The 1932 *Urania Bible*

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BACKGROUND

The Southern Forest Experiment Station (SOFES) had no formally designated experimental forests prior to the passage of the McSweeney-McNary Forest Research Act of 1928. This law legally authorized the establishment of experimental forests and with the August 1930 approval of Forest Service Regulation L-20, a process for the development of experimental forests on national forest lands emerged (Clapp 1931, 1938). While these formalized such facilities, the SOFES had not waited for these to begin such an effort—not by a long shot!

Almost a decade earlier, the SOFES had opened a field-based branch station in central Louisiana, following an earlier effort by the agency to cultivate a working relationship with the timber industry. Since at least 1909, U.S. Department of Agriculture Forest Service, Washington, D.C.-based staff such as William Willard Ashe, Wilbur R. Mattoon, and Samuel Trask Dana had worked on forestry issues with Henry Hardtner, a prominent lumberman in central Louisiana. Hardtner had started some of the first efforts by a southern industrialist to practice "perpetual forestry" on his Urania Lumber Company's extensive landholdings (fig. 1). By 1913, both Ashe and Mattoon had visited Hardtner's lands and saw his initial efforts to regenerate and protect his cutover, and both encouraged him further.

Hardtner's willingness to experiment in forestry was novel for the time, as was his eagerness to reach out to the Forest Service and university academics—most notably, Yale Forestry School's Professor Herman Haupt Chapman. Some of Hardtner's first forestry efforts would be considered primitive by today's standards

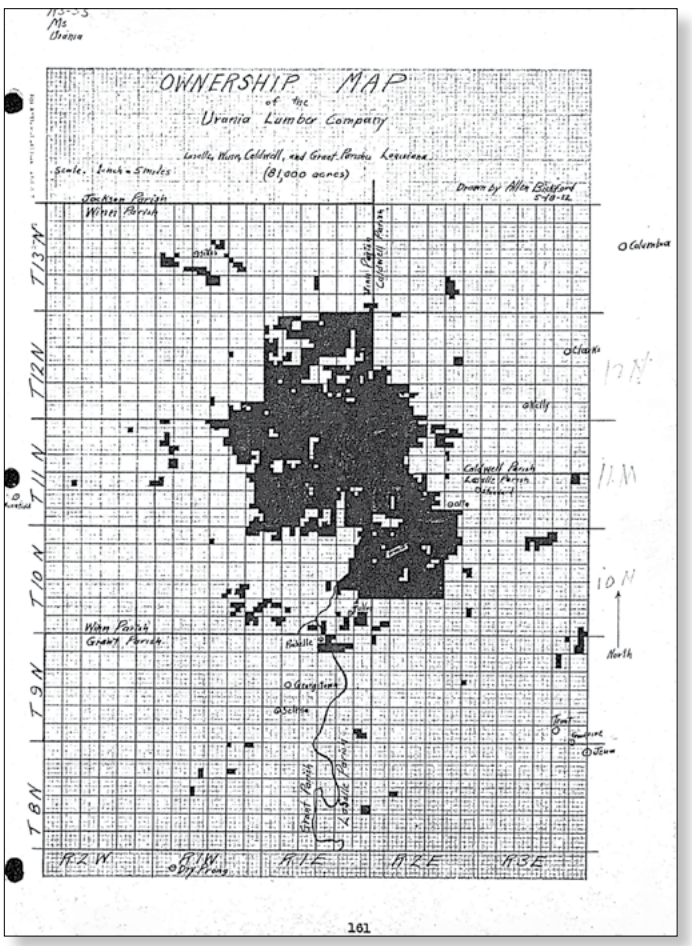


Figure 1—In 1932, the Urania Lumber Company owned about 81,000 acres of timberland in central Louisiana. In this 1932 hand-drawn map by C. Allen Bickford, company lands are shaded black, and were spread across four parishes.

but were revolutionary at that time. When timber was to be "mined" and then the land resold or abandoned, his simple acts of retaining a couple seed trees per acre to restock the forest and protecting the developing stand from fire and feral hogs was a dramatic shift from an industry that focused on cutting out their timber quickly and then moving on when the last log was milled.

The prospects of getting someone in the southern timber industry interested in forestry had a strong appeal to the Forest Service, who had sought such champions for years. During its first decades, the agency had expended considerable resources in developing working plans for a number of lumber companies and other large landowners who were seeking to extend the life of their operation. In the South, some of these were published (e.g., Chapman 1905, Olmsted 1902, Reed 1905, Sherrard 1903). The agency also produced a number of less specific assessments of timber resources (e.g., Dunston 1910, Foster 1912, Zon 1905) that recommended conservative cutting to allow for a second cut as well as protective measures and better utilization of the timber. But all of these reports failed to detail how to do these steps, or more critically, how best to tend the forest to ensure a perpetual source of desirable timber.

To achieve this end, Hardtner set aside areas of his company's land for experimentation and demonstration projects. By 1915, Dana and others from the Forest Service had helped Hardtner set up a number of small plot-based studies designed to consider a handful of specific questions. When the SOFES was established in July 1921, operation of the Forest Service plots at Urania were transferred to the Station's staff in New Orleans, LA and the Urania Branch Station of the SOFES was born. Over the next decade, additional studies were established as a series of new investigators came onto the scene. All of these early studies were of limited scope, lacked most research controls, and suffered from inadequate replication, but also proved to be a valuable training ground for SOFES researchers and students from Yale University and many other institutions during those formative years. Numerous Forest Service and university academics built much of their careers around the work at Urania, including Yale's Chapman, whose work on longleaf pine (*Pinus palustris*) from central Louisiana (e.g., Chapman 1922, 1932a, 1932b, 1948, 1953; Chapman and Bulchis 1940) helped his career immensely. In addition to Chapman's Urania work, a number of scientific papers were published, and the silvicultural experiments on the use of prescribed fire in pine-dominated forests and thinning in old-field loblolly (*P. taeda*) and shortleaf pine (*P. echinata*) stands helped to shape early forestry programs across the region (Bragg 2021, Wakeley and Barnett 2016).

To help keep track of the work at Urania, a document was assembled from the records available and periodically updated as new studies were installed, existing ones were impacted by events such as wildfires, and old ones discontinued. This unpublished collection—eventually known by some as the *Urania Bible*—was maintained over the years. The version of the *Urania Bible* (there were at least two editions) introduced in this paper was compiled by Roy A. Chapman and C. Allen Bickford in 1932. Roy Chapman, a 1927 University of Minnesota graduate, had worked for the SOFES as a temporary field assistant in 1926 and received a permanent assignment with the Station in 1929. Roy Chapman was particularly adept at statistics, having been trained specifically under Francis X. Schumacher in the Washington Office, as well as receiving additional training during his undergraduate years at Minnesota (Barnett and others 2023, Wakeley and Barnett 2016). In 1948, Roy Chapman returned to the Washington Office to continue to work on biometric and mensuration topics for the remainder of his Forest Service career. Dartmouth (1925) and University of Idaho (1931) graduate Bickford started with the SOFES in 1931 and worked on the silvicultural use of prescribed fire until he transferred to the Northeastern Forest Experiment Station in 1947. Bickford retired from the agency in 1963 as a statistician before embarking on a second career as a faculty member at the State University College of Forestry at Syracuse University.

Chapman and Bickford's account—which they had titled *Forestry History of Urania Lumber Company's Holdings in Northern Louisiana*—is part a history of the Urania Lumber Company and part an account of SOFES's early trials and tribulations. More importantly, the document contains valuable information about the establishment and design of dozens of studies at this location, including directions in how to get to the plots and maps of the plots (fig. 2).

The 1932 edition was added to over the years and has contributions such as memos to the study files, unpublished progress reports, and submissions to journals from persons such as SOFES researchers Henry Bull and David Bruce as late as the 1940s. A lengthy section of projects in the Urania area were added after 1933; the last of these new study installations was by Bickford in November 1936. As can be seen in the example in figure 3, the studies installed after 1933 likely include some of the earliest replicated, statistically robust, formal field studies of the SOFES [see articles by Bragg (2021), Barnett and others (2023), McNab (2022), and McNab (2023) for more on these early statistically designed studies].

