Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

DEC 19 1942

Circular No. 661 U. S. Department of Agriculture

November 1942 • Washington, D. C.

UNITED STATES DEPARTMENT OF AGRICULTURE

Farm Forestry in the Lake States:
An Economic ProblemBy RAPHAEL ZON, director, and WILLIAM A. DUERR,¹ assistant forest economist,
*Lake States Forest Experiment Station*²

CONTENTS

	Page		Page
Foreword.....	1	Present and possible returns from farm woods.....	16
Elements of the farm-forestry problem.....	2	Interrelations between forestry and farming.....	20
Geographic belts and economic districts.....	6	Possibilities of cooperative management and marketing.....	23
Western prairie belt.....	6	Public participation in farm-forestry programs.....	26
Southern woodland belt.....	7	Outstanding needs.....	30
Northern forest belt.....	11	Summary.....	33
Local problems summarized.....	12		
Farm woods as a source of timber supplies.....	13		

FOREWORD

A vast literature has come into existence on the subject of farm forestry in the United States. Most of it, however, is in the form of popular treatises on the physical improvement of the farm woods and on measuring and selling farm timber. Relatively few efforts have been made to analyze the economic problem of farm forestry, as an integral part of farm and regional economy.

The value of the farm woods has been generally recognized—as a

¹The authors make grateful acknowledgment to those who participated with them in the investigations on which this publication is based. Participants in the case studies (for locations of study areas, see fig. 1), who except as indicated are or were members of the staff of the Lake States Forest Experiment Station, are the following: (1) Littlefork area—William A. Duerr and C. H. Simonds, and E. J. Adams, Minnesota State Forest Service; (2) Cloquet—Prof. J. H. Allison, University of Minnesota, and R. N. Cunningham; (3) Carver County—William A. Duerr and C. H. Simonds; (4) Frog Creek area—Carl J. Holcomb, cooperating with F. B. Trenk, University of Wisconsin Extension Division; (5) LaCrosse area—H. F. Scholz and C. H. Simonds; (6) Yuba area—E. L. Lawson and C. H. Simonds, cooperating with F. B. Trenk and with C. V. Sweet, Forest Products Laboratory; (7) Antrim County—Carl J. Holcomb, and R. D. Jones, U. S. Forest Service Division of State and Private Forestry; (8) Eaton County—Prof. A. B. Bowman, Michigan State College, and Carl J. Holcomb. Statistics on forest areas, timber volumes, forest industries, and ownership are derived chiefly from the Forest Survey of the Lake States, conducted by the Lake States Forest Experiment Station under the direction of R. N. Cunningham. Data on farming and value of woodland products are based on information from the U. S. Census of Agriculture for 1935. Assistance in preparing this publication was furnished by personnel of the Work Projects Administration, O. P. 665-71-3-69, Sponsor University of Minnesota, and O. P. 01-2-71-126, Sponsor Lake States Forest Experiment Station.

²Maintained by the U. S. Department of Agriculture at University Farm, St. Paul, Minn., in cooperation with the University of Minnesota.

source of raw material to meet farm needs, as a source of merchantable crops, as a preventive of excessive soil erosion and water runoff, as a cover for game birds, as a protection to crops and farmsteads in the prairie-plains States against the hot, dry winds of summer and the blasts of winter, and, finally, as an aesthetic and recreational asset. Yet, in spite of this recognized value, until recently no coordinated attack was made on the problem of farm-woods economics. Even now, farm woods continue to be a neglected natural resource, undergoing gradual deterioration through excessive cutting and grazing. In wartime especially the woods are combed over for their supplies of strategic materials.

This study of farm-forest economy in the Lake States and the place of woodlands in the farm economy focuses the result of several years' research on a most urgent problem precipitated by present war conditions. War demands are falling with heavy impact on farm woodlands, and for an unknown period will continue to do so. Farm forest products are not only being drained away for war purposes but are being employed increasingly on the farm as substitutes for other materials that the farmer must do without—coal or oil, metal equipment, fencing, building materials, and so on. If this harvesting is done destructively, it may well wreck the farm woodlands irreparably. In the midst of our plans for post-war recovery, can we afford to overlook the threatened ruin of so important a farm resource?

Efforts to avoid the impoverishment of some 140 million acres of farm woodlands—as a part of a national plan for post-war restoration of a stable farm economy—must be based upon such data and observations as are here presented. In the light of an awakened interest in the farm woodland, it is timely to attempt an appraisal of the farm-forest situation in the very important rural sections of the Lake States, and to analyze the economic factors responsible for present conditions. These tasks the authors have here performed in concise and convincing fashion. Following this, they outline a program of remedial measures by which the farm woods can be brought to greater productiveness and be made to contribute in larger measure to a more ample and more secure rural life. It remains to translate this program into action.

