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THE DAWN OF SUSTAINABLE FORESTRY IN THE SOUTH



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PHOTO CREDITS

Cover: The top photo represents millions of acres of cutover land early in the 20th century in the West Gulf Region. At the time, reforestation of this land was not considered feasible. The bottom photo depicts the land after successful forest restoration began. A small cadre of individuals was responsible for this land transformation.

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ABSTRACT

In the late 19th century, virgin southern pine forests in the West Gulf Coast Region remained virtually untouched. After the Civil War, this land was made available by the government for homesteading and sale. Pine timberland was offered for sale at \$1.25 per acre. Primarily northern lumbermen and land speculators purchased the land. Lumbering then became the economic driver for the recovery of the region. By the end of the first quarter of the 20th century, only isolated pockets of the old-growth forests remained. Landscapes once covered with majestic stands of virgin longleaf pines had become vast “stumpscapes” void of any prospect of forest regeneration. Then a small group began the effort to restore these forests. The effort was led by Henry E. Hardtner of the Urania Lumber Company, William H. Sullivan of the Great Southern Lumber Company, and Philip C. Wakeley of the Forest Service, Southern Forest Experiment Station. This is the story of that restoration effort.

Keywords: History of forestry research, old-growth forests, pine plantations, restoration of southern pines, seed and seedling physiology, southern pines.

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CONTENTS

I	PREFACE
2	INTRODUCTION
2	Lumber Supply and Demand in the Aftermath of the Civil War
4	Repeal of the Southern Homestead Act
5	The Great Land Rush and the South's Economy
7	THE TIMBER HARVEST
7	Logging Practices
8	Sawmill Operations
11	MILLIONS OF ACRES OF CUTOVER FORESTS
13	THE BEGINNING OF REFORESTATION
13	The Influence of Henry E. Hardtner
14	Early forest management practices
14	Collaborative efforts
16	Contributions of Hardtner
17	Advocacy for reforestation
17	Hardtner's legacy
18	The Action of William H. Sullivan
18	The Great Southern Lumber Company
19	Attempts at diversification
20	The Bogalusa Paper Company
22	Establishment of a reforestation program
26	Legacy of the Great Southern Lumber Company
28	The Persistence of Philip C. Wakeley
28	Collaboration with Great Southern Lumber Company
29	Research at Stuart Nursery
30	Planting the Southern Pines document
30	Initiation of forest tree improvement programs
32	THE SPREAD OF SUSTAINABLE FORESTRY
34	CONCLUSION
34	Longleaf Pine Forests 100 Years Later
37	REFERENCES

PREFACE

In the mid to late 19th century, the virgin forests of the Northeast and Midwest were nearly exhausted of their best timber.

Lumbermen begin to realize that they would have to find other areas of timber and relocate their operations if they were to supply the lumber needed for the Nation's expansion westward.

Repeal of the Southern Homestead Act 1876 opened millions of acres of federally owned land in the Gulf Coast States for sale at a minimum price of \$1.25 per acre, and much of this land was covered with heavy stands of virgin longleaf pine. Lumbermen and land speculators or their agents from across the country flocked to the Western Gulf States where the most and the best virgin pine forests were to be found. In Louisiana, where 44 percent of all large sales occurred, buyers from the north and west outnumbered buyers from the South by nearly five to one.

The first three decades of the 20th century came to be known as the “*golden age of lumbering*” in the South. Between 1904 and 1929, over 327 billion board feet of southern yellow pine lumber was shipped to the markets of the world, with nearly 62 billion board feet harvested from the forests of Louisiana alone. The clear majority of this timber was harvested with a cut-out and get-out policy with total disregard for the regeneration of this magnificent resource. The millions of acres of desolate cutover land that resulted were envisioned to have a disastrous effect on the Nation's economy and perhaps even its climate.

In Louisiana where some of the more serious effects of aggressive harvesting occurred, a few individuals took the initiatives that brought the hope of reforestation. The effort was led by a visionary who convinced others that reforestation was feasible, followed by a pragmatic industrialist who committed his company to develop the necessary technology, and supported by a scientist who refined and documented the technology for its application across the South.

This publication describes the development and application of natural and artificial regeneration technology that restored the South's denuded forests and made them the “*wood basket*” of the Nation and a global leader in the practice of sustainable forestry.

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INTRODUCTION

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In the early 20th century, the harvest of the South's virgin pine forests was underway on a massive scale. The demand for lumber was enormous as the Nation expanded westward opening of markets in the Midwest and Western United States to build farms, homes, factories, and cities. In about 25 years, the harvest of millions of acres of the South's old-growth forests was completed. What brought this about and how were the South's forests re-established and made sustainable?

Lumber Supply and Demand in the Aftermath of the Civil War

Following the capitulation of the Confederacy, the government and businesses of the victorious Union rapidly redirected their energies to the growth and expansion of the Nation. Implementation of the Pacific Railroad Act of 1862 and completing the transcontinental railroad became a center of attention for the Nation and work began in earnest. With the driving of the last spike at Promontory Summit, Utah, in May 1869, the vast area stretching from the 100th meridian to the Rocky Mountains was opened for settlement. Huge amounts of building materials would be needed, and in the mid to late 19th century the main building material was wood. The railroads consumed copious amounts of wood for cross ties, bridges, and trestles, which in those days before chemical preservatives were developed, required frequent replacement. Homes, barns, stores, offices, factories, essentially all rural and small town structures were built with wood. And the area from the 100th meridian to the Rockies was essentially treeless!

The importance of wood in the developing Nation is indicated by the fact that the U.S. Census of 1880 included a special report on the status of America's forests and timber resources. Prepared under the direction of Harvard College Professor Charles S. Sargent, the 600-plus page report represented the best available assessment of the Nation's forest resources and future timber supply (Sargent 1884). At that time, white pine (*Pinus strobus*)

was the preferred species for the construction of buildings. The Lake States were the center of white pine lumber production with Michigan by far the leading producer. Sargent's report confirmed what many industry executives and public officials feared; at the current rate of harvest, the best and most accessible supplies of white pine would be exhausted in a little more than 10 years. To supply the needs of a rapidly expanding Nation, the lumber industry would have to relocate from the Lake States to the South or West where an abundance of virgin forest still remained.

For northern lumbermen, the most desirable timber nearest to existing operations and anticipated future markets were the extensive stands of virgin longleaf pine (*Pinus palustris*) stretching across the Gulf Coast States from Alabama and western Florida to Texas. Sargent (1884) claimed these forests, "... contain sufficient material to long supply all possible demands which can be made upon them." And much of these millions of acres that had been virgin longleaf pine was public land recently opened for sale at a minimum price of \$1.25 per acre!



Longleaf pine stands such as these were typical of the over 300,000 acres of Great Southern Lumber Company forest lands. (photo from Louisiana State University Archives)

Repeal of the Southern Homestead Act

In the decades following the Civil War, the economy of the South was in shambles—its agrarian society had been destroyed. Millions of former slaves were landless and destitute. The entire Nation was suffering from major war debt. Congress was desperate to find an affordable means to promote the economy and relieve the suffering of people, especially those in the war-torn regions of the South. At the time, the Federal Government owned nearly 46 million acres in the five southern public land States (Gates 1979), and Congress passed the Southern Homestead Act of 1866 hoping to provide a pathway to land ownership and generally improve the economy of the region (Lanza 1990). The Act enabled freed Blacks and loyal Whites to apply for up to 80 acres of land to homestead in one of the five public land States in the South.

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Implementation of the Southern Homestead Act was beset with problems that inhibited successful homesteading.
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However, implementation of the Southern Homestead Act was beset with problems, even after the discrimination against former Confederates was lifted in 1867 (Gates 1940). A number of factors inhibited successful homesteading, but the greatest by far was the fact that the majority of the available public land was not suited for row-crop agriculture. The best agricultural land had long since been removed from the public domain by colonial land grants and nearly 100 years of Federal land sales and grants to States and individuals. What remained was covered with heavy stands of timber and/or swamps (Gates 1940).

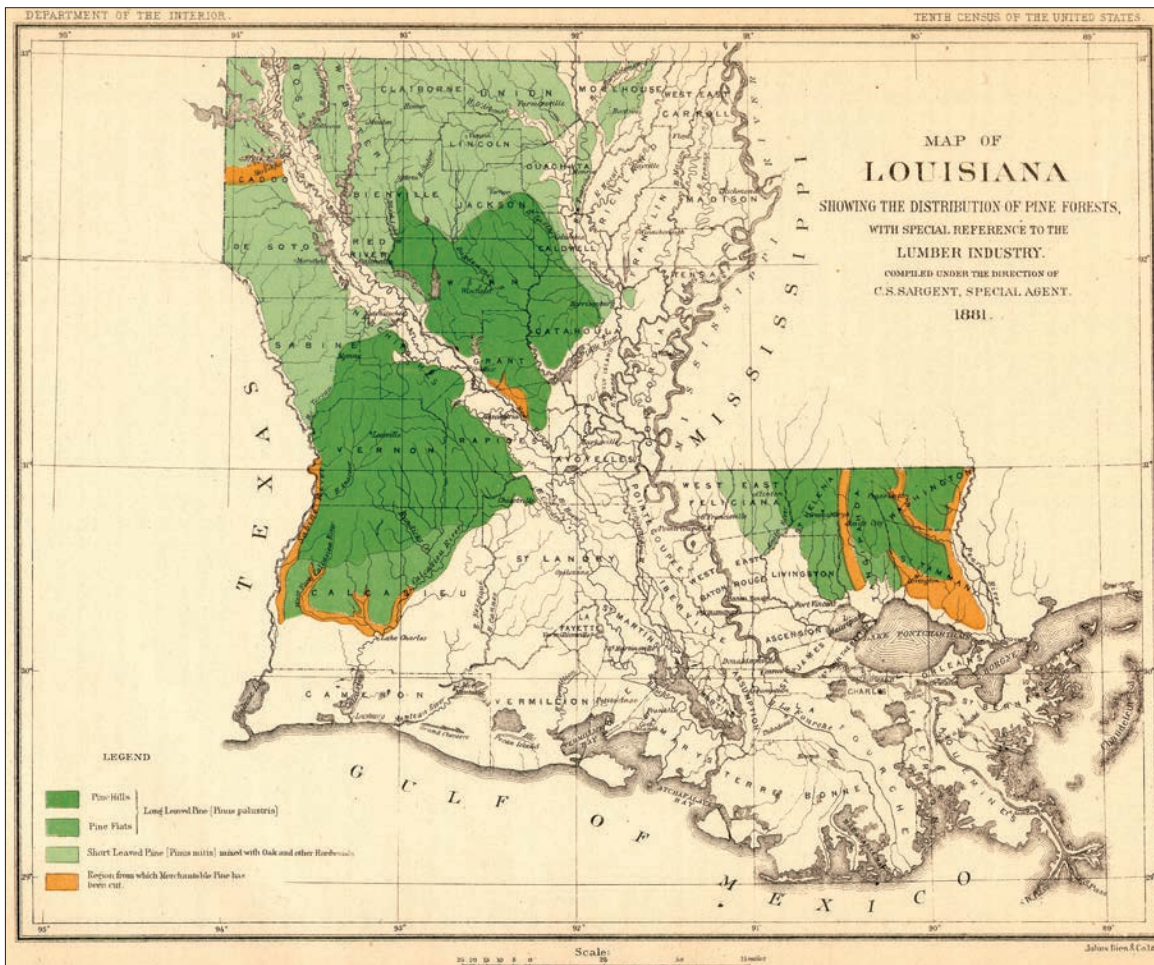
After a decade, less than a third of the original 46 million acres had been homesteaded and many of these were patented by employees of lumber and mining companies who quickly turned their claims over to their employers. Thus, in 1876, Congressmen from the South anxious to promote development of the region's timber and mineral resources, joined with a group of Congressmen from the North wanting to promote regional harmony, or in a few cases, speculate on land in the South, and the Southern Homestead Act was repealed. The remaining unpatented Federal land was first offered for sale by auction, but the auctions were disappointing with only a little more than 121,000 acres sold. In 1880, the remaining public land in the South was opened for sale at a minimum price of \$1.25 per acre.¹

