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A Forested Tract-Size Profile of Florida's NIPF Landowners

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Abstract

Information gathered from 2,713 permanent Forest Inventory and Analysis (FIA) sample plots showed that over 1.0 million acres, or 15 percent of the nonindustrial private forest (NIPF) timberland in Florida is in forested tracts ≤ 10 acres. Forested tracts ranging from 11 to 100 acres accounted for the largest proportion of NIPF timberland. By NIPF-ownership group, over 23 percent of other privately owned land was in forested parcels < 11 acres, whereas the other corporate and farmer-owned categories each recorded 6 percent. There was a higher proportion of natural pine stands in small forested tracts than in planted stands. Average softwood and hardwood growing-stock volume varied significantly by forested tract-size category. There was significantly more softwood growing-stock removals in the largest tract-size category than in the smallest. Comparisons of harvest and regeneration rates by forested tract size indicate that harvest and regeneration rates are considerably lower in tracts < 11 acres.

Keywords: Forest ownership, forested tract size, timber growth, timber removals, timber volume, timberland.

Introduction

Demands for timber products are expected to increase. As a group, Florida's farmers, individual landowners, and corporations that do not manufacture forest products are in a position to help future demands because (1) they control vast areas of forest land and timber volume; (2) public forests will probably play a smaller role in timber production as budget constraints continue and citizens seek to reduce levels of timber harvesting; and (3) many forest-industry holdings are being sold to corporations and individuals (Brown 1996).

In Florida, nonindustrial private forest (NIPF) landowners control 7.2 million acres, or 49 percent, of the State's 14.7 million acres of timberland (Brown 1996). Tract size affects management decisions. Hodge and Southard (1992) found a relationship between ownership size class and the landowner's willingness to prepare a written forestry plan. In addition, they determined that intent to harvest is closely linked to whether there is a written plan. When evaluating management alternatives, landowners must consider the high cost of managing tracts < 50 to 100 acres in size (Society of American Forests 1979). Cost sharing and technical assistance programs, such as the Soil Bank Program of the 1950's and the Conservation Reserve Program of 1985, are more appealing to those who either own large forest acreages or are already actively managing their lands for timber production (Kingsley and Birch 1977). Under the Forestry Incentives Program adopted in the 1970's, only those NIPF landowners who hold ≥ 10 acres were eligible for assistance.

Because increasing numbers of landowners control smaller tracts, and because incentive and cost-sharing programs continue to benefit those who own large tracts, Forest Inventory and Analysis (FIA) began collecting new information in Florida's seventh inventory (Brown 1996). The collected data include tract size and proportion of forested acreage in each tract. In this paper, I summarize forested tract-size acreage distri-bution of NIPF-owned lands in Florida by specific owner group, region, broad management class, and stand age. I also review the relationship between forested tract size and volume, growth, and removals. Finally, I examine harvest and regeneration rates by forested tract-size category.

The Procedure

Sampling in this study follows a design used by FIA at the Southern Research Station. I gathered information from a subsample of 2,713 permanent FIA plots that are visited periodically by U.S. Department of Agriculture, Forest Service inventory crews in Florida. Field crews researched county records and tax maps and gathered ownership information for each timberland-area sample. Only those sample plots on NIPF lands were considered.

For each NIPF-inventory plot, acreage of the entire tract is recorded. The boundary survey most often used in Florida is the rectangular system, in which tiers of townships are formed by north and south lines running according to the true meridian and by others crossing at

right angles. Townships are divided into 36 sections, each approximately 1 mile square (640 acres). The entire parcel is described on tax maps, or boundaries are drawn directly onto aerial photographs. Parcel acreage is readily available on the tax maps and is recorded for each sample plot location.

The area within a tract that contained forest was then determined, and that acreage was recorded as percent cover. Forest acreage was determined either directly from the county's aerial photographs or, if the county only had line maps, field crews transposed tract boundaries onto their aerial photographs. Forested tract size was the basis for analysis for our study, and I identified six distinct size classes for use in the comparisons I made: 1 to 10 acres, 11 to 50 acres, 51 to 100 acres, 101 to 200 acres, 201 to 500 acres, and > 500 acres. Forested tract differences among stand area variables, volume, growth, and removals were determined using the General Linear Model test (SAS Institute 1988).

The last inventory in Florida was made in 1987. When field crews revisited the sample plots in 1995, they noted any evidence of human activity, e.g., thinning, selective cutting, or final harvest. They also noted any artificial (planting or seeding) or natural regeneration. In preparing this report, I compared acres of final harvest with acres regenerated, then divided those figures by the number of years between inventories to get annual averages. I estimated the annual rate of final harvest and regeneration used for tract-size classes by dividing the average annual acreage harvested or regenerated by the total acres in that class.

The collection of forested tract size is limited to the acreage contained within the sampled tracts and does not include the total acreage any individual or corporation may own elsewhere in the county, State, or outside the State. Because trend information will not be available until the next inventory of Florida has been completed, the examination of the timber resource considered only current estimates of land area and timber volume. No tract-size data were collected during earlier inventories; therefore, comparisons of timber removals and harvest activities are confounded by timber harvesting on larger parcels that have been subdivided. Once trends have been determined, forested tract size will provide a measure of resource fragmentation and may identify a connection between tract size and the NIPF landowner's attitude towards timber management. Forested tract size and many other stand variables also may serve as additional timber-availability screening tools.

