

*In 1911, Yale Forest School students developed management plans for land in southeastern Texas. These plans are now foundational documents for an ecological restoration project.*

**I**n 1909 and 1911, Yale School of Forestry students prepared forest management plans for virgin stands of upland shortleaf and longleaf pine in southeastern Texas, and one of their professors published the students' data. The reports were intended to promote scientific forestry and enable timber companies to achieve sustained yields in the future. Although the management plans were largely ignored in an era of cut-and-get-out lumbering, the records of these old-growth forests, including age-class distribution and species composition, are now being used to guide the conservation and ecological restoration of a 5,784-acre mixed forest of 100-year-old shortleaf and loblolly pine named Cook's Branch Conservancy in Montgomery County, Texas. The conservation effort is expected to protect a sub-population of more than twenty-five breeding pairs of the endangered red-cockaded woodpecker, a species that only excavates its nest and roost cavities in living old-growth pine trees infected with red heart fungus, which are generally older than 80 years.

#### **1909 FIELDWORK**

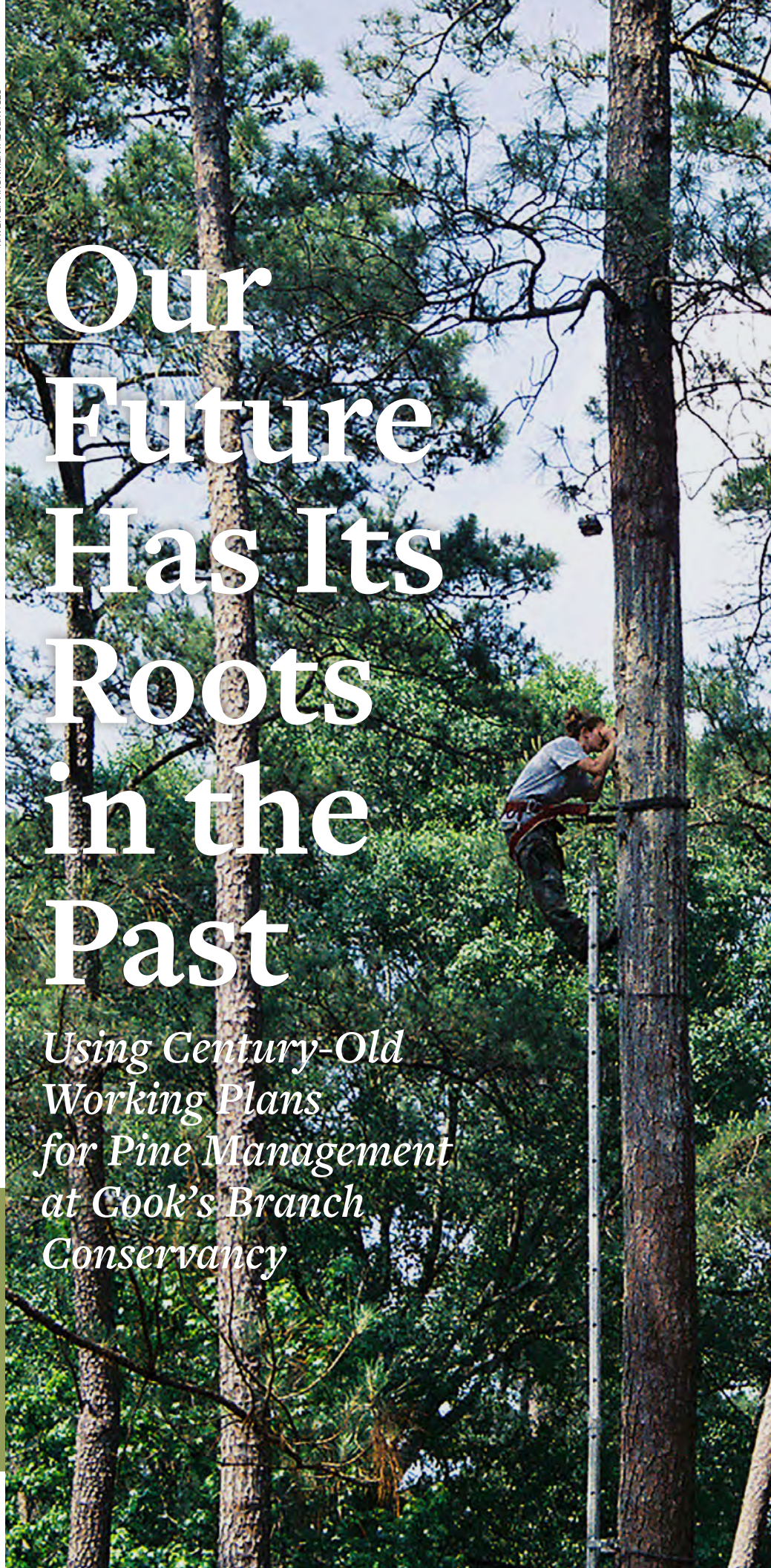
In spring 1909, the Yale School of Forestry took the senior class, as second-year master's

