaborations with state, federal, educational institutions, and other groups
- Better exchange of information and technology
- Technical assistance to landowners
- Education, outreach, and training
- Detection, assessments, reporting, and monitoring of forest pests

Alabama Forestry Commission: Urban & Community Forestry

Alabama Issues:

- Increase capacity of individuals, groups, and organizations to participate and contribute to Alabama's Urban & Community Forestry Program
- Implement activities to assess the condition of Alabama's urban forestry resource
- Increase public awareness of urban forestry
- Acknowledge and show appreciation for the achievements of individuals, organizations, and communities that contribute to Alabama's urban forestry program
- Improve public policy and governance to guide regional and local decision making
- Increase the level of professionalism in urban forestry private and public sector practice

Stakeholder Engagement

The outlining of threats and strategies to address them has been an undertaking which has only been possible by discussion with and input from many quarters. This engagement, which in actuality is continuous, was given its official Forest Action Plan-focused kickoff on February 15, 2019. Valued participation at this meeting came from representatives of, in no particular order, the Geological Survey of Alabama, the Alabama Urban Forestry Association, the Alabama Soil and Water Conservation Committee, the Alabama Natural Resources Council, the Alabama Forest Owners Association, the Alabama Department of Conservation and Natural Resources, the Alabama Chapter of the Association of Consulting Foresters, the Alabama Department of Environmental Management, the Nature Conservancy, the Longleaf Alliance, the American Forest Foundation, the Alabama Forestry Association, Alabama A&M University, Auburn University, Tuskegee University Cooperative Extension, commissioners and leadership of the Alabama Forestry Commission, the Natural Resource Conservation Service, and the U.S. Forest Service.

The collection of concerns and viewpoints contributed from the beginning of this effort, and from the intermediate reviews conducted with the above-named stakeholders as this process has taken its course, made possible the creation of a dynamic framework that sought to include and address all issues falling within the boundaries of what is realistically obtainable over the coming years. To be clear, in Alabama the State Forest Stewardship Coordinating Committee meets under the title of the Alabama Natural Resources Council, and together are made up of the appropriate representatives from many of the entities mentioned above. Apart from the ANRC's involvement in the 2010 plan and involvement from the earliest planning stages of this plan, valuable late-stage recommendations and additions to the present plan were made as a result of presenting the draft of this plan at the January 2020 annual meeting of the ANRC and soliciting its valued input. Channeling all of these inputs, both from without and from within the AFC, is a large undertaking, the aspirations of which will only be realized if cross-functional partnerships mature into near-seamless cooperation.

On a positive note, the creation of this document is proof that these efforts, if pursued vigorously, will bear the desired fruit. While this task as outlined is no doubt a momentous undertaking, it does not, and cannot be accomplished overnight. Ten years' worth of growth will see much good come from the professional forestry and natural resource community of the State of Alabama. We as professionals working under the guidance of this plan will continue to strive toward a sustainable future where we might each play our part in delivering upon this promise for the citizens of this great state.

No document of this type could possibly identify and notate all of the strategies necessary to navigate a decade's worth of change through this ultra-dynamic modern world, where the pace of change has never been faster. We follow in the footsteps of those foresters and forward-thinking landowners of the past who have transformed a degraded – and to some degree, dwindling – forest resource into the remarkably vibrant and resilient forest of the present. However, if the past has taught us one thing, it is that the future will likely follow paths not clearly visible to us today. The goal of the above has been to perform a stock-taking of many known threats and common partners who, through tireless hard work, will dedicate countless hours and even years to the addressing of threats so that Alabama's forests can continue to thrive and be a heritage prized by generations to follow.

APPENDIX 1 : Forest Action Plan Works Cited

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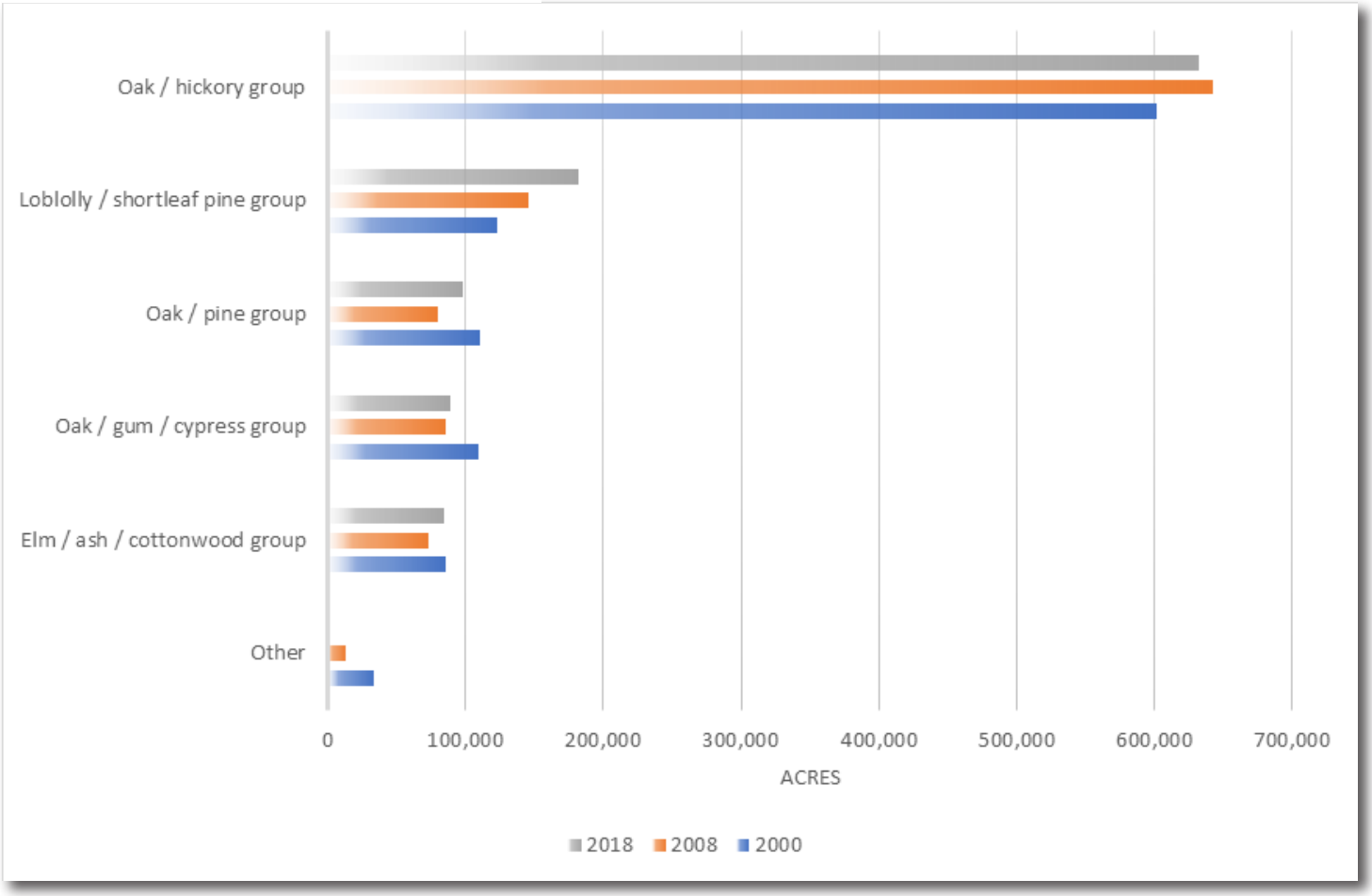
APPENDIX 2: Forest Types and Trends by Ecoregion