Results

Of the 7.2 million acres of NIPF timberland in Florida, 1.0 million acres, or 15 percent, were concentrated in forested tracts ≤ 10 acres (table 1). Forested tracts > 500 acres totaled 1.3 million acres, or 19 percent of all NIPF timberland in the State. Forested parcels ranging from 11 to 100 acres accounted for the largest proportion (34 percent); and tracts ranging from 101 to 500 acres accounted for the remaining 32 percent.

Ownership Group

I recognized three owner categories within the NIPF group: (1) land owned by individual farm operators, i.e., noncorporate farm ownerships; (2) other private land that is owned by individuals who are not farm operators; and (3) corporate land owned by parties that do not manufacture forest products, including incorporated farm ownerships.
Examination of forested tract-size classes among owner

Table 1—Acreage by forested tract-size class and NIPF-ownership group, Florida, 1995

		NIPF-ownership group		
Forested tract-size class	All classes	Farmer-owned	Other corporate	Other private-individual
		Acres		
0 - 10	1,058,957	59,947	164,345	834,665
11 - 50	1,497,752	313,295	267,743	916,714
51 - 100	928,200	214,431	207,270	506,499
101 - 200	1,118,101	181,428	379,787	556,886
201 - 500	1,268,978	171,202	627,725	470,051
501+	1,345,417	54,460	982,921	308,036
All classes	7,217,405	994,763	2,629,791	3,592,851

categories indicated variations in acreage distribution. Most noteworthy were differences in the proportion of forested acreage in the smallest and largest tract-size class. Twenty-three percent of other private land was in forested parcels < 11 acres, whereas 6 percent of both farmer-owned and corporate land was in small forested parcels (table 1). Thirty-seven percent of corporate-owned land was in forested parcels > 500 acres, compared to 9 and 5 percent for the other private and farmer-owned categories, respectively.

The large proportion of timberland in the largest forested tract-size category for corporate ownership occurs for two reasons. First, forest industry has sold a substantial amount of land to other corporations. Of the 2.6 million acres of corporate timberland in Florida (Brown 1996), 20 percent was classified as forest industry acreage in 1987. Much of it was in very large individual parcels, typical of forest industry holdings. Second, large corporations own much of the timberland in South Florida and are involved in agricultural enterprises. Agricultural corporations in that region often control individual parcels of several thousand acres.

Region

When forested tract size was compared on a regional basis, results indicated that Central Florida contained the highest proportion of tracts < 11 acres (fig. 1). Almost 20 percent of timberland controlled by NIPF owners in Central Florida were in the smallest forested tract-size category. South Florida had the highest proportion of forested tracts > 500 acres. Fifty percent of NIPF timberland in South Florida was in the largest forested

