

Estimating Timber Production for U.S. Farm and Other Private Forests

Robert N. Stone and David B. McKeever

Introduction

Uncertain supply prospects for industrial timber from farm and other private forestland continue to raise questions for forest policymakers. The private forest owner has long been the strawman for the professional forester. Forestry literature is rife with attacks on the private forest owner, who is accused of perpetuating "bad" forestry. Because farm and other private forests include three-fifths of the nation's commercial forest area and even more of the biological potential to grow timber, an unclouded view is needed of the current and likely production of timber, other forest products, and services from these forests.

The purpose of this paper is to demonstrate how ratios developed from conventional forest survey statistics can be used to compare timber harvesting and timber growing performances of farm and other private forest ownership with other ownership classes. Mainly we compare performance of farm and other private forest ownerships with that of forest industry ownerships. The assumed problem with farm and other private ownerships is their low timber production as compared with that of forest industry ownerships.

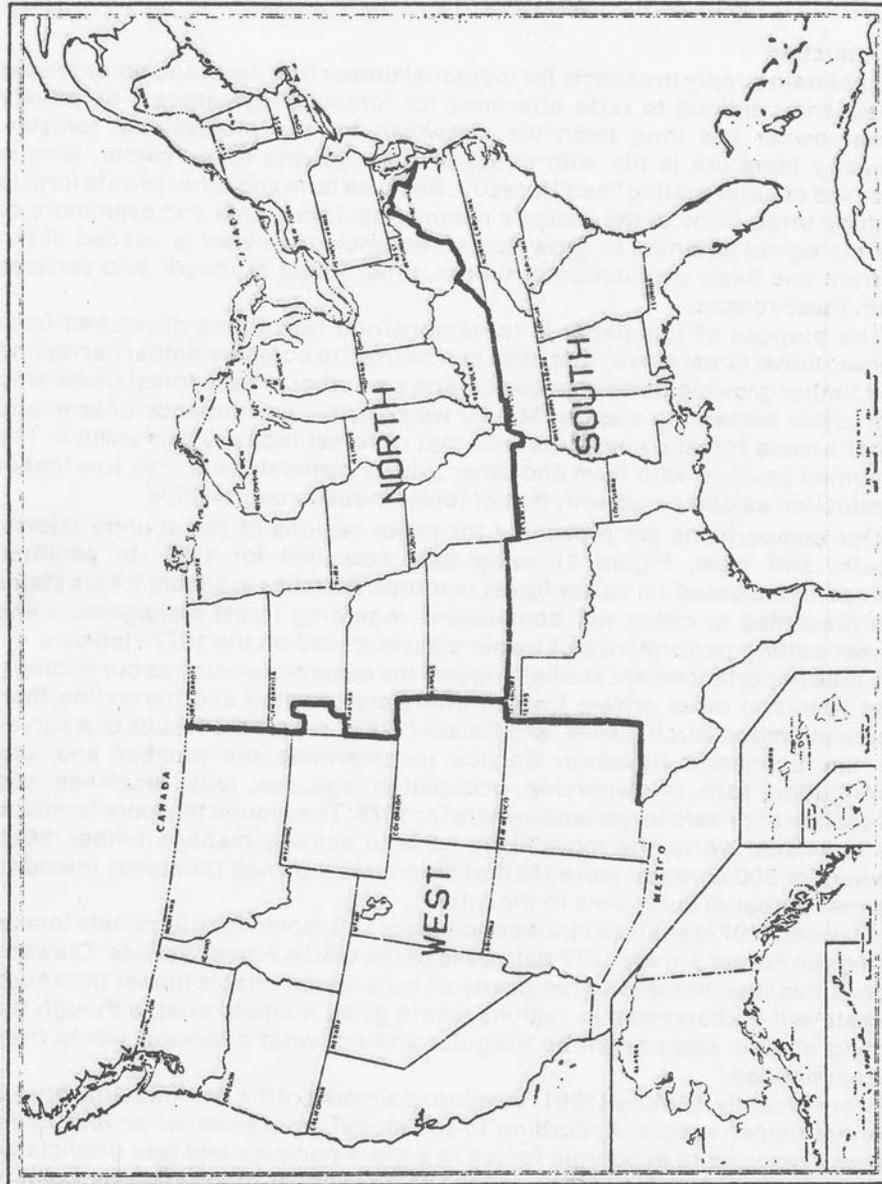
Our comparisons are presented for major regions of the country (North, South, and West, Figure 1) using data compiled for 1977. In addition, comparisons based on newer forest resource statistics available for six states are presented to check our conclusions regarding forest management and timber cutting performance of owner classes based on the 1977 statistics.

