Learning the Hard Way: The Beginnings of Forest Service Research in Arkansas

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As the Forest Service celebrates its first century of service, it is helpful to remember the agency's humble beginnings. In July of 1905, soon after Gifford Pinchot achieved his goal of a unified land management organization within the United States Department of Agriculture, the Forest Service had a grand total of 821 employees, including 153 professional foresters, to oversee the millions of acres of national forests they had inherited (Pinchot 1947). Undaunted by this task, Pinchot and other early Forest Service leaders forged ahead with a vision that transformed a once obscure and almost laughable idea of science-based forest management into a sustainable enterprise that has served the American public well.

During the festivities of this anniversary, others will tout the broader accomplishments of the Forest Service (e.g., Williams 2000). National and even global implications of the work of the agency will be highlighted and plans brought forward for the next century of stewardship. Our long-term, multipurpose history of land management will certainly and rightly rise to the forefront of this celebration. It is also important to recognize the role of Forest Service research, not only in the evolution of the agency, but in the development of forestry and other related professions. None other than Pinchot himself (1947) praised the study of the forest:

> The greatest contribution of Forest Research is the spirit it has brought into the handling of national resources. Under the pressure of executive work, the technical ideas of the forester at times grow dim. It is Forest Research which has kept the sacred flame burning and has helped to raise Forestry to the level of the leading scientific professions.

The struggles faced by modern Forest Service scientists pale in comparison to those confronting the earliest researchers laboring in relative obscurity with few of the tools and resources we now enjoy. Nevertheless, federal forest science rapidly evolved, with virtually all of the basic foundations of modern-day Forest Service research established by World War II.

This evolution can be exemplified by events in Arkansas before 1940. What makes this state such a good example of the development of early Forest Service research? By 1909, the focus of timber operations had moved from the cutover and burned forests of New England and the Lake States to the South (Smith 1974). Concurrent with this shift, forestry had emerged as a scientific discipline in the United States. In these formative years, forestry was a lesson to be learned the hard way, borne of the bitter boom-and-bust cycles of lumbering and agriculture. It was only logical that those studying this new field followed the companies who stood to benefit the most from their work. For instance, a significant portion of the early work of the Forest Service's research branch concentrated on helping southern timber concerns develop working plans to improve their utilization of the forest. Therefore, it should be of little surprise that Yale University established summer camps and formal working relations with lumber companies in Crossett, AR and Urania, LA in the 1910s.

The Earliest Years

Before the Civil War, the only reports on Arkansas forests came from either journals of explorers such as William Dunbar (Figure 1), George Hunter, Edwin James, Thomas Nuttall, John Audubon, Henry Schoolcraft, George Engelmann, and George Featherstonaugh, or government-sponsored surveys (e.g., Owen et al. 1860, Daniels 2000). Rarely did these efforts venture beyond brief accounts of the flora and fauna, and modern interpretation of these narratives provides only an incomplete glimpse of the virgin forest. Eventually, promotional accounts of the timbered lands of Arkansas (e.g., Langtree 1867, Kay 1900) abounded as railroad companies, land speculators, and government agencies sought to rapidly populate the state, but these descriptions are limited and more boosterism than science.

By the late 19th century the elements of forest-based research began to spread across the nation. Spurred on by a handful of academicians and conservation-minded citizens, the federal government took up the banner of forestry under the watchful eyes of people like Franklin Hough, Bernard Fer-