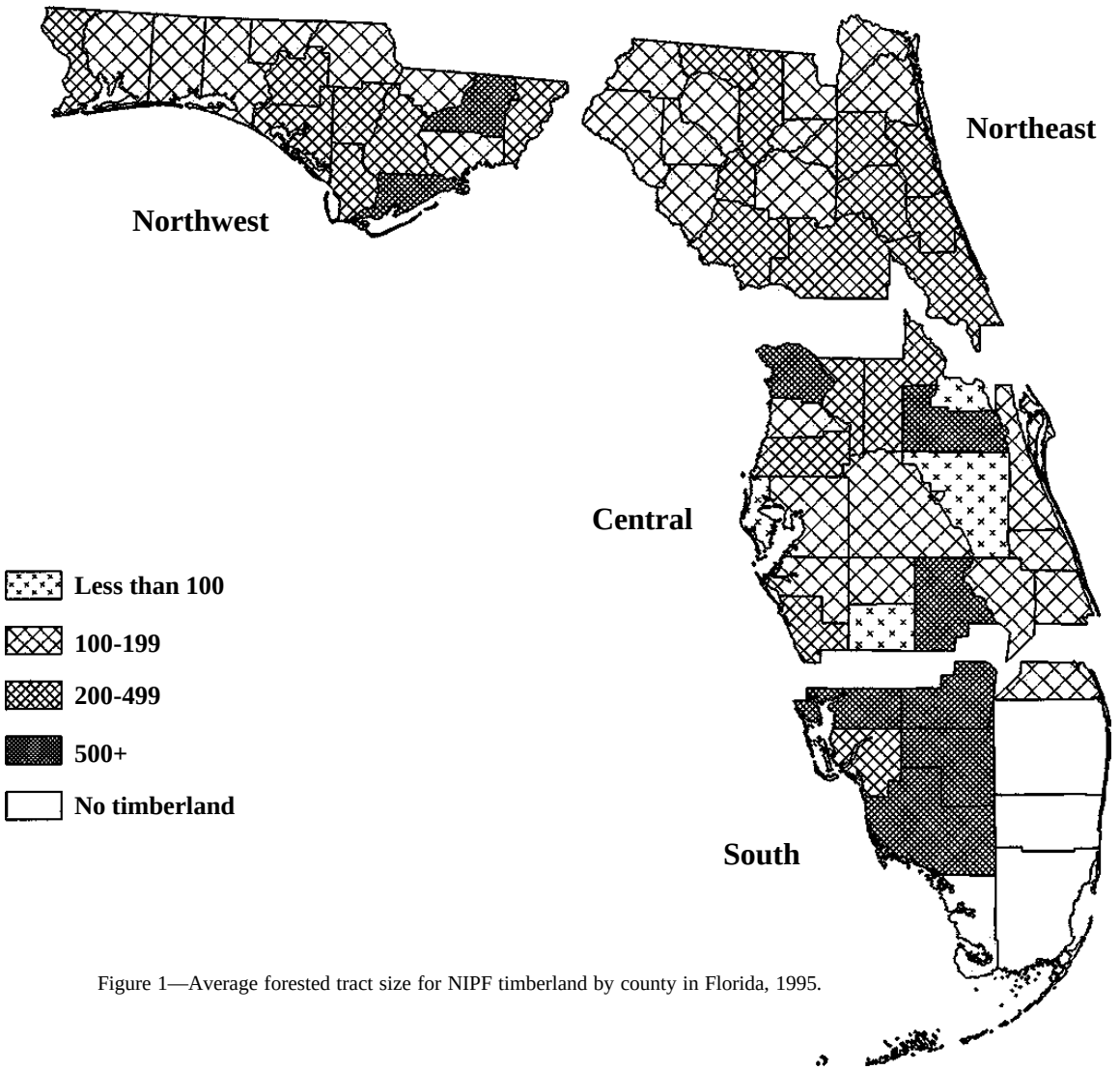

Figure 1—Average forested tract size for NIPF timberland by county in Florida, 1995.

tract-size category. Figure 1 displays tract size by county.

Broad Management Class and Stand Age

Comparisons of forested tract size were based on five broad management classes: (1) pine plantation, (2) natural pine, (3) oak-pine, (4) upland hardwood, and (5) lowland hardwood. Pine plantations on NIPF land occupied 1.6 million acres, 5 percent of which was in forested tracts < 11 acres (table 2). Twenty-six percent of the NIPF land planted in pine was in tracts > 500 acres, and the remaining 69 percent was somewhat evenly distributed in tracts 11 to 500 acres.

These findings showed that few pine plantations were in very small tracts, although there were noticeable differences in the distribution of planted stands among NIPF-owner categories. Ten percent of planted pine stands on the other private ownership group were in forested parcels < 11 acres, compared to fewer than 2 percent on the corporate group. By contrast, 4 percent of planted pine stands on other private ownership were in forested parcels ≥ 500 acres, compared to 54 percent on corporate holdings.

NIPF landowners controlled 1.4 million acres of natural pine, 18 percent of which was composed of < 11-acre parcels (table 3). Seventeen percent of natural pine acreage was in forested parcels > 500 acres. Our data indicate that natural pine stands in this smallest tract-size category were more fragmented than planted pine acreage in the same category. The largest proportion of natural pine acreage was in the 11- to 50-acre class; 23 percent of the total area. By NIPF-owner category, corporate land had 30 percent of natural pine acreage in tracts ≥ 500 acres and 7 percent in tracts < 11 acres. By contrast, other private land had 10 percent of natural pine acreage in tracts ≥ 500 acres and 28 percent in tracts < 11 acres.

Oak-pine is a transitory forest type in which hardwoods constitute a plurality of all live-tree stocking; but in which softwoods constitute 25 to 50 percent of the stocking. The distribution of acreage classified as oak-

Table 2—Area of planted pine stands by forested tract-size and stand-age classes for NIPF lands in Florida, 1995

Forest tract-size class	All classes	No manageable stand	Stand-age class (years)			
			0-9	10-19	20-29	30+
			Acres			
0 - 10	85,132	—	23,698	25,227	15,851	20,356
11 - 50	279,197	—	153,681	88,618	19,245	17,653
51 - 100	190,043	5,241	105,876	59,401	9,422	10,103
101 - 200	327,061	6,198	159,589	99,079	35,542	26,653
201 - 500	321,818	2,777	144,274	101,117	50,598	23,052
501+	427,024	13,696	141,579	135,498	107,054	29,197
All classes	1,630,275	27,912	728,697	508,940	237,712	127,014

Table 3—Area of natural pine stands by forested tract-size and stand-age classes for NIPF lands in Florida, 1995

Forest tract-size class	All classes	No manageable stand	Stand-age class (years)						
			0-9	10-19	20-29	30-39	40-49	50-59	60+
			Acres						
0 - 10	248,228	102,421	17,984	22,504	29,851	32,306	32,238	8,304	2,620
11 - 50	319,375	80,402	33,801	48,405	26,733	35,453	57,833	24,247	12,501
51 - 100	147,801	39,171	18,660	17,430	20,103	10,833	25,951	15,653	—
101 - 200	175,754	67,122	23,077	15,902	24,817	13,693	12,998	7,514	10,631
201 - 500	257,205	97,347	26,640	42,186	18,337	27,487	18,213	13,973	13,022
501+	233,429	85,428	13,198	23,269	22,664	29,487	34,790	17,010	7,583
All classes	1,381,792	471,891	133,360	169,696	142,505	149,259	182,023	86,701	46,357

pine forest generally has the same overall pattern as natural pine. On timberland controlled by NIPF owners, oak-pine stands covered 0.8 million acres. Sixteen percent of oak-pine stands were concentrated in forested tracts < 11 acres and 17 percent were in tracts > 500 acres (table 4). Thirty-eight percent of the oak-pine area was in 11- to 100-acre tracts and the remaining 29 percent were in forested parcels 101 to 500 acres.