Three important recent studies suggest the same conclusion as our findings, that farm and other private forest owners are growing and harvesting their share of timber. Birch, Lewis, and Kaiser (1982), report the results of a survey by the Economic Research Service to determine the number and size distribution, form of ownership, occupation, age, sex, race, residence, and education of private forest landowners for 1978. They found the more farmland an individual owns, the more likely he is to actively manage timber. Most owners of 500 acres or more (half of all privately owned farmland) intend to harvest timber at some time in the future.

Clawson (1979) analyzed the economics of U.S. nonindustrial private forests using the Forest Survey 1977 data base of the USDA Forest Service. Clawson concludes "that in the long run nearly all truly merchantable timber from such forests will be harvested in regions where good markets exist, although the timing of such sales might be irregular and not what a forester would have recommended."

More recently, Binkley (1981) developed a model of the nonindustrial private owners timber supply. According to the model, nonindustrial private forest owners respond to economic forces in a more complex and less predictable way than do their industrial counterparts. Owners of private forests seem to base timber harvesting decisions on a comparison of the expected income from timber production to the loss of nontimber land values. Thus, these lands are available for management and harvest given appropriate monetary and nonmonetary incentives.

Figure 1. Regions of the United States.



These reports analyze and summarize an accumulating body of information about private nonindustrial owners and forests. The results reveal an owner that is neither incompetent nor irresponsible, though forestry literature had painted him as such (Stone 1970). Our study supports these findings.

Data Sources

Available data about farm and other private forest owners are of two general types: those that focus on the owner and those that focus on land and timber characteristics. Numerous studies of private owners' characteristics, intentions, and accomplishments have been made (Stone 1970). Most were one-of-a-kind studies of a particular state or region. They tend to report point-in-time estimates of a specific population of landowners, rather like a snapshot of a moving situation. The sampling base and the focus were the owner. The studies were static and recorded little about tenure of owners or their characteristics over time.

The second general type of information is found in reports of USDA Forest Service forest surveys of individual states. These surveys of forestland, timber inventories, and timber growth and cut are done periodically in cooperation with state and local forest agencies for the entire United States. Information about forest ownership is routinely gathered for each sample location. The sampling base is forest area. The surveys are statistically planned and repeated about once each decade to provide a basis for comparing change over time.

Though timberland owners represent all segments of our society, it is necessary to group them into a limited number of categories to make the subject manageable. The forest surveys by the USDA Forest Service class forest owners into four major categories: farm and other private (all private ownerships except forest industry), forest industry (lands owned by companies or individuals operating wood-using plants), National Forests, and other public (publicly owned land other than National Forest Land).

Through the USDA Forest Service surveys, statistics for these owner classes are available by state for forestland area and for softwood and hardwood timber inventory in terms of growing stock and sawtimber. Comparable statistics, although with higher sampling errors, are published by the Forest Service for net timber growth and timber removals (harvest). These data are regathered on a 10- to 15-year cycle and are from state-by-state forest surveys made by the Resource Evaluation (Forest Survey) work units of the Forest Service (USDA Forest Service 1982). These are the data we use in our study.

Measures of Owner Performance

Using these data, what does our study show as to how major forest landowner groups perform relative to each other in terms of timber production and harvest?

In earlier papers we calculated a set of comparable estimators to describe how the four major forest landowners in the United States performed in terms of timber production in 1972 (Stone 1970, 1979). These estimators were used to define forest management and owner intentions in a study of forest owners in Upper Michigan. The concept was expanded in a later paper to show the regional differences in timber production by ownership group (Nelson and Stone 1973). Clawson, in a more recent study, used similar estimators to analyze the private nonindustrial forest owner's role in the U.S. timber supply (Clawson 1979).

For this present study, we recalculated these estimators for 1977 using basic forest area, timber volume, and annual timber growth and removal statistics (Tables 1 and 2). These estimators were in the form of ratios and per acre factors that describe how the four major forest owner groups compare in timber production for each region of the United States in terms of growing stock and sawtimber. The ratios show timber growth and removals (harvest) in relation to inventory volume, and timber removals in relation to timber growth (Table 1). The per acre factors show timber inventory, growth, and removals per acre (Table 2).

