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RESULTS OF FOURTEEN YEARS OF SMALL WOODLOT MANAGEMENT

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Introduction

Survey of land ownership in the Upper Peninsula of Michigan shows that small ownerships (5-5000 acres) control more than 3-1/4 million acres of the commercial forest land. Upper Peninsula residents own 75 percent of this land; the remaining 25 percent is controlled by absentee owners. Farmer owners comprise 17 percent of the total and hold 13 percent of the acreage (1). Only a small portion (3-4 percent) of the small woodlot owners do any timber harvesting in any given year, with less than half of them having ever done so. On those lands from which forest products were harvested, it was found that "poor" cutting practices were more prevalent than "good" (2).

The present study was initiated to demonstrate that an annual income can be obtained from small forest ownerships by good management practices. Farm woodlots especially are likely to be in poor condition, partly because of past cutting practices, grazing, or lack of management. Such woodlots are seldom a major source of income; therefore, they do not command attention. Lack of markets for forest products in the immediate area can also be a deterrent to woodlot management. This report is intended to encourage small woodlot owners to initiate a management program in their woodlots for their immediate and future benefit.

The Study Area

A 55 acre tract (which closely approximates the average size woodlot) of the northern hardwood timber type was selected for the demonstration area. (See Figure 1). The timber was generally poor and defective as result of fire and past cutting practices, but was similar to many small woodlots. In planning the demonstration, it was assumed that the owner would do the harvesting himself in order to supplement his income. Consequently, the 55 acres was divided into seven compartments, ranging in size from 6.1 to 9.8 acres. The management plan required the harvesting of one compartment each year, providing a seven year cutting cycle. The volume being harvested was not to exceed the growth, thus allowing for a sustained annual harvest. In a stand such as this, with a low volume of sawlogs, it is desirable to harvest less than the annual growth to build up the sawlog growing stock. Thus the selection of trees to be harvested is of utmost importance. To derive the highest value return per acre it is necessary to remove the overmature, defective, cull and low vigor trees, allowing the healthier and higher value trees to grow, thus increasing the value of the investment while still providing for a supplementary income.

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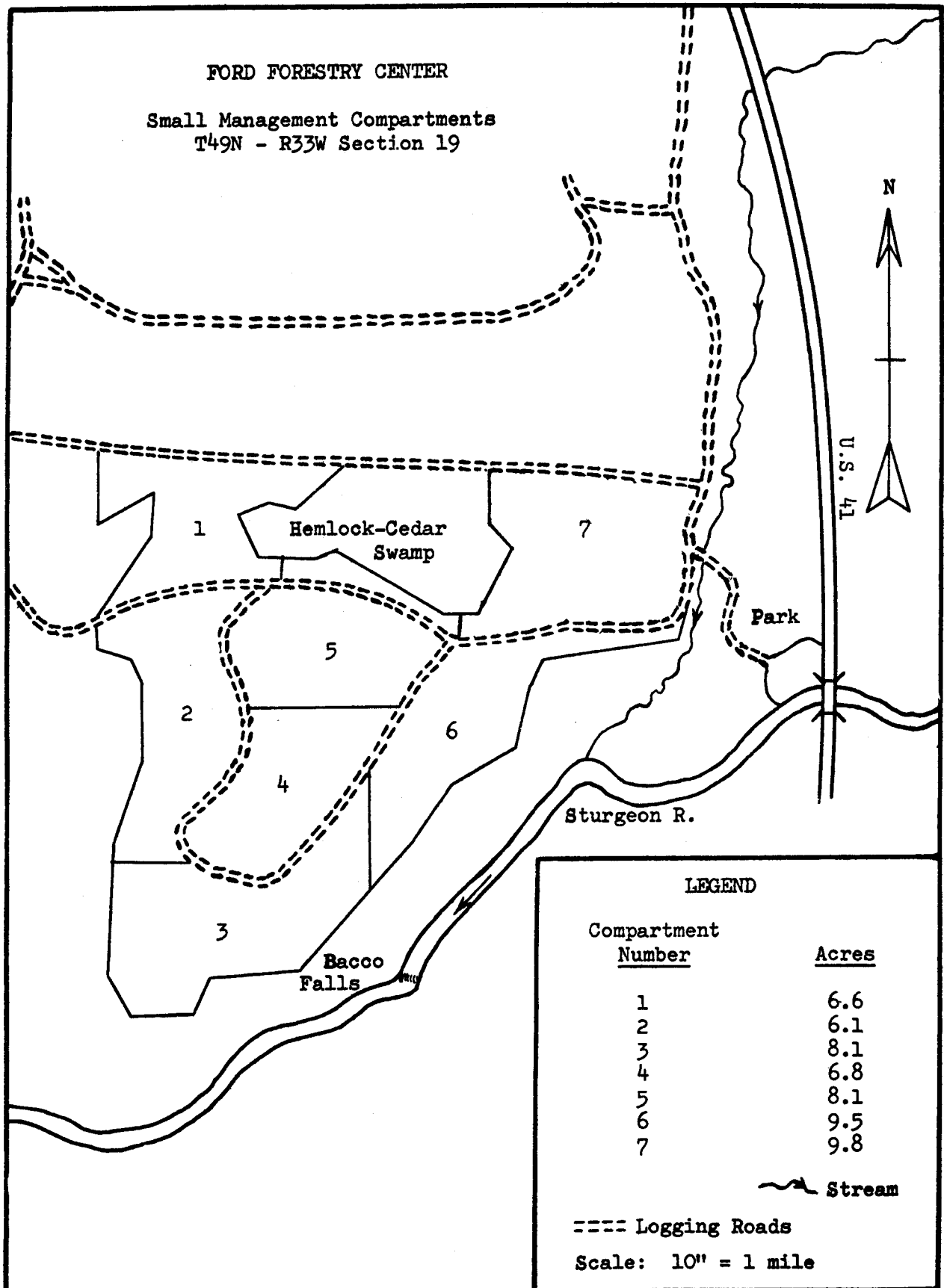