EARLE H. CLAPP,
Acting Chief, Forest Service.

ELEMENTS OF THE FARM-FORESTRY PROBLEM

Farm woodlands are an important source of raw materials for farm use in the Lake States and are gaining in potential importance to the forest industries of the region. Lake States farmers obtain from their own timber the major share of their requirements for fuel wood and posts and a substantial part of their barn timbers and repair lumber—a harvest worth in all some \$34,000,000 annually. At the same time, the depletion of commercial lumber supplies, the inaccessibility of remaining commercial timber, financial and technical deterrents to industrial ownership and operation of timber tracts, all favor the farm woods as a source of industrial raw materials.

Nor is there any fundamental reason why the productivity of the

farm woods in many localities in the Lake States should not be equal to such demands. On the whole, the farm woods are favored by good soil and growing conditions, by adaptability to intensive forest management, and by proximity to good roads and to centers of population and industry. And yet they have received so little care, and so large a part of their area has unwisely been used for pasture—a use proved to be highly detrimental—that their timber volume at present represents but a fraction of satisfactory stocking. Hence output is only a small part of what it could be, in terms both of domestic and industrial material. Marketing channels for what is available above farm needs are poorly established, largely because of this limited output.

Farm woods in the Lake States today cover some 15 million acres of land, or 29 percent of the region's entire forest-land area. They contain nearly 14 billion board feet of timber of saw-timber size³ and about 82 million cords of other live wood. Some of this timber is properly growing stock from which periodical growth can be cut for various purposes such as sawlogs, fuel, posts, pulpwood, and chemical wood. This vast resource is in the hands of 456,000 separate owners, representing 76 percent of the farmers in the region. Since the average volume of this timber, including growing stock, is 913 board feet and 5½ additional cords an acre, the average farmer's share is about 30 M board feet of saw timber and 180 cords of other wood, growing on 33 acres of land.

What causes underlie this understocked condition of farm woodlands, with less than 1 M board feet and 6 cords an acre, when the stocking easily possible on such lands under forest management should average five or six times as much? Part of the reason for present low average stand figures lies in the fact that more than one-fifth of the farm-woodland area is virtually deforested and an additional two-fifths stocked chiefly with young trees too small to contain usable wood. Reasonably good stocking can be found on only one-sixth of the area.

Farm-forest management is needed in the Lake States not merely as a corrective for such conditions on individual farms but as a regional policy based upon the contribution farm forestry can make to good land use, to stability of industry and employment, and to rural social benefits. Yet what appear to be the simplest and most logical steps in the direction of economic and social betterment through this medium are but slowly taken.

It is inherent in the system under which farm woodlands are owned and managed that misuse leads to greater misuse and low returns lead to still lower returns. The farmer whose timberland is yielding but a poor cash income is not inclined to regard this land as a very valuable part of his farm, especially if his income is low because of inefficient cutting, marketing, and utilization. But it is true also of the farmer who cuts substantial quantities of wood for home use, markets very little, and therefore does not realize the value of the

³ The statistics presented herein on the amount and value of farm-forest products are not identical with the data on these items that have been derived recently from other studies or surveys. Many computation factors have not been constant among these studies, with resultant variations in statistical findings. It is believed, however, that the statistics in this bulletin are adequate to the purpose of giving a broad and fair picture of the extent to which farm woods in the Lake States are contributing to forest industries and wood consumption on farms.

timber products which he harvests every year. Low income, real or imagined, leads the farmer to place a low value upon his timber enterprise and to find no incentive to woodland management. Instead, he pastures this land, gives little attention to his method of cutting, and may even burn the woods; whereupon quality of timber and income from timber decline progressively.

To improve the farm-woodland situation, this cycle of diminishing income and increasing mismanagement must be interrupted at some point. It is becoming more and more evident that the first step is not to attempt improvement of woods conditions, but rather to make possible greater returns to the owner. Forest stand improvement for its own sake or for a long-deferred income holds little appeal for woodland owners. The incentive to woodland management lies in current returns—the dollars-and-cents revenue from the sale of timber, the forest products used at home, and the many indirect benefits of the farm woods. From this point of view, utilization and marketing should be improved immediately, even at temporary sacrifice of some silvicultural principles or of the most rapid physical regeneration of the farm woods. The farm-woodland problem is primarily the problem of making farm woodlands pay, and consequently first efforts should be directed towards better timber utilization and marketing.