Table 1. Ratio Estimates of Timber Growth and Removals as a Proportion of Inventory, by Ownership Class and Region, 1977

Ownership class	North	South	West	Total
Growing stock growth as a percent of inventory				
Farm and other private	3.3	5.4	2.6	4.2
Forest industry	3.3	5.5	2.6	3.8
National Forests	3.5	4.1	1.0	1.4
Other public	<u>3.6</u>	<u>4.9</u>	<u>1.8</u>	<u>2.6</u>
Total, all owners	3.3	5.3	1.5	3.1
Sawtimber growth as a percent of inventory				
Farm and other private	3.8	6.3	2.7	4.8
Forest industry	3.5	6.1	2.5	3.8
National Forests	4.3	4.7	0.9	1.2
Other public	<u>4.4</u>	<u>5.6</u>	<u>1.7</u>	<u>2.4</u>
Total, all owners	3.9	6.1	1.5	2.9
Annual removal of growing stock as a percent of inventory				
Farm and other private	1.7	3.1	1.5	2.3
Forest industry	1.7	4.5	4.7	3.9
National Forests	1.1	1.9	0.9	1.0
Other public	<u>0.9</u>	<u>2.9</u>	<u>1.5</u>	<u>1.5</u>
Total, all owners	1.5	3.3	1.5	2.0
Annual removal of sawtimber as a percent of inventory				
Farm and other private	2.5	4.0	2.3	3.1
Forest industry	2.7	6.0	5.8	5.5
National Forests	1.8	2.7	1.0	1.1
Other public	<u>1.2</u>	<u>3.6</u>	<u>2.1</u>	<u>2.1</u>
Total, all owners	2.3	4.3	1.9	2.6
Annual removals of growing stock as a percent of net growth of growing stock				
Farm and other private	51	57	56	54
Forest industry	52	82	179	102
National Forests	30	45	88	71
Other public	<u>25</u>	<u>59</u>	<u>82</u>	<u>56</u>
Total, all owners	46	61	99	66
Annual removal of sawtimber as a percent of net growth of sawtimber				
Farm and other private	65	64	77	66
Forest industry	79	99	231	144
National Forests	42	57	110	94
Other public	<u>28</u>	<u>64</u>	<u>122</u>	<u>86</u>
Total, all owners	51	71	133	88

Source: (USDA Forest Service 1982)

Table 2. Per Acre Net Growth, Removals and Inventory by Ownership Class and Region, 1977

Ownership class	North	South	West	Total
Net growth of growing stock per acre (Cubic feet)				
Farm and other private	33	56	44	45
Forest industry	44	60	75	59
National Forests	43	58	30	35
Other public	<u>36</u>	<u>54</u>	<u>43</u>	<u>42</u>
Total, all owners	35	57	40	45
Net growth of sawtimber per acre (Board feet)				
farm and other private	81	191	188	144
forest industry	91	222	368	219
National forests	107	223	136	147
Other public	<u>84</u>	<u>206</u>	<u>191</u>	<u>146</u>
Total, all owners	84	199	181	155
Annual removal of growing stock per acre (Cubic feet)				
Farm and other private	17	32	25	25
Forest industry	23	49	135	61
National forests	13	26	27	25
Other public	<u>9</u>	<u>32</u>	<u>36</u>	<u>23</u>
Total, all owners	16	35	40	30
Annual removal of sawtimber per acre (Board feet)				
Farm and other private	53	122	144	95
Forest industry	72	219	851	315
National Forests	45	128	149	135
Other public	<u>23</u>	<u>131</u>	<u>233</u>	<u>126</u>
Total, all owners	51	142	241	137
Growing stock inventory per acre (Cubic feet)				
Farm and other private	991	1,040	1,702	1,082
Forest industry	1,339	1,098	2,905	1,545
National forests	1,205	1,392	2,964	2,575
Other public	<u>998</u>	<u>1,103</u>	<u>2,425</u>	<u>1,606</u>
	1,042	1,074	2,617	1,474
Sawtimber inventory per acre (Board feet)				
Farm and other private	2,111	3,025	7,081	3,020
Forest industry	2,618	3,639	14,780	5,741
National Forests	2,482	4,796	14,448	11,930
Other public	<u>1,896</u>	<u>3,656</u>	<u>11,364</u>	<u>6,087</u>
Total, all owners	2,161	3,269	12,512	5,345