Nonindustrial private forest landowners held 1.5 million acres of timberland classified as upland hardwood forest type. Of the five broad forest type classes, upland hardwood had the highest proportion of acreage in smaller, forested tract-size categories. Twenty-three percent of upland hardwood stands were in tracts < 11 acres and 26 percent were in tracts 11 to 50 acres (table 5). Only 8 percent of upland hardwood acreage was in forested tracts > 500 acres. The high percentage of fragmented upland hardwood stands was especially pronounced in the other private owner group, where 30 percent was in the smallest tract-size category and 4 percent was in the largest tract-size category. The other private owner group controls 60 percent of the NIPF-owned upland hardwood acreage in Florida (Brown 1996).

About 1.8 million acres of timberland on NIPF ownership were classified as lowland hardwood forest. By forest type, the acreage distribution of lowland hardwood was considerably different from the acreage distribution of upland hardwood (table 6). Thirteen percent of lowland hardwood stands were in forested parcels < 11 acres, and 22 percent were in forested parcels > 500 acres.

Volume, Growth, and Removals

Examination of growing-stock volume indicated considerable variation by forested tract size. Average softwood growing-stock volume varied significantly by parcel size ($F = 3.97$, $P = 0.0014$). Softwood volume per acre was significantly higher in the two largest tract-size classes than in the four other classes. Average softwood growing-stock volume per acre averaged 518 cubic feet in tracts < 11 acres and 502 cubic feet in the 50- to 100-

Table 4—Area of oak–pine stands by forested tract-size and stand-age classes for NIPF lands in Florida, 1995

Forest tract-size class	All classes	No manageable stand	Stand-age class (years)						
			0-9	10-19	20-29	30-39	40-49	50-59	60+
			Acres						
0 - 10	133,626	71,107	10,499	7,699	7,034	4,617	10,380	11,756	10,534
11 - 50	219,606	76,970	42,638	11,873	13,120	17,618	18,309	9,636	29,442
51 - 100	94,173	45,440	13,073	8,850	5,239	—	13,708	5,336	2,527
101 - 200	116,363	40,218	24,907	21,763	2,884	5,386	2,836	5,422	12,947
201 - 500	124,492	52,879	12,968	20,212	2,677	5,340	5,164	8,247	17,005
501+	144,214	69,739	31,445	5,480	2,734	6,720	4,192	15,575	8,329
All classes	832,474	356,353	135,530	75,877	33,688	39,681	54,589	55,972	80,784

Table 5—Area of upland hardwood stands by forested tract-size and stand-age classes for NIPF lands in Florida, 1995

Forest tract-size class	All classes	No manageable stand	Stand-age class (years)						
			0-9	10-19	20-29	30-39	40-49	50-59	60+
			Acres						
0 - 10	352,328	247,632	5,712	23,866	12,998	8,190	6,442	22,806	24,682
11 - 50	400,916	229,268	26,399	21,141	20,482	12,183	31,897	30,098	29,448
51 - 100	233,179	127,893	22,187	19,963	13,202	2,478	8,130	12,686	26,640
101 - 200	219,031	126,508	21,755	23,096	6,209	10,428	4,567	9,625	16,843
201 - 500	194,614	107,620	25,071	15,892	6,750	6,488	8,197	10,754	13,842
501+	128,259	76,883	18,265	2,701	2,478	—	—	—	27,932
All classes	1,528,327	915,804	119,389	106,659	62,119	39,767	59,233	85,969	139,387

Table 6—Area of lowland hardwood stands by forested tract-size and stand-age classes for NIPF lands in Florida, 1995

Forested tract-size class	All classes	No manageable stand	Stand-age class (years)						
			0-9	10-19	20-29	30-39	40-49	50-59	60+
				Acres					
0 - 10	239,643	107,649	—	5,206	5,319	9,404	19,164	31,672	61,229
11 - 50	278,658	60,169	13,860	9,557	7,736	18,379	45,238	37,012	86,707
51 - 100	263,004	83,750	11,642	11,134	8,036	10,094	21,533	18,879	97,936
101 - 200	279,892	76,248	8,097	9,002	10,379	18,464	23,230	34,084	100,388
201 - 500	370,849	83,100	14,533	6,450	7,733	29,883	24,682	50,674	153,794
501+	412,491	150,312	7,971	7,726	15,337	16,499	33,666	47,018	133,962
All classes	1,844,537	561,228	56,103	49,075	54,540	102,723	167,513	219,339	634,016

acre category (fig. 2). Average softwood volume per acre averaged 673 cubic feet in the 201- to 500-acre category and 685 cubic feet in tracts > 500 acres.