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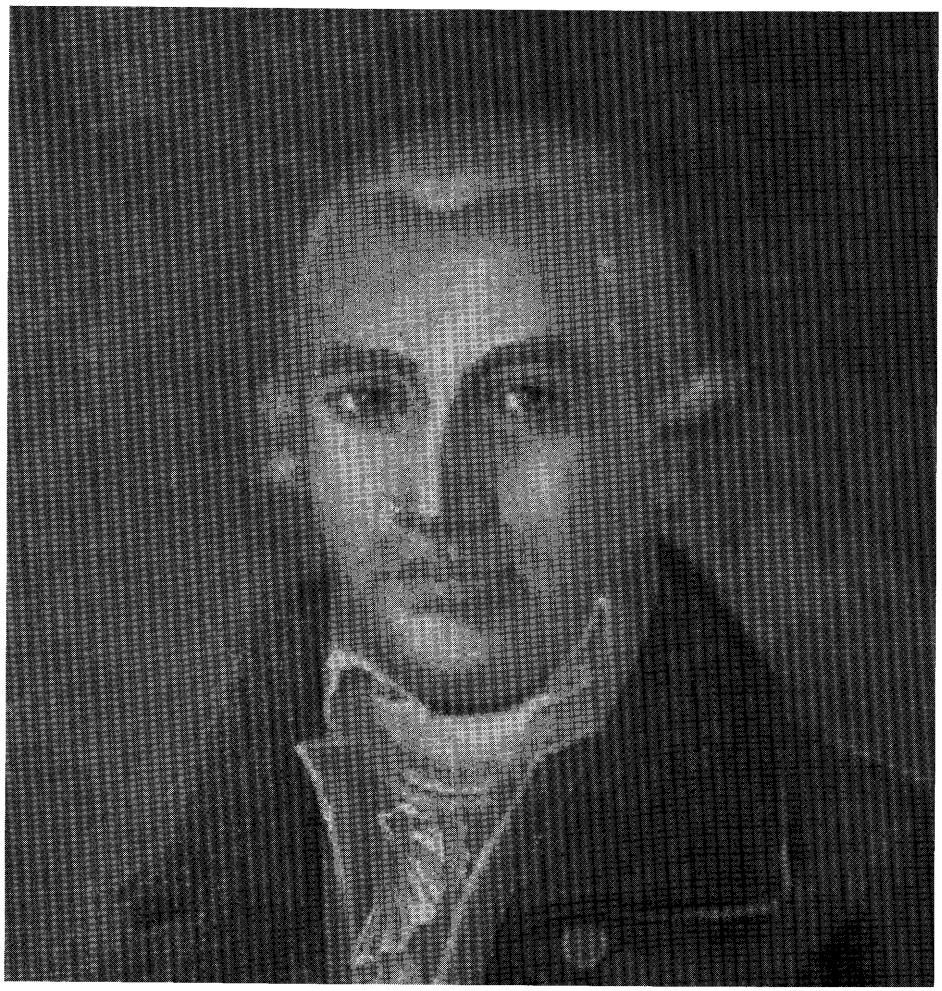

Figure 1. William Dunbar, an explorer, typified one of the earliest sources of forest-based knowledge in the lands that would eventually become Arkansas. Painting of William Dunbar by an unknown artist, courtesy of the Arkansas Museum of Natural Resources.

now, and Gifford Pinchot. By necessity, Forest Service research evolved as the profession of forestry matured. At first, the agency studied the nature and extent of American timberlands. With a workforce limited to a handful of staffers, early forestry bureau chiefs like Hough and Fernow depended on contributions from regional experts and special agents such as Charles Mohr (Mohr 1897) and questionnaires distributed to interested parties. Hough's early reports on American forestry (Hough 1882) and Harvard professor Charles Sargent's report in the Tenth US Census on the forests of North America exclusive of Mexico (Sargent 1884) are typical of this era, and provide baseline conditions of southern forests in the latter half of the 19th century.

Due to a lack of formal training in forestry, early nonfederal academicians only tangentially contributed to our knowledge of Arkansas forests. Francis Harvey of the Arkansas Industrial College (now the University of Arkansas at Fayetteville) and Frederick Coville (then of Cornell University) published several lists of Arkansas trees in the 1880s (Harvey 1883, Coville 1891), and Professor R. Ellsworth Call provided additional tree species and vegetation descriptions for eastern Arkansas (Call 1887–1889). After 1910, a growing number of academically oriented naturalists, ecologists, and foresters began reporting on the forest conditions and management techniques of the region. Herman Chapman of Yale University was one of the first professionally trained foresters to study Arkansas and Louisiana forests, and his groundbreaking publications (e.g., Chapman 1913) with pioneering timber outfits such as the Crossett, Southern, and Urania Lumber Companies helped establish the science-based application of forestry in the region. A couple of years later, G.C. Morbeck produced a report on the logging of pine and hardwoods in central Arkansas, concentrating on the forests and timbering operations of the Fordyce Lumber Company (Morbeck 1915). Morbeck's work was soon complemented by more ecological descriptions of Arkansas forestlands by roaming academicians such as Roland Harper and Ernest Palmer. These "junkets" followed a trend seen in forestry, ecology, and even archaeology in the South, a region with few local institutions capable of conducting natural resource-based research. Scholars from other parts of the United States would venture to the often-intact southern ecosystems and report on what they observed. Even as late as the early 1930s, only a handful of Arkansas-based academicians, such as Lewis Turner, had investigated and described the state's forests.