Source: (USDA Forest Service 1982)

The ratios of growth and removals as a proportion of inventory provide a way to measure and compare how the timber inventories are managed between owner groups. These ratios focus on how the capital stock is handled. Business managers find information about inventory control and turnover very useful in evaluating marginal change and performance. On the other hand, many perceptions of the quality of forest management among owner classes held by foresters come from comparisons of the per acre factors. These best reveal how the land is managed. It is therefore useful to use both ratios and per acre estimators. An ideal index of performance, which we lack, would rate how the land and inventory are jointly managed. Percentages, by ownership class of commercial forestland area, volume, growth, and removals by region, were also calculated (Table 3).

A word of caution in using these estimators. The state-by-state surveys were updated to a common year, 1977. However, the proportions of growth, removals, and inventory by ownership were usually not changed in updating because new ownership data were unavailable. Thus, the results most specifically reveal the ownership situation for the date of survey. For this reason, we also present the new state inventory data for six states to see if the conclusions based on the updated estimates are supported by the limited new information.

Timber Quantities

The quantity of standing timber and its growth and removal tend, of course, to be regionally distributed among classes of owners in somewhat the same proportions as is the commercial forest acreage. However, differences in policy and in forest characteristics from one owner class to another vary the pattern.

National averages based on regional statistics distort the situation for specific ownership classes. For example, the most productive forestlands in the West are owned by forest industries and have several times as much timber per acre as eastern forests. Because eastern forests are mainly privately owned, national averages would indicate that forest industry lands are better managed than nonindustrial private lands (Table 3). Thus, regional timber supply differences can be inadvertently attributed to differences in the quality of forestry between owner groups.

Table3. Commercial Forestland and Timber Inventory, Growth, and Removal by Region and Ownership Class. 1977

Region and class of ownership or manager	Commercial forest land	Growing stock			Sawtimber		
		Inventory	Growth	Removal	Inventory	Growth	Removal
----- Pct -----							
United States							
Farm and other private	58	42	58	48	33	54	40
Forest industry	14	15	19	29	15	20	33
National Forests	18	32	14	15	41	17	10
Other public	<u>10</u>	<u>11</u>	<u>9</u>	<u>8</u>	<u>11</u>	<u>9</u>	<u>9</u>
Total. all owners	100	100	100	100	100	100	100
North							
Farm and other private	71	67	66	73	69	68	74
Forest industry	11	14	14	15	13	12	15
National Forests	6	7	7	5	7	8	5
Other public	<u>12</u>	<u>12</u>	<u>13</u>	<u>7</u>	<u>11</u>	<u>12</u>	<u>6</u>
Total. all owners	100	100	100	100	100	100	100
South							
Farm and other private	71	69	70	65	66	68	62
Forest industry	19	20	20	27	21	21	30
National Forests	6	8	6	4	9	7	5
Other public	<u>4</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>3</u>
Total. all owners	100	100	100	100	100	100	100
West							
Farm and other private	20	13	22	13	12	21	12
Forest industry	11	13	21	39	13	23	40
National Forests	53	60	40	35	61	40	33
Other public	<u>15</u>	<u>14</u>	<u>16</u>	<u>14</u>	<u>14</u>	<u>16</u>	<u>15</u>
Total. all owners	100	100	100	100	100	100	100

Source: (USDA Forest Service 1982)

Nationally, farm and other private owners hold more growing stock than any other owner class because they control the majority of the forestland (58 percent). However, because their lands are the least well stocked, their share of the nation's total growing stock is 42 percent. Timber growth rates are high in eastern forests because of the lower timber inventories common to eastern hardwood and southern pine forests. Growth is especially large on farm and other private ownerships in the South, which account for three-fifths of the regional total growth. Growth as a percent of inventory, however, is slightly higher on industrial forestlands (Table 1). Removals, too, are at a high rate on forest industry lands. The farm and other private holdings are the East's major source of timber.