The variation in softwood growth per acre by forested tract size was also significant (F = 6.34, P = 0.0001). Lower average softwood growth per acre occurred in the smaller forested parcels, and higher softwood growth occurred in the larger tracts (fig. 3). The lowest average softwood growth per acre was in forested parcels < 11 acres, averaging 22 cubic feet. The highest average softwood growth per acre was recorded in forested tracts > 500 acres, averaging 38 cubic feet.

Softwood removals to softwood growth was similar across all tract-size categories, ranging from 11.5 cubic feet in the 0- to10-acre category to 32 cubic feet in forested tracts > 500 acres (fig. 3). Average softwood removals varied significantly by forested tract-size category (F = 4.24, P = 0.0008). Softwood growth exceeded removals across all forested tract-size categories, except for the 51- to 100-acre category, where growth equaled removals. The largest margin of softwood growth over removals was in forested parcels

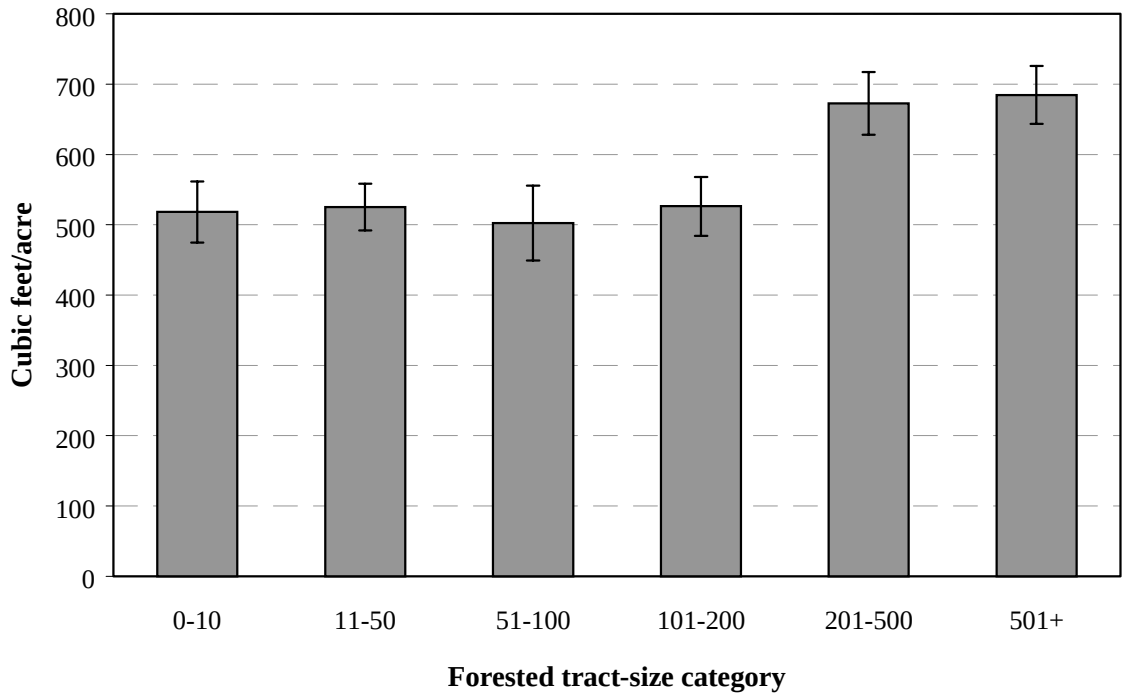

Figure 2—Average softwood volume per acre by forested tract-size category, Florida, 1995 (error bars represent one standard error).

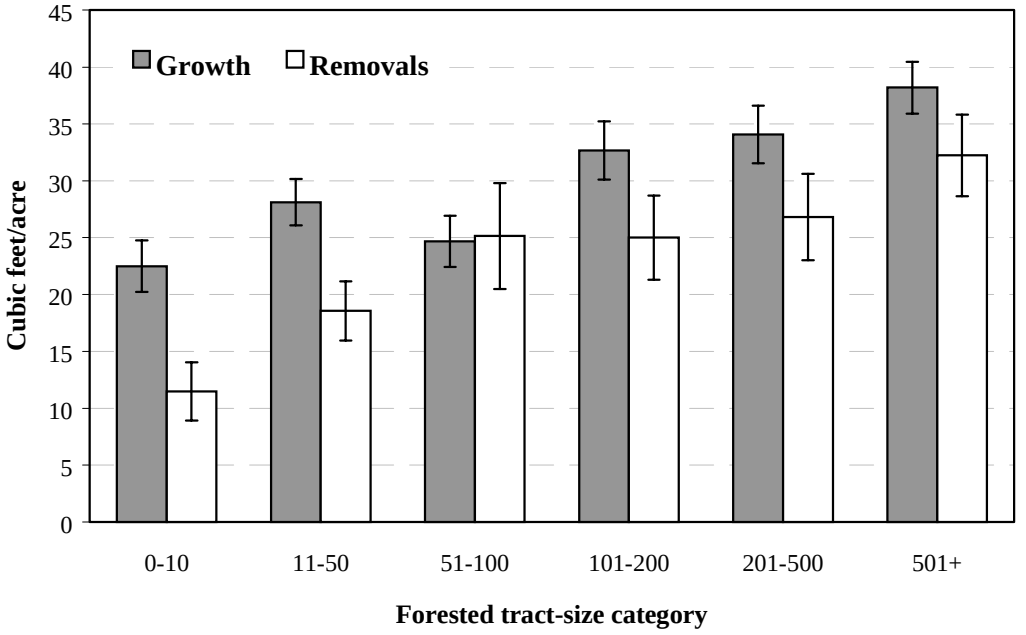

Figure 3—Average softwood growing-stock growth and removals per acre by forested tract-size category, Florida, 1995 (error bars represent one standard error).