The next step in the solution, however, goes beyond a simple opening of the way to larger timber income. It must lead the timberland owner out of old ways of doing things—old customs and habits that tend to persist even after they have been proved wasteful and inefficient. Farm forestry probably has more of such customs and habits to contend with than do most other branches of farm management. What is needed is a new concept of the importance of farm forestry.

During the period of farm settlement, wooded land was regarded as a hindrance to agricultural expansion. In the time of relative farm prosperity before 1920, when visions of a rapidly growing population, land shortage, and high land values were foremost in the minds of farm people, it was thought that agriculture should expand not only into outlying regions but also into the unimproved lands on existing farms. Even under more recent conditions, farm woods have been regarded by many as, at best, a reserve to be converted one day into cropland or open pasture. Farm owners still cling to the concept of the early days, when woodlands were abundant. In the more highly developed dairy and livestock sections of the Lake States, farmers desire to put their woodlands "to use," not to let them "stand idle." The injurious effect of grazing upon the woods, even if understood, is disregarded. An important part of the farm-woods problem, then, is the attitude of farmers and of those whose thinking is reflected in the attitude of farm people. Thus viewed, the farm-woodland problem is a problem in education. This might take the form of extension, demonstration, or technical guidance and assistance.

Finally, the farm-woods situation in the Lake States is complicated by the fact that the woods are the property of several hundred thousand separate owners, each of whom manages his part of the whole according to his individual judgment and ability, or lack thereof. It is becoming increasingly evident that the fate of basic resources—among them soil, water, and forests—cannot be left solely to the caprice of individual ownership. Some measure of community con-

trol is necessary to prevent the wastage of these resources or their destruction, and to lend unity and coordination to their management. Woodland depletion, like soil erosion and flood damage, is a matter of public interest. Thus viewed, the farm-woodland problem is a problem also of some form of land-use regulation.

A program for improving the farm-forest situation, including better timber utilization and marketing, education (including technical service to individual farmers), and land-use regulation, becomes an integral part of a regional and national program for the sustained use of basic resources.

Such encouragement of farm forestry must be based on a far-sighted weighing of the benefits from forest use of farm land and from alternative uses. From the viewpoint of the individual farmer, returns from timber sold and timber used at home, plus returns from the farmwoods as a protective and aesthetic asset, must be balanced against the benefits which could be obtained from the land now wooded if it were converted to cropland or pasture. The protective and aesthetic values, difficult if not impossible to measure closely, yet have great and in some cases decisive importance in determining whether farm forestry is worth while. Returns from the farm woods as a means of erosion and flood control must be judged also on a broader basis—the needs of the community and of the people within an entire watershed.

From the public viewpoint, possible returns from farm timber as a merchantable crop must be estimated according to the prospective regional and national output of forest products and the regional and national requirements of such products. The best regional policy for commercial farm forestry cannot be determined on the same grounds as the best policy for individual farmers. Needs of wood-using industries, trends in the use of forest products, and trends in the production of timber on large commercial holdings must all be considered. Furthermore, the immediate prospects for the sale of wood need to be distinguished sharply from the long-run prospects, for timber is a slow-growing crop and timber supplies cannot be quickly adjusted to changing requirements.

The economics of farm forestry rests ultimately on a wide field of conditions in both agriculture and forestry, knowledge of which is necessary for the formulation of a sound woodland policy. An essential part of the farm-forest program, therefore, is a program of research.

In the study reported here the attempt has been chiefly to present the broad aspects of the various phases of the farm-forestry problem, to point out the obvious and essential needs, to recommend the logical lines of attack on the problem, to indicate the need for well-thought-out programs and the remedial measures which they should include, but not to embark upon any detailed solution such as only further research, planning, and experience can develop. In the course of this study, weight has been given not only to available statistics on the extent, condition, and productivity of the farm woods, as well as to the quantity and quality of domestic and industrial demands upon them, but also to case studies made of eight typical localities in the principal producing units of the region. These have made it possible more effectively to interpret the general

statistics in terms of local conditions and to provide a sounder basis for programs adapted to varying conditions of site, population, and social and economic needs.

GEOGRAPHIC BELTS AND ECONOMIC DISTRICTS

Broadly speaking, as regards farm woodlands, the Lake States may be divided into 3 large areas: (1) The western prairie belt, (2) the southern woodland belt, and (3) the northern forest belt. Within the three broad geographic belts may be recognized 10 districts having distinctive farm-woods economic problems (fig. 1), to some extent determined by the character of the region's original forests (fig. 2). Farm-land and farm-woodland areas and farm-timber volumes of these 3 belts and the districts they comprise are given in tables 1 and 2. The distinctive characteristics of the 3 belts are reviewed briefly in the following paragraphs, as a preliminary to the analysis of the farm-forestry problem.