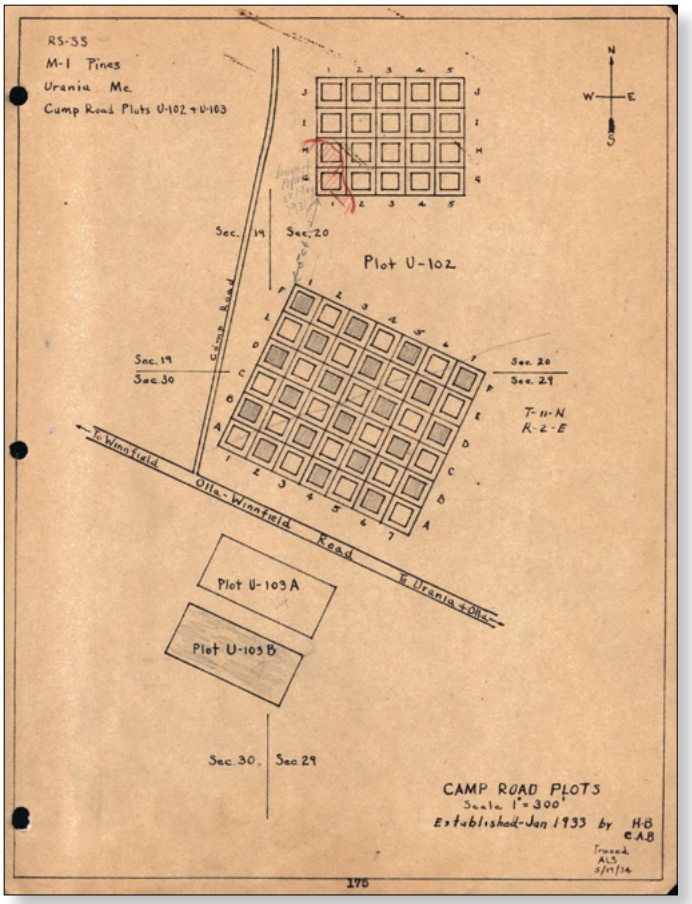
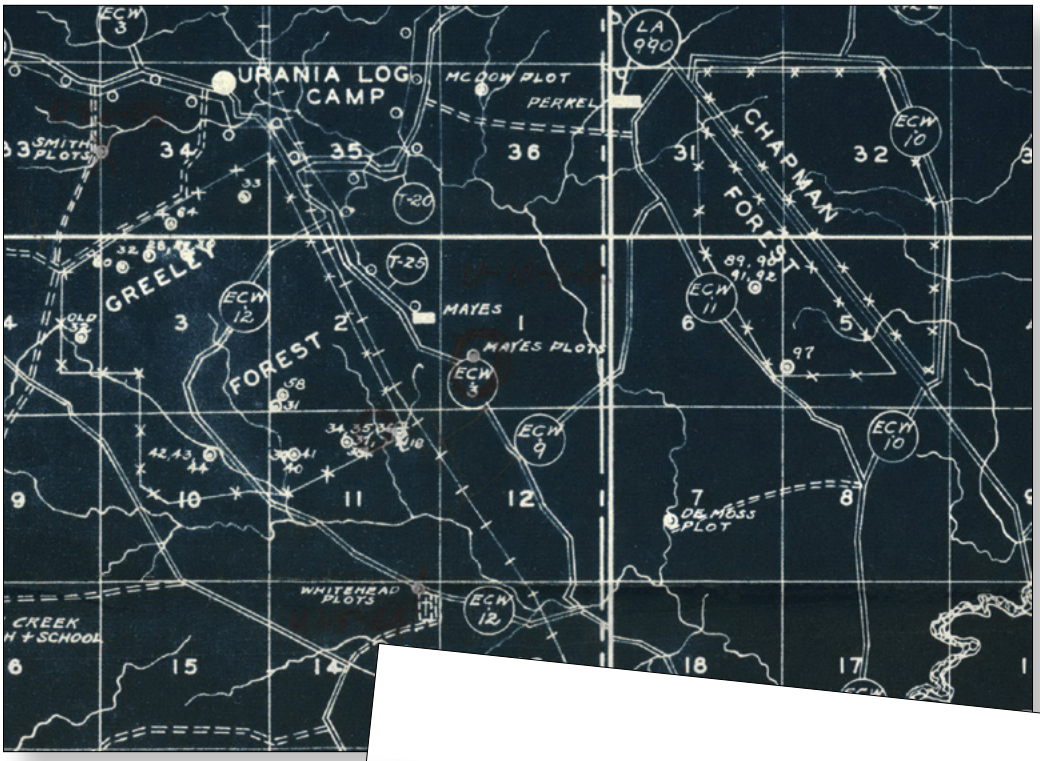
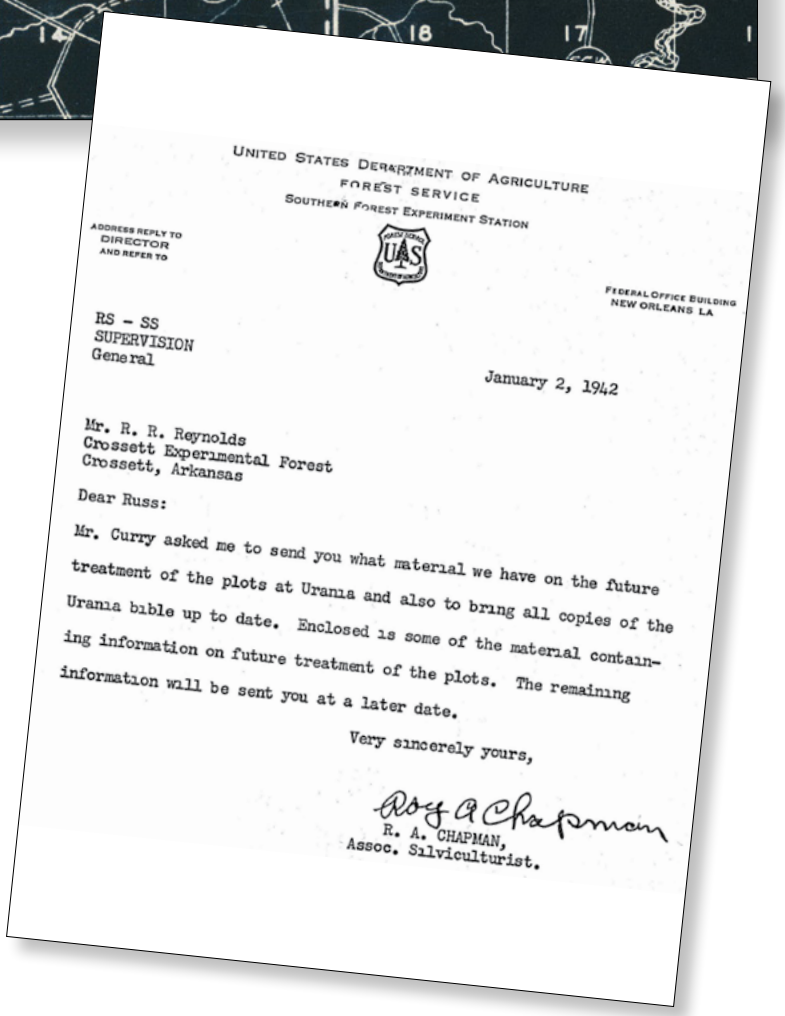


Figure 2—A zoomed-in view of the Urania Branch area, with study locations operated by the Southern Forest Experiment Station (to 1932). In this relatively small area, it is possible to see a series of individual and clustered plots (e.g., the McDow, Smith, Maye, DeMoss, Whitehead, and McDowell plots), as well as two large, fenced study areas (the Chapman and Greeley Forests). The full-sized map that this view was taken from covered 6 townships (over 138,000 acres).

In places, the text is brutally honest about the quality of the research work done—such as the Remarks and Recommendations section of the Holly Plot thinning work included at the end of this paper, which is an indirect critique of existing publications of this project (e.g., Wyman 1922). Their contribution is an irreplaceable window into some of the first field operations and early growing pains of the SOFES.

After Hardtner's tragic automobile accident death in 1935 and following the growth of Station research elsewhere, the SOFES invested less in the Urania Branch. The outbreak of World War II further dramatically realigned Station research priorities and reshaped the program for decades to come. By early 1942, the still-open studies in the Urania area were transferred to SOFES staff at the Crossett Experimental Forest, making remeasurements difficult (fig. 4). A number of these studies and sample plots were decommissioned during the late 1940s and into the 1950s, although a few were maintained into the early 1960s. However, the *Urania Bible* remained an indispensable tool for SOFES researchers then, and historians of forest science today.





UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SOUTHERN FOREST EXPERIMENT STATION

ADDRESS REPLY TO DIRECTOR AND REFER TO

FEDERAL OFFICE BUILDING
NEW ORLEANS LA

RS - SS
SUPERVISION
General

January 2, 1942

Mr. R. R. Reynolds
Crossett Experimental Forest
Crossett, Arkansas

Dear Russ:

Mr. Curry asked me to send you what material we have on the future treatment of the plots at Urania and also to bring all copies of the Urania bible up to date. Enclosed is some of the material containing information on future treatment of the plots. The remaining information will be sent you at a later date.

Very sincerely yours,

Roy A Chapman

R. A. CHAPMAN,
Assoc. Silviculturist.

Above: Figure 3—Experimental design and plot layout of what was likely one of the first statistically designed field studies of the Southern Forest Experiment Station (Camp Road Plot U-102), installed in January 1933 by Henry Bull and C. Allen Bickford. The shaded areas were untreated control plots; the unshaded ones (interior subplots) were one of seven different silvicultural treatments that included several hardwood control measures and different approaches to pine thinnings. While this particular design was not very efficient and had limited degrees of freedom, it was a clear improvement over most previous field studies, which lacked any kind of control or replications.

Right: Figure 4—Memo from Roy A. Chapman (in New Orleans) to Russell R. Reynolds (Crossett Experimental Forest) marking the transfer of the Urania-area studies to Reynolds' unit at the beginning of 1942. Note the importance still placed upon the *Urania Bible*.

Note: With the exception of some minor formatting changes, redevelopment of some figures for clarity, and corrections to obvious spelling errors, I changed very little of Chapman and Bickford's 1932 edition of the Urania Bible*. All text in the following pages using the American Typewriter font is original; editorial notes and comments by myself use Source Sans Pro font. Outside of a series of maps attached to the end of the* Urania Bible*, no figures were included in the copy I have access to. The images included have been added by me from related work. This paper actually contains only the first 40 pages (approximately) of the 1932 edition; there are at least 180 pages of additional, detailed text describing the various studies that were not included in this volume for brevity's sake.*

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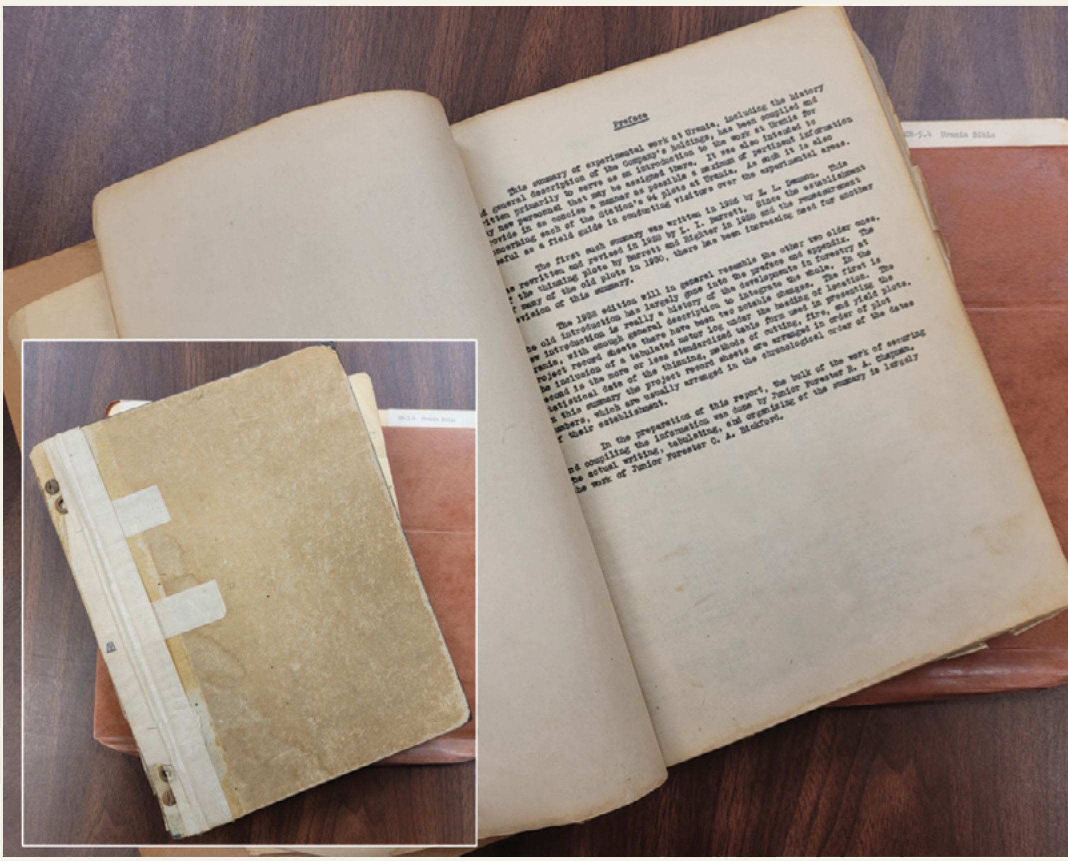


Image of the battered (well-used) 1932 version of the *Urania Bible* from the Crossett Experimental Forest archives. It is likely multiple copies of this volume were made, but we do not know how many. (USDA Forest Service photo from the archives of the Crossett Experimental Forest)

PREFACE

This summary of experimental work at Urania, including the history and general description of the Company's holdings, has been compiled and written primarily to serve as an introduction to the work at Urania for any new personnel that may be assigned there. It was also intended to provide in as concise a manner as possible a maximum of pertinent information concerning each of the Station's 94 plots at Urania. As such it is also useful as a field guide in conducting visitors over the experimental areas.

The first such summary was written in 1926 by E.L. Demmon. This was rewritten and revised in 1928 by L.I. Barrett. Since the establishment of thinning plots by Barrett and Righter in 1928 and the remeasurement of many of the old plots in 1930, there has been increasing need for another revision of this summary.

The 1932 edition will in general resemble the other two older ones. The old introduction has largely gone into the preface and appendix. The new introduction is really a history of the developments in forestry at Urania, with enough general description to integrate the whole. In the project record sheets there have been two notable changes. The first is the inclusion of a tabulated motor log under the heading of location. The second is the more or less standardized table form used in presenting the statistical data of the thinning, methods of cutting, fire, and yield plots. In this summary the project record sheets are arranged in order of plot numbers, which are usually arranged in the chronological order of the dates of their establishment.

In the preparation of this report, the bulk of the work of securing and compiling the information was done by Junior Forester R. A. Chapman. The actual writing, tabulating, and organizing of the summary is largely the work of Junior Forester C. A. Bickford.