Amy Brosi, a field technician with Raven Environmental Services, inspects a red-cockaded woodpecker nest cavity at CBC during the non-breeding season in 2017. This population is carefully monitored annually for population size, health, and reproductive success. If this was breeding season, she would be on the ground using a telescoping peeper scope so as not to disturb the birds.


RAVEN ENVIRONMENTAL SERVICES

# Our Future Has Its Roots in the Past

*Using Century-Old Working Plans for Pine Management at Cook's Branch Conservancy*







degree candidates were called, to southeastern Texas for ten weeks of field training near Doucette, Texas. Twenty-nine students and four professors pitched their tents in a longleaf pine (*Pinus palustris*) forest owned by the Thompson Brothers Lumber Company. Supervising the Yale students were Professors Herman H. Chapman and Ralph C. Bryant, each of whom made important early contributions to forest research. The goal of forestry professionals at the time was to persuade lumbermen to “regulate” their forests by leaving some twenty-five percent or more of superior young trees for a future harvest in about twenty years. The residual pines would meanwhile serve as the seed source for the next naturally regenerated forest. The students, at least, absorbed the lesson. Noted one in his working plan, “The chief object of lumbering should be to cut the forest to insure a good reproduction and not to cut for commercial purposes only.”<sup>1</sup>

Based on work conducted during the Doucette field school, Chapman published “A Method of Studying Growth and Yield of Longleaf Pine Applied in Tyler Co., Texas” in the 1909 *Proceedings of the Society of American Foresters*.<sup>2</sup> In this paper, he described how his students measured longleaf pine in nine scattered forty-acre plots to determine the “average or actual yields.” Their data produced a “somewhat remarkable result,” in that “Great uniformity was obtained in the figures from the different plots and by different students, and there can be no question that the figures shown actually represent the average production of the species in this locality.” Chapman further concluded that “longleaf pine is found in pure stands but seldom even-aged. The natural form of this forest constantly trends toward small, even-aged groups of a few hundred square feet,” confirming that this uncut longleaf

pine forest was unexpectedly an all-aged, or uneven-aged, forest.

Combining three of Chapman’s tables describing average age, diameter, and distribution, and using his age-class names, Table 1 summarizes the structure of the Doucette longleaf pine forest.

Chapman’s 1909 article thus preserves age data on virgin longleaf pine stands before the species was virtually extirpated across its entire range, which stretched from Texas across the Southeast and up into Virginia.

### 1911 FIELDWORK

Two years later, the Yale master’s degree candidates studied a virgin shortleaf pine (*Pinus echinata*) forest. The 1911 field school session began on April 14, when most of the forty-two students and four instructors arrived by train in Trinity, Texas, to begin ten weeks of hands-on training. The host was once again the Thompson family and the J. M. Thompson Lumber Company, which owned and leased some seventy-eight thousand acres along the Trinity, Houston, and Walker county lines. A new J. M. Thompson lumber mill, with a thirty-acre millpond, had been built close to Trinity and had produced more than 119,000 board feet of lumber since its two steam-powered bandsaws and planer first whirred to life just four months prior to the students’ arrival.