< 11 acres, where the margin was 1.96 to 1.

Average hardwood growing-stock volume varied significantly by forested parcel size (F = 4.09, P = 0.0011). Average hardwood volume per acre was significantly lower in forested tracts > 500 acres compared to the other five categories. Hardwood growing-stock volume per acre averaged 292 cubic feet in parcels > 500 acres, and 513 cubic feet in parcels 51 to 100 acres (fig. 4). Hardwood growth also indicated significant variation by forested tract size (F = 5.37, P = 0.0001). Average hardwood growth per acre was significantly lower in forested tracts > 500 acres than in the other five categories. Hardwood growth per acre

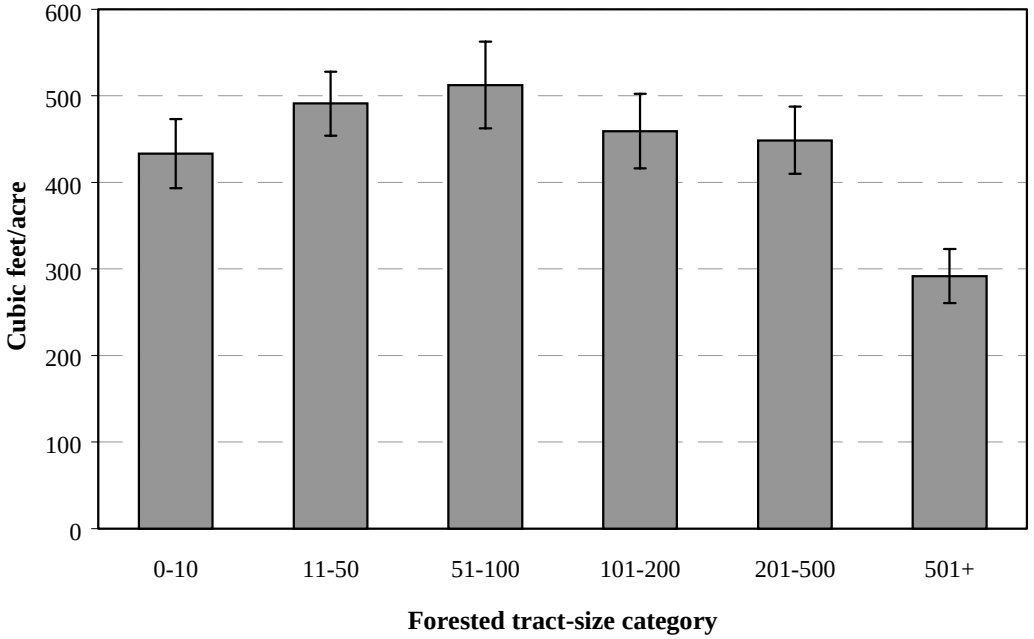

Figure 4—Average hardwood volume per acre by forested tract-size category, Florida, 1995 (error bars represent one standard error).

averaged 7 cubic feet in parcels > 500 acres, and 15 cubic feet in parcels 51 to 100 acres (fig. 5). The level of hardwood removals indicated some variation by forested-parcel category, but this variation was not significant (F = 0.98, P = 0.4276). Hardwood growth exceeded removals across all forested tract-size categories. The largest margin of hardwood growth over removals was in 101- to 200-acre forested parcels, where the margin was 5.59 to 1.

Harvest and Regeneration Rates

In Florida, an average of 1.4 percent of the NIPF timberland received a final harvest each year and remained in timberland (Brown 1996). The annual rate of final harvest was considerably lower in forested tracts < 11 acres (fig. 6). Overall, the harvest rate on forested tracts > 500 acres was 3.4 times that recorded on tracts < 11 acres. The trend in harvest rates by forested tract-size category was very similar to the trend of softwood growing-stock removals, where higher levels of removals were recorded in the larger forested tract-size categories (fig. 3).

An average 2.0 percent of Florida's NIPF timberland received some type of regeneration treatment each year (Brown 1996), including artificial and natural regeneration on both forest and nonforest land. Regeneration rates by forested tract-size category indicated a trend similar to harvest rates; the regeneration rate was considerably lower in forested tracts < 11 acres (fig. 6). Except in forested tracts > 500 acres, regeneration rates exceeded harvest rates. The highest regeneration rate, 2.7 percent, was recorded in the 101- to 200-acre tract-size category.