Urania Branch
SOUTHERN FOREST EXPERIMENT STATION

Table of Contents

R – SS
Supervision

May 25, 1932

FORESTRY HISTORY OF URANIA LUMBER COMPANY'S HOLDINGS IN NORTHERN LOUISIANA

By
R.A. Chapman and C.A. Bickford, Junior Foresters,
Southern Forest Experiment Station

PART I -- INTRODUCTION

The Urania Lumber Company owns approximately 100,000 acres of timberland in Louisiana, situated principally in the northwest part of LaSalle Parish, the east part of Winn Parish, and the southwest part of Caldwell Parish and including scattered holdings in Grant, Catahoula, Natchitoches, Bienville, and Rapides Parishes. The company's mill and office are situated at Urania, in the northwest part of LaSalle Parish, in north-central Louisiana. Urania is about 40 miles north of Alexandria, on the main highway to Monroe and on the main line of the Missouri-Pacific railroad between Alexandria and Little Rock.

The topography is gently rolling, with elevation above sea level varying between 60 and 300 feet, mostly between 100 and 200 feet. The climate is uniform and mild. Most of the rain comes in the early summer and in winter, the driest months being August, September, and October. At Alexandria the mean annual rainfall is 57 inches, and over a period of years has ranged between 42 and 78 inches. The mean annual temperature is 66 degrees F. and the absolute range is from 3 degrees to 109 degrees F. The normal growing season, or period between killing frosts, averages 242 days (9). Records of temperature and precipitation at Urania have been kept by the company since September, 1929. For 1930 and 1931, the average annual precipitation was 53.4 inches and the mean annual temperature was 65.8 degrees F.

The first white settlers came to Winn Parish about 1730. They took up land along the Red River and tributary streams, under French grants. The first settlers in what is now LaSalle Parish arrived about 1780, and took up land in the southernmost portion of the parish near Catahoula Lake, under Spanish grants. Because of its inaccessibility by water and the lack of roads, the area now owned by the Urania Lumber Company was not settled generally by whites until about 1850, although it is probably that white settlers appeared there about 1830. Settlers on the area came principally from Mississippi, Alabama, and Tennessee.

These pioneers were farmers in a small way only. At first they lived chiefly on fish and game. They cleared new land by "deadening" small patches of timber and grew only so much farm produce as they needed for themselves and their stock. Their main source of livelihood was stock-raising. The stock, chiefly cattle and hogs, were branded and allowed to roam at large through the piney woods and bottomlands, only the small patches under cultivation being fenced.

These first settlers moved from place to place, never owning any land and consequently paying no taxes. Gradually this floating population became more stable and turned to growing cotton and corn. The appearance of railroads in the region, in 1891, made established markets for farm products accessible and greatly stimulated the production of

agricultural crops and the establishment of permanent communities. Lumbering became an important industry in this region during the last quarter of the nineteenth century. The appearance of outside capital in the rapidly expanding lumber industry, about 1890, temporarily accentuated the tendency toward agricultural expansion and permanent settlement, but later drew men off the farms to the sawmills by the attraction of regular wages over the uncertainty of seasonal farm crops. The boll-weevil, which first appeared about 1900, also led many men to leave farming. In 1926, oil developments repeated the effect of lumbering.

Opening up this region through railroads and lumbering brought the realization that there was much better farming land in other parts of the state and country. This knowledge resulted in the abandonment of many farms. Thus today only a very small portion (2 per cent, according to 1930 census figures) of the total land area is under cultivation. Probably 85 per cent of LaSalle Parish has never been under cultivation (9). Approximately 10 per cent of the Urania Lumber Company's holdings are abandoned fields that have come back to pine, chiefly loblolly.

Oil was found in 1926 in a field centering at Tullos, four miles south of Urania. This field is relatively small. Although there have been few gushers, most of the wells have produced abundantly. At present, over-production in the oil industry has caused abandonment of low-producing wells. There is fear, also, that this oil field may be nearing exhaustion.

Probably one-third of the total area of LaSalle and Winn Parishes might at some future time be suitable for agricultural development. The chief crops are cotton and corn. Some oats are grown. Grazing has been and will probably continue to be important locally, but the stock raiser has to face the uncertainties of forage production and the ravages of ticks. Under proper management, lumbering could continue indefinitely. The production of timber crops probably offers the highest use for most of the land in these parishes.

Urania today is a small[1/] though relatively prosperous community, dependent chiefly on the Urania Lumber Company for its existence.

[1/]About 500 people were living in the village of Urania in 1930, according to the census of that year. Possibly 600 more were living in the immediate neighborhood.

The oil-well pumps are heard continuously. The oil industry has left its mark along Chickasaw Creek, where escaping oil and refuse from the pumps have killed the vegetation and given it an appearance of desolation. Throughout the district some agriculture is still maintained, but little of it could be called commercial farming. The field crops are cotton, corn, and oats, with some vegetables for home consumption. Great numbers of razorback hogs roam the woods, which belong for the most part to the Urania Lumber Company, living on a rather inadequate supply of mast and roots. These hogs are half-wild and during the greater part of the year are too poor to make good food. In the fall and winter they become well-fattened, and their owners depend on them as a food supply during the winter. A few rather scrawny, tick-infested cattle, also, exist on the open range. The farmers have been accustomed for generations to having a free and open range accessible to their stock and resent strongly any curtailment of this traditional right, as they call it. Until recent years cattle owners burned over much of the country during the winter months. Burning of the woods has been greatly curtailed since about 1920, when general fire protection was established.

PART II -- PHYSICAL DESCRIPTION

The area around Urania lies within the upland soils province of the Gulf Coastal Plain region. Its soils are derived from outcrops of the Jackson and Cockfield formations of the Eocene period. They are sedimentary in origin.

The soil series may be grouped on the basis of their drainage about as follows[2/]:

First bottom	(21.1%)	Terrace	(7.2%)	Uplands	(71.7%)
Bibb	(1.6%)	Cahaba	(0.4%)	Caddo	(6.9%)
Meadow	(14.6%)	Kalmia	(1.3%)	Montrose	(4.8%)
Ochlockonee	(4.9%)	Myatt	(5.5%)	Norfolk	(41.6%)
				Orangeburg	(1.5%)
				Ruston	(2.1%)
				Sumter	(1.1%)
				Susquehanna	(13.7%)

[2/] The percentages given are approximations based on soil maps of Winn and LaSalle Parishes prepared by the United States Bureau of Chemistry and Soils. The classification "Meadow" was used in the soil study of Winn Parish and not in that of LaSalle Parish. C.F. Marbut, chief of the Division of Soil Survey, Bureau of Chemistry and Soils, state in a letter dated July 30, 1932 "It is possible that some Myatt in Winn Parish has been included in the Meadow...It is reasonable to expect that the first bottoms along these creeks in Winn Parish are Ochlockonee silt or fine sandy loam."

The relative area in the various types in LaSalle and Winn Parishes as a whole is as follows: Sandy loam, 51%; silt loam, 24%; clay loam, 13%; clay, 9%; and sand, 3%.

Soils of the first bottom group are found along the principal streams—Castor, Funny Louis, Chickasaw, Flat, Beech, etc. The Ochlockonee is found immediately adjoining the streams and the Bibb is farther back toward the uplands. Unless too often flooded, the Ochlockonee series makes fair agricultural land. Nearly all of the soils of this first bottom group are forested, chiefly with moisture-requiring hardwoods such as red gum, beech, haw, magnolia, sycamore, blue beech, ironwood, holly, and cypress. Numerous vines and shrubs and some switch cane are found. On the Bibb series are found scattered loblolly pines. This type has never been cut clear, but has repeatedly been culled for the more valuable hardwoods. Thus the stands found in the bottoms are today very much as they have always been, except that there are not so many of the more valuable hardwoods of the larger sizes (2, 9).

The terrace soils are situated between the bottoms and the uplands. The Cahaba series occur chiefly as small hammocks in the bottoms and are very good agricultural land. The Kalmia series occur as hammocks in the first bottom and also as second-bottom terraces, while the Myatt is usually outside the bottoms. Land of the Kalmia series is successfully cultivated, but most of it is forested, chiefly with hardwoods and loblolly pine. Myatt is not suited to cultivation but is valuable chiefly for pasturage and forests. It is characterized by a stiff compact subsoil that is almost a hardpan. The forest species usually found are hardwood and loblolly pine, with pine predominating (2, 9).

The upland soils, more than half of which are Norfolk, are the most extensive group found in this region, composing the surface of more than 70 per cent of all the company's

holdings. They are generally well drained, but not well suited to agriculture. Throughout this soil group the original forest was longleaf pine with scattered individuals or groups of shortleaf pine and upland hardwoods, chiefly blackjack oak and red oak. Loblolly pine was sometimes found on soils of the Norfolk series, especially where moisture conditions were favorable. Shortleaf pine occurred chiefly on the Orangeburg, Montrose, Sumter, and Norfolk series. Hardwoods were most numerous on the Ruston, Susquehanna, Montrose, and Norfolk soils. Orangeburg, Ruston, and Caddo are the soils best suited to cultivation (2, 9). Since logging, longleaf pine has not generally reproduced; instead, shortleaf and loblolly, together with a variety of upland hardwoods, have taken large areas originally stocked with longleaf.

Ashe in 1909 (1) classified the company's holdings exclusive of the hardwood bottoms, as 80 per cent longleaf, 15 per cent shortleaf, and 5 per cent loblolly pine. The forest type map of the Urania lands made in 1931 by the Yale School of Forestry, covering an area of approximately 34,500 acres, indicates that the bottomland hardwoods occupy 19 per cent, longleaf 15 per cent, mixed pine and hardwoods 48 percent, shortleaf pine 2 per cent, and old-field pine stands 10 per cent. The indicated change in the proportion of longleaf between 1909 and 1931 is attributable in the main not to shrinkage of the area occupied by the longleaf type in the general region but to the fact that since 1909 the company has purchased mostly cut-over land of the mixed pine and hardwoods type or old fields. The chief forest types now are: bottomland hardwoods, mixed pine and hardwoods, old-field pine stands, longleaf pine, and shortleaf pine.

For practical purposes, bottomland hardwoods near Urania may be considered as a single type. However, two broad classes of hardwoods have been recognized. One of these types is found in the main bottoms of the larger streams, as Castor, Chickasaw, and Flat Creek. It varies in width up to a maximum of about a mile. In general it occupies the first bottoms, which are most subject to overflow. The other type occurs in the bottoms of the smaller tributary streams and branches, the outer margins of the main bottoms, and the lower slopes of the uplands. This type occupies in general the second bottoms, hammocks, and terraces, which are flooded very rarely.

In the first bottoms as a whole, red gum is probably the most important and most common tree; black gum is very nearly as common. In the understory blue beech is most common and hawthorn and holly are very common. Among the smallest trees, two-winged silverbell and winterberry are very common. Within the first bottoms there occur also subtypes, of which the most noteworthy is southern cypress. This subtype is found only where water normally stands on land bordering the main creeks and branches, and in sloughs, etc. Black willow, with occasional sycamore, is found on sites adjacent to the cypress sites but somewhat better drained. Another common group found within the first bottoms on slight mounds or terraces is made up of beech, evergreen magnolia, and loblolly pine, none of which occur in the first bottoms. The complete list of species for the first bottoms follows:

BOTTOMLAND TREE SPECIES[1]
Species found in the main bottoms, as those of the Castor, Flat, and Chickasaw, from 1/4 to 1 mile wide. (Listed alphabetically.)