¹ For more information on the functioning and repeal of the Southern Homestead Act and the aftermath see Carter and Barnett (in press).

The Great Land Rush and the South's Economy

Lumbermen and other capitalists seized upon the opportunity to speculate in timberland acquisition. Timber cruisers, mill owners, and land agents descended on the Gulf South in droves, causing one to comment, “The woods are full of Michigan men bent on the same mission as myself” (Gates 1979). In Louisiana, where 44 percent of all large sales (5,000 acres or more) occurred, buyers from the North outnumbered buyers from the South by nearly five to one. Some of the large purchases were by lumbermen from the North planning to relocate their mills. But most large sales were to lumberman and other capitalists planning to hold the land and sell later when the stumpage value increased.

Map of Louisiana by Sargent (1884)
illustrating the status of forested pine
land within the State.



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A sawmill in Central Louisiana was looked upon as a town's greatest asset as well as benefactor because it provided opportunities for work.

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The sale of Louisiana and Mississippi public lands was intended to promote development of the region's timber industries and increase local wealth. However, little of the valuable timberland was acquired by residents of the region. The greatest wealth derived from the lumber business was from the appreciation in stumpage values, not from the manufacture of lumber (Lacey 1909). The average stumpage price for yellow pine increased more than 10-fold between 1880 and 1904. Thus, land that sold for \$1.25 per acre in 1884 was worth between \$25 and \$30 per acre for the timber alone by 1904. But few cash-stressed southerners could afford to buy timberland and hold it for 10 or more years before realizing any significant return.

Although most of the profits from increased stumpage values went to out-of-State speculators, State citizens and State and local governments received some of the benefits. Millions of dollars were invested in lumber manufacturing facilities, and infrastructure was built to move logs to mills and lumber to markets. Mainline railroad tracks increased from 650 miles in 1880 to 5,554 miles by 1910. Every parish except Cameron had one or more rail line passing through it (Foster 1912, Fricker, n.d.).

Logging and sawmill operations provided jobs, and lumbering became an economic driver for the South's economy. However, out-of-State mill owners generally brought their skilled craftsmen and supervisory personnel with them, leaving mostly the lower paying jobs for local residents (Stokes 1954).

Brister (1968) summed up the benefit from the mills this way:

A sawmill in Central Louisiana was looked upon as a town's greatest asset as well as benefactor because it provided opportunities for work. Even though the hours of work were long and the wages were small when compared to the profits made, and when compared to wages and hours for similar work at this time, having a job in order to feed and clothe a family was the important thing.

THE TIMBER HARVEST

The period of 1900 to 1920 has been described as the “*golden age of lumbering*” in the Midsouth (Caldwell 1975). Louisiana grew some of the finest pines in the South. The vast virgin pine forests in the State’s upland regions southwest and north of the Red River and in the Florida parishes were mainly longleaf pine often in 100-percent pure stands with extremely dense growth (Mohr 1897). These magnificent forests became the source of intense lumbering efforts across the State because newly developed railroad logging could extend into every portion of this virgin forest. The combination of steam-powered logging and milling technology resulted in a massive harvest of the forests that drove the South’s economy for decades.

Logging Practices

In the late 1800s, the development of steam-powered logging and milling equipment flourished due to the great demand to harvest the huge acreages of virgin southern pines (Foster 1912). In addition to the steam locomotives that could move tremendous quantities of logs from the forests, rail mounted skidding and loading equipment allowed the companies to load and move the timber to the mills as fast as it could be cut. Temporary railroad spurs could be quickly moved into new areas of the forests.

Steam-powered log skidders and loaders were massive pieces of equipment. At one setting, one skidder could pull cut trees to the railroad track from a 30- to 40-acre area. Two types of skidders were used and both were self-propelled so they could move along the track over short distances. They, too, could be towed behind a locomotive. Although these machines appear to be large and cumbersome, they were true workhorses of their day. The Clyde skidder was capable of retrieving logs from four different points at the same time. Each cable, or lead, was approximately 1,000 feet in length. Once the logs were attached and a clearance signal was sent for retrieval, they could be skidded at a speed of 1,000 feet per minute. Working conditions around these machines were very dangerous.

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TOP: A Great Southern Lumber Company Clyde skidder with the employees needed to operate the skidder and man the cables that pulled logs to the railroad right-of-way. (photo from Louisiana State University Archives)

BOTTOM: A McGiffert steam-powered log loader in operation. (photo from Louisiana State University Archives)

The Clyde skidder pulled logs to the track and usually a McGiffert or Barnhart log loader followed along on the tracks and loaded logs onto rail log cars. The Lidgerwood skidder was a larger piece of equipment which not only brought logs to the landing from the cutting site, but loaded them onto railroad cars as well, making it both a skidder and loader. The Lidgerwood was capable of operating on both sides of the track, enabling the loggers to “clean up” from the spur about one-third of a mile of timber (Quick 1946). At each setting, each machine could skid and load timber from 30 acres of land. Even with the use of the Lidgerwood, however, a McGiffert loader was typically used to load short logs and pick up timber along the right-of-way.

Sawmill Operations

Sawmills and their accompanying towns sprang up across the State. It is estimated that as many as 1,300 such mills were developed in Louisiana alone in the early 20th century. Almost every town or community had one to several sawmills.

These mills became viewed as a double-edged sword. They provided employment of a large percentage of employees in the local areas, but within 20 years most of these mills had harvested their timber and closed their doors with many of the mill towns becoming ghost towns. When the timber cutout occurred, mill owners typically abandoned their towns and the mill-owned land reverted to the State due to unpaid taxes. Large lumbering operations were common in Louisiana and the aggressive nature of their logging methods resulted in extensive areas of cutover timberland with limited possibility for natural regeneration.

In the early 1920s, 23 mills were operating along a railroad section in western Louisiana with each producing more than 100,000 board feet a day. By the end of the decade, all had been shut down and abandoned. Sixty years later, even the foundations of buildings were gone and finding the original locations of the mills was difficult (Stokes 1954). R.D. Forbes, Louisiana's first state forester, described the situation in 1923 stating, "the plain truth of the matter is that in county after county, in State after State of the South, the piney woods are not passing but *have passed*" (Forbes 1923).

The mills varied greatly in size. At the time, two of the largest sawmills in the world were built and operated in Louisiana: (1) the Great Southern Lumber Company at Bogalusa, and (2) the Gulf Lumber Company at Fullerton (Barnett and Blomquist, in press).

Both the towns of Bogalusa in Washington Parish and Fullerton in Vernon Parish resulted from northern industrialists buying large quantities of timberland in the late 1800s and building towns to support the operation of their huge mills. The owners of both mills knew their timber resources would be harvested in about 20 to 25 years. They brought, however, an unusual commitment to build towns and provide housing and educational opportunities for their employees.