Interior Plateau

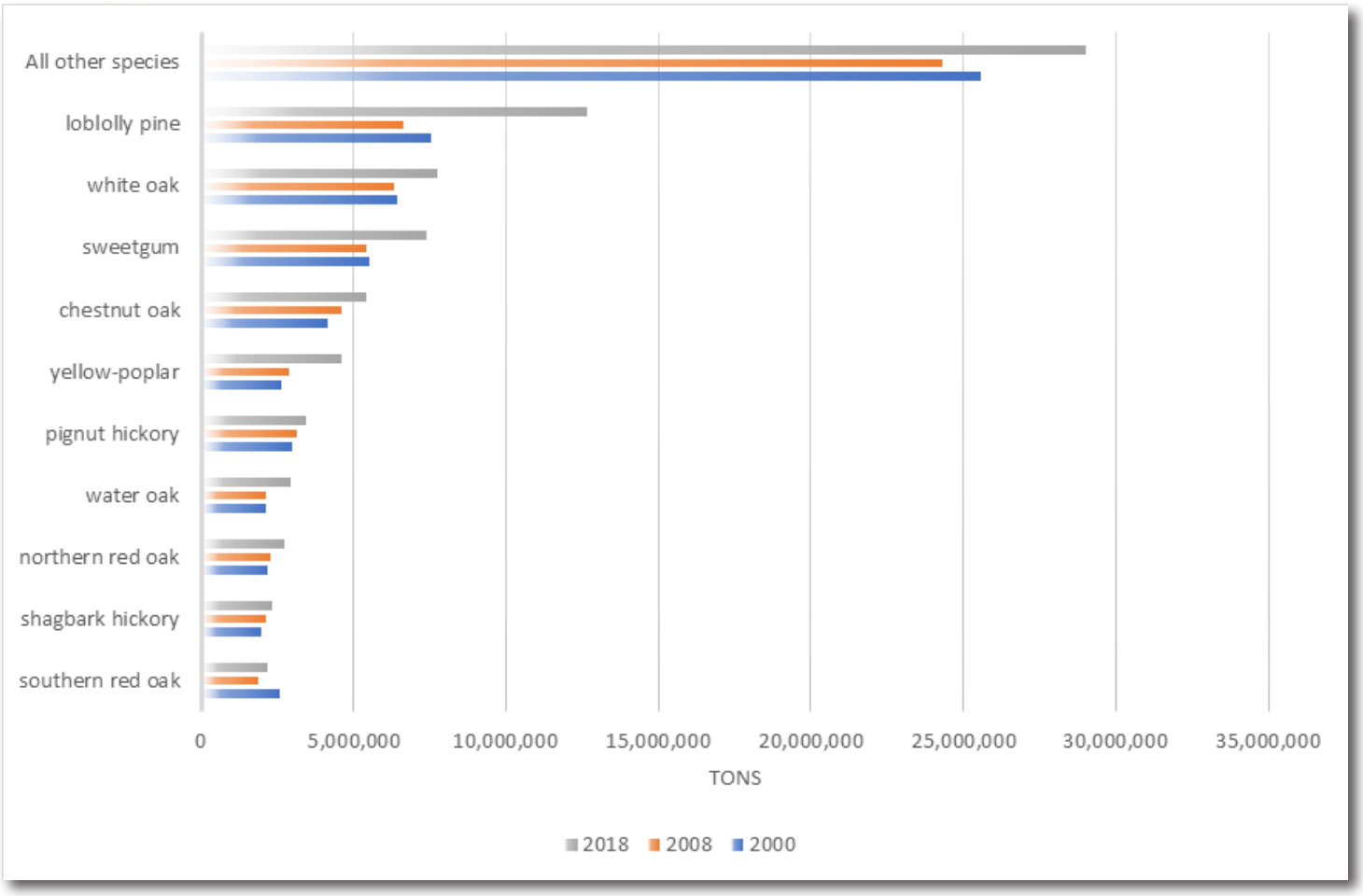
Forest Area



Interior Plateau: Timberland Area by Forest Type Group and Year, 2000-2018
FIA data for Colbert, Lauderdale, Lawrence, Limestone, Madison, and Morgan counties

Interior Plateau

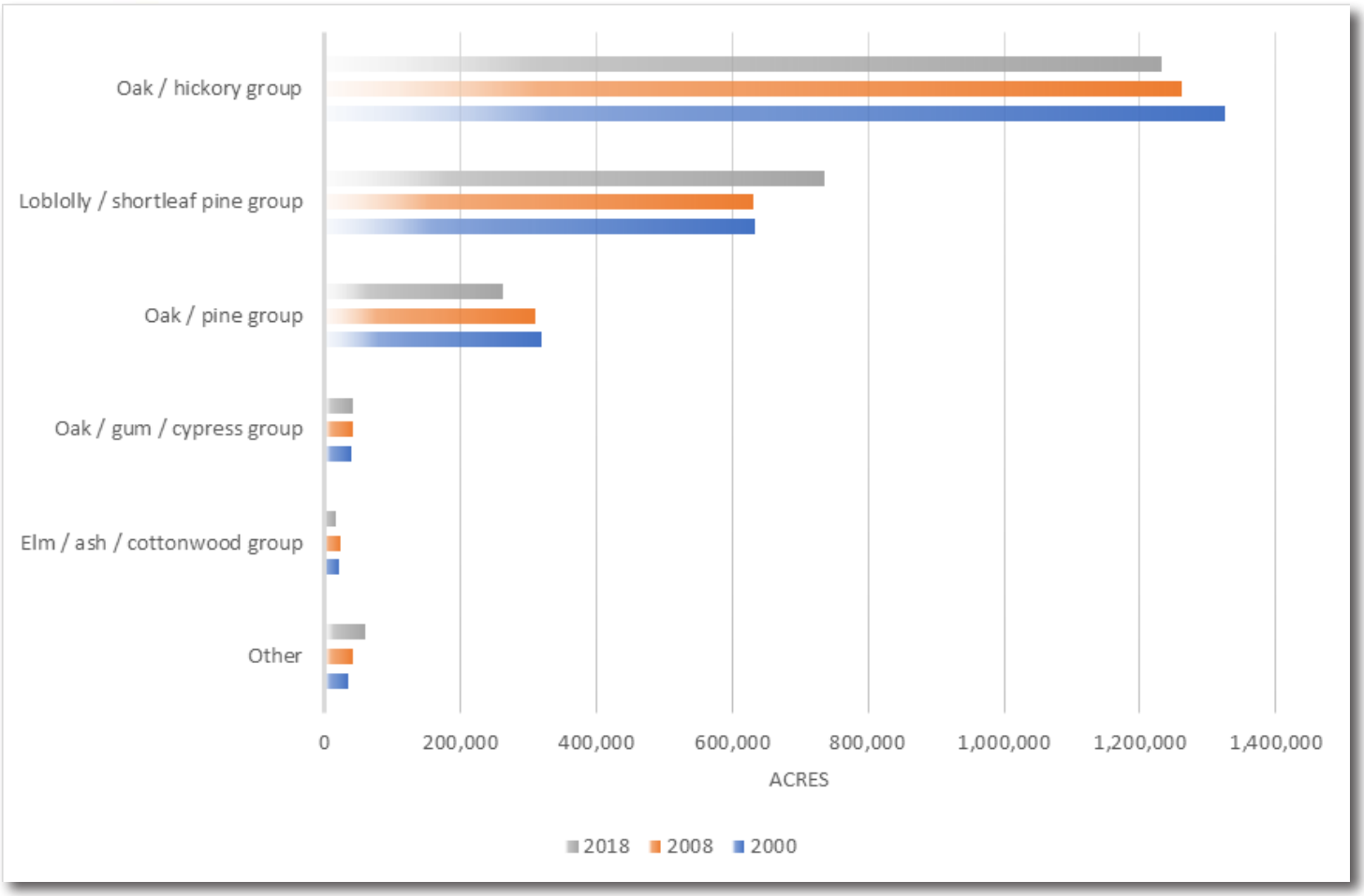
Timber Volume



Interior Plateau: Timberland Volume by Species (tons merchantable bole) and Year, 2000-2018
FIA data for Colbert, Lauderdale, Lawrence, Limestone, Madison, and Morgan counties

Southwestern Appalachians

Forest Area



Southwestern Appalachians: Timberland Area by Forest Type Group and Year, 2000-2018
FIA data for Blount, Cullman, DeKalb, Jackson, Jefferson, Marshall, Walker, and Winston counties.
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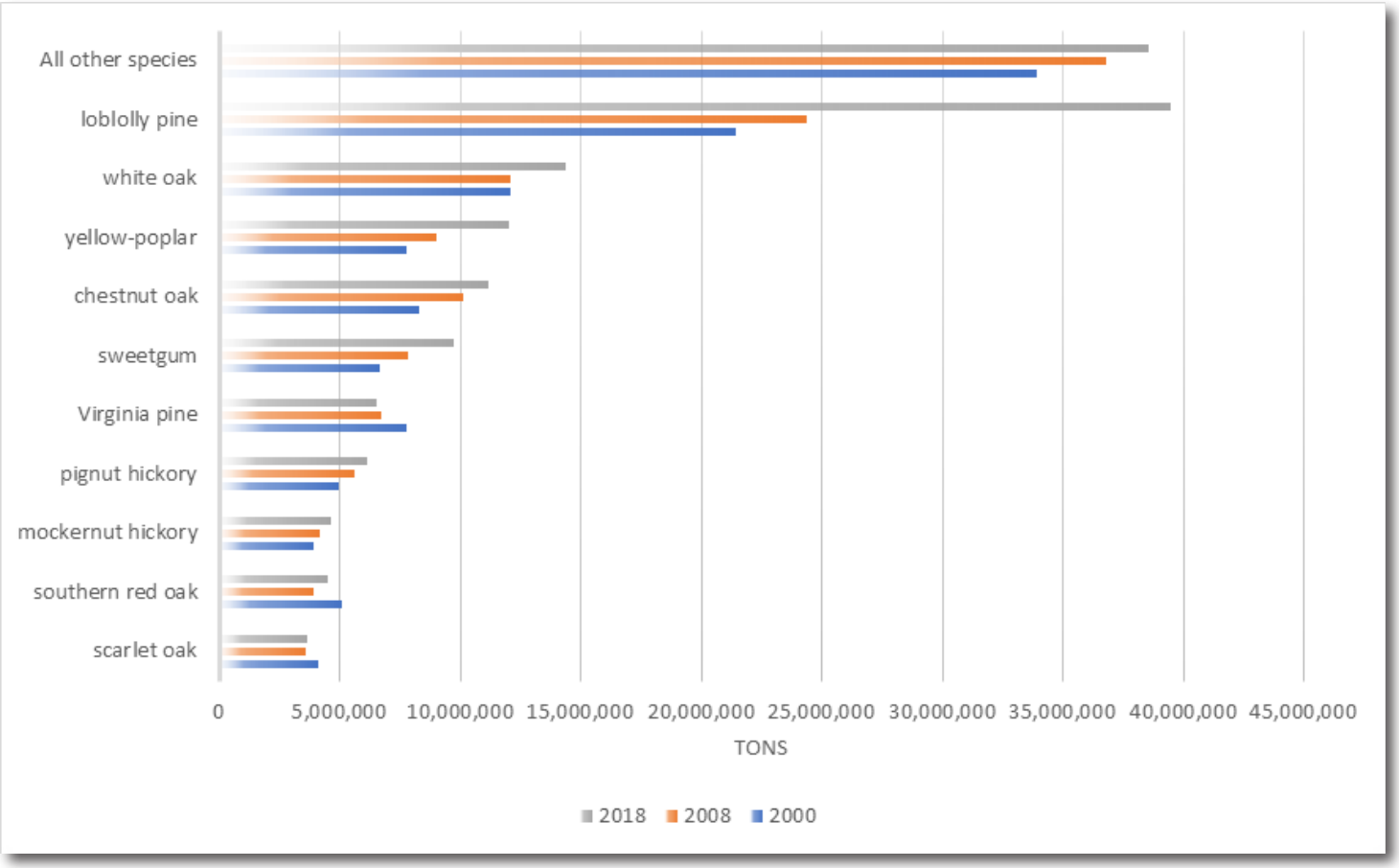
Southwestern Appalachians