Common	Occasional to frequent	Rare to uncommon
Carpinus caroliniana[1] Blue beech	Diospyros virginiana[1] Persimmon	Acer rubrum[1] Red maple
Crataegus spp.[1] Hawthorn	Fagus grandifolia[4] Beech	Asimina triloba[1] Pawpaw
Halesia diptera[2] Two-winged silverbell	Hicoria spp.[5] Hickory	Fraxinus americana White ash
Ilex decidua[2] Winterberry	Magnolia grandiflora Evergreen magnolia	Fraxinus pennsylvanica lanceolata Green ash
Ilex opaca[1] Holly	Morus rubra[1] Red mulberry	Gleditsia triacanthos Honey locust
Liquidambar styraciflua Red gum	Quercus mississippiensis[6] Bottomland post oak	Liriodendron tulipifera[9] Yellow poplar
Nyssa sylvatica Black gum	Quercus nigra Water oak	Ostrya virginiana[1] Hop-hornbeam
Taxodium distichum[3] Southern cypress	Quercus phellos Willow oak	Pinus taeda[4] Loblolly pine
	Quercus prinus[7] Swamp chestnut oak	Platanus occidentalis Sycamore
	Quercus rubra leucophylla[8] Swamp red oak	Quercus lyrata Overcup oak
	Salix nigra[3] Black willow	Symplocos tinctoria[1] Sweetleaf
	Ulmus alata Winged elm	Ulmus americana American elm
	Vaccinium arboretum[2] Tree huckleberry	

[1] Trees of the understory
[2] Technically trees, but usually shrubs, near Urania.
[3] Found only at stream banks.
[4] Confined to terraces above true main bottoms.
[5] Probably largely Hicoria leiodermis.
[6] May be a variety of Q. stellata
[7] Usually known locally as cow oak.
[8] Usually known locally as cherrybark oak
[9] Reported in Chickasaw bottoms.

In the second bottoms and terraces the key species are beech, evergreen magnolia, and loblolly pine. Beech and pine are common and magnolia is nearly always present. In general the second bottoms type is mainly a hardwood type, with beech and red gum as the most common species; black gum is common, also, and in the understory there are blue beech, holly, and sweetleaf. This type includes many diverse associations. It ranges from the borders of the swamps or first bottoms to the pine lands of the true uplands. Probably the most noteworthy subtype within the type is that known as a "pin oak flat." This occurs on poorly drained, nearly level areas outside the main bottoms. Standing water is common, especially within a few days after rain. It is in this subtype that nearly all the willow oak of the second bottoms is found. In other places occurs a beech and magnolia association which almost excludes other species from the main canopy. The complete list of species for this type follows:

[1] Editor's note: On scientific naming conventions from the original paper: some of these have been changed since this document was written. The genus for hickory, *Hicoria*, for example, is now *Carya*, and bottomland (delta) post oak, *Quercus mississippiensis,* is now *Quercus similis*.

INTERMEDIATE TREE SPECIES
Species found above small tributary branches, on lower slopes of the uplands, and at the outer margins of the main bottoms. (Listed alphabetically.)

Common	Occasional to Frequent	Rare to uncommon
Carpinus caroliniana[1] Blue beech	Acer rubrum[1] Red maple	Aralia spinosa[2] Devil's walking stick
Fagus grandifolia[4] Beech	Cornus florida[1] Dogwood	Asimina triloba[1] Pawpaw
Ilex opaca[1] Holly	Crataegus spp.[1] Hawthorn	Diospyros virginiana[1] Persimmon
Liquidambar styraciflua Red gum	Halesia diptera[2] Two-winged silverbell	Fraxinus americana White ash
Nyssa sylvatica Black gum	Hamamelis macrophylla[2] Witch-hazel	Ilex vomitoria[2] Yaupon
Pinus taeda[4] Loblolly pine	Hicoria spp.[5] Hickory	Juniperus virginiana[1] Eastern red cedar
Symplocos tinctoria[1] Sweetleaf	Ilex decidua[2] Winterberry	Melia azedarach[9] Chinaberry
	Magnolia grandiflora Evergreen magnolia	Myrica cerifera[2] Wax-myrtle (bayberry)
	Morus rubra[1] Red mulberry	Pinus echinata Shortleaf pine
	Ostrya virginiana[1] Hop-hornbeam	Platanus occidentalis Sycamore
	Oxydendrum arboreum[1] Sourwood	Prunus serotina Black cherry
	Quercus alba White oak	Quercus rubra Southern red oak[2]
	Quercus nigra Water oak	Quercus shumardii Shumard red oak
	Quercus phellos[4] Willow oak	Rhus copallina[2] Dwarf sumac
	Quercus prinus[7] Swamp chestnut oak	Taxodium distichum[3] Southern cypress Ulmus americana American elm
	Quercus rubra leucophylla[8] Swamp red oak	
	Quercus stellata[7] Post oak	
	Salix nigra[3] Black willow	
	Sassafras variifolium[1] Sassafras	
	Ulmus alata Winged elm	
	Vaccinium arboreum[2] Tree huckleberry	

[1] Trees of the understory
[2] Technically trees but usually shrubs, near Urania.
[3] Probably largely Hicoria leiodermis.
[4] Almost entirely on "pin oak flats" or glades.
[5] Locally known as cow oak.
[6] Usually known locally as cherrybark oak.
[7] Also present on this site is the bottomland post oak, which is either Quercus mississippiensis or a variety of Q. stellata.
[8] Found only at stream banks.
[9] Found only at old house sites.

A very conspicuous shrub that is almost invariably associated with this type and also with the upland types in the neighborhood of Urania, and that grows as large as several of the tree species included in these types, is French mulberry (Callicarpa americana).

It is in this type that loblolly pine seems to have attained its best development near Urania. It has grown, usually as scattered individuals in mixture with hardwoods, on the better-drained sites. These loblolly pines have grown very slowly, with long clean boles, and have produced lumber that has been sold with longleaf pine. They have been called Rosemary pine, locally, to distinguish the lumber from loblolly grown on the uplands. (All

[2] Editor's note: Listed by Chapman and Bickford as southern red oak, but *Quercus rubra* is more formally northern red oak, with southern red oak being *Quercus falcata*. Given the location, this is probably *Quercus falcata*.

the other southern pines, also, have been called Rosemary pine; in general, the name is most apt to be applied to shortleaf pine.) This loblolly pine, as well as much of the oak and red gum, has been cut out of most of the bottoms. Great quantities of the finest oak have been cut for export staves; red gum has been cut largely for figured veneer.

The remaining types, mixed pine and hardwoods, longleaf pine, shortleaf pine, and old-field pine, occur on the uplands. The species constituting the upland types are given in the following list:

UPLAND TREE SPECIES
Defined to include species found in the definite uplands. (Listed alphabetically.)

Common	Occasional to Frequent	Rare to uncommon
Liquidambar styraciflua Red gum	Acer rubrum[2] Red maple	Aralia spinosa[1] Devil's walking stick
Myrica cerifera[1] Wax-myrtle (bayberry)	Cornus florida[2] Dogwood	Diospyros virginiana[2] Persimmon
Pinus echinata Shortleaf pine	Crataegus spp.[2] Hawthorn	Fraxinus americana White ash
Pinus palustris Longleaf pine	Hicoria spp.[3] Hickory	Ilex vomitoria1 Yaupon
Pinus taeda Loblolly pine	Ilex opaca2 Holly	Juniperus virginiana4 Eastern red cedar
Quercus alba White oak	Nyssa sylvatica Black gum	Melia azedarach4 Chinaberry
Quercus marilandica Blackjack red oak	Rhus copallina[1] Dwarf sumac	Morus rubra2 Red mulberry
Quercus rubra Southern red oak	Sassafras variifolium[2] Sassafras	Ostrya virginiana2 Hop-hornbeam
Quercus stellata Post oak	Ulmus alata Winged elm	Platanus occidentalis Sycamore
	Vaccinium arboreum[1] Tree huckleberry	Prunus serotina Black cherry
		Quercus rubra leucophylla5 Swamp red oak
		Quercus velutina Black oak

[1] Technically trees but usually shrubs, near Urania.
[2] Trees of the understory.
[3] Probably largely Hicoria buckleyi arkansana and Hicoria alba.
[4] Found only at old house sites.
[5] Known also as cherrybark oak.

The mixed pine and hardwoods type varies considerably as to distribution of species, condition, etc. Pine, usually loblolly, is always predominant in the stand. However, considerable shortleaf and some longleaf are found. In places shortleaf pines are more numerous than loblolly pines. Southern red oak is the principal hardwood; other species often present are black gum and red gum. Also present, especially at old house sites, are eastern red cedar and chinaberry. Although some oak has been cut for ties, logging has generally removed only the pine, usually between 15 and 35 trees to the acre. Owing to the all-aged and many-sized character of the stand, enough small pines were left to restock the cut-over areas. Pine reproduction usually has been sufficiently complete and has developed rapidly.

In the original stand, the mixed pine and hardwood type occupied small areas only and was relatively unimportant. Now, it is the most prevalent type in the vicinity of Urania. The present composition of this type is closely similar to what it was in the original stand, except that red gum now makes up an appreciably greater proportion of the stand and that very little merchantable pine remains. With better market conditions in the industry,

this type would be economically significant because of the dearth of merchantable pine and the rapidity of the growth of loblolly pine.

The pure longleaf type was by far the most important in the virgin stand. It occupied almost entirely the soils classified as "upland." It was made up almost exclusively of longleaf pine. Blackjack oak, post oak, hickory, and shortleaf pine occurred as a very small part of the stand, with occasional red gums on the more protected and moister sites. In this type there were an average of 45 to 65 merchantable pine trees, or 15,000 to 20,000 board feet of pine timber, per acre, with practically no trees less than 8 inches in diameter. This type has been practically clear cut, only the defective pines and the blackjack oak being left. Subsequent to the cutting, it has in general changed over to the mixed pine and hardwood type, loblolly pine largely replacing longleaf.

Where hogs have been kept out and where seed supply has been adequate, longleaf has been able to maintain itself unless the site was especially suitable to loblolly or shortleaf. Elsewhere, there is practically no longleaf reproduction near Urania. Cut-over longleaf land that has restocked mainly to longleaf is now characterized by dense stands of young longleaf saplings with a few scattered shortleaf and loblolly pines in mixture and with a few old virgin longleaf trees that were left by the loggers as unmerchantable.

The shortleaf type is confined largely to the higher parts of the Orangeburg, Sumter, and Norfolk series and occupies a relatively restricted area. Species other than shortleaf that occur in this type include loblolly pine, red oak, post oak, and hickory. The original stand was all-aged, with from 25 to 40 merchantable pines to the acre. The best oaks were cut for ties. Areas originally occupied by this type have generally restocked abundantly with shortleaf. On occasional small areas oak brush has interfered with the shortleaf reproduction.