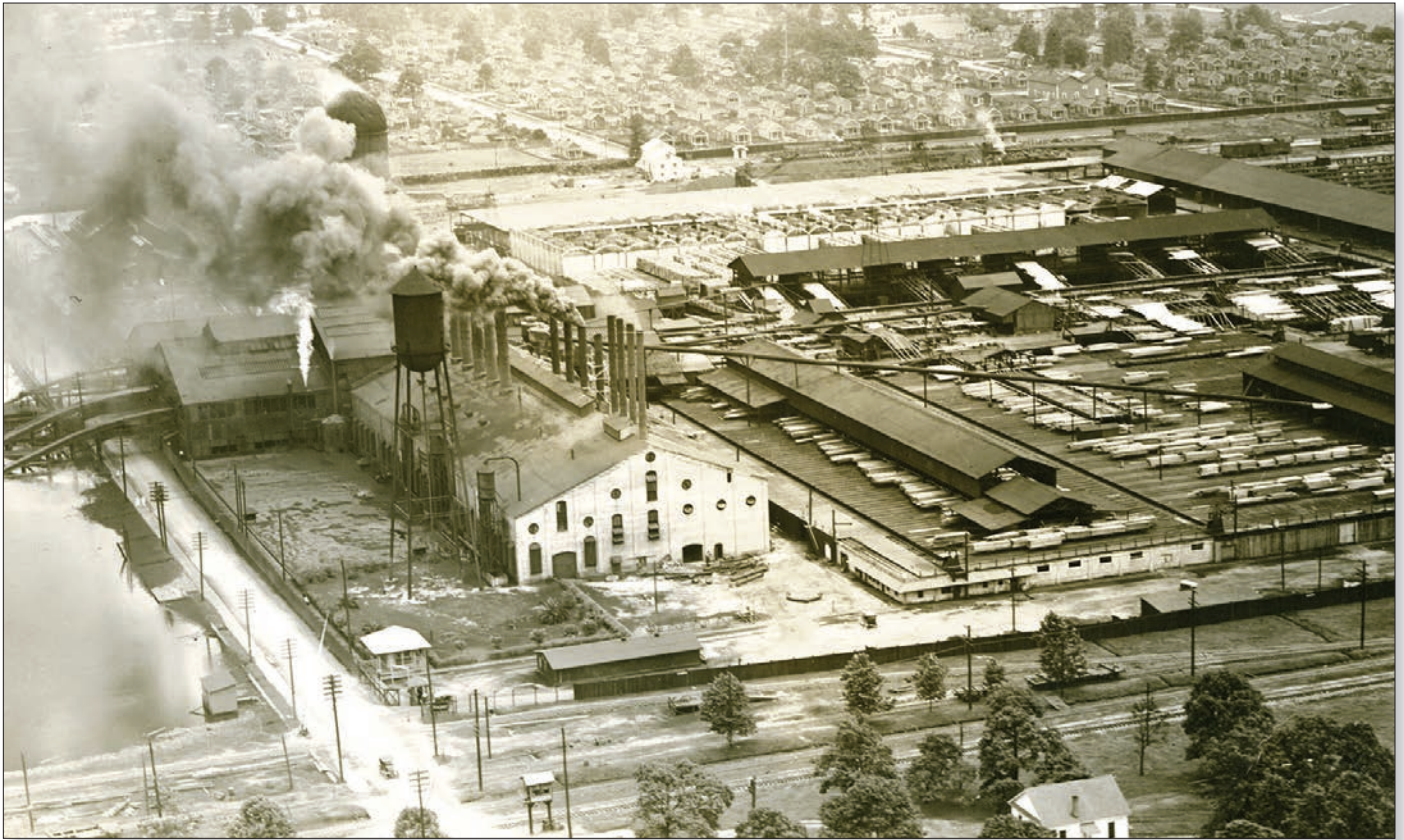
The land base for the Gulf Lumber Company at Fullerton was such that the timber was depleted in 20 years. No options existed but to close the mill when the timber base was depleted. No effort had gone into trying to diversify the company. S.H. Fullerton and manager M.L. Fleischel could see no other alternative—this fate was typical for most of the early large lumber companies. The mill and what was described as "one of the most modern and picturesque towns in the State" was dismantled and sold.

There were, however, exceptions. The city of Bogalusa continues to exist and thrive. W.H. Sullivan and the Goodyear

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The Great Southern Lumber Company sawmill in operation in the early 1900s. The stacks projected up from boilers where waste material was burned to provide power for the mill and city of Bogalusa. (photo from Louisiana State University Archives)

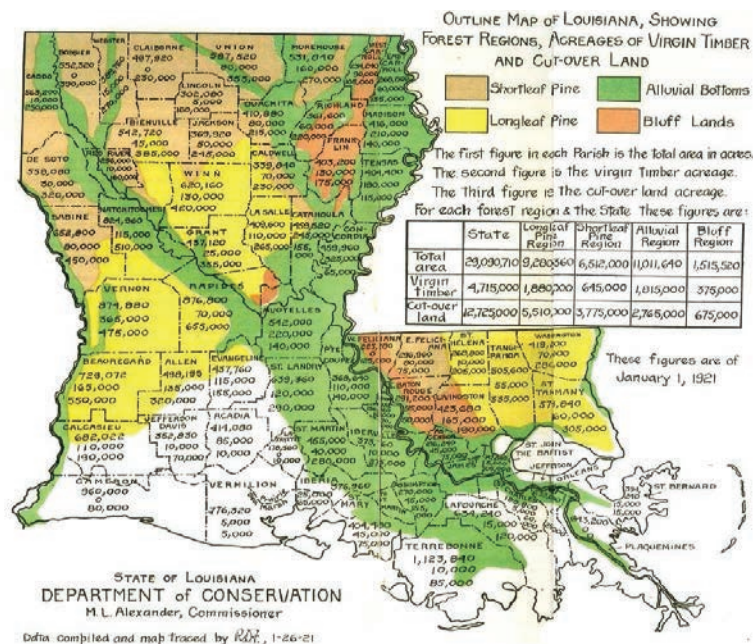
family of the Great Southern Lumber Company were determined to find means to keep the town alive after the virgin longleaf pines were harvested.

The Great Southern Lumber Company attracted national interest because of its size and the attitude of its leadership. The *American Lumberman* sent reporters and photographers to the “magic city” on more than one occasion. One reporter wrote in 1922: “This mill, by the way, is the largest sawmill in the world. At the time of our visit it was working on the basis of two 10-hour shifts and was turning out daily about 750,000 feet of lumber. The capacity of the mill is something over 1 million feet daily. Six logs go through the mill every minute, and one day’s work will strip 60 acres of timberland.” According to the reporter, about 3,000 men were employed by Great Southern (Curtis 1973).

MILLIONS OF ACRES OF CUTOVER FORESTS

Fueled largely by out-of-State capital, the lumber boom dramatically changed the look of rural Louisiana. With a policy of “cut out and get out,” large sections of the State became “stumpscapes” of barren cutover land as mill owners moved on to yet another stand of virgin timber elsewhere in the country. In a relatively short period of time, some 4.3 million acres of Louisiana virgin timber was clear cut—a land area roughly the size of the State of New Jersey (Fricker, n.d.). In his dissertation “*Lumbering in Southwest Louisiana*”, George Stokes (1954) aptly concludes: “The rapidity with which big-time lumbering had entered Louisiana was matched by the speed of its departure.” The early to mid-1920s is generally given as the ending date for the great lumber boom in Louisiana—it is then when almost all of the big mills had run out of timber and closed down. The great lumber boom was over.

As the 20th century began, steam-powered logging and milling equipment had become very efficient, and in 25 to 30 years most of the millions of acres of virgin pine forests had been harvested. Spur



Louisiana map drawn in 1921 by State Forester R.D. Forbes providing data by parish on the acreage of both virgin timber and cutover land (Forbes 1921). (map courtesy of Louisiana Department of Conservation).

rail lines were quickly taken up and moved to the next cutting site. The combination of devastation from the use of steam-powered skidders and the belief that there was no benefit in leaving small trees or seed trees resulted in barren cutover land. Millions of acres of cutover forests remained, and efforts to develop other uses of the land were generally unsuccessful. Lumbermen gave little thought to the potential of future forests because the trees being harvested were 150 to 200 years old—how could growing more trees be considered economical? Thus, millions of acres of cutover forests remained barren and tax delinquent.

The Cutover Land Conference of the South (1917) was held in New Orleans, LA, to seek uses for the massive acreage of cutover forest land. Of 340 people registered, only four were foresters. Most were representatives of railroads, lumbermen, and specialists in all lines of agriculture. Although timber growing was recommended by some as a solution for the cutover land problem, the sentiment of the meeting was in favor of converting forest land for livestock grazing (Barnett 2011).

There was widespread condemnation of the lumbermen for stripping the land. In 1904, Gifford Pinchot of the Forest Service, U.S. Department of Agriculture stated, “It is evident that never before has forest destruction been so rapid as the present, that we have never been so near to exhaustion of our lumber supply and that vigorous measures have never been as urgently required as now” (Heyward 1958).

The commercial use of cutover land for farming was not successful, and the resinous nature of the stumps following harvest presented an additional problem. Decades later, the harvest of these pitch-laden stumps for naval stores products provided an income to landowners.



THE BEGINNING OF REFORESTATION

It is both interesting and ironic that the prophet who began promoting reforestation of the cutover land came from a remote area in north Louisiana. Philip C. Wakeley is quoted as saying of Henry Hardtner, the visionary, “He had an old rattle trap mill and Urania, the town, was nothing to look at. ... Around Urania was the center of the Yale camp for years, and having started this program he utilized the full advice of Chapman and others of the Yale faculty. So, there was a nucleus, a focus of happy affection, so to speak, at Urania, dating back roughly to 1912” (Wakeley 1971).

The Influence of Henry E. Hardtner

How did the son of a German immigrant who settled in Pineville, LA, with a \$1,000 investment in a small sawmill become known as the “father of forestry in the South?” Henry E. Hardtner bought a sawmill and a small amount of timberland in 1896. He named the site Urania—it was a “heavenly” place to him. The new operation built a railroad to the new stand of timber. Hardtner’s rail line—the Natchez, Urania and Ruston Railroad—was a total length of 8 miles. But, Hardtner, a keen businessman, listed it on his mill letterhead. As a railroad president, he enjoyed pass privileges to other lines (Burns 1978).

Hardtner had an innate curiosity of and love for trees. He once said, “I was born in the forests and have had a close association with them since childhood. What I know about them cannot be learned in schools or colleges. To me they are as humans and I know trees as I try to know men” (Blackwell 1964).

Although he bought a small tract of virgin timberland, Hardtner typically purchased cutover land that had some scattered old-growth trees and small understory pines. There was enough old growth remaining on the land to supply his small mill. He could buy this type of land for about \$1 per acre. He became convinced that another merchantable crop could be grown in about 60 years. This belief, he expressed as early as 1905, ran

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—Henry E. Hardtner

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HENRY E. HARDTNER. (photo from Southern Forest Heritage Museum Archives)



contrary to the beliefs of typical lumbermen, and he was ridiculed for his statements (Burns 1978).



Hardtner initiated some basic standard management practices, as well as a primitive fire protection system.



EARLY FOREST MANAGEMENT PRACTICES

On his land, Hardtner initiated some basic stand management practices. He instructed his timber cutters to watch for smaller trees, to leave all trees below 12 inches in diameter, and leave four seed trees per acre for natural regeneration. This was at a time when large lumber companies were clear cutting their lands with use of steam-powered skidders that destroyed all standing trees. He also initiated a primitive fire protection system. Later, he began fencing young longleaf pine stands to protect them from the rooting of hogs. Annual burning of the woods and free-ranging hogs were found to be major problems in regenerating longleaf pine (Hardtner 1935). Hardtner was fortunate that his forests consisted of a significant proportion of loblolly pine (*Pinus taeda*) which is easier to regenerate naturally than longleaf pine.