Early Federal Involvement in Arkansas Forestry Research

Several federal agencies engaged in limited forest and forest-related technical programs in parts of the South. For instance, although concentrating primarily on agricultural issues, some of the first Bureau of Soils surveys occurred in counties with a substantial amount of uncut forests. Ashley County, for example, located in the southeastern corner of Arkansas and encompassing many of the holdings of the Crossett Lumber Company, saw the publication of its first soil survey before 1920 (Vanatta et al. 1916). In addition to soils descriptions, accounts of the virgin and second-growth timber in Ashley County were published. Other non-Forest Service federal investigators produced early reports on logging slash decay (Long 1917) and heartrot losses (Hepting and Chapman 1938) in the state of Arkansas. These examples highlight the compartmentalization of government forest science, in which specialists such as pathologists or soil scientists were housed in other agencies, while Forest Service research focused on wood utilization, inventory, economics, and silviculture (Bond 1937).

Forest Service Beginnings. Even with these useful contributions, the majority of the early forest-based research produced for Arkansas (and the South) arose from Forest Service analyses (Josephson 1989). This is particularly remarkable considering that the Forest Service did not have a permanent research staff in the state until the Crossett Experimental Forest was established in the

mid-1930s (Reynolds 1980). Most forest science was produced under the direction of distant offices, through intermittent visits by Forest Service employees, or as a portion of a larger research project. Arkansas forests, for example, contributed loblolly (*Pinus taeda*) and shortleaf (*Pinus echinata*) pine growth and yield information to the first major work on this topic for southern pines (USDA Forest Service 1929). Samples of lumber sawn in the state also contributed to work on the characteristics of southern pine timber (Davis 1931).

Outside of brief mention in reports by Hough, Sargent, and Mohr, forestry issues in Arkansas were first addressed in a technical format by Frederick "Fritz" Olmsted (Olmsted 1902). Although it was more an advisory report than research, Olmsted's work with the Sawyer and Austin Lumber Company was an integral part of Pinchot's outreach program (spelled out by Forestry Circular 21, Box 1) to the timber industry during the formative years of the Forest Service. A few years later, Samuel Record, then the supervisor of the Arkansas (now Ouachita) National Forest, published a booklet describing the timber species and general forest types of Arkansas, including growth and yield estimates (Record 1910). Over the years, other Forest Service staffers such as Wilber Mattoon, E.L. Demmon, and E.M. Davis incorporated lessons on topics like shortleaf pine, southern pine management and economics, and wood properties they learned in Arkansas forests into broader scale reports of forest conditions.

Even though the Arkansas and Ozark National Forests were established in 1907 and 1908, respectively, and others followed in the South with the passing of the Weeks Act in 1911, the Forest Service still lacked a formal research footing in the region until the 1920s. After locating the Southern Forest Experiment Station (SFES) headquarters in New Orleans on July 1, 1921, the Forest Service research program increased steadily throughout the region (Demmon 1942, Wakeley 1964, Josephson 1989, Strausberg and Hough 1997). The timing was impeccable. By the 1920s, it was apparent that the once seemingly inexhaustible southern forests were rapidly vanishing (Figure 2). Heretofore promising alternatives for cutover timberland such as agricultural or pastoral use were inadequate to deal with the vast acreages timber companies possessed. Fires raged virtually uncontrolled across the landscape, consuming over 2.5 million acres in 1929 in Arkansas alone (Bruner 1930). Lumbering interests and public officials clamored for assistance in solving these problems. However, it would not be

Figure 2. Loggers rapidly felled the virgin pine forests of Arkansas during the first few decades of the 20th century, leaving a cutover land primed for the implementation of good forestry practices. Image courtesy of the Crossett Public Library.