An example of a virgin longleaf pine stand (foreground) from central Louisiana (near Zimmerman in Rapides Parish) immediately prior to lumbering in the 1940s. Some of the pines in this stand have been "terpentined". Note the open, grassy understory underneath these fairly widely spaced old pines—a characteristic of longleaf pine woodlands that developed with frequent surface fires. (USDA Forest Service photo taken by Leland J. Prater, circa 1942)

Top: An example of the severe and extensive cutover longleaf pine lands of central Louisiana (Vernon Parish) following lumbering, excessive fire, and heavy livestock grazing, with virtually no seed trees remaining. (USDA Forest Service photo taken by John T. Cassady in 1946)

Bottom: An old-field, loblolly pine-dominated stand that arose following failed lumbering on previously timbered uplands. This condition was commonly found on the Urania Lumber Company's lands. This image is of one of the Maxwell Plots on Urania property prior to getting a "French" thinning. (USDA Forest Service photo taken by E.N. Munns in January 1925)

Most of the old-field stands in the vicinity of Urania are nearly pure loblolly pine. In general the soil of cultivated fields abandoned for agriculture is admirably adapted to the seeding in of loblolly pine, and the pine develops rapidly during the first few years. Shortleaf is a frequently associated species, but the faster-growing loblolly are usually characterized by their coarse grain and numerous persistent large limbs. The lumber is distinctly inferior in quality, although it may be entirely suitable for pulpwood. Many hardwoods are found in these old-field stands, mainly as an understory. A study of the quality of lumber from these old-field pines has been made by R.D. Garver of the Forest Products Laboratory. A report on this study is now in preparation.[3]

[3] Editor's note: It is not clear if this report was ever published, remained internal, or was never completed. During this period, Raymond D. Garver (sometimes with co-authors) worked on a variety of southern pine and hardwood economic, wood quality, and lumber yield studies. One such contemporary article, Garver and Miller (1933) included as a part of its analysis old-field pines cut from an unidentified stand in northern Louisiana, but it is unknown if these are the same trees referred to in this passage.

PART III – FORESTRY DEVELOPMENTS AT URANIA

Henry E. Hardtner came to Urania, then known as Prestridge[3/], in 1896, and bought a sawmill from John Q. Prestridge.

[3/] The original name of the village was Maxwell.

At the same time he purchased 400 acres of cut-over land. In 1897 he renamed the town Urania, after the Greek muse of astronomy, who presided over the destinies of Agriculture and Forestry. Since 1897 Mr. Hardtner has done a great deal to make Urania approximate more closely the heavenly implications of its name.

In 1896 there were sawmills at Olla and Tullos and at many other points in northern Louisiana. In 1898 Mr. Hardtner organized the Urania Lumber Company, purchased the Caldwell or Atwood Violet Tract of 3,000 acres (now called the H.H. Chapman Forest) at $4 per acre, and built a railroad to it. This road is now known as the Natchez-Urania & Ruston Railroad. Additional land purchases have been made from time to time until in 1932 the company owns nearly 100,000 acres, believed to be sufficient to operate the present mill on a sustained yield basis. No formal management plan has ever been prepared for the company's forest land.

From time to time the company has sold cut-over land for agricultural purposes. In nearly every instance the purchaser has given up cultivation and the company has bought back the land.

When the Louisiana Department of Conservation was created, in 1908, Mr. Hardtner was selected as chairman of the conservation commission. In 1909, at Mr. Hardtner's request, the United States Forest Service sent Forest Examiner W.W. Ashe to Urania to report on the forestry possibilities of the Urania Lumber Company holdings (1).

In 1908 Mr. Hardtner attended the Conference of Governors at Washington, D.C. At that time he met Roosevelt, Pinchot, and others who greatly encouraged and stimulated his interest in forestry. Mr. Hardtner was the first landowner to take advantage of Section 13 of the Louisiana Reforestation Act (Act 261), approved in 1912, when on June 14, 1913, he entered 25,749 acres under contract with the State for 40 years at a valuation of $1 per acre per year. G.M. Tannehill and Q.T. Hardtner entered 2,440 acres the same year (August 12, 1913). This was considered such a complete departure from the usual behavior of landowners that newspapers throughout the country described it as an act of patriotism.

In 1910 Mr. Hardtner was elected representative to the Louisiana Legislature from LaSalle Parish. That same year Harry P. Gample, a lawyer of Winnfield, Louisiana, secretary of the conservation commission of which Mr. Hardtner was chairman, drew up a State forestry law providing for a severance tax on timber, which was approved as Act 196 of 1910. Mr. Gamble rendered a great service to the cause of conservation in framing this Act, which was the first severance tax law in the United States. An act of 1912 remedied some of the defects of this law. O.M. Grisham of Monroe, as attorney for Mr. Hardtner, drew up the reforestation contract that was approved by the attorney-general and the department of conservation.

In 1913 the United States Forest Service sent W.R. Mattoon to Urania to report on the forestry work there. Mr. Mattoon was very favorably impressed, as indicated by the report he submitted, dated January 22, 1914. (10) He commented specifically on the large areas

Part of what would become the first silvicultural research project of the Southern Forest Experiment Station within a decade (Bragg 2021), this thinning study in even-aged, old-field loblolly pine stands was initiated by Samuel Trask Dana in 1915. (USDA Forest Service photo taken by Samuel Trask Dana on January 27, 1915)

coming back to pine, particularly to loblolly and shortleaf, the adequacy of the seed trees, and the abundant longleaf seed crop of 1913.

Since 1915 Mr. Hardtner has cooperated with various forest research agencies. The United States Forest Service initiated experimental work at Urania in January, 1915, through S.T. Dana, assistant chief of forest investigations. The Yale School of Forestry held its spring camp at Urania in 1917, and has held camp there every year since except in 1918 and 1919. The Forestry Division of the Louisiana Department of Conservation, established in 1917, has cooperated in some of the investigative work underway at Urania. The Southern Forest Experiment Station has maintained branch headquarters at Urania ever since it was established in 1921. To assist these agencies in their programs Mr. Hardtner has set aside many areas for experimental purposes.

Elk Pasture, an area of 1,500 acres lying on both sides of the Missouri-Pacific railroad, was fenced in 1915. This area had been cut over about 1904 and in 1915 was very sparsely stocked, although there were many seed trees present. Under continuous protection from fire and hogs since 1915, it now supports an excellent stand of pine and hardwoods, mostly longleaf and loblolly pine. Four accidental fires have occurred on this area since it was fenced in 1915: a 25-acree fire in 1918, a 50-acre fire in October, 1929, a 30-acre fire in August, 1930, and a 33-acre fire in October, 1931. +60 acre fire Sept 1932[4] A small herd of elk was obtained from Wolf, Wyoming, in 1916 and put into the east half of this pasture. The elk have never reproduced and their numbers have steadily declined. Three were reported as remaining in 1932. Buffalo, also, were introduced, but they died out rapidly.

[4] Editor's note: As a living document, the *Urania Bible* had many hand-written notes to add material and corrections for other parts of the typed manuscript. In this instance, the 60-acre fire in September 1932 in the Elk Pasture occurred after the manuscript had been typed, so this statement was inserted here. Using editorial discretion, some changes or corrections have been made seamlessly, while others were left apparent.

A picture of the cutover longleaf pine in the "Elk Pasture" area, showing in the distance a herd of Rocky Mountain elk brought from Wyoming in December 1915. (USDA Forest Service photo taken by W.R. Mattoon on May 1, 1916)

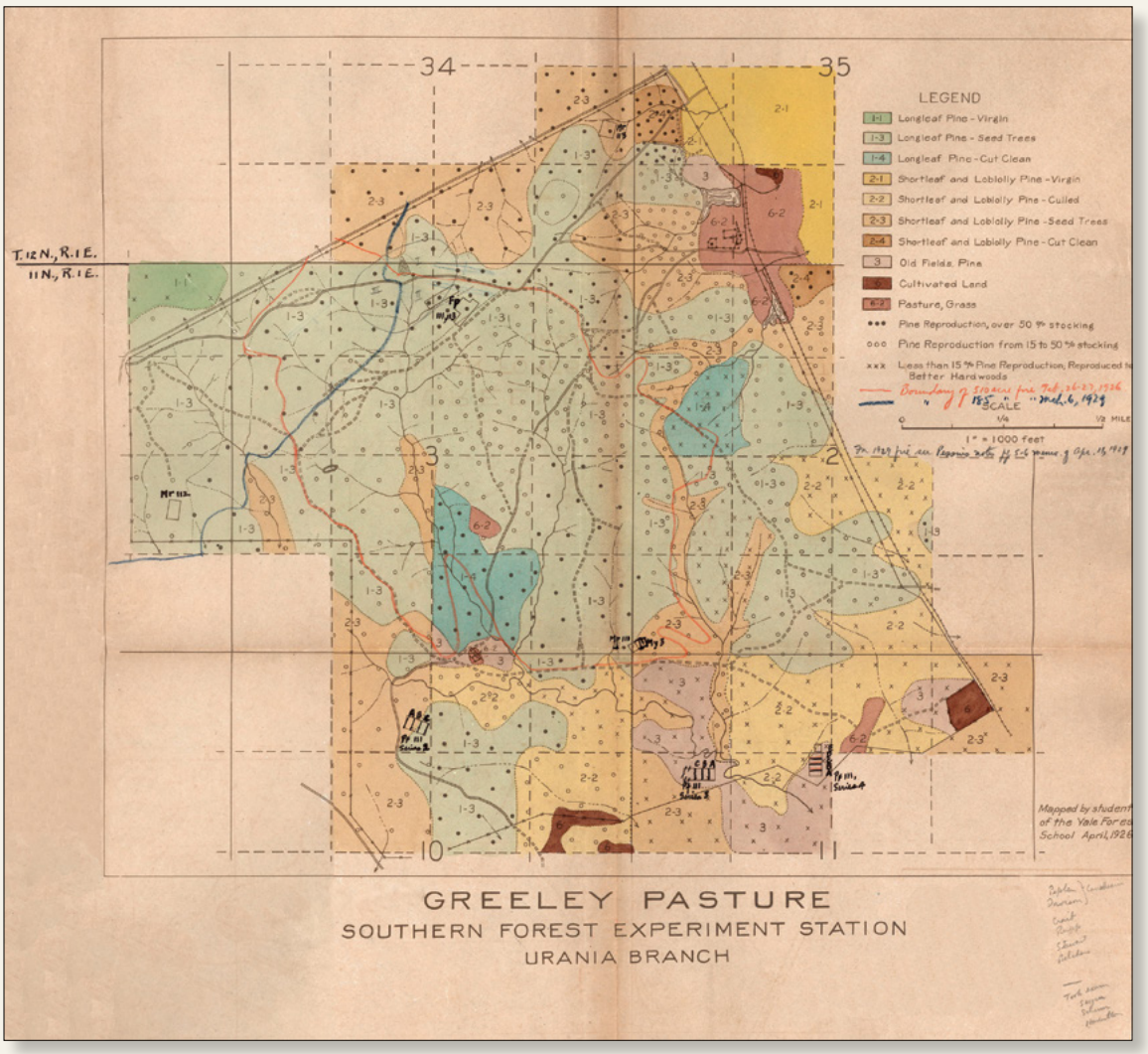
Deer Pasture, which has also been called the Violet Urania Forest, was fenced in 1915. (Named after Mr. Hardtner's daughter, Violet, it was called Deer Pasture because a small herd of deer were grazed here.)

This area of 20 acres lies between Urania proper and the Missouri-Pacific railroad tracks. It has been protected from fire since 1915, but not from hogs. It now supports a fine stand of loblolly pine, although the original stand was practically pure longleaf pine, as is evident from scattered virgin longleaf pine trees still standing.

The John M. Parker plot of 38 acres was fenced in 1916. John M. Parker was Governor of Louisiana from 1920 to 1924, and has always been actively interested in conservation and forestry. This area was originally forested with longleaf pine and when it was cut over many trees were left, which have since served as seed trees. A full stand of longleaf pine originated from the 1913 seed crop, about half of which was killed by fire in 1915. The area has been protected from fire and hogs since 1916 and now supports an excellent stand of young pine, mostly longleaf. There have been two small fires during this period—one of 25 acres in September, 1924, and one of 14 acres in September, 1931. In 1926 slash pine was planted on about two acres of the area covered by the 1924 fire.

In the fall of 1919 an area of 1,500 acres near Hinton was fenced named Greeley Pasture[5], after W.B. Greeley, then Forester of the United States Forest Service.