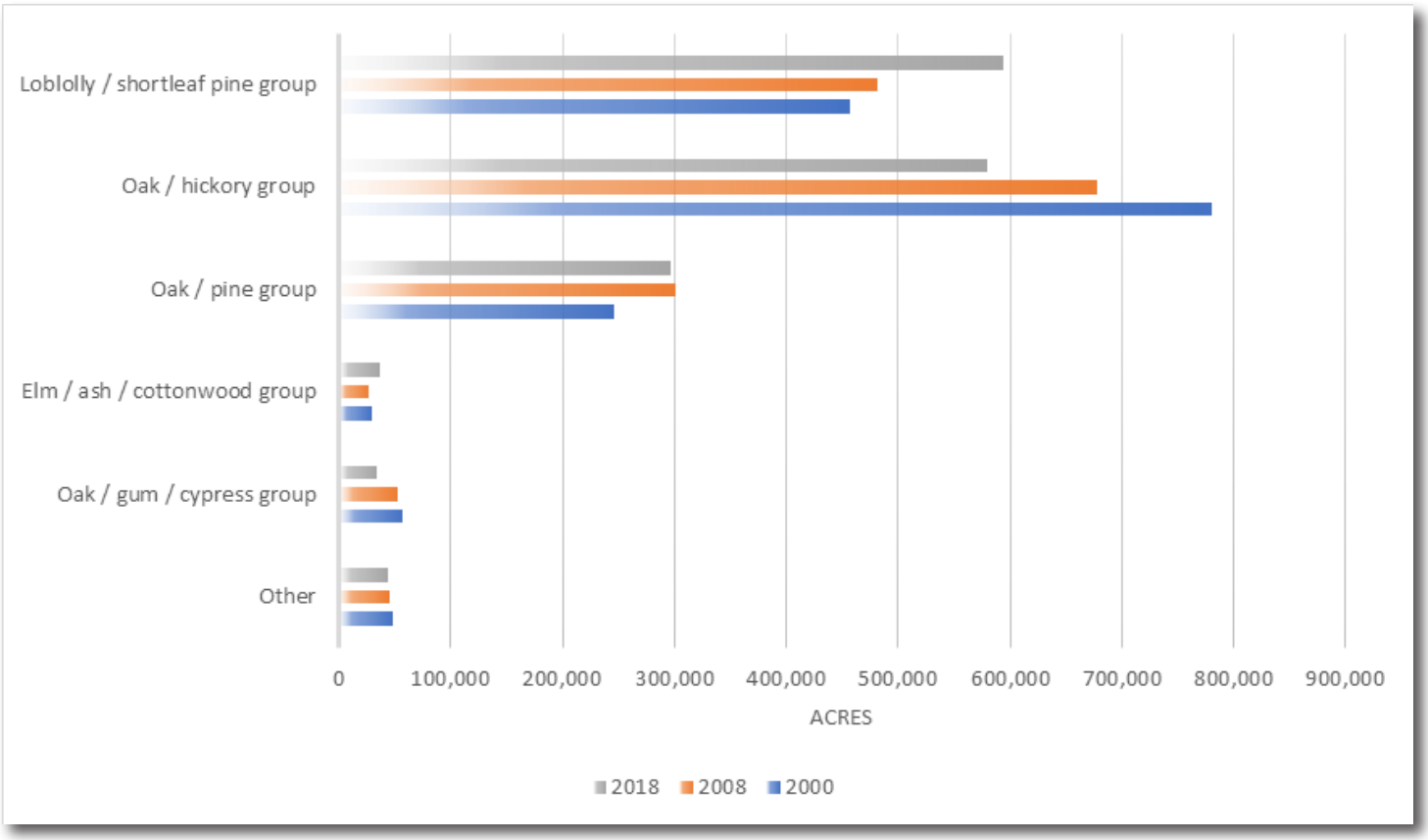
Timber Volume



S. W. Appalachians: Timberland Volume by Species (tons merchantable bole) and Year, 2000-2018
FIA data for Blount, Cullman, DeKalb, Jackson, Jefferson, Marshall, Walker, and Winston counties.

Ridge and Valley

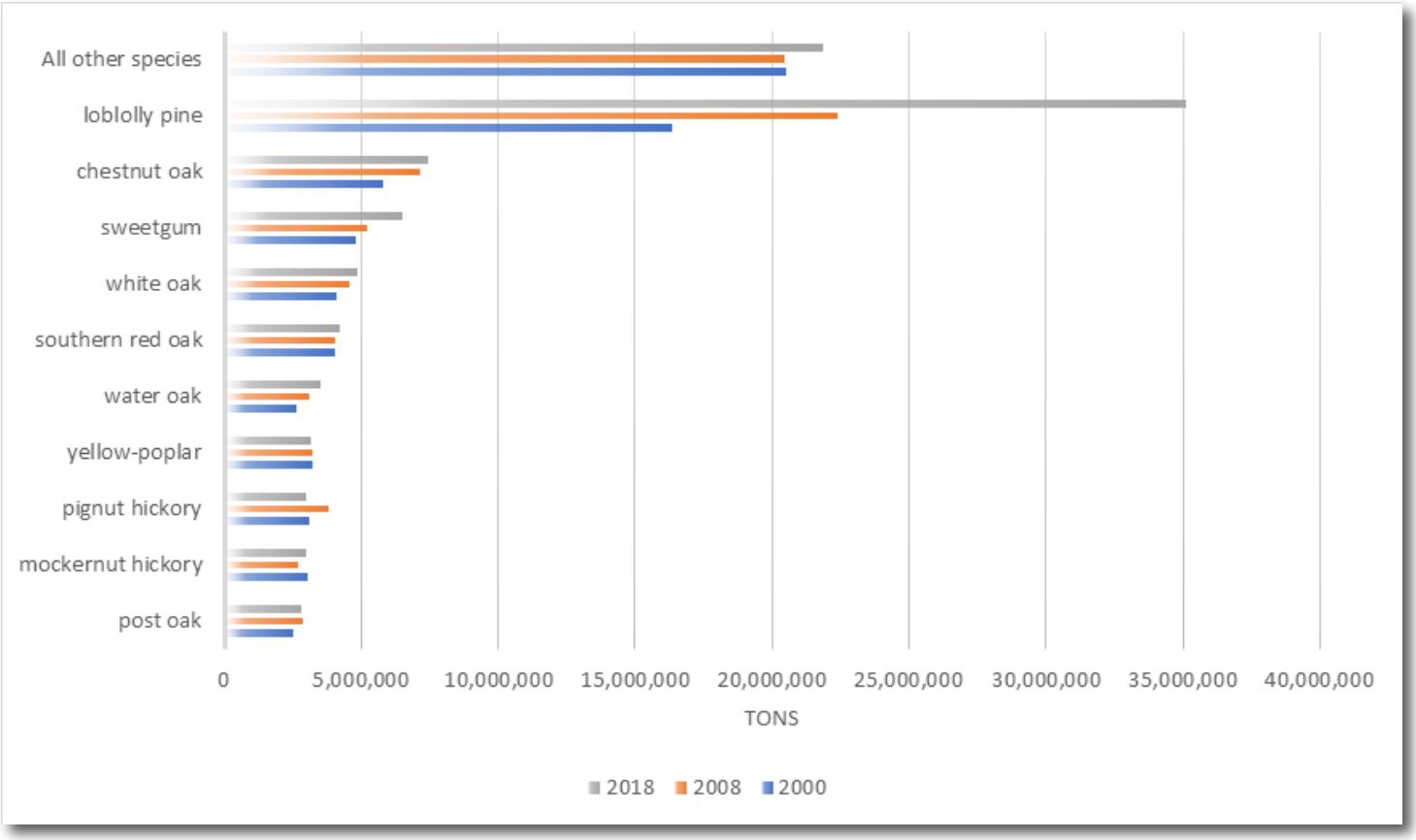
Forest Area



Ridge and Valley: Timberland Area by Forest Type Group and Year, 2000-2018
FIA data for Calhoun, Cherokee, Etowah, Shelby, St Clair, and Talladega counties.