COLLABORATIVE EFFORTS

Hardtner, in addition to his study of forest conditions, read forestry literature and began in 1909 contacting the Forest Service in Washington for advice. At his request, the Chief of the Forest Service sent to Urania over a number of years the most knowledgeable forestry specialists in the country. The first of these was W.R. Mattoon, a pioneer extension forester who in 1913 drew up a preliminary plan for experiments in thinning and fire protection. He was succeeded by Samuel T. Dana, who following Mattoon's plan established a series of plots in 1915 to evaluate fire and thinning regimes (Blackwell 1964). These were the first of their kind of research studies in the South (Kerr 1958, Mattoon 1939). In addition, Austin Cary and W.W. Ashe were other early Forest Service pioneers who visited and advised Hardtner at Urania. It is interesting to note that they found Hardtner's knowledge ahead of the professional understanding at the time. Subsequently, their involvement increased his professional reputation (Barnett 2011).

Another important collaborative effort of Hardtner was establishing Urania as the site for the spring field camp at Yale University School of Forestry. In 1917, his belief in research and education became the basis for locating the annual 3-month camp there. In 1921, Hardtner built a permanent location for the camp where it continued annually until 1942. Professor H.H. Chapman, who supervised and trained the camp students, conducted



HENRY E. HARDTNER (right) with **CARL A. SCHENCK** who headed the Biltmore Forest School at Asheville, NC.



Typical forest conditions on the Urania Forest. Scattered old-growth pines supported the mill while younger trees grew to harvest size. The size of the forest grew to over 100,000 acres. (photo from Southern Forest Heritage Museum Archives)

research efforts with Hardtner which clarified the role of fire in longleaf pine management and established early growth and yield guidelines for southern pine species (Chapman 1939, 1947).

When the Forest Service established the Southern Forest Experiment Station in New Orleans, LA in 1921, a branch office was set up in Urania where valuable field studies were conducted for years. The Federal foresters found him to be unusually approachable, genial, and receptive to new ideas. These traits led him to be showcased as an exemplary lumberman (Demmon 1935).



The legacy of Henry Hardtner to forestry is remarkable. As a lumberman he began to understand the potential for reforesting cutover lands. He promoted his ideas and used his forest land to demonstrate the sustainability of southern pine forests.



Hardtner became the leading advocate for reforestation in the South and spent a great deal of time studying reforestation and conservation in general. His brother, Q.T. Hardtner, was in charge of the sawmill operation (Demmon 1935). Henry Hardtner was responsible for Louisiana being one of the first Southern States to pass legislation encouraging the practice of forestry (Greeley 1951). He had a strong influence in getting other legislation enacted.

CONTRIBUTIONS OF HARDTNER

In *Forestry in the U.S. South: a History* (Carter and others 2015) describe Henry Hardtner's contributions thusly:

It was not solely Hardtner's successful demonstration of sustained-yield management of southern pine that earned him such a prominent place in the history of forestry in the South. He was a dynamic activist and advocate for forestry, tireless in his efforts to promote forestry among his fellow lumbermen, politicians, and the public. He had a hand in the passage in 1904 of the first forestry legislation in Louisiana, providing for the establishment of a department of forestry, fire suppression, and forestry education. Unfortunately, no funds were appropriated to implement the provisions of the act. In 1908, he was appointed chairman of the first Louisiana Commission for the Conservation of Natural Resources. Two years later the commission released a comprehensive report which included a six-point forestry program recommending: (1) protection of cutover lands from fire, (2) prevention of wasteful logging and injury to young trees, (3) establishment of state forest reserves, (4) correction of the system of taxation on growing timber, (5) initiation of taxation on timber when cut, and (6) creation of a department of forestry staffed by professional foresters. It took several years for the Louisiana legislature to provide funds, but eventually the commission's recommendations became the 'cornerstone of forestry in the state.' The earliest legislation based on these recommendations authorized reforestation contracts between the state and owners of cutover lands whereby the owners agreed to dedicate the land to growing timber and protect it from fire in return for an adjusted tax assessment. Hardtner signed the first contract with the state under the new law.

Hardtner died in August 1935 in an auto-train collision while en route to the State capitol in Baton Rouge, LA, to argue his

case with Governor Huey P. Long's administration, which was attempting to break the reforestation contract with his company.

ADVOCACY FOR REFORESTATION

Urania became the mecca for those interested in learning the potential of reforestation. Visitors from all over the country came to Urania to talk to Hardtner. One of the most significant visits was when the Great Southern Lumber Company's general manager and Board of Directors came to Urania 1920. William H. Sullivan and his directors were so impressed with Hardtner's results that they decided to establish a reforestation effort for their lands. They chose to reforest the vast area cut over by hand planting their Bogalusa operations, believing that waiting for natural pine regeneration as Hardtner had done would entail too much delay (Heyward 1958). However, other lumber industry executives in general believed that this project was entirely impractical, and many public foresters considered it purely a publicity stunt.

HARDTNER'S LEGACY

The legacy of Henry Hardtner to forestry is remarkable. As a lumberman, he began to understand the potential for reforesting cutover lands. He promoted his ideas and used his forest land to demonstrate the sustainability of southern pine forests. In addition as a Louisiana state legislator, he led a program to provide tax relief for those wanting to reforest their land. He also led an effort to develop and introduce a timber severance tax that would provide for forest fire protection programs across the State and fund the Louisiana Division of Forestry.

In the afternoon of April 27, 1939, all businesses and schools in Urania were closed for the dedication of a bronze plaque and stone tablet presented by the Society of American Foresters, Yale School of Forestry Alumni, and Hardtner family in memory of the life and achievements of Henry E. Hardtner. The inscription on the memorial briefly summarizes his contributions (Chapman 1939):

HENRY E. HARDTNER

PIONEER OF SOUTHERN FORESTRY

- Founded Urania Lumber Company, 1898.
- Chairman, Louisiana Conservation Commission, 1908-1912.
- Author, Louisiana Reforestation Act, 1910.
- Sponsor, first severance tax law in United States, 1910.
- Co-operation with U.S. Forest Service in research, 1913.

A bronze plaque embedded in a stone tablet presented by the Society of American Foresters, Yale School of Forestry Alumni, and the Hardtner family in memory of the life and achievements of Henry E. Hardtner.



- Initiated reforestation on Urania forests, 1915.
- First permanent remeasured sample plots in South, 1915.
- Co-operated with Yale School of Forestry at Urania, 1917.
- Branch of Southern Forest Experiment Station est. 1921.
- Experiments in controlled burning for longleaf pine, 1928.
- An inspired leader in forest conservation.
- A courteous and beloved friend, 1871–1935.

At the memorial service were many of the most influential foresters of the United States. Comments from a number of these were published in the 1939 volume of the *Journal of Forestry*. His accomplishments were many and his friendship was coveted.

As an indication of the significance of his contributions, in June 1934, the Urania Lumber Company became the first company in the United States to be accredited for sustained yield forestry under the conservation provisions of the then lumber code (Demmon 1935).



WILLIAM H. SULLIVAN, general manager of the Great Southern Lumber Company. (photo from Louisiana State University Archives)

The Action of William H. Sullivan

When convinced that Henry Hardtner's ideas on reforestation were sound, William H. Sullivan, the general manager of the Great Southern Lumber Company in Bogalusa, began an aggressive reforestation program. The company would use natural regeneration when possible, but also develop techniques to grow and plant southern pine seedlings.

The Great Southern forestry operation began in the winter of 1920-21 with full approval of the directors. Eight hundred acres were fenced, seed beds were prepared by plowing, and loblolly pine seeds were direct seeded. At the same time, fire protection was established on 5,000 acres, and seed trees were marked to be left on the lands being logged. The portion of the saw-milling equipment which sawed small logs was shut down, and skidder crews were told to protect the remaining seed trees or get out of the woods (Garrison 1952).

THE GREAT SOUTHERN LUMBER COMPANY

In 1905-06, Frank H. and Charles W. Goodyear, lumber barons from New York, purchased 300,000 acres of virgin longleaf pine timberland and in 1906 began building a mill and town. But, this was not a typical lumbering operation. The

sawmill was built with steel and was meant to become the largest mill in the world—capable of processing a million board feet of lumber per day. The sawmill, log pond, and lumber stacks occupied nearly 200 acres. The log pond alone covered 27 acres. The powerhouse was equipped with 13 boilers, all fired with planer mill refuse. Here power was generated to run the sawmill and the paper mill, and furnish the needs of the city.

When construction of the mill was completed in 1907, it was a magnificent structure. Paul M. Garrison, later chief forester for Great Southern and then the Gaylord Container Corporation, described it thusly in 1952:

There was, of course, all the other equipment necessary to produce 1,000,000 board feet of lumber and timber in 24 hours. Back of this were the forests, railroad, Shay and rod locomotives, log cars, Lidgerwood and Clyde skidders and McGiffert loaders to supply the raw material to satisfy this hunger monster. Here in Bogalusa was invested \$15,000,000 in forests, houses, and sawmill and logging equipment before one thin dime of revenue was taken out.

The town was also exceptional. Harvey Murdock, who had planned several real-estate developments on Long Island and in the environs of New York City, was engaged to draft plans for the city of Bogalusa (Goodyear 1950). The final draft of Murdock's map showed three residential areas: (1) a business section; (2) plots for public buildings, such as a city hall, a hospital, and schools; and (3) several parks, the largest of which was to be called Goodyear Park. Bogue Lusa Creek divided the town site and was the basis for the town being named Bogalusa. To the south of the creek, the Company proposed to build 850 homes to be sold or rented to employees.

From the onset, the sawmill town was planned to become a permanent city. Sullivan and the Goodyear brothers provided the needed infrastructure and amenities. Sullivan once stated:

All my life, I've built sawmills and sawmill towns. I've come into virgin forests with my men and their wives and children. I've seen the young folks marry and have children of their own. I've seen them attending churches and schools I built. Then, even in the biggest operations, we'd come to the end of the cut. I've seen the whole town pulled up by the roots and moved. Worse, I've seen it stand empty, another

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When convinced that Henry Hardtner's ideas on reforestation were sound, William H. Sullivan, the general manager of the Great Southern Lumber Company in Bogalusa, began an aggressive reforestation program.

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The Bogalusa Commissary was built to provide merchandise for the citizens of Bogalusa. Privately owned businesses also provided supplies and materials to citizens. (photo from Louisiana State University Archives)

American ghost town. So, when I started building Bogalusa in 1906, I swore by the Lord that it was going to be one sawmill town that would last—Quick, 1946

To accomplish this, they soon began to seek to diversify its economy.