The volume of growing stock on industrial forestlands accounts for 15 percent of the total standing timber. Nationally, this growing stock volume is about proportional to acreage. Half of all industry-owned timber is in the West, where the quantity per acre is far greater than in the other regions and greater also than that of the other classes of holdings in the West (Table 2). In every region, both timber growth and removals per acre are higher on industrial forestland than on lands of other owners, except for higher sawtimber growth occurring on the National Forests in the North and South.

Trends in Land Ownership

Ownership of the 483 million acres of commercial forestland varies from region to region (Table 4). Nationwide, 72 percent is privately owned, in the South 90 percent, and in the North 82 percent. The situation is much different in the West, where two-thirds of the commercial forest area is publicly owned. The predominance of private forestland in the East and of public ownership in the West traces back to the early development of the country.

Since 1952, commercial forest acreage decreased by nearly 17 million acres, about 3.4 percent. Forest industry was the only ownership gaining acreage. All other ownerships decreased, some by up to 6.3 percent. Forest industry increases came mostly from the purchase of farm woodlands.

Regional changes closely followed national changes except in the South. Forest industry acreage increased in all regions. About 4 million acres were added in both the North and the South. The largest percentage gain was in the North. Farm and other private ownerships decreased in all regions, particularly in the South. National Forest and other private ownerships increased in the South but decreased in the North and West.

The leasing of forestland for timber production is becoming more common, particularly in the South. Several million acres are currently under lease.

Trends in Timber Inventory Ownership

Between 1952 and 1977, the quantity of timber growing stock increased nationwide by 194 billion cubic feet or 37.5 percent. This increase was chiefly on farm and other private forests at 192 percent. Public forests also achieved gains, whereas industry lands experienced a 47 percent reduction despite the additions to industry's land base of 15 percent. This reduction reflects conversion of old-growth to young-growth timber in the West and is more apparent in the sawtimber trends. Between 1952 and 1977, total sawtimber inventory increased 25 percent, while sawtimber inventory on industrial forestlands decreased by nearly 50 percent.

Table 4. Area of Commercial Forestland in the United States by Ownership Class and Region, 1952 and 1977

Ownership class	Region											
	North			South			West			U.S. Total ¹		
	Area		Percent change	Area		Percent change	Area		Percent change	Area		Percent change
	1952	1977		1952	1977		1952	1977		1952	1977	
----- Million acres -----												
Farm and other private	123.5	117.7	-4.7	143.2	134.1	-6.4	29.4	26.2	-10.9	296.1	278.0	-6.1
Forest industry	14.0	17.9	+27.9	32.1	36.2	+12.8	13.4	14.6	+9.0	59.5	68.8	+15.6
National Forests	10.3	9.8	-4.9	10.4	10.9	+4.8	74.0	67.9	-8.2	94.7	88.7	-6.3
Other public	<u>21.0</u>	<u>20.7</u>	<u>-1.4</u>	<u>6.4</u>	<u>6.8</u>	<u>+6.3</u>	<u>21.6</u>	<u>19.5</u>	<u>-9.7</u>	<u>49.0</u>	<u>47.0</u>	<u>-4.1</u>
Total, all owners	168.8	166.1	-1.6	192.1	188.0	-2.1	138.4	128.3	-7.3	499.3	482.5	-3.4

Totals may not add due to rounding.

Source: (USDA Forest Service 1982)

Timber Management Activities

Since 1950, over 36 million acres have been planted to trees on private land. Over 19 million acres were planted by forest industry. The remaining 17 million acres were planted by farm and other private owners. In the last few years, forest industry has been planting about twice as many acres as nonindustrial private owners. As a percent of land owned, forest industry planting were nine times as high as that of nonindustrial private in 1981. Performance in terms of stand treatment was less one sided but again unbalanced. One acre in 132 received stand treatment on forest industry lands contrasted with 1 in 770 on farm and other private forests.

Six-state Study

In addition to the statistics calculated from the 1977 survey, we analyzed USDA Forest Service survey statistics for six more recent state inventories—Arkansas (1969, 1978), Florida (1970, 1980), Michigan (1966, 1980), Pennsylvania (1968, 1978), South Carolina (1968, 1978), and Tennessee (1970, 1980) (Bechtold and Scheffield 1980, Considine and Powell 1978, Hahn 1982, Jakes 1982, Knight and McClure 1979, Murphy 1982, Sheffield 1979, Smith 1982, Spencer 1982, Van Hees 1980). We wanted to see if the conclusions about farm and other private forest ownerships from the 1977 statistics were also revealed by the newer information. We calculated ratios and per acre estimators for growing stock and sawtimber for each of these states. The length of time between surveys varied somewhat among the states, consequently percentage changes may not be strictly comparable.