The Thompson forest holdings around Trinity in 1911 were mostly untouched by logging crews, but they were not untouched by humans. The agriculture census in 1910 for Trinity County reports fourteen hundred farms averaging eighty-six acres, with 19,165 cattle, 27,170 swine, and 8,955 horses, mules, sheep, and goats, for a grand total of 55,290 grazing, browsing, and rooting livestock—nearly all of which were free-ranging in the forest.<sup>3</sup>

Three Yale students—Arthur F. Fischer, Arthur F. Kerr, and Louis

**Table 1.** Doucette Forest Composition, 1909

Classification (Names Assigned by H. H. Chapman)	Age (Years)	Diameter at Breast Height (Inches)	Distribution by Area (Percentage)
Immature Unmerchantable	—	—	25.0
Young Merchantable	109	14.8	25.0
Mature	183	20.6	33.5
Veteran	301	28.5	16.5

Roemer Stadtmiller—wrote working plans with recommendations for forest management.<sup>4</sup> The plans variously describe forest use as including grazing; farming; hunting; harvesting trees for structures, fencing, and firewood; and cutting bolts from large trees for straight-grained wood for roof shingles. The students also noted scattered abandoned forest clearings they called old-fields. Each also commented on fire. Arthur Fischer stated, “Fire is a yearly occurrence,” and “Burning over stands every one or more years, as needed, prevents serious damage.” Stadtmiller concurred: “As soon as reproduction is well started and out of fire danger, the forest should be burned over every year.” Arthur Kerr, however,

disagreed: “In the matter of fire protection, the most important factor is to prevent fires,” and “fire should be kept out absolutely.”<sup>5</sup>

#### CORROBORATION

The Yale students’ records largely dovetail with a detailed description of the J. M. Thompson Lumber Company’s Trinity holdings that was published three years earlier in the September 26, 1908, issue of *American Lumberman* magazine. The writer observed,

While the undergrowth is abundant, as is the case in every shortleaf yellow pine region, it is not unduly heavy and mostly runs to small bushes rather than to large saplings . . . while it is

almost entirely virgin pine, the proportion of ‘ripe’ trees [those infected with red heart fungi (*Phellinus pini*)] is not large. The timber is generally of good size, as is evidenced by the estimate of 5,000 [board] feet to the acre, but it is still growing and shows no indication of decay, so that whether it is manufactured into lumber at once or left for the future the results will be satisfactory. In these second bottoms [of non-riverine perennial streams] the large bodies of hardwoods and much of the larger timber are found. . . . The company’s holdings of timber have fifteen miles of frontage extending along the [north bank of the] Trinity river.<sup>6</sup>

**Table 2.** Trinity Forest Volume Estimates by Species, 1908

Species	Estimated Board Feet	Percentage of Total
Shortleaf pine ( <i>Pinus echinata</i> )	375,036,000	84.29
White oak ( <i>Quercus alba</i> )	9,230,000	2.07
Red oak, water oak ( <i>Q. falcata</i> , <i>Q. nigra</i> )	15,250,000	3.43
Post oak ( <i>Q. stellata</i> )	15,495,000	3.48
Ash ( <i>Fraxinus</i> spp.)	2,585,000	0.58
Hickory ( <i>Carya</i> spp.)	25,000	0.01
Linn [linden] ( <i>Tilia</i> spp.)	190,000	0.04
Elm ( <i>Ulmus</i> spp.)	1,585,000	0.36
All gums ( <i>Liquidambar</i> , <i>Nyssa</i> spp.)	25,565,000	5.75



ADAPTED FROM AMERICAN LUMBERMAN, SEPTEMBER 26, 1908, 77.



The various Thompson lumbering interests in Texas as of 1908: Thompson & Tucker Lumber Company, Willard; Thompson Brothers Lumber Company, Doucette; and Thompson & Ford Lumber Company, Grayburg. The Yale forestry students worked on the J. M. Thompson Lumber Company at Trinity. The ✕ marks the location of the CBC property, which was acquired in 1964.

Soil and topographical conditions would be favorable for both logging and future regrowth, the writer observed: "In few places is reforestation more practicable than here, as illustrated by the few places in this section where small mills had operated fifteen and twenty years ago, for there already is a fine growth of merchantable timber more than twelve inches in diameter."<sup>77</sup> (Three years later, the Yale students would similarly write of conditions being conducive for "seedling reproduction.") On the whole, *American Lumberman* concluded, "the wisdom of the late John M. Thompson in the purchase of the valuable tract is readily seen."