ATTEMPTS AT DIVERSIFICATION

The Great Southern Lumber Company began massing large quantities of cutover forest land and began efforts to find uses for this land. With some misgivings, the Goodyear brothers tried to put a part of the cutover lands to use for farming and livestock production, but the land was not suitable for agricultural purposes and, too, hundreds of resinous stumps per acre needed to be removed. The livestock effort failed as well. Cattle did not do well on the cutover sites (Goodyear 1950).

In the late 1920s, Great Southern planted thousands of acres of tung plantations. The tung or tung-oil tree (*Vernicia fordii*) is native to central China. The oil from the nut had traditionally been used in lamps in China, but in modern times as an ingredient in paint, varnish, and caulk. It is also used as wood finish for furniture and other wooden products. The climate along the Gulf Coast seemed ideal for the species, and the company invested in plantations and the facilities needed to process the nuts for oil. But, freezing weather and hurricanes destroyed much of their plantations, and with increasing foreign



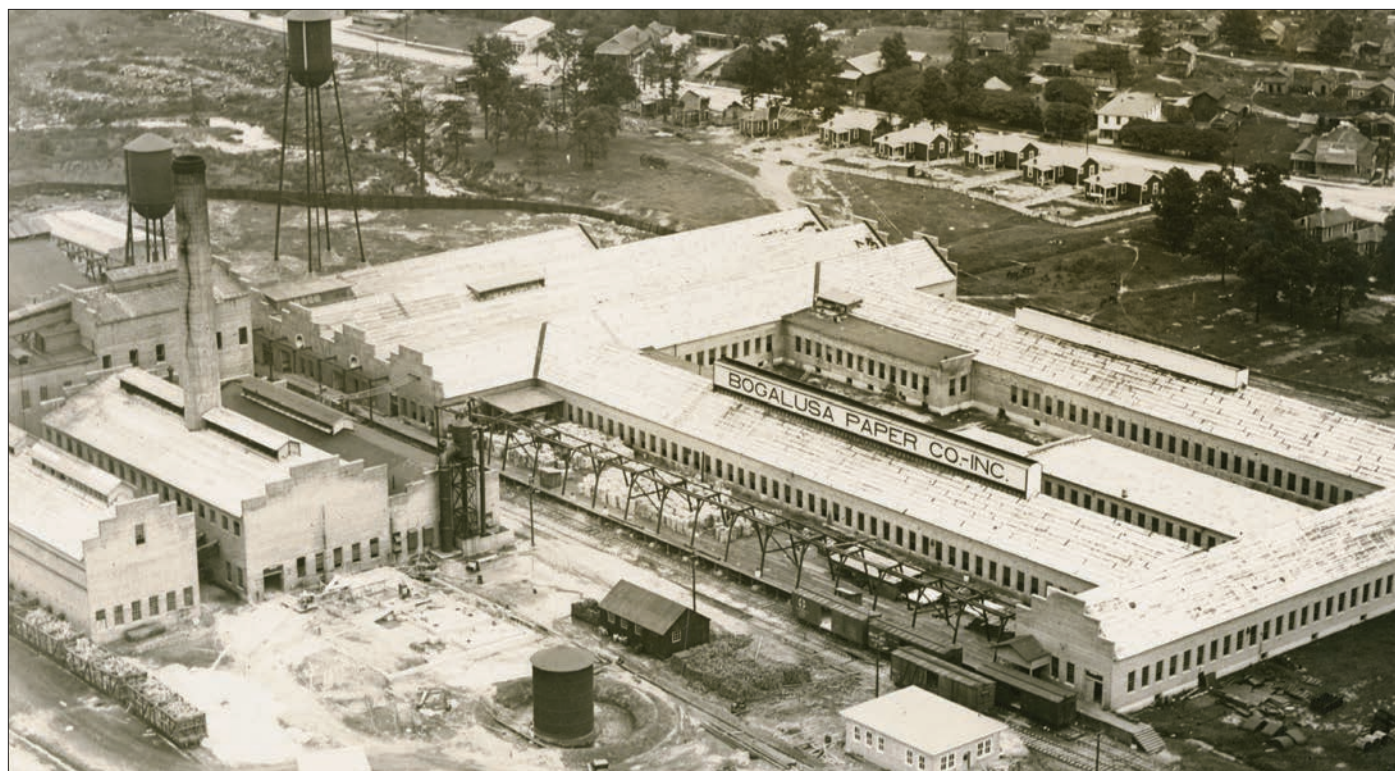
competition for producing the oil, this effort ended (Wikipedia 2016). Although the trees are now occasionally used for landscaping purposes along the Gulf Coast, they are listed as an invasive species in Florida.

The Great Southern manager **D.T. CUSHING** (left) and **LAMONT ROWLAND** in a stand of one of the tung-oil plantations. (photo from Louisiana State University Archives)

THE BOGALUSA PAPER COMPANY

In 1912, a pioneer paper mill, the Louisiana Fibre Board Company, was developed in Bogalusa by a group of investors from the Midwest. The mill was built to produce sulfite pulp using waste material from the Great Southern Lumber Company sawmill. This effort was unsuccessful until it converted to the sulfate process, at which time it became quite profitable.

The Goodyear's had investigated the development of a paper mill in the 1890's and were anxious to convert more of their Bogalusa sawmill waste to profit, so they engaged a consulting firm to explore the possibility of an additional paper mill in Bogalusa. The consultants concluded there was enough sawmill waste to manufacture nearly 800 tons of paper per day with a profit of \$20 per ton utilizing the sulfate process. As the result



The Bogalusa Paper Company facility in the late 1920s. (photo from Louisiana State University Archives)

of this report, a subsidiary, the Bogalusa Paper Company was formed and in October 1916, construction began on a mill to produce 100 tons per day of Kraft container board. Three years later, Bogalusa Paper Company acquired Louisiana Fibre Board, and Bogalusa became the most important paper manufacturing center in the South (Oden 1973).

Papermaking could assure the life of the company and the community once the Great Southern Lumber Company sawmill had exhausted the available supply of sawtimber, provided a source of raw material other than sawmill waste could be found.

ESTABLISHMENT OF A REFORESTATION PROGRAM

In the fall of 1917, Great Southern became the first forest products company in Louisiana to employ a professional forester when they hired Harry B. Krausz, a member of the Yale School of Forestry class of 1916 (Anon. 1917). According to the *Yale Forest School News* (1918a):

... One of his [Krausz's] chief jobs is to bring about the reforestation of the cut-over lands belonging to the company. Ten acres ... have been set aside for a nursery at the

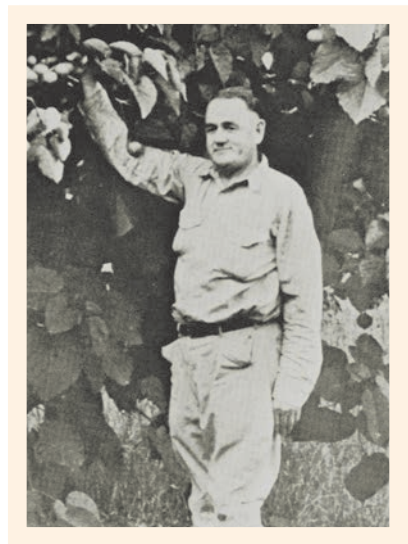
company's farm. ... He is planning to use considerable slash pine. ... He plans to set out one year stock and carry the rest over for another year. ... Pine seedlings will be grown on a large scale to be furnished free to settlers in the region The company is acting as a demonstrator in the farm forestry work carried on by the States Relations Service in co-operation with the Forest Service. ... In addition to his reforestation work Krausz has two fire patrolmen ... and is also the proud possessor of a horse and saddle.

For unknown reasons, Krausz did not stay long in Bogalusa. By the summer of 1918, he was employed as a farm forestry specialist in North Carolina (Yale Forest School News 1918b).

Great Southern's reforestation plans appear to have been in limbo until 1920 when the president, A.C. Goodyear, general manager, Will Sullivan, and the entire board of directors of Great Southern visited Henry Hardtner at Urania, LA, where they acquired the information needed to modify the company's logging and milling practices and justification to begin a reforestation program. Upon returning to Bogalusa, Sullivan ordered that the use of the steam-powered skidders be changed so that smaller timber and seed trees were left to facilitate natural regeneration. However, the thousands of acres that had been cutover without leaving seed trees would have to be planted to establish a second crop. Sullivan anticipated that a second crop of trees would meet the future needs of the paper mill and hoped that trees would be large enough to supply the sawmill before all of the company's old-growth timber was harvested.

Once a decision was made by the company, lack of funding to carry out the proposed program was never a problem. To replace the departed Harry Krausz, Sullivan appointed J.T. "Jake" Johnson as forester and F.O. "Red" Bateman as ranger to carry out his plans. Neither had any forestry training or experience, but they served the company admirably. Johnson spent much of his time in public relations—convincing local residents about the need for fire prevention. Bateman took the lead in developing reforestation techniques. Their efforts began in 1919-20.

One early decision in 1920-21 was to begin leaving seed trees in their harvesting efforts and to take advantage of natural regeneration. In 1920, Bateman noted that a bumper crop of longleaf pine cones was in place in an area to be logged and obtained Sullivan's permission to fence an area of 10,000 acres to protect it from hogs in order to obtain natural regeneration.



F.O. (RED) BATEMAN contributed greatly to developing reforestation technology for southern pines. Here he is standing in a tung plantation.

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Within 5 years after initiating a reforestation program, Great Southern was recognized as one of the world's most progressive lumber companies and a pioneer in developing reforestation technology.

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This effort was successful and became a beautiful stand of 10,000 acres of longleaf pine—a great example of a modified shelterwood regeneration system (Wakeley 1976). Outside of the fenced area, hogs had reduced the original catch of thousands of seedlings per acre to two or three seedlings per acre.

To increase their amount of reforested land to supply their papermill, Great Southern began buying naturally reseeded forest land. While the idea was opposed at first—they had more than enough cutover land—the company eventually agreed to purchase additional land with young, established stands (DeKalb 1921). Eventually, 120,000 acres of naturally regenerated forest lands were purchased and protected from fire (Garrison 1952).

By 1923, Bateman had nursery and planting techniques for loblolly and slash (*Pinus elliottii*) pines pretty well under control. He had worked out the essentials of the general practices still employed today—slit planting of bare-root seedlings grown at moderate seedbed densities in the nursery without shade. He developed a planting tool (or “dibble”) that is still used to plant pine seedlings. The 6- by 8-foot spacing he chose as most suitable and economical for southern pines was the almost universal standard throughout the South for decades. Before the Great Depression halted the planting operations in 1933, Bateman had planted 12,700 acres of pine seedlings. With only one exception—the Biltmore Estate in North Carolina—there was no other successful southern pine plantation of more than 100 acres (Wakeley 1976).