Table 1. Distribution of total forest area in the various forest types and forest conditions in 1935 for the south Arkansas Delta (adapted from Winters 1939).

Forest type	Old growth		Second growth, sawlog size		2nd growth, not sawlog size	All conditions	
	Uncut	Partly cut	Uncut	Partly cut			
	Acres						%
Red gum-water oak	25,400	59,500	150,000	48,400	172,200	455,500	16.7
Mixed oak-mixed hardwood	24,600	100,000	196,000	160,300	301,600	782,500	28.6
Overcup oak-bitter pecan	54,000	105,600	80,200	34,100	64,200	338,100	12.4
Water oak	8,700	53,100	113,500	76,200	67,500	319,000	11.7
Hackberry-elm-ash	21,400	108,700	150,800	39,700	97,600	418,200	15.3
Cottonwood-willow	—	—	78,600	15,900	107,900	202,400	7.4
Cypress-tupelo gum	6,300	23,000	21,400	19,900	19,900	90,500	3.3
Pine-hardwood	—	—	17,400	14,300	9,600	41,300	1.5
Scrub oak-scrub hardwood	—[a]	—[a]	5,500	5,500	65,100	84,900	3.1
Totals	144,400	454,700	813,400	414,300	905,600[b]	2,732,400	100.0
Percent of total	5.3	16.6	29.8	15.2	33.1	100.0	

[a] Although the survey data show an area in this type and condition, it is too small to indicate accurately even the relative magnitude of the individual item. The area estimated, however, is carried in the total for the type and condition.
[b] Of this area, only 4% can be classified as clearcut.

until the early 1930s that timber companies and state governments found the willingness to support fire suppression and programs to reestablish and manage forestlands (Lang 1965).

Cooperative Ventures. Cooperation among federal, state, and private agencies increased as local opposition to reforestation diminished and companies began hiring trained foresters. Even before federal experimental station branch locations appeared across the South, the Forest Service worked with whoever was interested in sustainable practices. This represented a productive dynamic—government researchers provided expertise and advice to lumber companies, which often contributed timberland access and funding to support further work. For example, in 1932 Russ Reynolds (Figure 3) of the SFES instituted a cooperative program with Les Pomeroy, Gene Connor, and the Ozark Badger Lumber Company of Wilmar, AR to help develop their "pine tree banking" techniques (Pomeroy 1989). Following this fruitful venture, Reynolds and fellow SFES forester A.E. Wackerman established selective management and truck logging studies on Crossett Lumber Company lands in southern Arkansas, which soon led to the establishment of the Crossett Experimental Forest and further work on these topics (Reynolds 1980). During this same period, the more conventional Sylamore Experimental Forest was emplaced in the Ozark National Forest by the Central States Forest Experiment Station to conduct research in the hardwood forests of the Ozark Mountains.

Social Implications. Over the years, early Forest Service scientists also contributed to the fields of economics, wildlife management, hydrology, tree improvement, wood utilization, and agroforestry. Research programs were extended into neglected resources such as the extensive bottomland hardwood forests of the lower Mississippi River Valley. Studies of the renewal of southern forests came at a critical juncture in Arkansas history, as traditional agricultural practices declined and whole rural populations uprooted to distant industrial centers, making large areas of vacant land available for "alternative" uses. This transition was not easy, however. Throughout the South the efforts of Forest Service scientists like Russ Reynolds and Austin Cary were vital to overcoming years of resistance to change and conventional wisdom, and the opposition could be formidable: as late as 1929 only 15 of 100 Arkansas legislators voted to authorize the formation of a state forestry department (Lang 1965). In a further example, G.P. George, a newspaper editor, attorney, and politician from Hamburg, AR, was among those sharply critical of government forestry programs. In a collection of caustic editorials published in the waning years of the virgin timber, George (1928) decried the "pine tree menace":

> A Forest Conservation law to be applied to lands suitable for agricultural purposes is wrong. The attempt to grow pine trees on lands needed and suited for farms and ranches is wrong. Our mind is made up as long as we live with the present lights before us . . . The pine tree menace must be destroyed and pushed back and give room for the people to expand and grow, and these lands must be given over to people for homes and the forest conservation idea must be abandoned.

