

SIXTY YEARS OF MANAGEMENT ON A SMALL LONGLEAF PINE FOREST

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Abstract—A management demonstration in a 40-acre tract of second-growth longleaf pine (*Pinus palustris* Mill.) had its 60th anniversary in 2008. A demonstration was initiated by the U.S. Forest Service in 1948 on the Escambia Experimental Forest in south Alabama. At the time, the management goal for this Farm Forty was to produce high-quality poles and logs on a 60-year rotation. The goal was to be accomplished entirely through management of the existing natural forest with little to no capital investment other than the cost for prescribed burning, marking trees for cut, and limited control of cull hardwoods. Since that time, management has continued making the stand an excellent demonstration of small-scale longleaf pine management. This paper celebrates the 60th anniversary of the Escambia Farm Forty with discussions of standing volume of merchantable pine timber at selected inventories plus volumes harvested between inventories.

INTRODUCTION

Some of the earliest observations about forested systems in the United States were written about longleaf pine (*Pinus palustris* Mill.). In 1840 after traveling through the northern part of the Mississippi Piney Woods, historian John F.H. Claiborne (1906) wrote “The growth of giant pines is unbroken for a hundred miles or so, save where river or large water courses intervene. . . . Much of it is covered exclusively with the longleaf pine; not broken, but rolling like the waves in the middle of the great ocean. The grass grows three feet high and hill and valley are studded all over with flowers of every hue. The flora of this section of the state and thence down to the sea border is rich beyond description.”

The first European settlers in what is now the Southeastern United States were confronted with an upland forest that was dominated by a single species of tree—longleaf pine. Stretching from the Coastal Plain of southern Virginia across a broad belt of the South Atlantic and Gulf Coasts into eastern Texas, longleaf occurred on nearly 90 million acres and on over 60 million of those acres, longleaf alone dominated the overstory. From Virginia to Texas, it dominated the Coastal Plain and sandhills and extended into the Cumberland Plateau, Valley and Ridge, Blue Ridge, and Piedmont physiographic provinces.

Today, only about 3 million of the original 90 million acres still support longleaf pine—a loss of over 96 percent of the original longleaf forest acreage. Sadly, even fewer acres retain examples of an intact, functioning longleaf ecosystem with all associated plants and wildlife. Longleaf pine forests have been listed as one of the rarest ecosystems in the United States. The rangewide, large-scale reduction of this ecosystem began with the cutting of the original forests at the turn of the 20th century with little to no regard for regenerating stands after they were cut. This coincided with a major effort to exclude and/or suppress all fires including the frequent, low-intensity fires which are critical for longleaf pine regeneration. Other reasons for the severe decline include conversion to non-longleaf pine plantations, agriculture, urbanization, and development.

With the longleaf pine resource declining, the Forest Service, U.S. Department of Agriculture established the Escambia Experimental Forest (EEF) in 1947 with the hope that Forest Service scientists could find ways to provide for longleaf’s restoration, with special emphasis on its regeneration. The EEF is a 3,000-acre tract near Brewton, AL, on private land owned by T.R. Miller Mill Company. The company, interested in the higher prices longleaf timber commanded, leased the property to the Forest Service for 99 years.

At the time the EEF was established, about half of the forest land over most of the South was in small ownerships. Many of these tracts had been heavily cutover in the past, and returns were low from any forestry activity. As a result, many owners were often uncertain as to their land’s best use. What were costs and returns when such lands were intensively managed and the best-known practices applied? It was in response to questions such as this that researchers established the Farm Forty in 1948 as a demonstration of small woodlot management.

The Farm Forty

The Farm Forty was established on the EEF as a demonstration of longleaf pine forest management for the small-scale private forest landowner. At the time of establishment, the Farm Forty supported an understocked, 35- to 45-year-old, second-growth longleaf pine forest that was common on many farm forests in the Coastal Plains of the Gulf South (Boyer and Farrar 1981). The tract is predominantly longleaf pine (31 acres), with the remaining 9 acres comprised of mostly slash pine (*P. elliottii* Engelm.) in the creek bottoms and flats. Site index for longleaf on the Farm Forty at the time it was established was average—70 feet at 50 years. The results of the first 30 years of management and demonstration on the Farm Forty were reported by Boyer and Farrar (1981).

MANAGEMENT

The long-term management goal of the forest was to grow high-quality sawtimber and poles on a 60-year rotation (Boyer and Farrar 1981). With the private landowner in mind, this goal was to be accomplished through management of

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the existing forest with little to no additional investment or expense. Primarily expenses were from cost of prescribed burning and control of hardwoods. Regeneration and intermediate cuts provided regular income from the forest; however, removals were not to exceed growth until full stocking, and a balanced distribution of age classes was achieved.

Beginning in 1948, initial harvests were conducted annually. These harvests removed the poorest quality trees through thinnings and improvement cuts to gradually improve growing stock. Shelterwood cuts were used to recruit younger age classes and promote natural regeneration on the forest starting in 1954. Harvest areas were established on the forest so that small areas, 2 to 4 acres in size, were harvested leaving the highest quality seed bearers in the overstory. Seed from these remaining overstory trees was used to regenerate the stand. Once the new stand of young trees was established sawtimber-sized trees were removed from the overstory, often through a series of thinnings. Through time, a number of age classes were developed on the Farm Forty with the goal of always having mature stands to be harvested so there could be continuous revenue from the forest.