The Great Southern reforestation program quickly gained significant international recognition and numerous foreign visitors. An example was the visit of Dr. Tor Jonson of Sweden. He was at the time one of the world's most knowledgeable and respected foresters. Wakeley commented, “I think that Red Bateman communicated with Jonson with greater understanding of forests than did most of the professional foresters” (Wakeley and Barnett 2011). It is interesting to note that within 5 years after initiating a reforestation program, Great Southern was recognized as one of the world's most progressive lumber companies and a pioneer in developing reforestation technology.

In 1928, Henry Hardtner wrote to Sullivan praising the Great Southern's reforestation program (Southern Lumberman 1929). Hardtner wrote in part:

I have watched with interest and enthusiasm the development and progress of reforestation at Bogalusa... I knew the land in its naked, desolate state only a few decades



ago, and now that same land... is covered with a mantle of green thrifty pine trees, growing rapidly and rearing their tops heavenward. Your success is beyond my greatest expectations, and your greatest difficulties are over. You have done more real reforestation work than any other organization in America.

The combination of the harvest of the last of the virgin longleaf pine and the impending effects of the Great Depression resulted in the ending to the reforestation program in 1933. Sullivan's hope that second-growth forests could be grown to the size needed to continue to supply the sawmill did not occur—a gap of 10 to 12 years remained. The Goodyear's and Sullivan had sought a source for timber to maintain the operation of the mill until their forests could grow to meet their need. Sullivan (Southern Lumberman 1928) in an address to his sales staff justified the company's effort to ship redwood (*Sequoia sempervirens*) timber from the west coast as:

We found that between the time our standing timber was cut out and the new timber would be ready for the mill, there would be a lapse of 10 to 12 years, and what should we do to

The group that met Tor Jonson at Bogalusa on September 15, 1925. From left to right, kneeling: R.D. Forbes, Director of the Southern Forest Experiment Station; Roy Hogue, State Forester of Mississippi; W.R. Hine, State Forester of Louisiana. Standing: J.K. Johnson, Great Southern; Norman Core, Louisiana Division of Forestry; Tor Jonson; Harry L. Baker, U.S. Forest Service; Mr. Johansson (interpreter); F.O. (Red) Bateman; and E.L. Demmon, who succeeded Forbes as Director of the Southern Station.



The Great Southern Lumber Company sales staff gathered in Bogalusa in front of an early shipment of redwood logs from California.

fill in these years and keep Bogalusa going? The Goodyears were willing to spend more money to accomplish this end and went west to look into redwood, in which our neighbors were interested, but lacked the money to go into it in a big way. We had it and today it is invested in this project in order that Bogalusa might live, in order that the Great Southern Lumber Company might continue to live... .

It was soon found that the cost of transporting redwood logs by a fleet of ships to be cut into lumber at Great Southern was an unprofitable venture. This problem was enhanced by the oncoming economic impact of the Great Depression. The redwood effort soon had to be abandoned (Garrison 1952).

In early 1935, all of the then 472,000 acres of Great Southern lands, including their administration and management personnel were transferred to the Bogalusa Paper Company, and in 1936 the reforestation program resumed. In 1937, Robert Gaylord, Inc. and the Bogalusa Paper Company merged and the resulting company became the Gaylord Container Corporation (Garrison and

Bercaw 1953). Using their past experience as a guide in bringing cutover land back into production, the new directors agreed to continue an aggressive forest policy. The company has since changed ownership several times, but has always maintained its commitment to progressive and sustainable forestry practices.

LEGACY OF THE GREAT SOUTHERN LUMBER COMPANY

In April 1938, the last log processed by the Great Southern Lumber Company was cut by sawyer Ben Sellers who had cut the first log 30 years earlier. Seven months later, the company began liquidation (Goodyear 1950). Although the Great Southern Lumber Company ceased to exist almost 80 years ago, the forests it created continue to be productive today. Hardtner's Urania Forest was deemed first in having a sustainable forestry program. Great Southern achieved sustainable forestry status soon thereafter by developing both natural and artificial reforestation technology and applying it across their land ownership. Their paper mill provided a market for their growing amount of raw material. The forests developed by Great Southern remained sustainable through several different land ownerships and have fulfilled DeKalb's (DeKalb 1921) prediction that Great Southern was developing a "perpetual timber supply" that would become the basis for industrial permanency.

It is notable that before its old-growth timber supply ended, Great Southern launched one of the first, largest, and most successful forest restoration efforts in the country.

William H. Sullivan did not live to see the closure of his company—he died unexpectedly in January 1929. There was a great outpouring of sorrow for his death and pride of his accomplishments. Seldom has one individual made such an impact on a community, a business, a State, and left a legacy that has continued for over a century.

In 1954, the Gaylord Container Corporation, successor to the Great Southern Lumber Company, planted its 100 millionth pine seedling in 110,500 acres of plantations (Heyward 1963). This became the largest privately owned man-made forest in North America, and the first planted forest of significant extent to reach merchantable size. This forest is a lasting testimony to W.H. Sullivan's vision and the energy and dedication to carry out his vision in a practical way.



Photo taken in 1939 of slash pines which were hand planted in 1924-25. **PAUL M. GARRISON**, chief forester of Gaylord Container Corporation, stands in an area where 7 cords of pulpwood per acre have been thinned, leaving 27 cords per acre (Goodyear 1950).

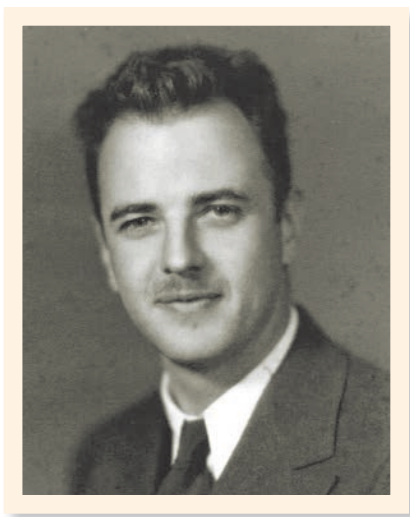


Photo of **PHILIP C. WAKELEY** taken in the 1930s while working at the Stuart Nursery.

The Persistence of Philip C. Wakeley

Philip C. Wakeley, a native of New York and graduate from Cornell University, was recruited by the Forest Service, Southern Forest Experiment Station at New Orleans, LA in 1924. He was immediately assigned to Bogalusa to work in collaboration with the Great Southern Lumber Company's reforestation program. Wakeley had the opportunity to work with Johnson and Bateman until Great Southern ended their reforestation program in 1933. Wakeley considered Bateman to be one of the greatest silviculturists that the South has known. Thousands of acres of Great Southern's second-growth longleaf, all their plantations, and in a real sense, most of the plantations in the South, stand as a monument of Bateman's genius (Wakeley 1976).

When Philip C. Wakeley began his reforestation research at Bogalusa in 1924, the Southern Forest Experiment Station had been in existence for only 3 years, and the Station's area of responsibility included all of the South's Coastal Plain from east Texas to the Carolinas. Wakeley's findings, developed in collaboration with Great Southern, were then to be applied to the entire Southern Coastal Plain. He began an intensive collaborative effort to understand and develop southern pine seed collection and processing, seedling nursery culture, and planting technology. One of Wakeley's responsibilities was to document and communicate this information to the general forestry community.

COLLABORATION WITH GREAT SOUTHERN LUMBER COMPANY

The results of Wakeley's cooperative research with the Great Southern on nursery production spread to other organizations interested in reforestation. A number of forestry companies developed small nurseries to evaluate the potential for beginning reforestation efforts. In 1929, Wakeley decided to write a bulletin on the results of their seed, nursery, and planting research. He decided to visit nurseries in other organizations to gain a prospective from their nursery managers. The survey included six nurseries: Louisiana State University School of Forestry at Baton Rouge, Louisiana Division of Forestry at Woodworth, Industrial Lumber Company at Elizabeth, Long Bell Lumber Company at DeRidder, and the Texas Forest Service nurseries at Kirbyville and Conroe, TX (Wakeley and Barnett 2011).

Philip Wakeley's collaboration with Johnson and Bateman at the Great Southern Lumber Company ended in the early 1930s

with the advent of the Great Depression. During Wakeley's association with Great Southern, he began developing information for seed collecting, processing, and treating; on seedling stock specifications; and a variety of nursery cultural treatments. With the demise of the Great Southern forestry program, Wakeley's reforestation research program was moved to the Forest Service's new Stuart Nursery at Pollock in central Louisiana.

RESEARCH STUART NURSERY

The Stuart Nursery was established in 1934 by the Kisatchie National Forest (KNF) in conjunction with the creation of the Civilian Conservation Corps (CCC). Although KNF employees managed the nursery, nearby CCC camps with 200 young men each provided manpower for its operation and field planting (Barnett and Burns 2012). Nursery seedling production was about 25 million annually with most of these seedlings shipped to CCC projects that had reforestation emphases. Wakeley's research, now located at the nursery, took advantage of the CCC crews to apply a variety of nursery cultural practices and to establish outplanting studies. Over the 9-year duration of the CCC involvement and support, nearly three-quarters of a million tree seedlings were planted in research studies on the newly formed Palustris Experimental Forest (Barnett and others 2011).

By the end of the 1930s, Wakeley and his colleagues were able to publish guidelines for southern pine seed (Wakeley 1938a) and seedling production (Huberman 1938, Wakeley 1938b) and planting technology (Wakeley 1935). Early versions of these publications were used by the organizations using CCC crews to grow seedlings for reforestation projects. Most of these CCC-related projects ended with the closure of the CCC program at the beginning of World War II. However, the availability of the CCC program provided an opportunity to field test seed, seedling, and planting research results and pioneer reforestation guidelines for southern pines.

PLANTING THE SOUTHERN PINES DOCUMENT

The technology developed at the Great Southern and Stuart nurseries facilitated the development of Wakeley's southern pine seedling grade specifications and other cultural guidelines that were needed to successfully produce and plant seedlings. After World War II, Wakeley reviewed the forestry literature and analyzed all the research data from his studies. With this information he published his classic book, *Planting the*

Wakeley's research took advantage of the CCC crews to apply a variety of nursery cultural practices and to establish outplanting studies.