[5] Editor's note: The following handwritten note by CAB (Bickford), dated August 17, 1934, was included in the margin of this paragraph: "A note by Hine (unsigned) dated Oct. 20, 1924 reports the date of fencing Greeley Pasture as Oct 1920 and the authority as Tannehill. Tannehill's memory for dates is poor; he has also told me that this area was fenced in the fall after the armistice was signed which would be 1919, as typed." Hine was W.R.B. "Billy" Hine, a forester and forest assistant with the Southern Forest Experiment Station from its inauguration in 1921 until the fall of 1925, when he resigned to become the first state forester for Louisiana (Wakeley and Barnett 2016). The identity of "Tannehill" is uncertain, but is probably George Milton Tannehill, an early leader in the Urania Lumber Company who died in a tragic pedestrian accident in New Orleans, LA in April 1940.



A circa 1929 map of the Greeley Pasture drawn by the students of the Yale Forestry School in April 1926 and updated by Southern Forest Experiment Station staff over the years to add other pertinent information. According to the text of the *Urania Bible*, this area was leased to the Forest Service in 1923 for experimental purposes, 2 years before the Bent Creek Experimental Forest near Asheville, NC, was established.

In 1923 Greeley Pasture was leased to the United States Forest Service for a 30-year period at $1 per year, as an experimental area. This area was originally in longleaf and shortleaf pine, averaging about 15,000 board feet per acre; it was cut in 1909 and 1910, and a number of trees were left in cutting. Prior to 1920 it had burned over periodically and had been grazed by both cattle and hogs. Grazing by hogs probably accounts for the absence of longleaf seedlings at the time of fencing. Since 1920, it has been subject to light grazing by cattle and to occasional grazing by a few hogs. There have been seven accidental fires since 1920. Three of these fires were small ones near the south boundary, the dates of which are not certain. In 1923 a small fire set by a locomotive spark occurred north of the pond, near the north border of the pasture. On February 26 and 27, a fire presumably set by hunters burned over 510 acres in the north and central part of the pasture. A 50-acre incendiary fire occurred in the northeast part of the pasture on January 27, 1928. On March 6, 1929, 185 acres burned over in the northwest part of the pasture.

In 1928, at the suggestion of Professor H.H. Chapman of the Yale School of Forestry, an area of 1,234 acres was fenced for the purpose of testing on a large scale the effects of periodic controlled fires on the establishment, growth, and survival of longleaf pine. This area, named the H.H. Chapman Forest, originally supported an excellent stand of longleaf pine. This was cut between 1902 and 1904, many trees which at that time were not merchantable being left standing. It has been burned over periodically, the last fire before fencing occurring during a very dry period in September, 1924. In 1928 there was practically no pine reproduction on the area, except a small patch of young loblolly pine then 3 to 5 years old. The lack of longleaf reproduction was probably due to hogs, as the trees had borne several crops of seed since cutting took place. In October, 1928, this area was burned over just prior to the ripening of an excellent longleaf pine seed crop. A small control area of about 5 acres was left unburned. An area of 58 acres in the southwest portion of this forest was burned again in February, 1932, as the beginning of a series of experiments in periodic burning. On March 25 and 26, 1932, an incendiary fire burned over nearly all the unburned portion of the Chapman Forest, as well as a considerable area outside, decreasing the value of the experimental plots which had been established there by the Southern Station.

In 1929 an area of 4,000 acres west of Hinton was designated as the Bryant Forest, after Professor R.C. Bryant of Yale, and dedicated to management studies in mixed longleaf and shortleaf pine. It had been tentatively decided that shortleaf was more likely to reproduce satisfactorily. To avoid the expense of fencing, no effort was made to bring about longleaf regeneration, only shortleaf seed trees being left. This area was logged off in 1929.

The mill of the Urania Lumber Company was remodeled in 1928 and now has two band saws normally cutting about 70,000 board feet daily, or 18,000,000 board feet per year. The company regularly employees 175 men at the mill and 75 men on the logging operation. The men work 10 hours a day both at the mill end and in the woods; the mill runs a single shift daily. Urania is strictly a company town. The company's commissary is a general store that handles nearly all the kinds of goods needed by the community. The only independent establishments are the restaurant and barber shop.

The company bought a steam skidder in 1917, at a cost of about $17,000, but after using it in the woods for 10 years decided it was too costly a way to operate. The skidder is still in use, but it is now moving logs in the millyard and mule teams are being used in the woods operation.

In general it has been the practice of the Urania Lumber Company to cut to a fixed diameter limit. The limit was 8 inches in 1917 and 12 inches in 1928, and is now 14 inches. This standard has served as a flexible rather than a fixed guide. The choice of trees for cutting has invariably been made by the company's woods foreman, Francis Smith.

The fire-protection organization of the company is especially noteworthy. Protection work began in a small way in the immediate vicinity of Urania as early as 1913; in 1920 the company began active cooperation with the State, and in 1925 it instituted the present intensive system. A State fire tower was built in May, 1925, about 3 miles north of Urania, from which, except in very smoky weather, a large portion of the company's holdings is visible. The State, in cooperation with the United States Forest Service and the Urania Lumber Company, maintains resident farmers as wardens of the outlying districts. The wardens provided by the company occupy company land rent free for their protection

work. The company officials know and understand the people with whom they have to deal and have generally obtained their cooperation in the fire-protection program. The result is that the company's annual burned acreage has been small since the present intensive system was initiated in 1925. Accurate information to area burned is not available. Fires have been small and infrequent near Urania; they have been larger on outlying areas. The year 1924 was a bad one because of a long-extended drought; since then, fires have been small and relatively few. The men who work for the company, those in the mill as well as the woods crews, are always available to suppress fires, and make it their practice to discourage others from setting fires.

In connection with the annual field work of the Yale School of Forestry seniors at Urania, Professor Chapman has carried on a number of investigations in the management of southern pine. He has recorded the results of some of these studies in a bulletin (3) on the natural reproduction of longleaf pine. The students have mapped about one and one-half townships (through 1931) in the vicinity of Urania for both topography and forest types; each year they are mapping additional areas. A list of the experiments by the Yale School of Forestry at Urania follows:

1. Losses through decadence of virgin longleaf pine, by number of trees, volume in board feet, and percentage of the original stand. Classified under wind, insects, fire, lightning, rot, drought. 200 acres measured annually. Initiated in 1920.
2. Development of natural stands of longleaf pine from seed. Four 1-acre plots. Parker Plot. Initiated in 1920.
3. Losses of longleaf pine seed trees on cut-over land from same causes. 1,034 trees. Records kept from 1917 on, but not complete for each year.
4. Growth of trees left on cut-over areas, longleaf pine with a few loblolly pines. 1,034 trees. Radial growth for 30 years since cutting. Heights, crown development, and volume growth. Stem analysis on 100 trees. Initiated in 1920.
5. Seed production on longleaf pine seed trees, differentiated by soil type, age, diameter, height, length of crown, volume of crown, isolation or crowding, rate of diameter growth, and relation of seed production to these factors. 1,034 trees. Complete records of cones and seed produced. Initiated in 1920.
6. Character and number of seed trees required for full stocking. 1,034 trees. Initiated in 1917.
7. Establishment of seedlings. Longleaf pine. Production of seed per acre, in numbers and pounds. Number of seedlings established in following spring, in percentage of seed produced. By soil types. Effect of burning previous to fall of seed. Effect of continuous fire protection previous to fall of seed. Effect of soil type. Effect of hardwood litter versus grass. Effect of hardwood shade. 52 plots of 1/100 acre each, established in 1917 and measured annually beginning in 1920.
8. Survival of longleaf pine seedlings. In absence of fire. Effect of competition of loblolly pine and of hardwoods. By soil types. 72 plots of 1/100 acre each established in 1917 (see 7). Effect of competition with pine grasses in the absence of loblolly pine, hardwoods, or brush. 11 plots of 1/100 acre each established in 1920. Burned September 1, 1924, but continued. 10 plots of 1/100 acre each established in 1925 on area unburned since 1916. Brown-spot disease on these plots.

9. Effect of grazing on longleaf pine reproduction and on the distribution and abundance of certain grasses on plots described in paragraphs 7 and 8. Initiated in 1920.

10. Roberts Plots U-8 and U-9, taken over in 1930 with consent of the Southern Station. Plot U-8, effect of complete fire protection since 1916 on longleaf pine reproduction established in 1920 or 1921. Plot U-9, effect of fire protection from 1918 to date on reproduction established in 1919. Freed from competition of loblolly pine and brush in 1930.

11. Removal of hardwood competition as a preliminary to growing longleaf pine seedlings. Elk Pasture Plots 1a, b; 2a, b; 3a, b. Plots 2a and 3a, hardwoods slashed down in June, 1928. 2a and b burned in spring of 1929. 3a and b burned in fall of 1928. Plots 2 and 3 burned accidentally in part in summer of 1930, and purposely in June, 1931. Brush not slashed on Plots 2b and 3b.

12. Use of fire as a means of obtaining healthy reproduction of longleaf pine seedlings.
    a. Plots 1, 2, and 3, Elk Pasture (several acres) established in 1928. Seed trees mapped. Burned (see 11) in 1928-29.
    b. Chapman Forest. Burned in fall of 1928—1.234 acres. 58 acres burned in February, 1932. Remainder burned accidentally in May, 1932. Plots established by Southern Forest Experiment Station.

13. Thinnings in natural reproduction of loblolly and longleaf pine. Spacing 10 x 10, 12 x 12, 15 x 15 feet. 1931. On forest growth sites. Elk Pasture.

14. Survival of loblolly pine seedlings established 1929 on grazed pasture land, carpet grass sod; 2 plots 6 x 66 ft. Tennis court in Elk Pasture. Initiated in 1929.

The United States Forest Service made its first contact with the Urania Lumber Company in 1909 when Forest Examiner W.W. Ashe visited the company's holdings and made a report (1). W.R. Mattoon visited Urania in 1913 on a similar mission (10). In 1915 S.T. Dana, then assistant chief of forest investigations, came to Urania and established the first permanent sample points in silviculture in the far South, four series of thinning plots and one fire and grazing plot. In 1920 these plots were reexamined by C.R. Tillotson, with the help of State Forester Forbes and State Ranger W.H. Thompson.

The United States Forest Service plots at Urania were taken over by the Southern Forest Experiment Station in July, 1921. Additional sample plots were centered at Urania, which was the first branch station of the Southern Forest Experiment Station. Forbes and Wyman established brush-disposal plots in September, 1921. Forest Assistant W.R. Hine was in charge of the work at Urania from the fall of 1922 to October, 1925, in cooperation with other staff members including L. Wyman and F.H. Miller. Hine was in residence there for a short period beginning February, 1923. Junior Forester L.I. Barrett was in charge of the Urania work from July, 1926, until December, 1928, when he was succeeded by Junior Forester F.I. Righter. In September, 1929, Righter turned over the Urania projects to Junior Forester R.A. Chapman.

Junior Forester C.A. Bickford worked with Chapman on the Urania project from July, 1931, until October 1, 1931. At various times from 1921 to date, other station men have helped in the establishment and reexamination of the many plots at Urania, as follows: E.L. Demmon, 1925-1926; L.J. Pessin, 1928-1930; V.L. Harper, 1928; W.G. Wahlenberg, 1930 to date; James L. Averell, 1930-1931; and Henry Bull, 1932. Local men including Togo McKeithen and Dave McCartney have been employed for routine work. Student

assistants who have worked at Urania include H.W. Hicks, 1925; L.D. Lloyd, 1927; Eric Ostlin, 1927; J.W. Zehnder, 1929; R.H. May, 1929-1930; J.C. Craig, 1930; T.S. Coile, 1930-1931; F.W. Bennett, 1931; and M.A. Huberman, 1932.