Time has certainly shown George's vociferous opposition to be misguided. Sustainable forestry proved the economic salvation of the region, whose soils were as poorly suited for conventional agriculture as they were favorable for growing pine, oak, gum, and cypress. In fact, timber outfits such as the Crossett Lumber Company became strong advocates of forestry in part because they had been unable to sell cutover land to farmers, and company-run cattle ranching proved unprofitable (Reynolds 1980). Bruner's groundbreaking work on fire issues has also been credited with prodding the legislature into authorizing the Arkansas State Forestry Commission by 1931.

Other Contributions of Forest Service Programs

Forestry Research Outlets. The Forest Service provided a valuable service by supplying the major outlets of technical information on forests and forestry (McDonald 1996). It is easy to forget in this modern era of dozens of forest-related journals and high-speed digital reference access how little was available in the early days of forestry. Before the publication of the *Proceedings of the Society of American Foresters*, *Forestry Quarterly*, and the *Journal of Forestry*, their better-known successor, very few American periodicals published forestry-related work. Horticultural magazines like *Garden and Forest* or trade publications like *American Lumberman* dealt only indirectly with management issues, while science-based societies rarely concerned themselves with the practical

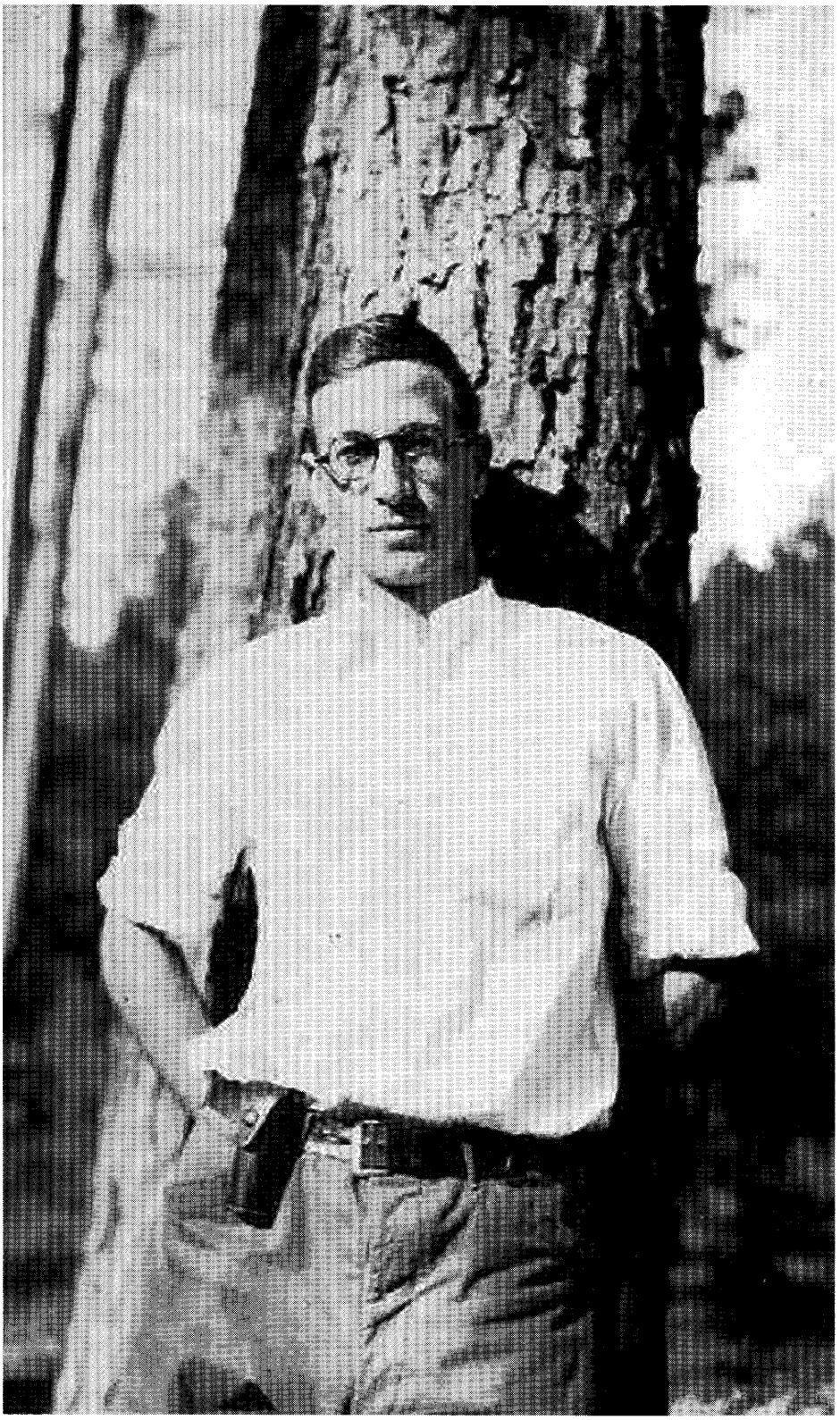

Figure 3. Russ Reynolds, the first dedicated Forest Service scientist permanently staffed in Arkansas, arrived in the mid-1930s to establish a research program in the second-growth timber (USDA Forest Service photograph).

aspects of forestry. Thus, it fell on Forest Service bulletins, circulars, and reports to provide practitioners the bulk of the information they required. Fortunately, Forest Service scientists such as Wilbur Mattoon and Russ Reynolds specialized in the development of outreach publications on southern forestry.