Other than periodic harvests, the primary cultural treatment and expense during the first 30 years of management on the Farm Forty was prescribed fire. Through the use of winter burns, the entire Farm Forty was burned seven times for brush control, hazard reduction, and seedbed preparation. Management costs were intentionally kept low to demonstrate to landowners how they could manage their property with limited resources. The only additional costs beyond burning expenses were marking trees for harvest and control of cull hardwoods.

Management over the second 30 years continued with periodic shelterwood harvests to promote regeneration, and tracts were burned on a 2- to 3-year cycle (Boyer and Farrar 1981). Season of burn was shifted from winter to spring burns during this time to improve hardwood control. Additional benefits from the spring burns included better control of hardwoods in low lying areas, and reestablishment of native cane breaks [*Arundinaria gigantea* (Walt.) Muhl.] and pitcher plants (*Sarracenia* spp.) in the flats.

GROWTH AND HARVEST

Growth and removal of pine volumes on the Farm Forty from 1977 to 2007 are summarized in table 1. During the period

Table 1—Total stand per-acre volumes in cubic feet, sawtimber stand per-acre volumes in cubic feet, and International 1/4 and Doyle log rules for the Escambia Experimental Forest Farm Forty from 1977 to 2007

Farm Forty 1977 to 2007	Total stand per acre (>3.5 inches d.b.h.)	Sawtimber stand per acre (>9.5 inches d.b.h.)		
	<i>cubic feet</i>	<i>cubic feet (stem only)</i>	<i>board feet International 1/4-inch</i>	<i>board feet (Doyle)</i>
Inventory 1977	1,194	855	5,408	3,268
Increase 1962 to 1977	261	133	959	794
Cut 1963 to 1977	275	219	1,351	768
Growth 1963 to 1977	536	352	2,310	1,562
Inventory 1987	1,392	1,003	6,417	4,022
Increase 1978 to 1987	198	148	1,009	754
Cut 1978	159	89	537	281
Growth 1978 to 1987	357	237	1,546	1,035
Inventory 1992	1,426	1,010	6,455	4,072
Increase 1988 to 1992	34	7	38	50
Cut 1988	140	119	748	446
Growth 1988 to 1992	174	126	786	496
Inventory 1997	1,533	1,084	6,914	4,334
Increase 1993 to 1997	107	74	459	262
Cut 1993	47	38	211	112
Growth 1993 to 1997	154	112	670	374
Inventory 2002	1,593	1,137	7,226	4,491
Increase 1998 to 2002	60	53	312	157
Cut 1998	261	184	—	—
Growth 1998 to 2002	321	237	—	—
Inventory 2007	1,457	1,034	6,529	3,979

from 1977 to 2007, overall volume per acre increased 22 percent, and sawtimber volume increased 15 percent to 1,084 cubic feet per acre from 1977 to 1997 (table 1). Gains in total volume per acre slowed through the 2002 inventory period, with a <5-percent increase to 1,593 cubic feet per acre.

September 15, 2004, Hurricane Ivan made landfall and impacted much of the EEF, including 10 acres of timber in shelterwood systems on the Farm Forty along with many other acres on the EEF. Salvage harvests were conducted over the following year; however, timber volumes harvested during these operations were not separated for the Farm Forty alone making it impossible to know exactly how much volume was lost as a result of Hurricane Ivan. Inventories conducted in 2007 show that there was a 9-percent volume decrease in total standing timber volume from the 2002 inventory (table 1). Decreases occurred in both sawtimber and pulpwood as standing volumes were reduced to 1,034 and 422 cubic feet per acre, respectively.

DISCUSSION

Using the shelterwood method, stands were thinned to approximately 30 square feet of basal area and naturally regenerated to mimic natural processes on a small scale. Eventually, older stands were removed as the new stand matured. Over time, a number of age classes were developed within the Farm Forty so there were always mature stands to be harvested providing periodic revenue from the forest with minimal cost to the landowner. An additional benefit of this method is that while a stand reestablishes itself, high-value wood can be grown on the remaining large, seed-bearing trees.

CONCLUSIONS

Beginning in 1948, the Farm Forty was set up as a demonstration forest on the EEF for private landowners to help them effectively manage their tracts with limited

monetary input. Over 60 years of research on the Farm Forty has provided information vital to the southern landowner and timber manager.

Forest researchers continue to use the EEF to delve into many longleaf management concerns and problems. Research topics over the past 60 years have included natural regeneration, stand management and growth, site quality and soils, fire ecology, and woods grazing. The EEF is a much used outdoor demonstration area for the education and enjoyment of a host of visitors including school children and forestry students. It is a real-world, living demonstration of proven techniques that can be used to produce both tangible products and aesthetic values. As the timber grows and responds to forces such as hurricanes, and as interest in new forest products develops, the Farm Forty will continue to be managed with the perspective of the private landowner in mind.

A 15-minute video, "Sixty Years on the Farm Forty: Longleaf Pine Management for the Private Landowner," was recently produced, which highlights the Farm Forty and its 60th anniversary. In addition, a Farm Forestry Field Day has been scheduled for May 2009. The authors may be contacted for more information on this and other activities on the Farm Forty.

LITERATURE CITED

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