Ridge and Valley

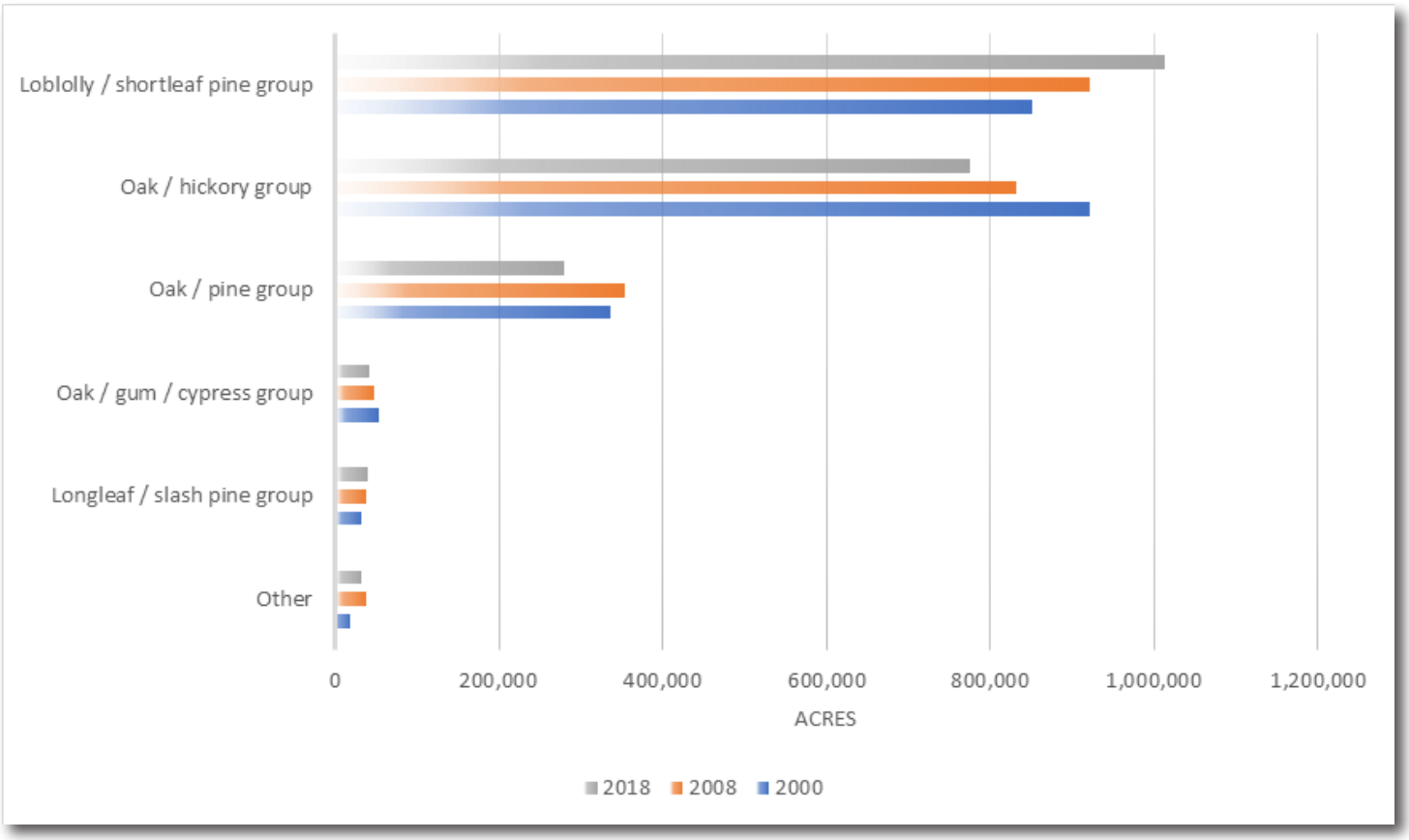
Timber Volume



Ridge and Valley: Timberland Volume by Species (tons merchantable bole) and Year, 2000-2018
FIA data for Calhoun, Cherokee, Etowah, Shelby, St Clair, and Talladega counties.

Piedmont

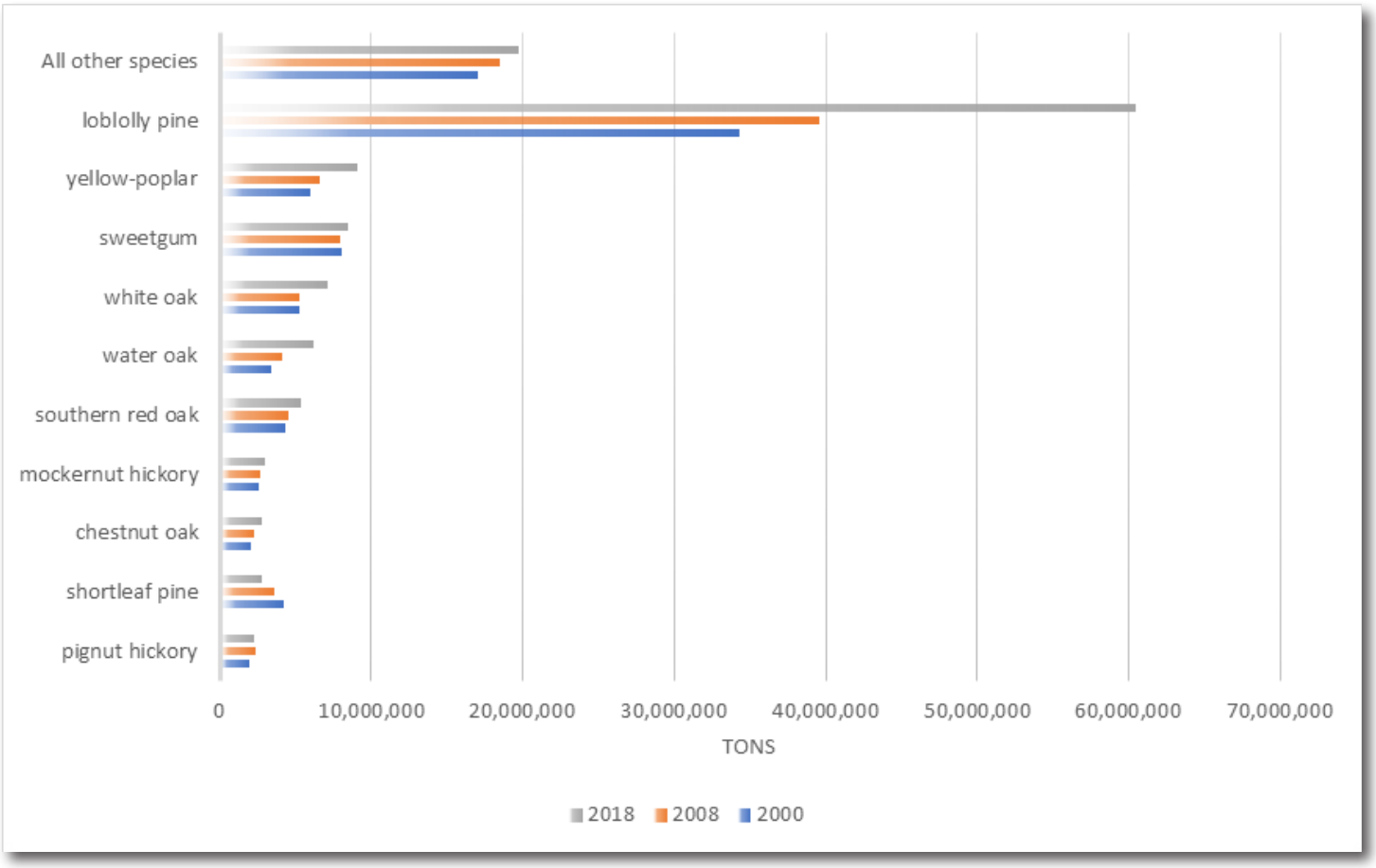
Forest Area



Piedmont: Timberland Area by Forest Type Group and Year, 2000-2018
FIA data for Chambers, Clay, Cleburne, Coosa, Lee, Randolph, and Tallapoosa counties.

Piedmont

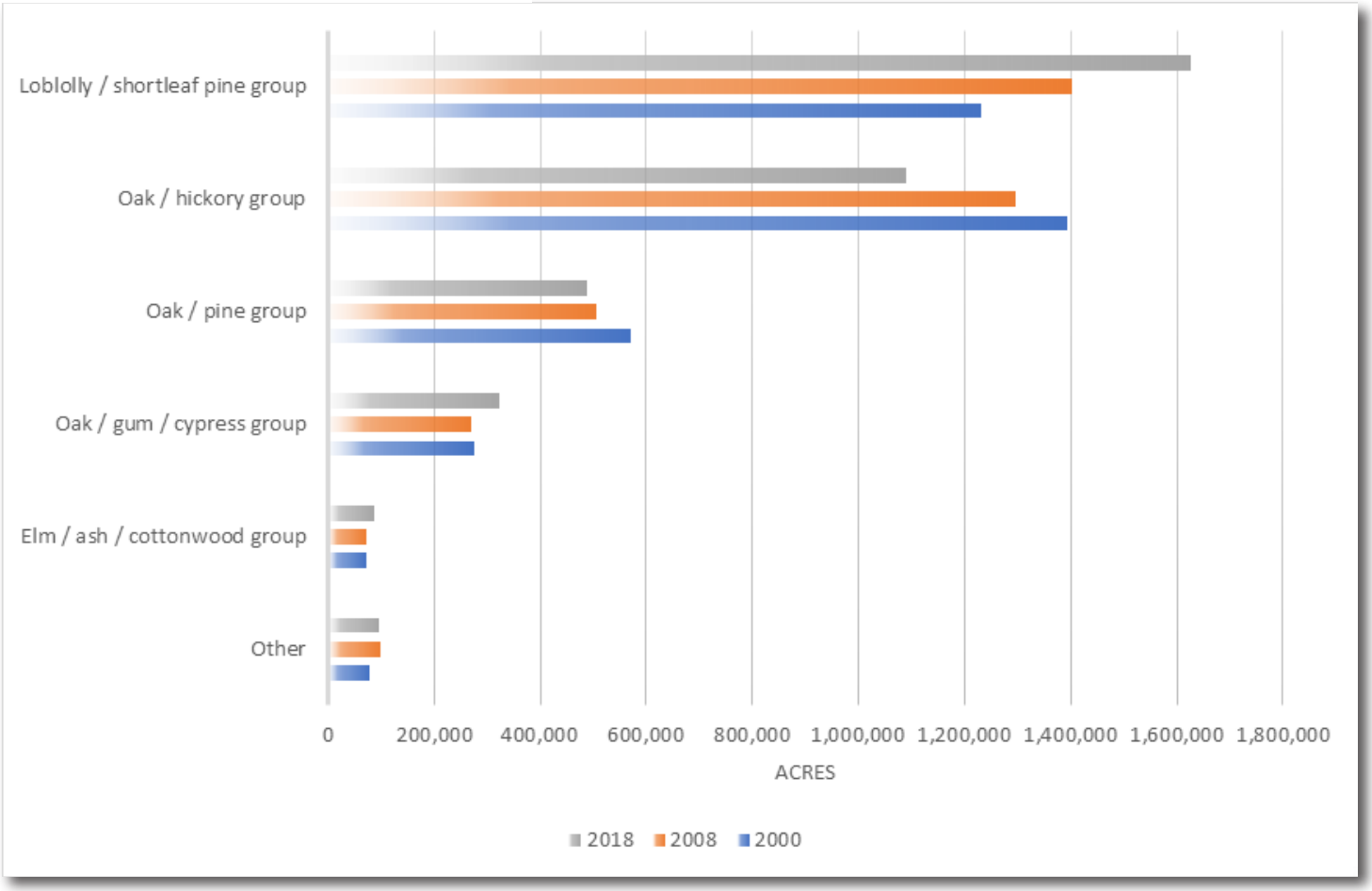
Timber Volume



Piedmont: Timberland Volume by Species (tons merchantable bole) and Year, 2000-2018
FIA data for Chambers, Clay, Cleburne, Coosa, Lee, Randolph, and Tallapoosa counties.