Comparisons of artificial and natural regeneration rates by forested tract-size category were also made to describe differences between smaller and larger forested tracts. Overall, an average of 1.3 percent of the NIPF timberland in Florida was artificially regenerated, and natural regeneration averaged 0.7 percent each year. Both artificial and natural regeneration rates were considerably lower in forested tracts < 11 acres than in other classes (fig. 7).

Traditional NIPF studies have sought to link socioeconomic status with landowner willingness to adopt recommended forestry practices. It is fairly certain that those who enjoy a higher socioeconomic status are more likely to initiate responsible forest management. Data presented by Doolittle and Straka (1987) suggested that owners of large production units (acres of timberland) are more likely to adopt a plan for regeneration. Although there are many factors that affect timber management on NIPF timberland, comparisons of harvest and regeneration rates in Florida suggest that timber harvesting, tree planting, and other forestry practices are occurring at a much lower rate on forested tracts < 11 acres than on larger forested tracts.

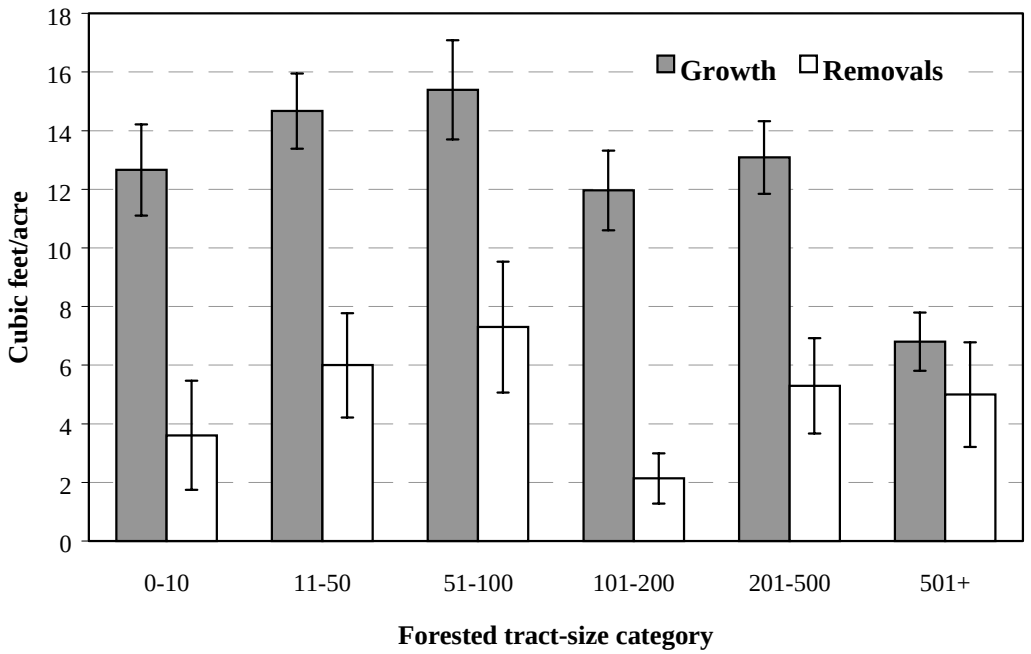

Figure 5—Average hardwood growing-stock growth and removals per acre by forested tract-size category, Florida, 1995 (error bars represent one standard error).

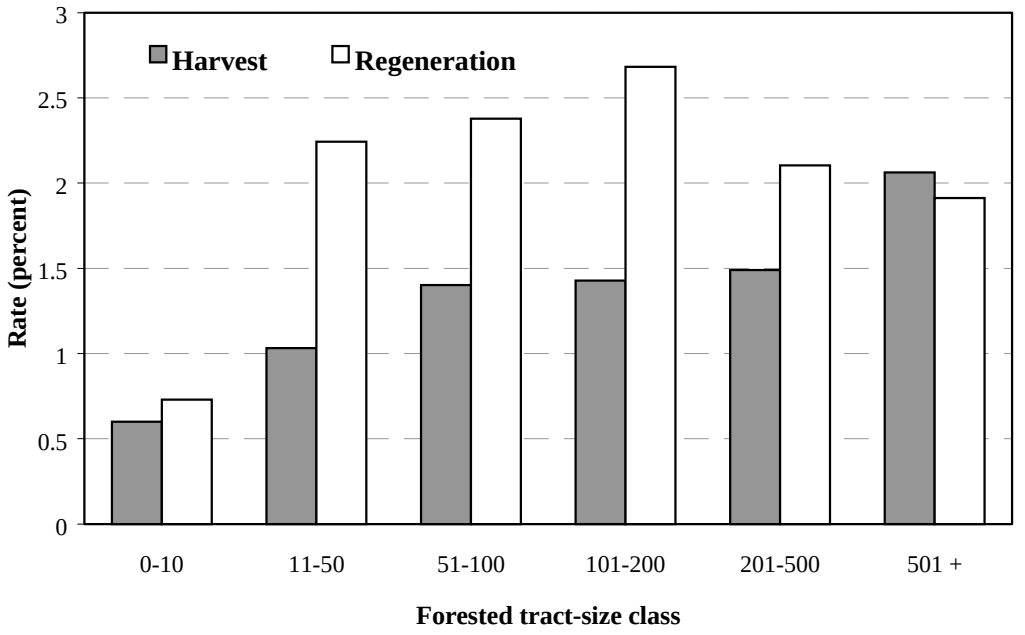

Figure 6—Harvest and regeneration rates on timberland by forested tract-size class, Florida, 1995.