A list of the projects with the Southern Forest Experiment Station has undertaken at Urania is given below:

Date Established	Kind of Study	Species	Name of Experimental Area	No. of Plots	Area in Acres
1915	Thinning, light & heavy	Loblolly	Maxwell, Castor	6	1.50
1915	Thinning, light & heavy	Shortleaf	Holly, Mayes	5	1.00
1925	Thinning, Accretion Cut	Loblolly	Deer Pasture	1	1.00
1925	Thinning, Light & Heavy	Loblolly	Maxwell	2	0.50
1927	Thinning, Hardwoods Cut	Shortleaf-Loblolly	Olla Tower	2	0.80
1928	Thinning, Light & Heavy	Loblolly	Isom Strange, Arnold, Nelson, Whitehead	9	1.936
1931	Thinning, Demonstration	Loblolly	Bronson	3	5.00
1921/1922	Brush Disposal & Methods of Cutting, Commercial Operation	Shortleaf-Loblolly-Hardwoods	Dulaney	12	34.30
1925	Methods of Cutting, for Pulpwood	Loblolly	Maxwell	2	0.52
1925	Methods of Cutting, Commercial Pulpwood Operation	Shortleaf-Loblolly-Hardwoods	Brown Paper Mill Company	1	0.30
1930	Methods of Cutting, Clearcut, diam. limit, Selection, & Accretion	Loblolly	Smith	5	5.15
1925	Cone Production	Longleaf-Shortleaf-Loblolly	Greeley Pasture	1	--
1929	Cone Production	Longleaf-Shortleaf-Loblolly	Chapman Forest	1	--
1923	Natural Reproduction	Longleaf,Loblolly, Shortleaf	Greeley Pasture	3	0.65
1927	Natural Reproduction	Loblolly	Elk Pasture	1	0.01
1928	Natural Reproduction	Longleaf Longleaf,Loblolly, Shortleaf	Greeley Pasture	3	0.47
1929	Natural Reproduction With and Without Fire	Longleaf	Chapman Forest	2	0.28
1932	Natural Reproduction Effect of Fire 3 Years Later.	Longleaf	Chapman Forest	1	0.15
1932	Natural Reproduction	Loblolly	Smith	1	--
1923	Method of Planting	Shortleaf-Loblolly	Greeley Pasture	3	2.32
1915	Hog Damage	Longleaf Reprod.	Roberts	2	0.50
1915	Fire Damage	Longleaf Reprod.	Roberts	2	0.50
1923	Fire Damage	Loblolly	Greeley Pasture	11	2.60
1923	Fire Damage	Loblolly	Elk Pasture	5	1.00
1924	Fire Damage	Loblolly	McDow	1	--
1925	Fire Damage	Shortleaf	Greeley Pasture	1	--
1925	Growth and Yield	Upland Hardwoods	Greeley Pasture	1	0.10
1925	Growth and Yield	Loblolly	Maxwell	1	0.45
1925	Growth and Yield	Loblolly	Cary	1	0.25
1930	Growth and Yield	Loblolly	McCartney	2	0.80
1930	Growth and Yield	Loblolly	Boyd	1	0.415
1932	Growth and Yield	Loblolly	DeMoss	1	2.00
1932	Growth and Yield	Loblolly	McDowell	1	1.00
			Total	94	65.5

Although many of these experiments were begun without adequate planning and were carried out under the handicap of inexperienced and frequently changing personnel, it is felt that they have furnished a variety of miscellaneous information as well as serving to

train the staff. The thinning studies have usually been inconclusive. If there is an advantage in thinning, it is so slight as to be completely obscured where the plots were not strictly comparable when established. Of course, none of the studies are as yet completed, and later growth and analysis may bring out results [that are] today obscure. The fire and hog-grazing study of longleaf reproduction (Roberts Plots) has shown that longleaf pine reproduction can not survive where there are many hogs and that annual controlled winter fires materially retard the growth but are not, apparently, a serious factor in survival. The two original Roberts Plots on which all longleaf was destroyed by hogs (U-8, 9) reseeded to longleaf, but the reproduction has been unable to compete with the loblolly and shortleaf pine reproduction or has been retarded in growth by the heavy ungrazed grass.

The Dulaney plots were partially burned before the study was completed; nevertheless they showed that in this region brush disposal is not a major problem, because of the rapidity with which brush rots. The fire plots in second-growth loblolly indicate that annual controlled burning at any season ordinarily has very little effect on the growth or survival of loblolly pine. Exceptional conditions, such as a hot summer fire after a period of protracted drought where there has been no fire for 10 years can completely kill out a stand of young loblolly pine. In mature loblolly pine, however, a single hot fire, even after a period of protracted drought, does not seriously affect the survival of this species, although it cuts down the growth. Shortleaf pine, because of its sprouting ability, can withstand fire much better than loblolly pine. The study at Chapman Forest has indicated that a fire occurring just prior to a good seed crop can materially increase the number of longleaf pine seedlings established per acre over the number established on land protected from fire for several years. It remains to be seen how many of these seedlings will survive; both burned and unburned areas will be overstocked if all the seedlings now present survive.

The other studies at Urania have not run long enough to give definitive conclusions. To date Urania's most important contribution has been the training of new and inexperienced personnel.

The work at Urania should help solve many questions. Ashe (1) called attention in 1909 to the fact that longleaf was not satisfactorily restocking at Urania. Many factors complicate the longleaf reproduction problem in a region where other pines and hardwoods are found. Where hogs are plentiful there is no longleaf reproduction. Therefore, fencing is necessary if longleaf is to be grown. Longleaf produces an abundant supply of seed about once in 3 or 4 years. Squirrels and birds eat longleaf mast, and when the seed crop is small the rodents and birds get practically all of it.

The problem of fire in relation to longleaf pine establishment and survival is one of the most controversial problems connected with forestry practice in the South. At Urania, Professor Chapman of the Yale School of Forestry believes that controlled periodic winter burning is essential to the development of longleaf pine reproduction. While some believe that annual fires are essential, others believe that any fire is detrimental. It is known that on areas where the original stand was nearly pure longleaf pine, species susceptible to fire were notably absent. Given fire protection, loblolly will replace longleaf as the dominant species on some sites, even where there is an abundant supply of longleaf seed and no hogs. It is known too that annual winter fires materially retard height growth. It is possible that other factors are operating to crowd longleaf out of much of what was formerly longleaf land. Many of the Station's experiments are directed toward solution of vexing problems regarding the establishment of longleaf seedlings.

Apparently the most important research problems presented by the second-growth stands in the vicinity of Urania relate to the management of established stands of loblolly and shortleaf pine. One of these problems has to do with the effect of fire. Frequent fires do not materially affect second-growth loblolly and shortleaf, unless the fires occur after a protracted drought, during the vegetative season, or before the seedlings are well established. It is possible that periodic winter fires in loblolly and shortleaf pine would reduce the accumulated fire hazard and in some cases constitute a sound protective measure, particularly where an adequate fire-protection organization is not available. It is certainly necessary to protect loblolly and shortleaf from fire during the seedling stage.

Another problem that merits considerable attention is the management of second-growth shortleaf and loblolly pine other than old-field stands. The area in old fields near Urania is small (estimated at 10 per cent), and for that reason the chief forestry problems are concerned with second-growth mixed age stands on cut-over areas stocked in varying degrees of density.

Hardwood bottoms at Urania represent approximately one-fifth of the total forest area there and bottomland forests are a potential source of revenue, but no attempt has been made to ascertain methods of management for this type. Most of the bottomland hardwood stands have been culled of their more valuable species, and so are in a condition not nearly so productive as desired.

There are also some areas of upland hardwoods that merit study. Most of these areas have a large proportion of worthless species. Some attempt should be made to determine what to do with them.

In the general field of fire research, it is probable that much valuable information could be obtained by a fundamental study of inflammability, combustion, and relative hazards of different fuels. Specially, a record of wind velocity and actual fire temperatures at different points about and above the ground could be expected to give us much useful information.

The work at the Urania should center, however, around the determination of proper forest management practices for second-growth loblolly and shortleaf stands on cut-over areas.

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(8) ----------History of Conservation in Louisiana. A pamphlet printed at Alexandria, 1928.

(9 Lounsbury, C., Rogers, R.F., and Bennett, H.H. Soil Survey of LaSalle Parish, Louisiana. U.S. Department of Agriculture, Bureau of Soils, 1920.

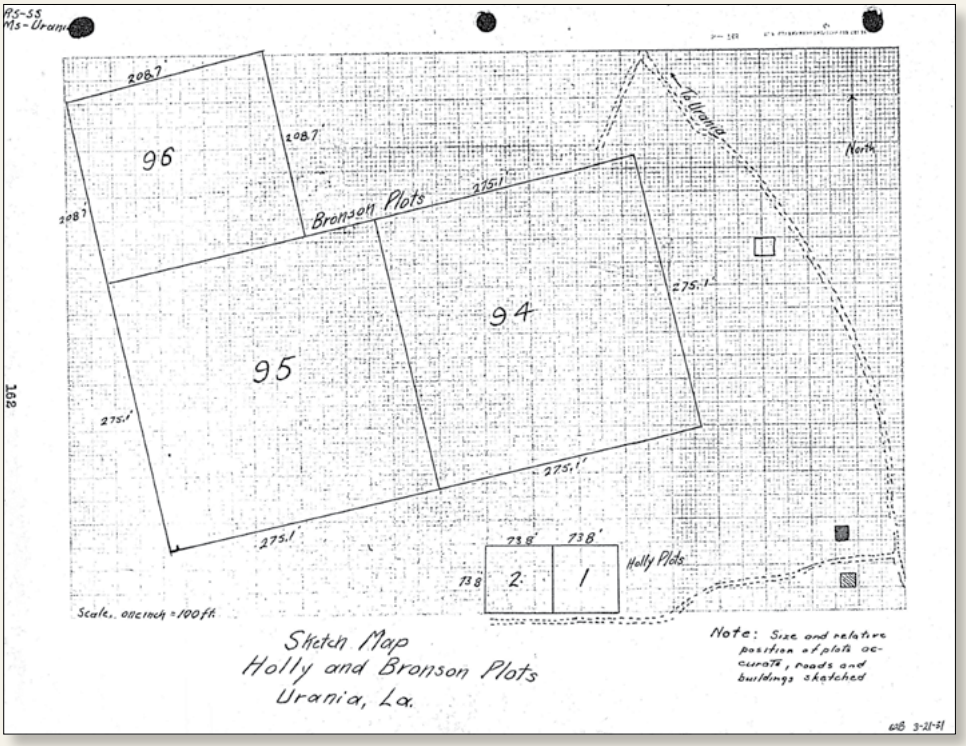
(10) Mattoon, W.R. Report on Urania Lumber Company. U.S. Forest Service. January, 1914.

[6] Editor's note: The actual title of this publication is *Factors determining natural reproduction of longleaf pine on cut-over lands in La Salle Parish, Louisiana*; the rest of the information is correct.

NOTE

The project record sheets (starting with page 35) and the succeeding sections of this report (the Appendix, Glossary of Local Terms, and the maps) were prepared prior to the final editing and typing of the "Forestry History of the Urania Lumber Company's Holdings in Northern Louisiana." This final typing of the "Forestry History, etc." was done in such a way that fewer pages were required than before, hence the lack of pages 33 and 34.

R.M.



Map of the Bronson (U-94, U-95, and U-96) and Holly (U-1 and U-2) plots, Urania Lumber Company. The small Holly Plots were the first two Forest Service plots at Urania, installed by Samuel Trask Dana in January 1915.