Fall Line Hills

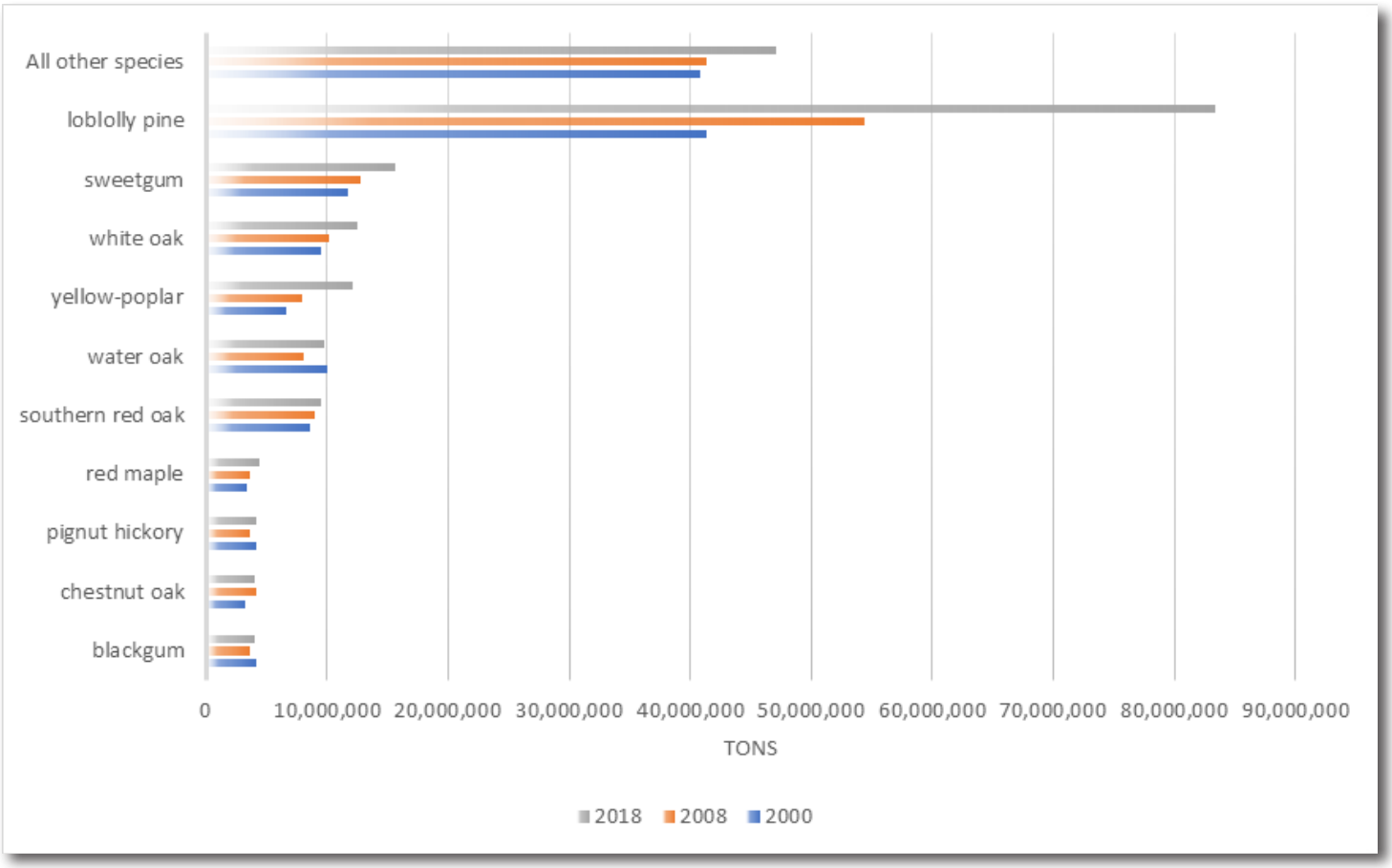
Forest Area



Fall Line Hills: Timberland Area by Forest Type Group and Year, 2000-2018
FIA data for Autauga, Bibb, Chilton, Elmore, Fayette, Franklin, Lamar, Marion, Pickens, and Tuscaloosa counties.

Fall Line Hills

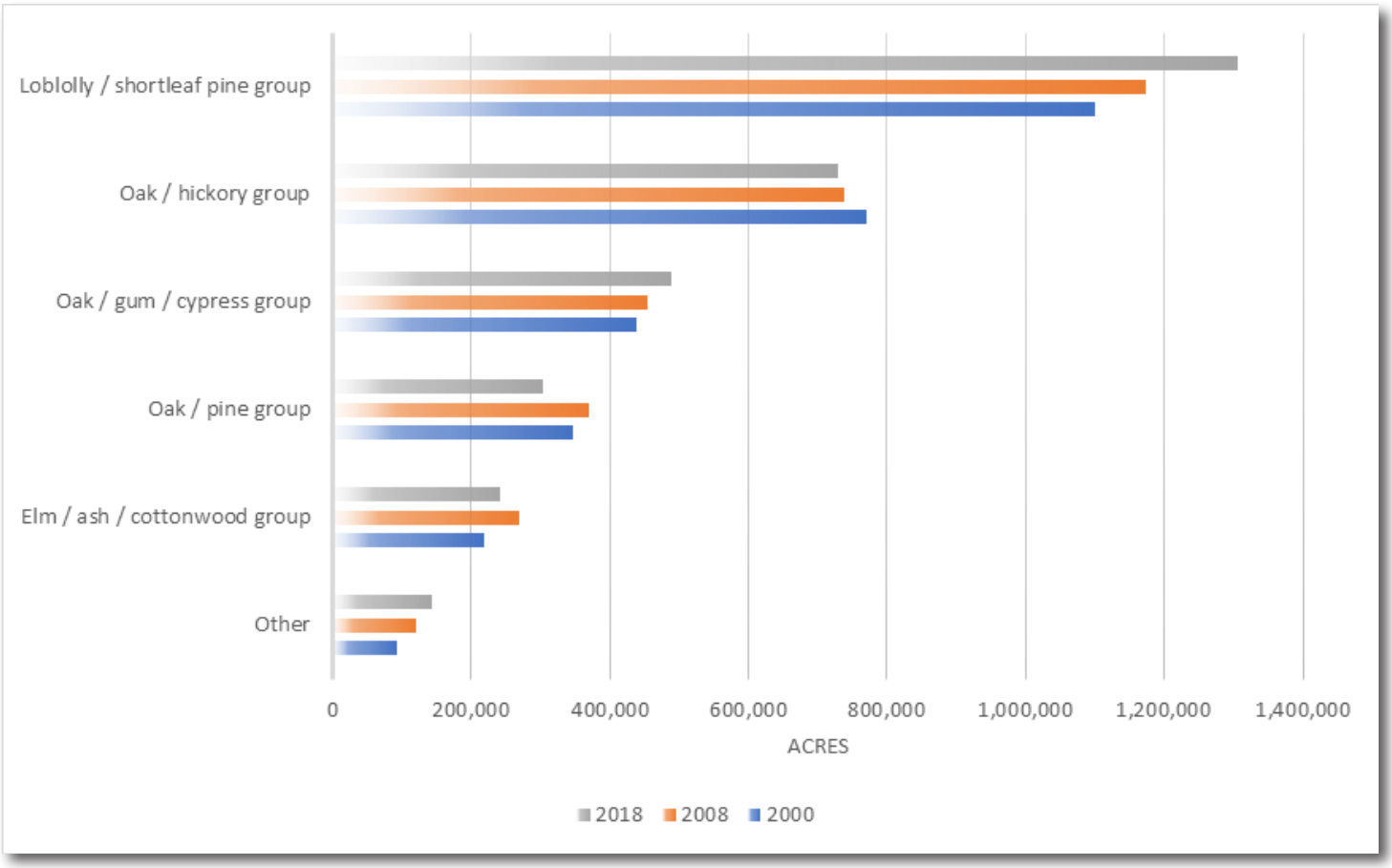
Timber Volume



Fall Line Hills: Timberland Volume by Species (tons merchantable bole) and Year, 2000-2018
FIA data for Autauga, Bibb, Chilton, Elmore, Fayette, Franklin, Lamar, Marion, Pickens, and Tuscaloosa counties.