Area

Commercial forestland area continued to decline, although small increases of less than one percent of total area were made in two states—South Carolina and Tennessee. Area changes for the forest industry and the farm and other private ownerships were the most dynamic. Forest industry ownerships tended to increase acreage between survey years (four of six states increased by up to 58 percent), while farm and other private ownerships tended to decrease acreage. With the exception of a 1 percent increase in Tennessee, farm and other private acreages decreased between surveys in all states.

Volume

Total growing stock volume continued to rise. The six states surveyed had increases in volume of up to 75 percent between survey years. The increases were nearly evenly divided between softwoods and hardwoods. Volume increased at a much slower rate on industrial forestlands than on farm and other private lands. Florida farm and other private lands doubled in volume per acre, while Michigan, with the largest forest industry increase, increased just 29 percent. Relative growing stock volume change was generally positive for softwoods (except softwoods in Michigan) and hardwoods on farm and other private forests in five of the six states, (volume, growth, and removal data by species group and ownership class are not available for Pennsylvania). They are generally negative on all forest industry lands (except softwoods in Tennessee) (Table 5). Thus farm and other private forests had increases in volume relative to their area, while forest industry had decreases in volume relative to their area.

Sawtimber volume changes were very similar to growing stock changes. Volume increased in all states; more rapidly on farm and other private forests than industrial forestlands. Relative softwood and hardwood volumes declined on forest industry lands while increasing on farm and other private forests.

Table 5. Relative Change¹ in Softwood and Hardwood Growing Stock and Sawtimber Volume, Growth, and Removals, Selected States,² Years, and Ownership Classes

State/survey years/ ownership	Growing stock						Sawtimber					
	Volume		Growth		Removals		Volume		Growth		Removals	
	Soft- wood	Hard- wood										
----- Million acres -----												
Arkansas 1969. 1978												
Forest industry	-36	-12	-23	-21	-36	36	-48	-14	-43	-22	-49	14
Farm and other private	8	4	8	8	9	-10	9	5	16	6	13	-4
Florida 1970. 1980												
Forest industry	-11	-52	1	8	5	20	-22	-8	-20	16	8	16
Farm and other private	39	34	2	-7	-5	-32	6	1	8	-11	-8	-33
Michigan 1966. 1980												
Forest industry	-20	-5	6	-4	-51	-19	-39	-20	-7	-27	-70	-36
Farm and other private	-6	4	-4	11	19	13	-5	11	-29	27	20	19
South Carolina 1968, 1978												
Forest industry	-32	-30	-24	-32	-13	0	-37	-25	-42	30	-9	3
Farm and other private	9	6	8	7	-4	-4	9	4	12	6	-5	-3
Tennessee 1970. 1980												
Forest industry	5	-3	10	-11	19	34	3	-9	-7	-14	121	27
Farm and other private	6	1	7	3	-26	-7	7	3	9	7	-20	-4

$$^1 \text{Relative change} = \left(\frac{\% X_2 - \% A_2}{\% A_2} \right) - \left(\frac{\% X_1 - \% A_1}{\% A_1} \right)$$

where

X_1 = variable of interest (volume, growth, or removals, year 1.

X_2 = variable of interest, year 2

A_1 = area of commercial forest land, year 1

A_2 = area of commercial forest land, year 2

²Volume, growth, and removals data by species group and ownership class are not available for Pennsylvania.

Source: Bechtold and Scheffield, 1981; Chase, Pfeifer and Spencer, 1966; Considine and Powell, 1980; Ferguson 1968; Hahn 1982; Jakes, 1982; Knight and McClure, 1969, 1971, 1979; Murphy, 1972; Sheffield, 1979; Smith, 1982; Spencer, 1982; and VanHeese. 1980.