The article also lists the estimated total board feet, by species, across Thompson's entire holding (Table 2). The species composition and volumes by percent of the total comport with the students' working plans, which describe almost pure shortleaf uplands, with some "post oak" areas. Interestingly, loblolly pine is not included in the list while each working plan describes loblolly as present along streambanks and in the bottoms.

**PUTTING THE PIECES TOGETHER**  
Taken together, the 1911 working plans, the 1908 *American Lumberman* article, and the 1910 census help us reimagine this virgin shortleaf pine

forest's structure, composition, and use. One important question that is not directly answered, however, is the age-class distribution. Arthur Kerr's 1911 plan states that "veteran" shortleaf pines are 150 to 200 years old and grow in small, clear (i.e., homogeneous) stands or are scattered throughout the "mature" class, defined as 60 to 100 years old. Stadtmiller wrote that the average age of veteran shortleaf was 180 years and that mature pines averaged 79 years. Fischer lumped veteran and mature pines together and assigned a combined average age of 100 years.

Another resource for age-class distribution in a virgin, mixed shortleaf-loblolly pine forest is a study by Chapman, "Prolonging the Cut of Southern Pine: Part I. Possibilities of a Second Cut," published in 1913 and based on work during the 1912 Yale field school, which was held on Crossett Lumber Company lands in Ashley County, Arkansas, some 250 miles northeast of Trinity. Chapman described this forest's age-class distribution: "Much of it is approximately even-aged, but seldom continuous over very large areas. It is more likely to be broken up into different age classes, clumps of large, overmature trees being interspersed among groups of young timber, small poles or seedlings."

Chapman's 1913 article does not provide detailed tree age data, however: the Crossett forest was "composed of shortleaf and loblolly pine in almost equal mixture," which may have influenced his decision to lump both





TOP PHOTO: IMAGE P907\_43, EAST TEXAS RESEARCH CENTER; BOTTOM PHOTO: RAVEN ENVIRONMENTAL SERVICES

species together, using the average age of longer-lived shortleaf and shorter-lived loblolly. His summary of tree age simply states, “The age of the pine timber in this vicinity rarely exceeds 150 years, although occasional very old trees may reach 200 years.” Notably, he also described extensive shallow soils with a hardpan across the entire forest and surmised that these soils would reduce tree longevity.<sup>8</sup>

The Yale field reports and later publications about the Trinity and Crossett forests generally agree that the age range for veteran shortleaf pines in those forests was 150 to 200 years old. However, more recent information suggests that shortleaf can live far longer. Eastern Oldlist, an online database of ancient trees in eastern North America, documents eleven shortleaf pines in seven southeastern states ranging from 254 to 324 years old, with an average age of 291 years; the oldest loblolly is

At top, an unknown Thompson Lumber Company employee, photographed three miles southeast of Trinity, around 1908. Below is a prescribed burn unit on the CBC property. The photos, taken about 110 years apart, though not at the same location, illustrate the objectives of the CBC’s restoration project as well as the value of prescribed fire as a management tool for achieving them.





246 years old, and the oldest longleaf is 458.<sup>9</sup> Craig Loehle assigns a “typical age of mortality” for shortleaf pine at 200 years and assigns a “maximum longevity” of 300 years.<sup>10</sup> Cerny et al. increase Loehle’s age range significantly, stating that “shortleaf pine has a documented longevity of 350–400 years.”<sup>11</sup>

Chapman’s 1909 and 1913 articles and the 1911 working plans also generally agree on the age-class structure and distribution in the three virgin forest types: pure longleaf (Doucette), mostly pure shortleaf (Trinity), and evenly mixed shortleaf-loblolly (Crossett) were all uneven-aged by virtue of having large and small groupings of even-aged pines, with those groups being of various ages, scattered throughout the forest.

### MODERN APPLICATION

The Yale students’ forest management plans and recommendations went mostly unheeded, in part because twenty years of taxation before a final harvest would have eaten into the timber companies’ profits, and meanwhile, a post-harvest catastrophic fire could destroy all the residual timber. There was simply more money to be made by selling clearcut land to settlers and farmers.