Black Belt

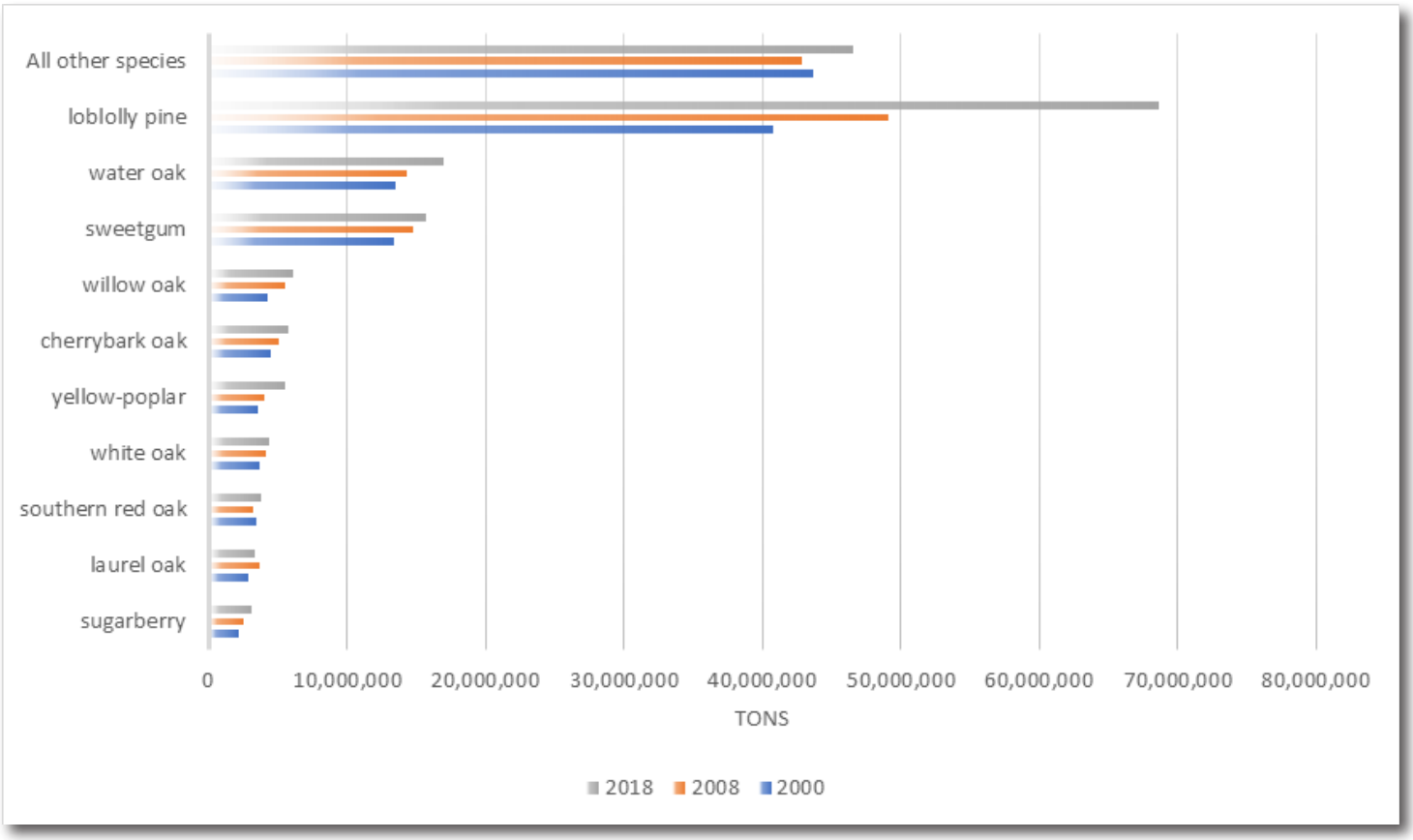
Forest Area



Black Belt: Timberland Area by Forest Type Group and Year, 2000-2018
FIA data for Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, and Sumter counties.

Black Belt

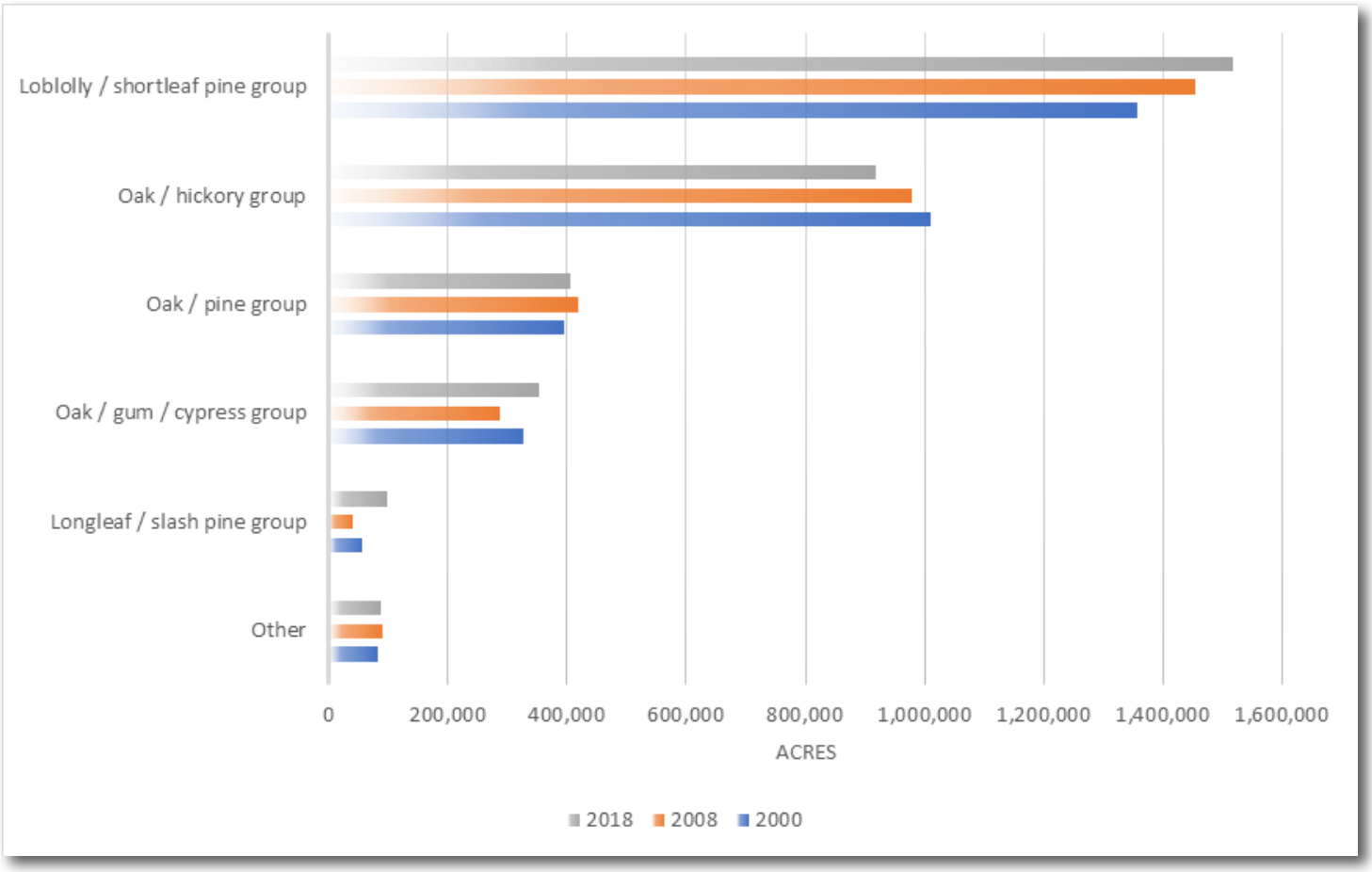
Timber Volume



Black Belt: Timberland Volume by Species (tons merchantable bole) and Year, 2000-2018
FIA data for Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, and Sumter counties.

Southeastern Plains

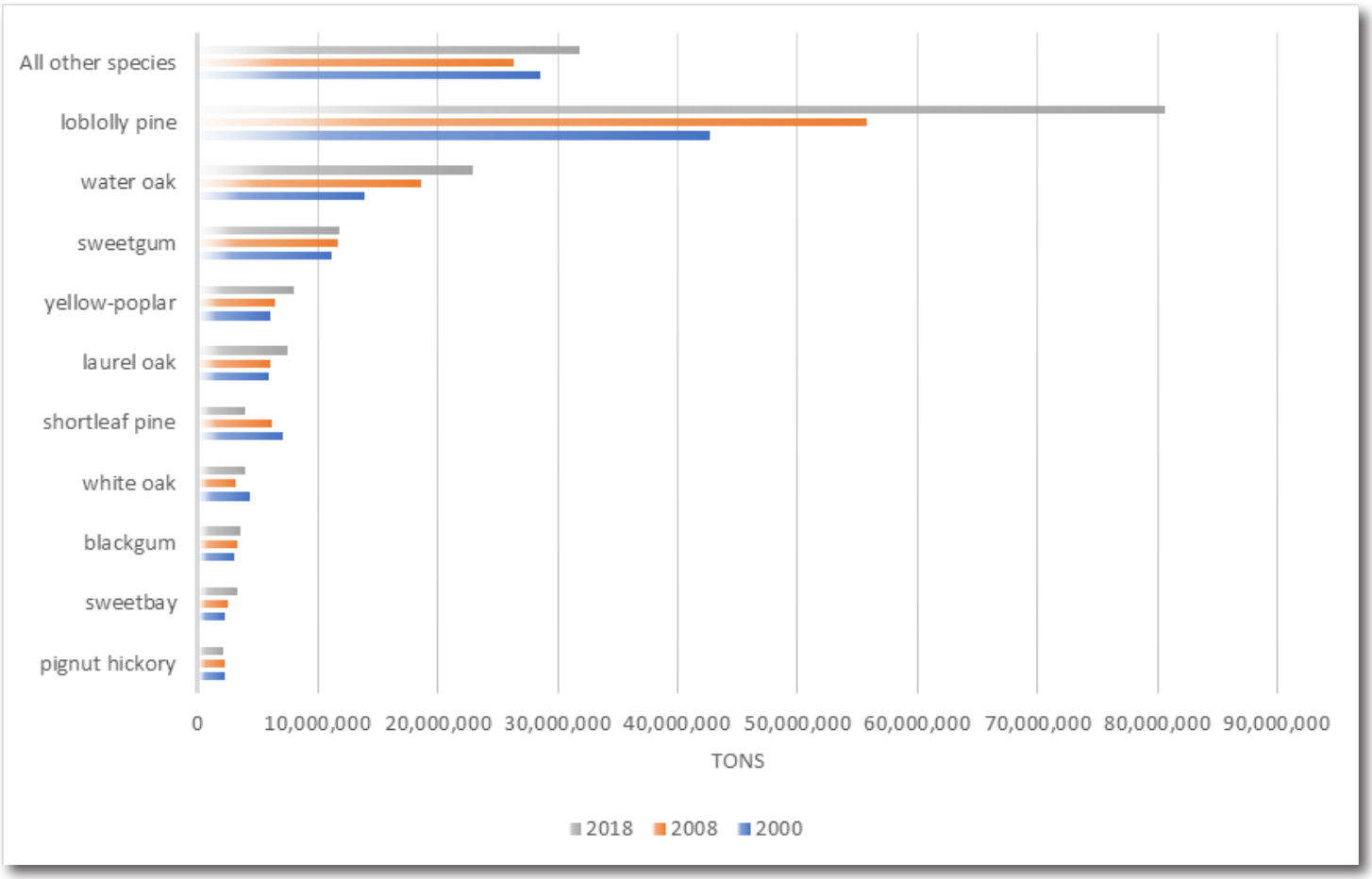
Forest Area



Southeastern Plains: Timberland Area by Forest Type Group and Year, 2000-2018
FIA data for Barbour, Bullock, Butler, Coffee, Crenshaw, Dale, Henry, Pike, Russell, and Wilcox counties.