Growth

Growing stock growth per acre of all ownerships increased in the six states surveyed. Growth on industry lands increased in three states and on farm and other private forests in five states. Large increases occurred in timber growth, especially in South Carolina and Florida. Net growth in South Carolina is about one cord per acre per year. Softwood growing stock growth, all ownerships, increased in all states (except Tennessee) as did hardwood growth. Softwood growth was positive for both forest industry and farm and other private forests in all five states. Surprisingly, increases tended to be larger on farm and other private forests. Hardwood growth increased in three of five states on forest industry lands and in all five states on farm and other private forests. Again, increases tended to be larger on farm and other private forests. Relative changes in growing stock growth per acre tended to favor farm and other private forests for both softwoods and hardwoods.

Total sawtimber growth for all ownerships increased in all states at rates slightly higher, on the average, than growing stock. Sawtimber growth increased in all states on both forest industry (except Michigan) and farm and other private forests. Softwood sawtimber growth increased in all states and ownerships, except in Michigan. Hardwood sawtimber growth increased in all states and ownerships. Relative sawtimber growth declined on all forest industry lands except for hardwoods in Florida (Table 5). Relative growth increased on farm and other private lands in five of six states.

Removals

Total growing stock removals per acre (all ownerships) increased in all sample states except Tennessee, where a small decline (less than 2 percent) was noted. Removals increased on all industry lands and all farm and other private lands (except Tennessee). Increases were larger, on the average, on forest industry lands.

Softwood growing stock removals likewise increased in all states and by as much as 70 percent in Florida. Four of five states increased softwood growing stock removals in both forest industry and farm and other private ownerships. No trend was evident in relative changes in softwood removals per acre by ownership.

Changes in total hardwood removals per acre varied widely among states. By ownership, however, forest industry tended to increase hardwood removals, while farm and other private lands tended to decrease. Relative change in hardwood removal was negative for all farm and other private forests in all states except Michigan and positive for all forest industry lands in all states except Michigan.

Total sawtimber removals followed the trends on growing stock removals. Removals increased overall and at a slightly higher rate on forest industry lands.

Trends

The trends evident in these six recently surveyed states are similar to overall U.S. trends that have been occurring since 1952. The total area of commercial forestland is decreasing. Timber volumes are becoming less differentiated by ownership. Nonindustrial private holdings, which have traditionally been less heavily stocked than forest industry holdings, are increasing in timber volume faster than forest industry lands. This is true for both growing stock and sawtimber volumes. This increase in volume is a result of both slightly higher growth per acre on nonindustrial private lands and slightly lower removals per acre. If these trends continue, the differences in stocking between forest industry and farm and other private lands will become even less evident.

Summary and Conclusions

This analysis of timber production for farm and other private forests used ratio estimates and per acre factors prepared from the timber statistics the Forest Service compiled for 1977 and from more recent forest surveys of six states.

These data reveal diminishing differences between the timber harvesting and growing performance of farm and other private owners and the forest industry. Forest industry lands contain much more softwood than farm and other private lands, where the gains in timber volume are primarily hardwood. Farm and other private forestland have lower timber growth per acre than forest industry. Proportionally fewer trees are being planted, and fewer acres on farm and other private forests receive timber stand improvement treatments than on industrial forestland.

Yet with 58 percent of the commercial forest, farm and other private ownerships produce 58 percent of the timber growth. Over the last 25 years, these forests have become increasingly closer to the stocking levels of forest industry forests, although with much more of the stocking in hardwood species. For a variety of reasons, farm and other private forestlands are becoming better stocked. Their timber inventory increased 192 percent between 1952 and 1977.

More information is needed for a more useful model of the nonindustrial private forest owners and their timber production prospects. For example, the amount of subdivision or consolidation of properties to create smaller or larger units is not well known. Little has been done since Schallau's early work (Schallau 1965). To understand the consequences of such actions, we need to know both net and gross acreages that are being consolidated and subdivided. Since the size of property is important in the cost of production activities, changes in tract size change timber production opportunities. We do not know if units, on the average, are getting more or less manageable.

It is still unclear what the tenure of farm and other private forests is. The survey by the Economic Research Service and recent Forest Survey reports suggest that these lands are held longer than the 12-18 years commonly suggested in forestry literature. Accurate estimates of the length of time owners control decisions will help define the proportions of forestland "withdrawn" from timber harvesting.

Overall, our study shows that the performance in timber production of nonindustrial private forest owners is more favorable than was believed in forestry circles for decades. However, more detailed information is still needed before reliable projections of timber production by ownership class can be made.

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