The Forest Service's Stuart Nursery was built and operated by CCC crews with Kisatchie National Forest supervision. It produced 25 million seedlings annually to support the planting needs of the Forest Service sponsored camps in several States.

Southern Pines" (Wakeley 1954). The document provided the information necessary to begin and conduct artificial regeneration programs across the South. It became one of the most referenced publications in the history of the Southern Forest Experiment Station.

INITIATION OF FOREST TREE IMPROVEMENT PROGRAMS

In the "*Planting the Southern Pines*" publication, Wakeley reported on a study he installed at Bogalusa in 1926 that evaluated effects of four different seed sources on stand productivity. At 15 years in plantation age, the local source had produced more than twice as much pulpwood per acre as either of the two most distant sources (Wakeley 1944). In addition, conspicuous and economically important differences in resistance to disease appeared among the different sources.

Wakeley's photographic documentation of the 1926 study results did much to influence foresters on the importance of seed source selection and led to the formation of the Southern Forest Tree Improvement Committee (SFTIC). One of the first important undertakings of SFTIC was to establish the Southwide Pine Seed Source Study under his direction.

The Southwide Pine Seed Source Study was a gigantic undertaking. Thirty-three of the studies 57 plantations were established during the winter of 1952-1953. At each plantation site, seedlings of loblolly, shortleaf, slash, and longleaf pines, representing a wide geographic range of seed-collection sites, were planted (Wells and Wakeley 1966). The significance of this study



The geographic results of Wakeley's seed source study convinced many of the importance of seed selection and influenced the establishment of the much larger Southwide Pine Seed Source Study and development of major tree improvement programs.

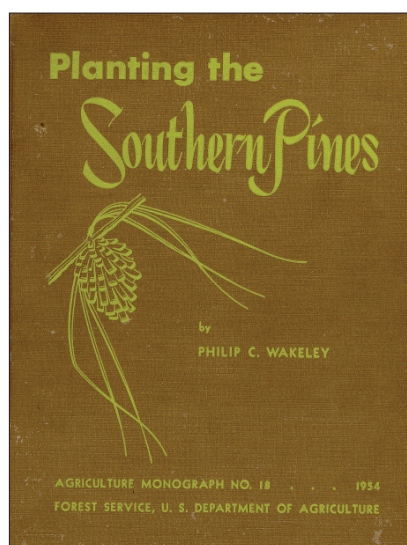
can be understood by its description by leading forest pathologists who called it a “gift from the gods” (Wakeley and Barnett 2011). They recommended that the outplantings be followed to gain an understanding of the biology of insect and disease pests that could affect pine plantation performance.

Thus, Wakeley was not only responsible for the guidelines for reforesting the South's pine forests, but his work also led to the southern pine tree improvement programs that have greatly increased the productivity of these forests and enhanced their sustainability.

Carter and others (2015), paraphrasing Winston Churchill, said of Wakeley and his colleagues, “never in the history of forestry have so many benefited so much from the work of so few.” Although there have been many refinements and improvements in southern pine nursery technology over the last century, the basic guidelines developed through the collaboration of Jake Johnson and Red Bateman of Great Southern with Phil Wakeley of the Southern Forest Experiment Station remain as the foundation for these practices.

Wakeley was not only responsible for the guidelines for reforesting the South's pine forests, but his work also led to the southern pine tree improvement programs that have greatly increased the productivity of these forests and enhanced their sustainability.

THE SPREAD OF SUSTAINABLE FORESTRY



Wakeley's *"Planting the Southern Pines"* became the basis for the South's reforestation programs following World War II.

By the end of the third decade of the 20th century, the best and most accessible virgin stands of longleaf pine along the Gulf Coast States were gone. With the onset of the Great Depression, worldwide demand for lumber plummeted. Southern yellow pine lumber production reached its lowest point of the century in 1932. But the actions and accomplishments of Henry Hardtner, Phil Wakeley, and Will Sullivan were beginning to resonate across the region and across the country.

In the early 1920s, Congress enacted legislation to expand forestry research and to provide Federal assistance to States to provide forest fire protection, build tree nurseries and provide seedlings for reforestation, and encourage landowners to practice forestry. States began to follow Hardtner's persistence and Louisiana's example by enacting seed tree laws to encourage natural regeneration, protecting forests from wildfire and providing ad valorem tax relief to encourage landowners to practice forestry. Federal economic recovery programs such as the CCC followed techniques pioneered by Great Southern Lumber Company and refined and documented by Phil Wakeley and his associates, to build nurseries and plant millions of pine seedlings on cutover forest and abandoned farmland (Wakeley 1954). The Agricultural Conservation Program, Soil Conservation Service (now Natural Resources Conservation Service), and Forest Service in cooperation with State Foresters, Forest Extension Specialists, private industry, and consulting foresters brought education and assistance to thousands of private landowners resulting in many planting trees and practicing sustainable forestry.

The Bogalusa Paper Company and other fledgling Kraft pulp and paper manufacturers were among the very few industries that continued to make a profit and, in some cases, expand during the Great Depression. Most followed the Bogalusa Paper Company model, acquiring their own timberlands and practicing sustainable forestry to ensure their future supply of raw material.

A “*golden age of industrial Forestry in the South*” began following the end of World War II. In 1953, with the post-war boom in full swing, the first nationwide scientific forest inventory was completed. It showed that there were about 88 million acres of pine forest in the South, of which 3 million acres were plantations and the rest originated from natural seeding, a remarkable example of the resiliency of the ecosystem aided and abetted by the practice of forestry. By the end of the 20th century, the South was producing 60 percent of the total U.S. harvest of industrial roundwood. In 2007, nearly 18 billion board feet of southern yellow pine lumber was produced, the highest in history and nearly 2 billion board feet more than in 1909, the highest year of production during the “*golden age of lumbering*.”

As the 21st century began, decreasing demand and increasing global competition spawned widespread consolidation and disintegration of the pulp and paper industry. The Great Recession of 2008 disrupted the housing industry. Thus, the harvest of conventional forest products from the South’s forest has declined in recent years. However, the forest products industry remains a major driver of the economy of Louisiana and the region. In 2012, there were 14.9 million acres of forest in Louisiana, of which, about 85 percent was privately owned. Forestry in Louisiana was an \$11 billion industry with forestry-related employment accounting for 2 percent of all jobs in the State (Tanger 2014). Henry Hardtner, Will Sullivan, Phil Wakeley and those who followed in their footsteps would be justly proud.

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The forest products industry remains a major driver of the economy of Louisiana and the region.

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CONCLUSION



Man and nature working in harmony rapidly restored forests to the region and by the end of the century sustainable new pine forests covered the entire Southern Coastal Plain.



Longleaf Pine Forests 100 Years Later

The millions of acres of longleaf pine that once covered most of the Gulf Coastal Plain all but disappeared in a remarkably short period of the early 20th century. Man and nature working in harmony rapidly restored forests to the region, and by the end of the century sustainable new pine forests covered the entire Southern Coastal Plain. These forests continue to be a leading driver of the South's economy. This is an amazing achievement and the Great Southern Lumber Company played a major role in this accomplishment.

However, longleaf pine, once by far the dominant species, has been replaced by other pines in the restored forests. The botanical characteristics of longleaf pine, a reduction in wildfire, and the presence of hogs—domestic and feral—rendered longleaf far less competitive than loblolly and slash pine with which it shared most of its original range. Both loblolly and slash pine are more prolific seeders; produce smaller, more easily dispersed seed; have a high seedling survival rate; and initiate height growth the very first year. Neither loblolly nor slash seedlings are consumed by hogs which seem to consider the carrot-like tap root of longleaf a delicacy.

Frequent burning gives longleaf a distinct advantage over other species of southern pine. Once past the cotyledon stage, a few weeks after germination, longleaf seedlings can tolerate repeated burning. Slash and especially loblolly seedlings are readily killed by surface fires until they are 8 to 10 years old. Apparently, ubiquitous burning of the forest by both Native Americans and European immigrants maintained longleaf as the dominant species of the southern pinelands.

The 1953 forest survey found 88 million acres of pine forest in the South, 3 million acres of which were plantation and the rest derived from natural seeding. Of the total, 51.8 million acres were loblolly-shortleaf pine and 26.9 million acres were longleaf-slash pine (Oswalt and others 2014). There is little doubt that most of these acres were dominated by longleaf at the beginning of the 20th century.

As plantation forestry accelerated during the second half of the 20th century, longleaf was seldom the species planted. Longleaf seeds are large; have thin seed coats; and are more difficult than other southern pine species to collect, process, and store while maintaining good seed viability. The lack of sufficient quantities of quality seeds limited the amount of seedlings that could be produced.

Longleaf pine plantation success is low with nursery-grown, bare-root seedlings. If seedlings must be stored and shipped, initial survival is especially poor. Hogs commonly destroy longleaf planting. They seemed to relish the succulent nursery-grown seedlings.

Longleaf pine seedlings regenerated by direct seeding in the early 1960s (Barnett 2014). They have emerged from the grass stage and have begun active height growth.





There is hope that the longleaf pine ecosystem will continue to expand, providing an economic asset as well as a recurring vision of the beautiful and inspiring forests that once covered so much of the South's forested landscape.



Once planted, longleaf seedlings may remain in the so-called grass stage for several years before they begin height growth. Inadequate site preparation and lack of competition control after planting can prolong the grass stage. Lower survival and slow early growth invariably results in lower yield and lower return on investments in longleaf plantations than can be achieved by slash or loblolly pine. Even the Great Southern Lumber Company chose to plant slash or loblolly on lands where once grew magnificent stands of longleaf. During the second half of the 20th century, thousands of acres of second growth longleaf was harvested and replanted with slash or loblolly pine.

Longleaf pine forests, which are reported to have occurred on about 90 million acres across the South, have been reduced to about 4 million acres and the longleaf ecosystem is considered endangered. There is hope, however, that the remaining acreage can be maintained and even expanded.

Seed-related problems which limited the production of longleaf pine seedlings early in the 20th century have been overcome by research and improved technology (Barnett and McGilvray 2002). Sufficient quantities of quality longleaf seeds are now available to meet current needs.

Within the last two decades, production of longleaf pine seedlings has shifted from bare-root to container seedling nurseries (Barnett 2004). This new technology results in excellent field performance. Cost-sharing programs are now available to encourage the restoration of longleaf pine on private land. Agencies across the South are promoting the unique values of longleaf pine and encouraging its planting on appropriate sites. So, there is hope that this ecosystem will continue to expand, providing an economic asset as well as a recurring vision of the beautiful and inspiring forests that once covered so much of the South's forested landscape.