FIGURE 1. Small Woodlot compartments.

Harvesting Results. Harvesting was conducted by conventional short log methods. Skidding equipment varied from year to year, but horse, crawler tractor and wheel skidder were used. The income that can be obtained from a particular harvest will depend largely upon the value of the timber, the terrain, the skill and efficiency of the operator and the equipment employed. The resulting figures, therefore, would apply only to like stands using similar harvesting methods and equipment. Most of the compartments were harvested by a farmer who supplemented his income by woods work. It is not necessary that the woodlot owner purchase or own all the equipment necessary for logging. Contract truckers are available for trucking his products to market and most of the other equipment is available at a reasonable rental cost. Local contract trucking charges were used in all the calculations and also wheel skidder rental charges in those compartments in which the wheel skidder was rented. A farm tractor could also be adapted for log skidding.

Table 1. is an example of the method used in calculating the net roadside value and net earnings from each compartment. Local current market prices were used to obtain the gross value of products delivered. To obtain a gross roadside value of products, hauling and loading costs were deducted from the F.O.B. value. The deduction of other direct and indirect costs, such as depreciation on equipment, gasoline and oil, stumpage and land taxes provides a net roadside value of products. This value divided by the manhours worked gives the net earnings per manhour worked. In some circumstances road building costs would be incurred and would be charged off as a long term capital investment.

Table 2. summarizes the net hourly returns for hours expended in the first and second harvest of each compartment over a span of 14 years. The average net earning for the first harvest was \$2.76 per manhour worked and for the second \$4.63 per manhour, thus the second harvest produced \$1.87 per manhour more income than the first. The cause of the increased earnings can be attributed mainly to a 35% reduction in hours worked to produce an equivalent value of products. A large part of the reduction in manhours worked at the second harvest is due to the size of products harvested. The volume of sawlogs produced was 50% greater and the pulpwood volume 40% less at the second harvest, thereby decreasing handling time considerably. The use of the wheel skidder, which reduced skidding time, contributed to the reduction in manhours.

Table 3. summarizes the volume of products harvested annually over the 14-year period. The increased net sawlog volume (50% greater) and the decrease in pulpwood volume (40% less) indicates an improvement in the residual trees following the first harvest. It is the ultimate management goal through continued harvesting to create a thrifty forest of high quality trees by continued removal of the poorer growing stock. Following the third harvest a majority of defective trees will have been removed.

Table 4. indicates that the soundness factor on sawlog trees has changed from 75% to 88% as a result of the two harvests. Defect can never be entirely eliminated from a stand, but by judicious selection of trees, an average soundness factor

TABLE 1. Earnings Per Hour of Time Invested in 1964 Harvest of Compartment #1. Study No. 16
Small Management Study A

Man-hours Worked	Gross Value ^{1/} of Products F.O.B. L'Anse	Gross Roadside ^{2/} Value of Products Alberta	Gross Earnings Per Man-hour Worked	Net Roadside ^{3/} Value of Products Alberta	Net Earnings Per Man-hour Worked
34	\$ 383.73	\$ 264.03	\$ 7.77	\$ 182.86	\$ 5.38

^{1/} Prices used to calculate value of products represent the current market prices in September 1964. The computations for gross value of products is given in Table

^{2/} To obtain gross roadside value of products, the following loading and hauling costs were deducted from gross value, F.O.B. L'Anse.