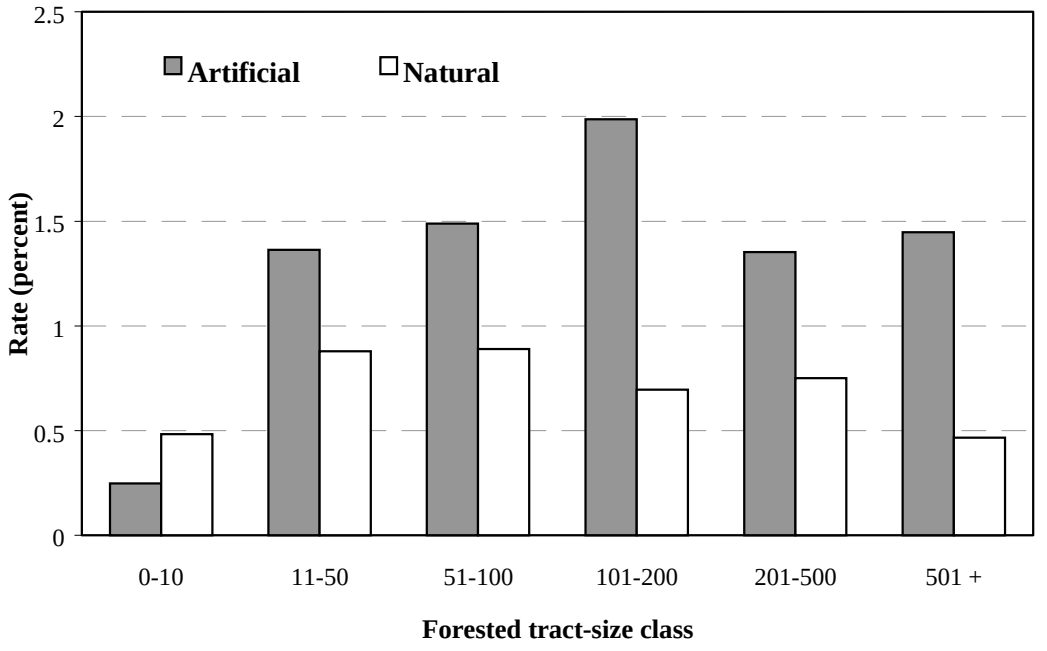

Figure 7—Artificial and natural regeneration rates on timberland by forested tract-size class, Florida, 1995.

Summary and Conclusion

Examination of forested tract size in Florida showed that 15 percent of the timberland controlled by NIPF owners was in tracts ≤ 10 acres. Most forested tracts < 11 acres were controlled by the individual private landowner. Natural pine stands appeared to be more fragmented than other broad management classes, and a substantial portion of such stands in small forested parcels were < 10 years old. Comparison of softwood growing-stock volume per acre showed that many large forested tracts contained large amounts of softwood volume. Conversely, the average volume per acre of hardwood growing-stock was significantly lower in forested parcels

> 500 acres. The average growth per acre for softwoods and hardwoods varied significantly by forested tract size. The average softwood removals per acre varied significantly by forested tract size, whereas average hardwood removals showed no significant differences. Comparisons of harvest and regeneration rates by forested tract-size class indicated that considerably lower levels of timber harvest and regeneration were occurring in parcels < 11 acres than in other tract-size classes.

Anticipated demands for increased timber production in Florida and elsewhere in the South will shift more attention to the timber resource on NIPF land. By monitoring forested tract size over time throughout the South, I will learn how the diverse NIPF-ownership group manages land and timber. Trend information by forested tract size will enable accurate monitoring and evaluation of resource fragmentation and the level of timber removals from small parcels. With this information, we will be able to identify factors affecting timber availability and production on NIPF lands in the Southern United States.

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Thompson, Michael T. 1999. A forested tract-size profile of Florida's NIPF landowners. Res. Pap. SRS-15. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 10 p.

Information gathered from 2,713 permanent Forest Inventory and Analysis (FIA) sample plots showed that over 1.0 million acres, or 15 percent of the nonindustrial private forest (NIPF) timberland in Florida is in forested tracts ≤ 10 acres. Forested tracts ranging from 11 to 100 acres accounted for the largest proportion of NIPF timberland. By NIPF-ownership group, over 23 percent of other privately owned land was in forested parcels < 11 acres, whereas the other corporate and farmer-owned categories each recorded 6 percent. There was a higher proportion of natural pine stands in small forested tracts than in planted stands. Average softwood and hardwood growing-stock volume varied significantly by forested tract-size category. There was significantly more softwood growing-stock removals in the largest tract-size category than in the smallest. Comparisons of harvest and regeneration rates by forested tract size indicate that harvest and regeneration rates are considerably lower in tracts < 11 acres.

Keywords: Forest ownership, forested tract size, timber growth, timber removals, timber volume, timberland.

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