Some of the first Forest Service publications focused on working plans and resource assessments. To this end, Forest Service researchers had two primary goals: helping the timber industry learn how to sustainably manage their lands, and educating other members of the public on the advantages of forestry. For example, Olmsted's (1902) working plan emphasized the topics that dominated early Forest Service programs—encouragement of fire suppression and the establishment of naturally regenerating forests, in addition to fairly detailed, if basic, information on tree biology, growth and yield, silvics, and forest protection. In Arkansas, this technical assistance was also a means to soothe some of the acrimony that developed following the establishment of national forests in what had previously been the public domain. Local citizens and politicians needed to be convinced that these public timberlands were not simply being withdrawn from commercial usage, and forest supervisors required a means to spell out the consequences of the utilization of national forests (Steen 1976).

The establishment of the Forest Service's Forest Products Laboratory in Madison, WI in 1910 meant that aspects of wood technology for even distant locations like the Ouachita National Forest become accessible. Reports on fire control technology, wood-using industries, and the national forests of Arkansas (Adams 1912, Harris et al. 1912) were eventually followed by others on the milling of timber from the federal lands in the state (e.g., Garver and Miller 1928). By the time of this last article, much of the emphasis in Forest Service publications had switched to improving production efficiency, silviculture, and forest establishment, as well as protection of forests from destructive agents like hogs and fire (Bruner 1930, Bond 1937, Eldredge 1937). Eventually, as formal Forest Service research stations were established across the nation, publication of technical materials evolved from practical, extension-focused reports or statistical bulletins to more formalized publications on the scientific efforts of the agency. Many of these efforts were also published or summarized in professional (but nonfederal) outlets like the *Journal of Forestry*, *Southern Lumberman*, and *American Forests*.