Southeastern Plains

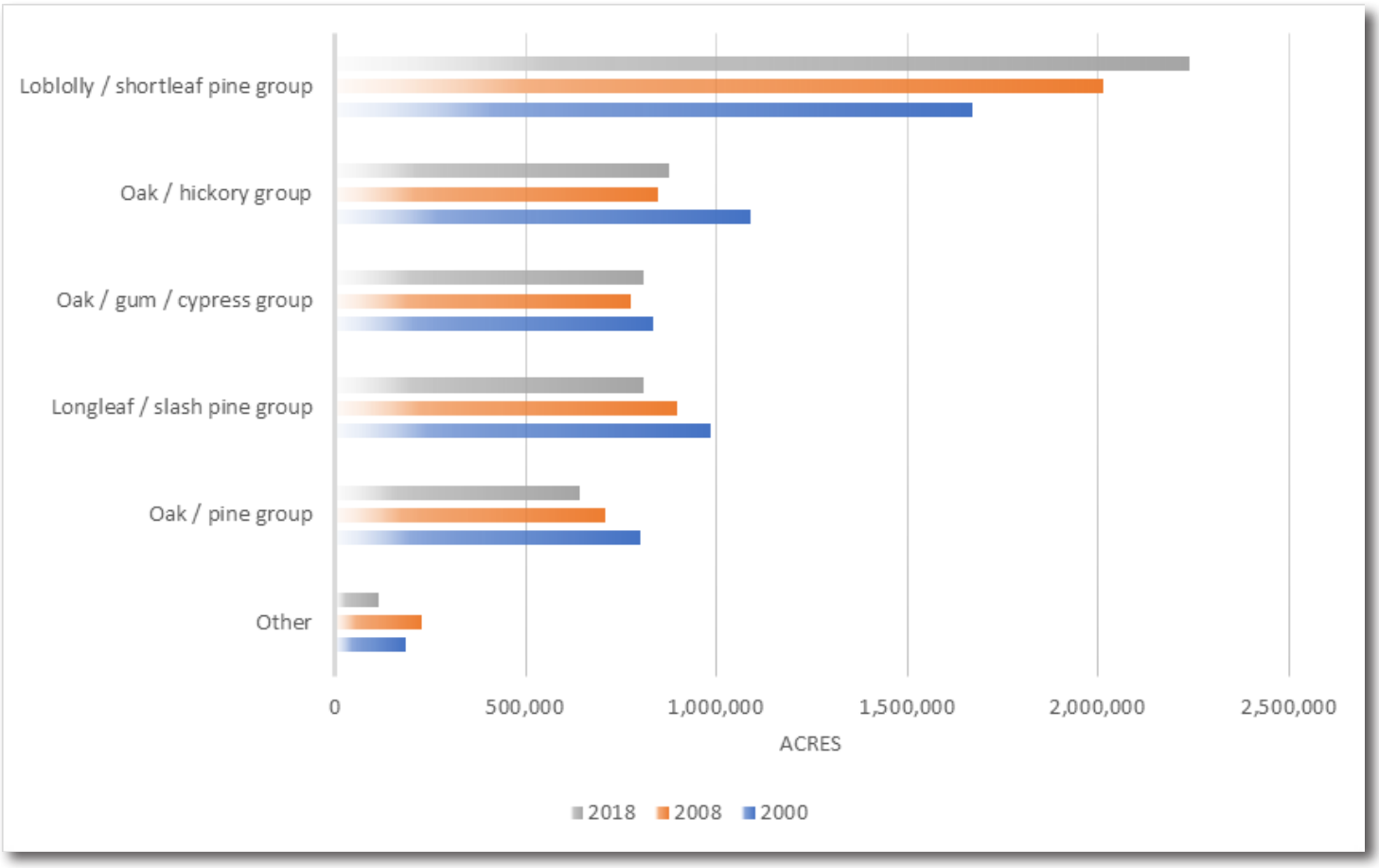
Timber Volume



Southeastern Plains: Timberland Volume by Species (tons merchantable bole) and Year, 2000-2018
FIA data for Barbour, Bullock, Butler, Coffee, Crenshaw, Dale, Henry, Pike, Russell, and Wilcox counties.

Gulf Plain

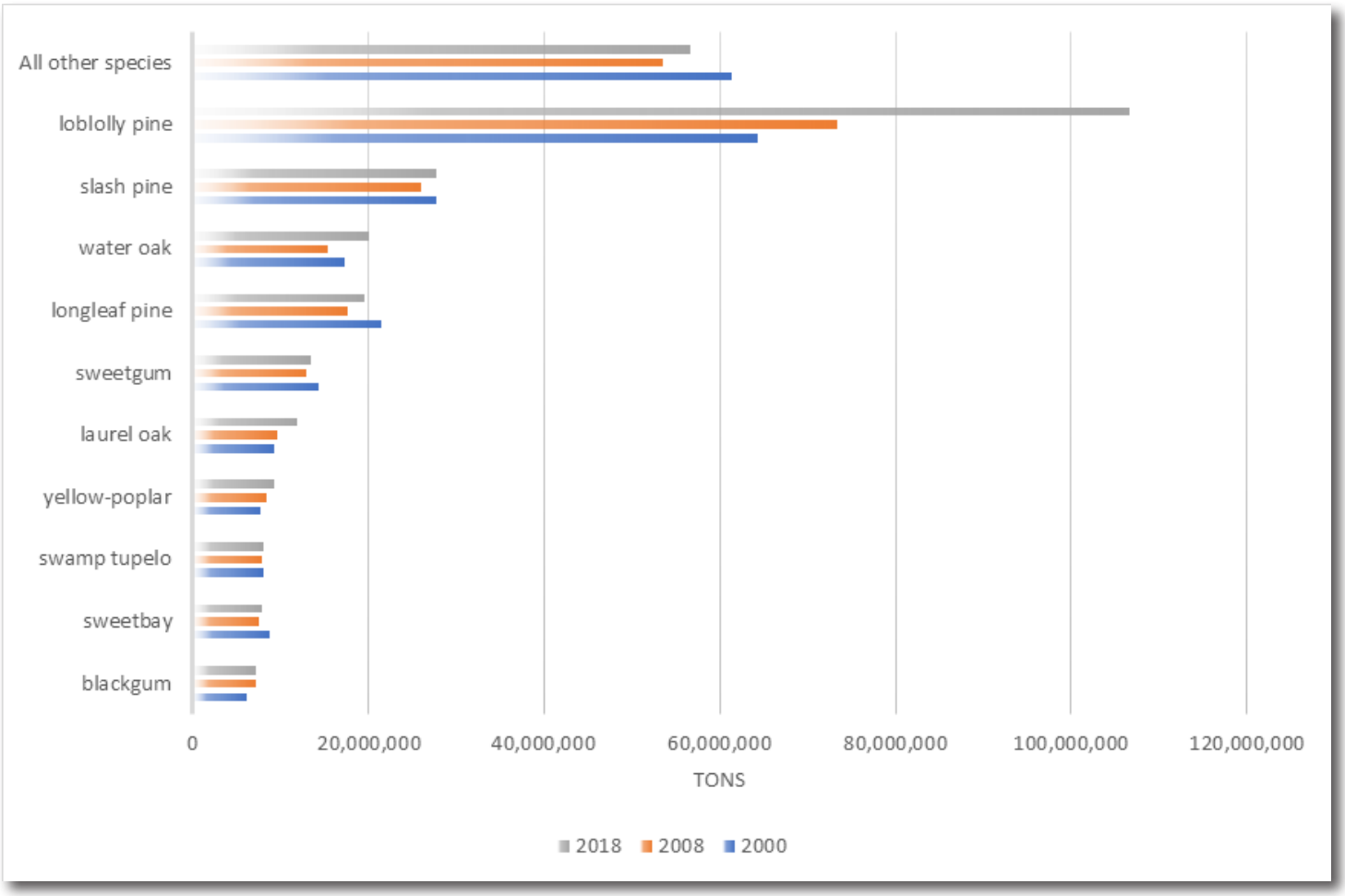
Forest Area



Gulf Plain: Timberland Area by Forest Type Group and Year, 2000-2018
FIA data for Baldwin, Choctaw, Clarke, Conecuh, Covington, Escambia, Geneva, Houston, Mobile, Monroe, and Washington counties.

Gulf Plain

Timber Volume



Gulf Plain: Timberland Volume by Species (tons merchantable bole) and Year, 2000-2018
FIA data for Baldwin, Choctaw, Clarke, Conecuh, Covington, Escambia, Geneva, Houston, Mobile, Monroe, and Washington counties.