REFERENCES

- Anon. 1917. A trained forester for Louisiana. Chicago: Lumber World Review. 33 (December 10): 40.
- Barnett, J.P. 2004. Restoring the longleaf pine ecosystem: the role of container seedling technology. In: Shepperd, W.D.; Eskew, L.G., comps. *Silviculture in special places: Proceedings of the National Silviculture Workshop*; September 8-11, 2003; Granby, CO. Proceedings RMRS-P-34. Fort Collins, CO: U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station: 127-134.
- Barnett, J.P. 2011. Faces from the past: profiles of those who led reforestation of the South's forests. Gen. Tech. Rep. SRS-133. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 68 p.
- Barnett, J.P. 2014. Direct seeding southern pine: history and status of a technique developed for restoring cutover forests. Gen. Tech. Rep. SRS-187. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 35 p.
- Barnett, J.P.; Blomquist, S.R. [In press]. The tale of two sawmill towns. *Forests & People*.
- Barnett, J.P.; Burns, A.C. 2012. The work of the Civilian Conservation Corps: pioneering conservation in Louisiana. Gen. Tech. Rep. SRS-154. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 64 p.
- Barnett, J.P.; Haywood, J.D.; Pearson, H.A. 2011. Louisiana's Palustris Experimental Forest: 75 years of research that transformed the South. Gen. Tech. Rep. SRS-148. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 64 p.
- Barnett, J.P.; McGilvray, J.M. 2002. Guidelines for producing quality longleaf pine seeds. Gen. Tech. Rep. SRS-52. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 21 p.
- Blackwell, M.E. 1964. Mr. Henry and his baby trees. Administrative report. 43 p. On file with: Southern Forest Heritage Museum, Anna C. Burns CCC Collection. Long Leaf, LA 71448.
- Brister, E.H. 1968. Once upon a river: a history of Pineville, Louisiana. Baton Rouge, LA: Claitor's Publishing Division. 230 p.
- Burns, A.C. 1978. Henry E. Hardtner, Louisiana's first conservationist. *Journal of Forest History*. 22(2): 79-85.
- Caldwell, J.M. 1975. The forest of the vintage: geography of industrial lumbering in North Central Louisiana, 1880-1920. Norman, OK: University of Oklahoma, Graduate College. 204 p. M.S. thesis.
- Carter, M.C.; Barnett, J.P. [In press]. Causes and consequences of the early 20th century lumber boom in Louisiana and the Gulf South. *Forest History Today*.
- Carter, M.C.; Kellison, R.G.; Wallinger, R.S. 2015. *Forestry in the South: a history*. Baton Rouge, LA: Louisiana State University Press. 448 p.
- Chapman, H.H. 1939. Dedication of memorial tablet to Henry E. Hardtner. *Journal of Forestry*. 37: 759-760.
- Chapman, H.H. 1947. Results of prescribed fire at Urania, LA, on longleaf pine land. *Journal of Forestry*. 45: 121-123.
- Curtis, M. 1973. Early development and operations of the Great Southern Lumber Company. *Louisiana History*. 14(4): 347-368.
- Cut-over Land Conference of the South. 1917. The dawn of a new constructive era: proceedings of the Cut-over Land Conference of the South. April 11-13, 1917. New Orleans: Chamber of Commerce of the New Orleans Area, Southern Pine Association, Southern Settlement and Development Organization. 244 p. <http://dx.doi.org/10.5962/bhl.title.32436>. [Date accessed: September 15, 2016].
- DeKalb, C. 1921. Perpetual timber supply through reforestation as a basis for industrial permanency. The Timberman. July. <http://freepages.genealogy.rootsweb.ancestry.com/~mcclendon/Bogalusa/Timberman/>. [Date accessed: May 16, 2016].
- Demmon, E.L. 1935. Henry E. Hardtner. *Journal of Forestry*. 33: 885-886.
- Forbes, R.D. 1921. The why and how of forestry in Louisiana. Bulletin 7. Baton Rouge, LA: Louisiana Department of Conservation. 40 p.

- Forbes, R.D. 1923. The passing of the piney woods. *American Forests*. 29(351): 132-133.
- Foster, J.H. 1912. Forest conditions in Louisiana. Bulletin 114. Washington, DC: U.S. Department of Agriculture Forest Service. 39 p.
- Fricker, D. [N.d.] Historic context: the Louisiana lumber boom, c. 1880-1925. Baton Rouge, LA: Fricker Historic Preservation Services LLC. http://www.crt.state.la.us/Assets/OCD/hp/nationalregister/historic_contexts/The_Louisiana_Lumber_Boom_c1880-1925.pdf. [Date accessed: June 10, 2016].
- Garrison, P.M. 1952. Building an industry on cut-over land. *Journal of Forestry*. 50(3): 185-187.
- Garrison, P.M.; Bercaw, T.E. 1953. The Gaylord story, part I. *Forest Farmer*. 18(2): 8-9, 19, 22, 26.
- Gates, P.W. 1940. Federal land policy in the South, 1866-1888. *Journal of Southern History*. 6(3): 303-330.
- Gates, P.W. 1979. Federal land policies in the southern public land States. *Agricultural History*. 53: 206-227.
- Goodyear, C.W., II. 1950. Bogalusa story. Buffalo, NY: William J. Keller, Inc. 208 p.
- Greeley, W.B. 1951. Forests and men. Garden City, NY: Doubleday and Company. 255 p.
- Hardtner, H.E. 1935. A tale of a root—a root of a tale, or root hog or die. *Journal of Forestry*. 33: 351-360.
- Heyward, F. 1958. History of industrial forestry in the South. The Colonel William B. Greeley lectures in industrial forestry. No. 2. Seattle: University of Washington, College of Forestry. 50 p.
- Heyward, F. 1963. Col. W.H. Sullivan—Paul Bunyan of Louisiana forestry. *Forest & People*. 13(1): 20.
- Huberman, M.A. 1938. Growing nursery stock of southern pines. Leaflet No. 155. Washington, DC: U.S. Department of Agriculture. 8 p.
- Kerr, E.F. 1958. History of forestry in Louisiana. Baton Rouge, LA: Louisiana Forestry Commission, Office of the State Forester. 55 p.
- Lacey, J.D. 1909. Tariff hearings before the Committee on ways and means of the House of Representatives, Sixtieth Congress, 1908-1909. Washington, DC: U.S. Government Printing Office: 3019-3020.
- Lanza, M.L. 1990. Agrarianism and reconstruction politics: the Southern Homestead Act. Baton Rouge, LA: Louisiana State University Press. 156 p.
- Mattoon, W.R. 1939. Dedication address to Henry E. Hardtner. *Journal of Forestry*. 37: 761-762.
- Mohr, C. 1897. The timber pines of the Southern United States. Bulletin 11. Washington, DC: U.S. Department of Agriculture, Division of Forestry. 176 p.
- Oden, J.P. 1973. Development of the southern pulp and paper industry, 1900-1970. Starkville, MS: Mississippi State University. 652 p. Ph.D. dissertation.
- Oswalt, S.N.; Smith, W.B.; Miles, P.D.; Pugh, S.A. 2014. Forest resources of the United States, 2012: a technical document supporting the Forest Service 2015 update of the RPA Assessment. Gen. Tech. Rep. WO-91. Washington, DC: U.S. Department of Agriculture Forest Service, Washington Office. 218 p.

- Quick, A. 1946. The history of Bogalusa, the “Magic City” of Louisiana. *The Louisiana Historical Quarterly*. 28(1): 181 p.
- Sargent, C.S. 1884. Report on the forests of North America (exclusive of Mexico). Washington, DC: Department of the Interior, Census Office. 612 p.
- Southern Lumberman. 1928. Great Southern’s sales staff holds interesting and constructive conference. *Southern Lumberman*. 133(December 29, 1928): 34.
- Southern Lumberman. 1929. Praises Bogalusa project. *Southern Lumberman*. 134(January 5, 1929) 44.
- Stokes, G.A. 1954. Lumbering in southwest Louisiana: a study of the industry as a culturo-geographic factor. Baton Rouge, LA: Louisiana State University. 231 p. Ph.D. dissertation.
- Tanger, S.M. 2014. The economic contribution of forestry and the forest products industry on Louisiana’s congressional districts. Research Information Sheet 112. Baton Rouge, LA: Louisiana State University Agricultural Center. 15 p.
- Wakeley, P.C. 1935. Artificial reforestation in the southern pine region. Tech. Bull. 492. Washington, DC: U.S. Department of Agriculture Forest Service. 115 p.
- Wakeley, P.C. 1938a. Harvesting and selling southern pine seed. Leaflet No. 156. Washington, DC: U.S. Department of Agriculture. 8 p.
- Wakeley, P.C. 1938b. Planting southern pines. Leaflet No. 159. Washington, DC: U.S. Department of Agriculture. 8 p.
- Wakeley, P.C. 1944. Geographic seed source of loblolly pine seed. *Journal of Forestry*. 42: 23-33.
- Wakeley, P.C. 1954. Planting the southern pines. Agricultural Monograph 18. Washington, DC: U.S. Department of Agriculture Forest Service. 233 p.
- Wakeley, P.C. 1971. Lectures in forestry; regeneration, plantation growth, and the personal and professional challenges of research. Forest Research Series 23. Clemson, SC: Clemson University, Forestry and Recreation Resources, Department of Forestry. 40 p.
- Wakeley, P.C. 1976. F.O. (Red) Bateman, pioneer silviculturist. *Journal of Forest History*. 20(2): 91-99.
- Wakeley, P.C.; Barnett, J.P. 2011. Early forestry research in the South: a personal history. Gen. Tech. Rep. SRS-137. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 90 p.
- Wells, O.O.; Wakeley, P.C. 1966. Geographic variation in survival, growth, and fusiform rust infection of planted loblolly pine. *Forest Science Monographs* 11. 40 p.
- Wikipedia. 2016. *Vernicia fordii*. https://en.wikipedia.org/wiki/Vernicia_fordii. [Date accessed: March 25, 2016].
- Yale Forest School News. 1918a. Alumni Notes. January 1, 1918. 6(1): 15.
- Yale Forest School News. 1918b. Alumni Notes. July 1, 1918. 6(3): 47.



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