Branch station: Urania, Louisiana. Permanent Plots U-1 and U-2

Project: RS-SS, Mt-113. Holly Plots

Object of experiment: This study was made to test the effect of a moderate thinning "from below" on a 12-year-old even-aged stand of shortleaf pine.

Experimental area location: The plots lie in the NE1/4,SW1/4, Sec. 6, T. 10 N., R. 2 E.

Motor Log

Mileage	Notes	Mileage
0.0	Urania Commissary; drive west on dirt road past Company's office and cross railroad tracks	1.3
0.3	R by Mr. Quincy Hardtner's residence.	1.0
0.9	Left.	0.4
1.0	Left.	0.3
1.05	Straight through past house.	0.25
1.2	R at sign and drive between two houses.	0.1
1.3	Stop. Plot 1 is 50 feet west.	0.0

The land is owned by the Urania Lumber Company. See maps, pages 159, 160 and 162.

Forest type

Original type was probably longleaf pine; present stand is old-field shortleaf-loblolly pine. This site is considered good for shortleaf pine. The stand was 12 years old in January, 1915.

Species of tree studied

Second-growth, old-field shortleaf pine. Associated species are loblolly pine with mixed hardwoods in the understory.

Soil

Province – Interior Coastal Plain.
Series and type – Montrose silt loam.
Topography – gently rolling.
Elevation – 80 feet.
Drainage – N.W., good.
Litter – pine and hardwood.

History of area

Date of cutting is not definitely known, but the area was treeless in 1903 although not under cultivation. The area has never been burned and has been open to all classes of grazing until 1925 when it was fenced. The present stand seeded in naturally in 1903.

Record of experiment

Established: January 16-27, 1915, by S.T. Dana. Plots – two numbered U-1 and U-2, each plot 73.8 x 73.8 feet, containing 1/8-acre. No. 1 check plot; No. 2 moderately thinned, removing suppressed and intermediate trees.

Measurements: March, 1920, remeasured but not thinned by R.D. Forbes and C.R. Tillotson. October, 1924, remeasured by W.R. Hine, Averell and Tinker. January, 1925, thinned by E.N. Munns and W.R. Hine. January, 1930, remeasured and thinned by R.A. Chapman and R.H. May.

Reports: May 12, 1915, Establishment Report, S.T. Dana. November, 1922, Results from Sample Plots in Southern Pine Experiments. Journal of Forestry. Lenthall Wyman. October 11, 1927, Progress Report, L.I. Barrett and E.W. Gemmer.

Photographs: Plot 1, 22424-A, Jan., 1915; 45627-A, March 6, 1920; 242828, Feb. 7, 1930. Plot 2, 22420-A, Jan., 1915; 22425-A, Jan., 1915; 45628-A, March 6, 1920; 211221, Aug. 10, 1926; 241520, Nov. 16, 1929; 242829, Feb. 7, 1930; 247949, Jan., 1930.

Dates of remeasurement: The plots are to be remeasured at 5-year intervals; the next is scheduled for the winter of 1934-35.

Holly Plot U-1

Year	Number of Trees per Acre					Ave. D.B.H.	Range in D.B.H.	Ave. Height	Total B.A. per Acre	Total cu.ft. volume per Acre
	Crown Classes									
	Dom.	Codom.	Inter.	Suppr.	Total					
					Loblolly pine					
1915	224	104	32	248	608	2.9	1”- 6”	24	28.1	228
1920	192	64	80	40	376	4.7	1”- 8”	35	45.3	586
1925	176	88	24	56	344	5.8	1”-10”	48	62.7	1,165
1930	112	96	64	16	288	6.9	3”-12”	56	74.9	1,630
1935										
					Shortleaf pine					
1915	248	568	328	2176	3320	1.8	1”- 5”	19	62.5	439 *667*[11]
1920	264	240	272	640	1416	3.5	1”- 7”	30	92.5	996 *1581*
1925	240	240	192	80	752	4.9	2”- 8”	42	97.0	1,663 2828
1930	80	216	120	144	560	5.6	2”- 9”	52	96.6	2,069 *3699*
1935[7]										*4350*[11]
								914-1247-871-651[11]		

[7] Editor’s note: These numbers (in italics) were handwritten in the margins of this table, with no further explanation.

Holly Plot U-2

Year	Number of Trees per Acre: Crown Classes: Dom.	Codom.	Inter.	Suppr.	Total	Ave. D.B.H.	Range in D.B.H.	Ave. Height	Total B.A. per Acre	Total cu.ft. volume per Acre
					Loblolly pine					
1915[1]	20	32	32	144	226	1.7	0"- 5"	17	3.6	25
1915[2]	16	8	8	8	40	3.4	0"- 5"	24	2.6	21
1920	16	8	16	8	48	4.4	0"- 6"	34	5.1	67
1925[1]	16	8		64	88	6.6	0"- 8"	51	7.5	146
1925[2]	16	8		56	80	7.4	0"- 8"	53	7.2	146
1930[1]	16	8			24	8.6	7"-10"	61	9.7	236
1930[2]	16	8			24	8.6	7"-10"	61	9.7	236
1935[1]										
1935[2]										
					Shortleaf pine					
1915[1]	376	352	512	1712	2952	2.0	0"- 7"	18	66.2	580
1915[2]	368	176	48	128	720	3.6	0"- 7"	25	51.4	514
1920	264	120	224	152	760	4.8	0"-10"	36	95.8	1,492
1925[1]	264	176	136	144	720	5.8	0"-11"	47	130.2	2,670
1925[2]	264	160	80	32	536	6.4	2"-11"	50	118.9	2,516
1930[1]	120	208	104		432	7.6	4"-12"	59	135.9	3,438
1930[2]	120	184	32		336	8.0	4"-12"	60	116.5	2,997
1935[1]										
1935[2]										*4044*[11]

[1] Before thinning. [2] After thinning.

Remarks and Recommendations

The response to thinning in this study has been quite marked. The study might have been better with an isolation strip and mother plot.

It seems that a five-year interval between thinnings is not enough. In continuing the study, it may be advisable to investigate the use of a ten-year interval between thinnings.

A thinning in a stand as young as this (12 years old in 1915) does not yield enough to be economically sound, and at the same time probably reduces amount available for later thinning that may yield a slight profit.

These plots are so small that their results cannot be accepted without additional evidence.

No isolation strip. Plot 2 on better site.

RS – SS
M-1, Pines
Urania
Mt
Maxwell, U-5[8] March 28, 1935

Notes on 1934-35 Thinning and Recommendations for Future Thinnings to Produce High-Quality Sawlogs

The trees marked for removal were the poorest trees in the stand. The thinning was largely from below, continuing the method of former thinnings, and aimed to leave between 200 and 250 trees per acre; 232 trees per acre, averaging 8.8 inches d.b.h., were actually left.

The plot should be rethinned [sic] every 5 or 10 years at the time of a remeasurement. Each time, cut only the poorest trees (poorest in vigor, quality, growth, and/or potential) but make no thinning whatever unless at least one cord per acre can be removed. Make the final cutting or harvest when the average d.b.h. is at least 24 to 30 inches.

The 1934 marking and the above recommendations were made jointly by Bull and C.A. Bickford.

Henry Bull,
Assistant Silviculturist

[8] Editor's note: It is unclear why Henry Bull inserted five pages of these short memos to the file on these thinning treatments and recommendations for the Maxwell Plots here in the section for these two Holly plots. There does not appear to be a direct link, and they are not in the same location at Urania. I reproduced this one here because it does provide a good (if brief) example of how the study information was updated in the *Urania Bible*.

APPENDIX[9]
To Urania Summary of 1932

Concerning the work:

In general, in numbering trees for permanent plot work, use outside white paint. Where trees are too small to use paint, metal tags are recommended. When the plot is near a house or travelled road, metal tags do not last, and to avoid confusion in the permanent records, do not assign a new number to the tree, but put on a new tag with the old number. Sometimes it may be advisable to make tree location maps for such plots. With painted numbers, repaint before the numbers become too obscure.

The corner stakes of the permanent plots are to be painted white in the upper portion and the plot number painted on each stake in black, also any additional special information that may be necessary. The paint on these stakes is to be freshened as needed.

Fire lines are to be raked each fall for the Holly, Maxwell, Mayes, Whitehead, Arnold, Nelson, Isom Strange, McCartney, and Boyd Plots. When possible, they should also be raked in the winter.

Mr. G.M. Tannehill and Mrs. Joe Wilson are very useful resources of information, Mr. Tannehill for general administration and roads, and Mrs. Wilson for local history and roads near the old Whitehead Place.

Unless otherwise stated, surveys are run with a Forest Service compass, using a magnetic declination of 7 degrees east.

Until notice to the contrary, all fires occurring where they may have some bearing on the relation of fire to longleaf pine will be mapped with a compass and pacing. Where it is thought a later striking contrast may appear, mark the boundary of the burn definitely.

Concerning travel:

Plot accessibility at Urania can become a truly vexing problem. Nearly all the plots require more or less travel on dirt roads. Some spots on almost any of these dirt roads can become practically impassable with surprisingly little rain. However, with practice and favorable moisture conditions, it is usually possible to drive to all of the plots at any time of the year. In general the summer is the driest time and the area is most accessible then; the winter is the wettest and in really wet weather, strangers should stay on paved or gravelled [sic] roads.

The paved Alexandria-Monroe highway is usable except when flooded by the Chickasaw or Little River. When it is flooded, the alternatives are boating or office work. The Olla-Winnfield road floods readily through Castor swamp; when there is any water flowing over the road on the Olla side of the bridge there is too much water on the other side to get through with an automobile. At such times use Motor Log #1 on page 154 to get to plots across the Castor.

The Hinton road is always driveable [sic] as far as Hinton, unless there are bridges out. Going into Greeley Pasture, stop at Mr. Reed's for information. His mule, Della, will pull a stuck car out if it is pullable.

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[9] Editor's note: This appendix starts on page 153 of the *Urania Bible*, continues to page 158, and appears to have been the last section of the original 1932 document. Pages 159 to 175 are a series of maps of the Urania area, including most plot locations and some plot layouts. The version of the *Urania Bible* in my possession has page number 176 up to hand-numbered page 218 inserted between pages 158 and these maps, and includes a few new studies added between September 6, 1934, and March 10, 1942.

The Flat Creek swamp is always bad to cross. When it is necessary to work on the other side of Flat Creek, walking is the most economical mode of travel. May 1, 1932, the best way to drive has been listed as the Motor Log to plots U-89, U-90, U-91, U-92, U-97, and U-99. For other routes see Motor Logs #2, 3, 4, and 5, pages 154-157. The state is building a new highway from Olla to Sikes (see map, page 159) which, when finished, will probably provide the best route to such plots as are on the other side of Flat Creek.

Miscellaneous Motor Logs[10]

GLOSSARY OF LOCAL TERMS

1. **Branch** – any small tributary to a creek, many of them frequently dry.
2. **Dump** – "fill" of road-building parlance further north.
3. **Glade** – a small depression, usually undrained, outside the main bottoms. Driving here can become very slippery but sticking is relatively rare.
4. **Hammock** – flat-topped ridge in or near the main bottoms, usually an island in high water, flooded only in extremely high water. Hammocks are frequently bordered by pin oak flats.
5. **Pin oak flat** – a depression on the order of a glade, but larger. The pin oak is truly willow oak, Quercus phellos. This a very common association on the borders of a principal bottom.
6. **Spring branch** – a branch fed by a spring, hence usually wet.

[10] Editor's Note: For brevity, these motor logs are not included in this paper.