APPENDIX 3. Forest Types of Alabama (2018 FIA data)

Forest Type	Area in Acres	Percent of Total
Loblolly pine	8,873,214	38.58%
Mixed upland hardwoods	2,298,280	9.99%
Loblolly pine / hardwood	2,073,337	9.02%
White oak / red oak / hickory	1,531,357	6.66%
Sweetgum / yellow-poplar	1,016,497	4.42%
Sweetgum / Nuttall oak / willow oak	933,608	4.06%
Sweetbay / swamp tupelo / red maple	817,739	3.56%
Longleaf pine	734,101	3.19%
Yellow-poplar / white oak / northern red oak	441,343	1.92%
Slash pine	377,826	1.64%
Sugarberry / hackberry / elm / green ash	281,707	1.22%
Chestnut oak	269,258	1.17%
Chestnut oak / black oak / scarlet oak	266,104	1.16%
Virginia pine	227,819	0.99%
Post oak / blackjack oak	213,992	0.93%
Baldcypress / water tupelo	190,959	0.83%
Elm / ash / black locust	181,634	0.79%
Cherry / white ash / yellow-poplar	177,678	0.77%
Longleaf pine / oak	162,720	0.71%
White oak	161,857	0.70%
Sycamore / pecan / American elm	157,967	0.69%
Shortleaf pine / oak	157,625	0.69%
Nonstocked	138,833	0.60%
Swamp chestnut oak / cherrybark oak	131,632	0.57%
Slash pine / hardwood	125,118	0.54%
River birch / sycamore	113,267	0.49%
Overcup oak / water hickory	105,368	0.46%
Virginia pine / southern red oak	101,751	0.44%
Yellow-poplar	101,329	0.44%
Sassafras / persimmon	100,131	0.44%

Eastern redcedar / hardwood	96,428	0.42%
Shortleaf pine	94,040	0.41%
Eastern redcedar	68,971	0.30%
Other pine / hardwood	59,513	0.26%
Other exotic hardwoods	48,792	0.21%
Red maple / oak	38,868	0.17%
Spruce pine	19,575	0.09%
Red maple / lowland	18,209	0.08%
Willow	14,639	0.06%
Southern scrub oak	13,237	0.06%
Eastern hemlock	11,625	0.05%
Scarlet oak	10,120	0.04%
Cottonwood / willow	9,938	0.04%
Other hardwoods	6,518	0.03%
Paulownia	6,087	0.03%
Cottonwood	5,876	0.03%
Black locust	4,544	0.02%
Northern red oak	4,444	0.02%
Baldcypress / pondcypress	1,517	0.01%
Silver maple / American elm	334	0.00%

APPENDIX 4. Priority Area / Threats Matrix

As discussed in Chapter 4, state forestry agencies are required by the federal government to designate "Priority Areas" where certain factors may create a more intense threat to the forests. It is in these areas that the Alabama Forestry Commission will invest federal grant funds to help solve forestry related problems. Despite this use of federal funds, it is important to note that all areas of the state will receive the same level of assistance from the Alabama Forestry Commission.

The steering committee created a matrix to prioritize the threats facing Alabama's forests. Each county received a score based on the intensity of that threat within the county (listed on the next page). Scores were totaled and the following table ranks each of the 67 counties in Alabama based on these threats. The actual matrix, too large to be shown on this page, can be found at the web address listed below.

https://forestry.alabama.gov/Pages/Management/Forms/Threats_Matrix.xlsx

Alabama Counties in Ranking Order

Baldwin	19	Jackson	9
Barbour	16	Montgomery	9
Choctaw	16	Perry	9
Washington	16	Randolph	7
Conecuh	15	Winton	7
Jefferson	15	Chambers	6
Mobile	15	Clay	6
Russell	15	Cullman	6
Butler	14	DeKalb	6
Clarke	14	Lamar	6
Escambia	14	Limestone	6
Marengo	14	Lowndes	6
Pike	14	Madison	6
Bullock	13	Lawrence	5
Geneva	13		
Lee	13		
Macon	13		
Marion	13		
Tuscaloosa	13		
Walker	13		
Wilcox	13		
Monroe	12		
Calhoun	11		
Covington	11		
Dale	11		
Dallas	11		
Pickens	11		
Shelby	11		
Bibb	10		
Cleburne	10		
Henry	10		
Houston	10		
Marshall	10		
Talladega	10		
Chilton	9		
Coffee	9		
Crenshaw	9		
Fayette	9		
Franklin	9		

APPENDIX 5. Alabama Natural Resources Council

Approximately 70 percent of Alabama is covered with forests. In addition to providing clean air, water, and recreational opportunities, Alabama forests provide the raw material for a $20 billion dollar forest products industry. Combined with the $3 billion annual impact of forest-associated outdoor recreation, it's easy to see why forests and wildlife are considered essential components of Alabama's economic and social landscape.

Members of the ANRC **(listed below)** are leaders of state and federal government agencies as well as private organizations with an interest in forest resources. The Council collaboratively develops programs and activities that motivate Alabama landowners, leaders, and citizens to be wise stewards of our forests and related sustainable natural resources through the coordinated services and programs available from participating organizations. The Council has successfully served forest landowners throughout the state since 1971 and currently focuses on several key activities.

- **Alabama Agricultural Experiment Station, Auburn University**
- **Alabama Cooperative Extension System**
- **Alabama Dept. of Conservation and Natural Resources, Wildlife & Freshwater Fisheries Division**
- **Alabama Department of Education, Agribusiness Education**
- **Alabama Division, Society of American Foresters**
- **Alabama Farmers Federation**
- **Alabama Forest Resources Center**
- **Alabama Forestry Association**
- **Alabama Forestry Commission**
- **Alabama Soil and Water Conservation Committee**
- **Alabama TREASURE Forest Associatiaon**
- **Alabama Wildlife Federation**
- **Association of Consulting Foresters, Inc., Alabama Chapter**
- **College of Agriculture, Auburn University**
- **School of Forestry and Wildlife Sciences, Auburn University**
- **USDA Farm Service Agency**
- **USDA Forest Service, National Forests in Alabama**
- **USDA Forest Service, State and Private Forestry**
- **USDA Natural Resources Conservation Service**
- **USDA Rural Development**

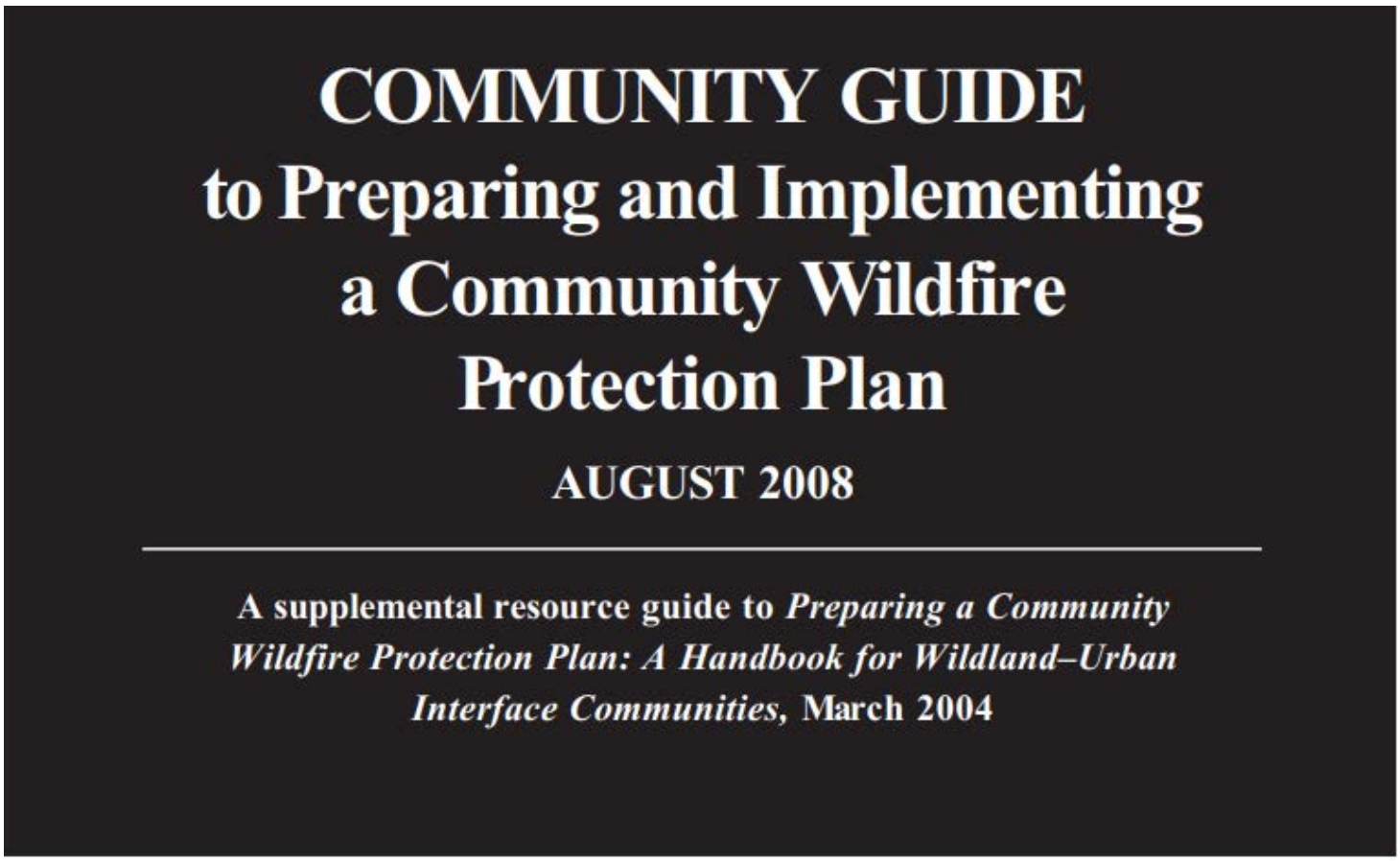
APPENDIX 6. Forest Legacy Assessment of Need

The Forest Legacy Assessment of Need documentation can be found at

http://www.forestry.state.al.us/Pages/Management/Forms/Assessment_of_Need-FLP.pdf

As directed, the Forest Legacy Assessment of Need document has been uploaded to the U.S. Forest Service Dropbox.

APPENDIX 7. Community Wildfire Protection Plan



Community Wildfire Protection Plan documentation can be found at

https://www.forestsandrangelands.gov/documents/resources/communities/CWPP_Report_Aug2008.pdf

The Alabama Forestry Commission is an equal opportunity employer and provider. In accordance with federal law and Alabama Forestry Commission policy, this agency does not discriminate on the basis of race, color, national origin, sex, age, or disability.

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