Today, however, the students’ work is no longer being ignored. About fifty miles south of Trinity is a 5,784-acre conservation area, Cook’s Branch Conservancy (CBC), where the desired future condition is a forest that represents the pre-Anglo settlement, old-growth, forested grassland ecosystem. The Yale working plans are not presettlement, but they are the first known descriptions of a local virgin shortleaf pine forest, and they were written by soon-to-be professional foresters. The Chapman articles, 1910 U.S. Census, and *American Lumberman* are likewise presumed trustworthy. The information in these sources provides new insights for CBC’s natural resource management plan.

CBC will now consider the typical age of mortality for shortleaf pine to be 200 years old, with a maximum longevity of 300 years. If timber harvests are necessary to achieve desired future conditions, small group-selection harvests (two to five acres) will be used to mimic natural processes, with single-tree selection as a second alternative. No clearcutting will be allowed unless forest health is considered to be in extreme jeopardy. Preferred upland tree species are shortleaf pine, post oak, and southern red oak. Preferred streamside (mesic) species are loblolly pine, white oak, and water oak. The desired prescribed fire entry interval for upland stands is one year, with all other stands on an average interval of no more than three years. Frequent prescribed fire reduces woody understory and midstory while promoting herbaceous groundcover, and when combined with managing for old-growth pine trees, creates ideal habitat for the red-cockaded woodpecker and many other old-growth forested grassland specialists. CBC has recently enrolled in the California Air Resources Board carbon offset program, an action that should provide an alternative or supplemental revenue stream to timber harvests.

Perhaps the most important conclusion for the CBC or any landowner wishing to conserve and restore an old-growth southern pine forest ecosystem, is that the commitment and effort must continue for at least ten generations—250 or more years. CBC’s management plan will continually change as new information appears and new knowledge is gained, but these century-year-old records are a good foundation.

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*Transcriptions of all three working plans may be found at [foresthistor.org/yale-working-plans](http://foresthistor.org/yale-working-plans). Many thanks to Yale University for permission to publish them.*

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### NOTES

1. L. R. Stadtmiller, “Working Plan for Thompson Bros. Lumber Co., Trinity, Texas” (Master’s thesis, Yale University School of Forestry, 1911), 10.
2. H. H. Chapman, “A Method of Studying Growth and Yield of Longleaf Applied in Tyler Co., Texas,” *Proceedings of the Society of American Foresters* IV, no. 2 (1909): 207–20.
3. U.S. Census Bureau, *Thirteenth Census of the United States, Volume VII: Agriculture, 1909 and 1910*, Texas, Table 1, Farms and Farm Property, by Counties: April 15, 1910 (Washington, DC, 1910), 652.
4. The three plans have been transcribed and are available at [www.foresthistor.org/yale-working-plans/](http://www.foresthistor.org/yale-working-plans/).
5. A. F. Kerr, “Working Plan Thompson Bros. Lumber Company, Trinity, Texas” (Master’s thesis, Yale University School of Forestry, 1911); Stadtmiller, “Working Plan for Thompson Bros. Lumber Company”; and A. F. Fischer, “Working Plan for Trinity Holdings of Thompson Bros. L. Co.” (Master’s thesis, Yale University School of Forestry, 1911).
6. “Lone Star Pine,” *American Lumberman*, September 26, 1908, 114.
7. “Lone Star Pine,” 114.
8. H. H. Chapman, “Prolonging the Cut of Southern Pine: Part 1. Possibilities of a Second Cut,” *Yale Forest School Bulletin* 2 (1913): 5, quote on 6. The same bulletin contains Ralph Bryant’s “Part II. Close Utilization of Timber,” 23–32, which examines “the need for the exercise of more care in felling and log making” to reduce waste.
9. Eastern Oldlist, <http://www.ldeo.columbia.edu/~adk/oldlisteast> (accessed October 25, 2020).
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11. K. C. Cerny, D. W. Stahle, and D. C. Bragg, “A Frontier Shortleaf Pine Stand in the Old-Growth Cross Timbers of Oklahoma,” *Journal of the Torrey Botanical Society* 143, no. 3 (2016): 233.