Inventories. Following the passage of the McSweeney–McNary Forest Research

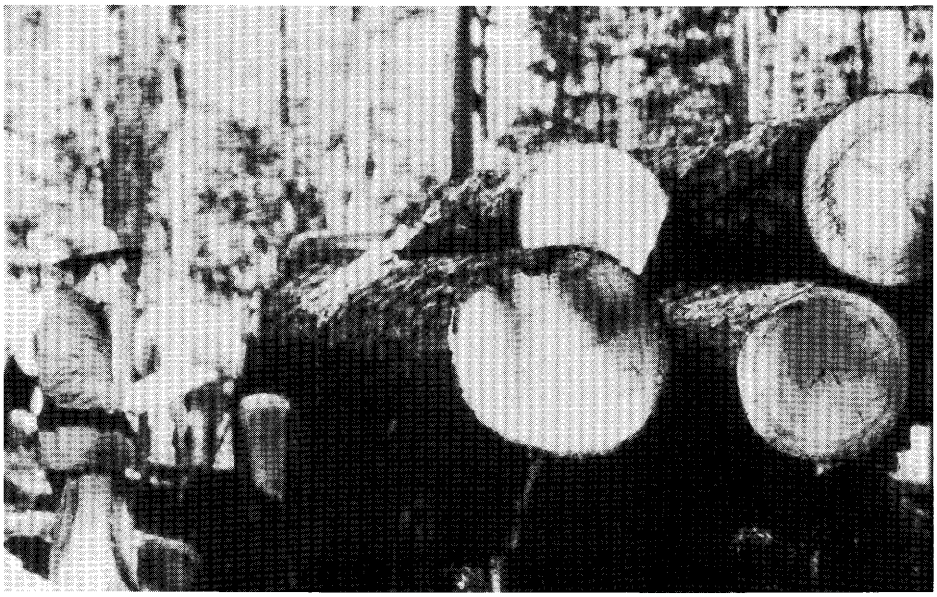

Figure 4. An example of the photographic record established by early Forest Service scientists. Taken by Russ Reynolds in 1935 near Fountain Hill, Arkansas, this image depicts a study of the efficacy of using trucks to selectively log second-growth pine stands (USDA Forest Service photograph).

Act in 1928, the Forest Service also began to establish large-scale forest inventories. Before this effort, the only statistics kept on American forests were summaries encapsulated in Census Bureau publications or occasional government commission reports, some of which were reproduced in trade journals of the day. For instance, in 1903 Arkansas was reported to have the greatest remaining timber stocks of any state east of the Rocky Mountains (American Lumberman 1903). Prompted by the rapidly vanishing forests of the United States, these resource assessments helped to show a growing nation the need for sustainable forestry. By the late 1930s, forest surveys conducted by federal agents were being issued regularly for Arkansas and other southern states, and with a level of detail previously unheard of in public forums (Table 1).

Photography. As a part of their regular duties, Forest Service scientists took innumerable photographs of people, plants and animals, forested landscapes, milling practices, and other natural curiosities. Gifford Pinchot had implemented this practice in the early days of the Forest Service, and this photography has served forestry well, then and now. During their Forest Service tenure, Wilbur Mattoon, Clement Mesavage, and Russ Reynolds captured scenes of Arkansas timberlands, logging practices, and lumber mills now long since vanished (Figure 4). At the time, these photographs served as educational tools and provided visual evidence of the condition of the land (both positive and negative). In addition to preserving a valuable portion of American history, these images now help modern restorationists reconstruct views of the past to address environmental concerns of today.

Conclusions

As World War II approached, the practice of forestry was well grounded in Arkansas. The 1930s witnessed the establishment of the Arkansas State Forestry Commission and the first experimental forests in the state. By the mid-1940s, the first in-state collegiate program to train foresters had begun at the Arkansas A&M College (now the University of Arkansas at Monticello). During the first critical decades of their involvement in the state, Forest Service researchers played prominent roles as leaders and advocates of scientific forestry. Whether engaging in time-and-motion studies of truck logging or examining the impacts of damaging agents, Forest Service researchers have transferred ideas, methodologies, and technology that have greatly benefited forest management. In Arkansas and throughout the South, sound practices have improved forest health, sustained productive ecosystems, and helped stimulate local economic development. In addition, this work has helped alleviate many of the negative environmental and social consequences wrought on a landscape and people undergoing radical transformations. Undoubtedly, the Forest Service's second century of service will be confronted with many other hard lessons, but we can look to the accomplishments of agency scientists in early 20th century Arkansas as a model of how to face these challenges.

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Box 1. Forestry Circular 21.

A bold initiative first issued in 1898 by the ambitious Pinchot and his staff, Forestry Circular 21 was intended to help farmers, lumbermen, and other private forest owners voluntarily implement more responsible logging practices and sustainable forestry. Under the terms of the circular, in return for financial support and access to their lands, the government provided trained agents to conduct inventories, evaluate existing practices, and recommend logging, afforestation, protection, and silvicultural strategies. Over the next decade, first the Forestry Division, then the Bureau of Forestry, and finally the Forest Service used the principles of this popular outreach program to introduce scientific forestry to thousands of individuals, associations, and companies such as the Sawyer and Austin Lumber Company of Pine Bluff, Arkansas, thereby helping to establish the foundation needed by the developing profession across the nation.

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