- a. Loading and hauling 2,610 bd. ft. of logs @ \$10/M----- \$ 26.10
 - b. Loading and hauling 15.6 cords Chemical wood @ \$ 3.50/cord ----- 54.60
 - c. Loading and hauling 6 cords hardwood pulp @ \$4.00/cord ----- 24.00
 - d. Railroad charges 6 cords hardwood pulp @ \$ 2.50/cord ----- 15.00
- \$ 119.70

^{3/} Miscellaneous direct and indirect costs deducted from gross roadside value of products to obtain net roadside value.

- a. Depreciation on crawler tractor, using \$6,000 as purchase price and 10,000 hours as useful life
15 hours @ \$.60/hour ----- \$ 9.00
 - b. Gasoline for tractor 1-1/2 gallons per hour, 22.5 gallons @ \$.25/gal. (non highway use) ----- 5.62
 - c. Depreciation on chain saw. Felling and limbing 19 hours @ \$.40/hour ----- 7.60
 - d. Gasoline and Oil for chain saw ----- 1.50
 - e. Taxes on 55 acres @ \$.45/acre ----- 24.75
- \$ 48.47
- Stumpage 32.70
- \$ 81.17

TABLE 2. Small Management Study Earnings Per Hour of Time Invested

(Annual Harvest 1958-1972)

Compartment Number	Manhours Worked		Net Roadside ⁽¹⁾ Value of Products		Net Earnings Per Manhour Worked	
	1st Harvest	2nd Harvest	1st Harvest	2nd Harvest	1st Harvest	2nd Harvest
1	34	72	\$ 182.86	\$ 307.70	\$ 5.38	\$ 4.28
2	25.5	48	122.47	237.73	4.80	4.95
3	83	49	203.07	293.07	2.45	5.98
4	45	24	157.55	171.55	3.50	7.16
5	76	39	162.00	206.32	2.13	5.29
6	143	75	349.12	197.53	2.44	2.63
7	<u>110.5</u>	<u>32</u>	<u>251.47</u>	<u>157.00</u>	<u>2.28</u>	<u>4.91</u>
Totals	517	339	\$ 1,428.54	\$ 1,570.90	\$ 22.98	\$ 35.20
Average Per Yr.	73.86	48.43	\$ 204.08	\$ 224.41	\$ 2.76 ⁽²⁾	\$ 4.63 ⁽²⁾

(1) All direct and indirect costs have been deducted from the gross roadside value of products. Product prices are representative of those prevailing in the Houghton-Baraga County area.

(2) Weighted average per hour worked.

TABLE 3.

Small Management Study
Volumes Harvested
(1958-1972)

Compartment Number	Sawlog Net ⁽¹⁾		Pulpwood ⁽²⁾	
	B. F. Volume 1st Harvest	Scribner 2nd Harvest	Cord Volume 1st Harvest	2nd Harvest
1	2,610	3,310	20.5	26.2
2	1,160	6,550	22.2	10.6
3	3,915	7,820	24.0	16.3
4	2,645	4,600	21.5	11.2
5	2,410	5,610	30.1	16.0
6	6,010	5,210	51.8	21.8
7	<u>4,141</u>	<u>1,845</u>	<u>36.6</u>	<u>21.8</u>
Total (55A.)	22,891	34,945	206.7	123.9
Av. Vol./Yr	4,131.1		23.6	
Av. Vol./A	1,051.6		6.0	
Av. Vol./A/Yr.	75.1		.428	

(1) Sawlog log grade yields were in the following proportions: Grade #1(1.9%), Grade #2 (36.3%), Grade #3 (61.8%).

(2) Pulpwood volumes include all size trees not meeting sawlog standards.

of 93% can be achieved. Due to increased quality of the remaining trees, future harvests will require the removal of less volume to attain an equal or higher value of products than was previously possible.

Table 4 also shows that measurement 1 (before initial cutting) recorded a volume of 4,466.2 board foot net per acre, while measurement 3 (7 years following cutting) showed a volume of 4,834.7 board feet net per acre. This represents an increase of 368 board foot per acre, even though 416 board feet per acre was harvested during the 7 year growth period. Growth calculations cover only a seven year period because the study plots, which provide volume and growth data, are measured every seven years just prior to harvesting. The volume removal of 75 board feet per acre per year is 44 board feet less than the growth of 119 board feet, which is in accordance with the plan to cut less than the growth in order to increase the sawlog growing stock. The larger the size of the sawlog trees, the corresponding higher value will be obtained from them; therefore, it is advantageous to build up the sawlog stocking to provide for continued harvest of larger size trees. The harvest immediately following the M-3 measurement further reduced the residual volume to 3,692.8 board feet per acre. Increased growth during the next 7 year period should again restore the stand volume to the original or even somewhat greater volume.

Tables 3 and 4 also show both the pulpwood volume production that has accrued as well as the sawlog production during the management period. It is equally important that pulpwood size trees are carefully selected for harvest since the remaining trees will supply the future sawlog crop. Those trees which have no potential for attaining sawlog size and quality should be removed to provide growing space for crop trees. Table 3 shows a pulpwood removal of .428 cords per acre per year and Table 4 a pulpwood gross growth of .427 cords per acre per year, indicating that the seven year growth has equalled the removal. This removal has been greatly beneficial to the stand, since the majority of the pulpwood trees removed had no sawlog potential.

Conclusions

It is evident from the results of this study that many idle woodlots have the potential of producing for their owner a good wage for time expended and at the same time increasing the value of his woodlot, provided good management procedures are followed. The trees left to grow will grow faster. Since they have more space and since they are the better trees, they will yield more valuable products in the future. Good forestry practices are as important to the production of fine trees as good farming is to growing fine crops.

Small woodlot owners who desire to manage their woodlots can obtain help from several sources. Both the County Extension Director and State Extension Forester can assist him as will various forestry consulting agencies. He can also visit the Ford Forestry Center where the demonstration area can be inspected and where guidance in establishing a similar plan can be provided.

TABLE 4.

Small Management Study
 Volumes Per Acre and Growth
 Per Acre Per Year Before 2nd. Harvest
 (7 Year growth period)

Com- part- ment No.	Meas. Period	Sawlog			Pulpwood		All Tree		All Tree
		Bd. Ft. Gross	Volume 1/4" Rule Net	% Sound	Volume Gross	Cords Net	Cubic Ft. Gross	Volume Net	Basal Area Sq. Ft.
1	M-1	7,918.2	4,874.8	(61)	22.449	14.189	3,299.54	2,519.26	130.08
	M-3	6,249.2	5,264.9	(84)	11.366	10.676	2,538.78	2,375.06	104.12
	Growth	76.8	110.1		.201	.312	40.15	47.47	1.28
2	M-1	7,056.7	4,966.8	(70)	22.339	16.834	3,408.04	2,819.56	127.90
	M-3	7,130.4	5,924.3	(83)	13.524	12.708	3,020.57	2,810.79	111.52
	Growth	243.2	212.4		.446	.424	77.78	73.35	2.34
3	M-1	4,889.3	3,755.8	(77)	21.070	17.323	2,883.92	2,466.05	110.93
	M-3	5,218.3	4,281.4	(82)	15.866	14.744	2,630.29	2,426.69	101.38
	Growth	126.5	107.7		.467	.450	55.35	52.37	1.81
4	M-1	7,056.5	5,703.1	(80)	14.815	11.847	2,814.08	2,435.82	106.44
	M-3	7,482.0	6,340.5	(85)	11.556	10.990	2,731.09	2,548.88	103.60
	Growth	169.8	144.8		.440	.423	74.04	69.26	2.53
5	M-1	6,076.2	4,891.2	(80)	15.843	13.140	2,717.53	2,392.57	103.63
	M-3	6,916.5	5,848.8	(85)	11.854	10.943	2,699.68	2,499.63	100.56
	Growth	208.0	175.2		.395	.369	70.52	65.51	2.17
6	M-1	3,883.8	3,028.2	(78)	21.222	18.124	2,725.04	2,346.68	112.42
	M-3	3,052.7	2,560.1	(84)	17.485	15.977	2,312.38	2,132.60	95.14
	Growth	51.6	44.0		.539	.526	65.38	62.66	1.88
7	M-1	5,850.0	4,608.3	(79)	16.151	13.636	2,739.47	2,374.92	109.66
	M-3	5,683.4	4,585.9	(81)	12.561	11.185	2,511.12	2,255.55	98.25
	Growth	113.1	82.8		.437	.400	66.53	60.67	2.06
Av.	M-1	5,927.8	4,466.2	(75)	18.883	15.044	2,899.40	2,458.70	112.31
Av.	M-3	5,809.0	4,834.7	(83)	13.681	12.560	2,610.81	2,407.63	101.32
Av.	M-3	4,211.5	3,692.8	(88)					
	(After cut)								
Av.	Growth	136.6	118.9		.427	.419	64.52	61.48	2.01

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