TABLE 1.—*Farm-land and commercial forest-land areas of the Lake States, by geographic belt and economic district*

Geographic belt and economic district	Total land area ¹	Total farms	Average area per farm		Total area in farms		Total area in commercial forest including farm woods		Commercial forest area on farms ²		Farm area in commercial forest ²
	1,000 acres	Number	Acres	1,000 acres	Per cent	1,000 acres	Per cent	1,000 acres	Per cent	Per cent	
Western prairie, Minn. -----	20, 852	91, 363	203	18, 552	89	1, 563	7	881	56	5	
Southern woodland belt:											
Mississippi Valley, Minn.	11, 356	74, 885	133	9, 967	88	2, 240	20	1, 904	85	19	
Southwestern woodland, Wis.	7, 351	48, 543	140	6, 812	93	2, 560	35	2, 076	81	30	
Central pine, Wis.	7, 244	43, 150	128	5, 522	76	2, 970	41	1, 744	59	32	
Southeastern industrial, Wis.	7, 849	69, 256	104	7, 193	92	1, 066	14	883	83	12	
Southern woodland, Mich.	15, 055	142, 110	89	12, 655	84	2, 257	15	1, 566	69	12	
Total and average.	48, 855	377, 944	112	42, 149	86	11, 093	23	8, 173	74	19	
Northern forest belt:											
Northeastern forest, Minn.	18, 818	37, 054	116	4, 299	23	13, 441	71	1, 947	14	45	
North woods, Wis.	12, 683	38, 928	101	3, 932	31	9, 876	78	1, 809	18	46	
Upper Peninsula, Mich.	10, 571	16, 081	90	1, 450	14	9, 076	86	663	7	46	
Northern pine-hardwood, Mich.	10, 774	38, 326	114	4, 355	40	7, 346	68	1, 587	22	36	
Total and average.	52, 846	130, 389	108	14, 036	27	39, 739	75	6, 006	15	43	
All districts.	122, 553	599, 696	125	74, 737	61	52, 395	43	15, 060	29	20	

¹ From Forest Survey.

² As given in 1935 Census of Agriculture except that 651,000 acres of brush prairie in western Minnesota have been omitted.

WESTERN PRAIRIE BELT

The western prairie belt (fig. 1) is confined to southwestern and western Minnesota and has an extent of some 21 million acres, or about two-fifths of the State's total land area. It is a region of sparse natural woods and planted shelterbelts. Its naturally wooded areas comprise some 1.5 million acres, of which 56 percent is on farms. Along stream courses the natural farm woods consist of elm and other lowland hardwoods. Along the eastern boundary of

the prairie in the south are stands of oak, maple, and basswood; in the north are scattered groves of scrubby aspen and oak. The natural farm woods contain 523 million board feet of saw timber, an average of 594 board feet per acre of woodland.

TABLE 2.—Average farm-woodland areas and farm-timber volumes of the Lake States, by geographic belt

Geographic belt	Farms		Average woodland area		Saw-timber volume			Cordwood volume		
	Total	Wooded	Per farm	Per wooded farm	Total	Per wooded farm	Per acre of woods	Total	Per wooded farm	Per acre of woods
	Number	Number	Acres	Acres	Million board feet	Board feet	Board feet	Million cords	Cords	Cords
Western prairie	91,363	30,500	10	29	523	17,000	594	3	98	3.4
Southern woodland	377,944	300,500	22	27	8,600	29,000	1,052	49	163	6.0
Northern forest	130,389	125,000	46	48	4,628	37,000	771	30	240	5.0
Total	599,696	456,000	25	33	13,751	30,000	913	82	180	5.4

Planted farm shelterbelts in this prairie belt cover a total area of some 86,000 acres, 7 out of 10 farms on the prairie having forest plantations of some kind. The shelterbelt trees are mainly cottonwood, boxelder, and green ash. Most of the plantations were established during the period of heavy settlement between 1880 and 1900 and are now decadent as a result of old age, lack of renewal, and the severe droughts of recent years.

The large farms in the prairie belt are devoted mainly to beef-cattle and general livestock production, dairying, and cash-grain farming. The farm-woods problem is chiefly a matter of providing domestic timber needs and protecting farmsteads and fields from unfavorable climatic conditions; the farm forests have low commercial possibilities.

SOUTHERN WOODLAND BELT

The southern woodland belt includes the Mississippi Valley district of Minnesota, the southern two-thirds of Wisconsin, and the southern half of the Lower Peninsula of Michigan. It has a gross land area of about 49 million acres. Characteristically, the farms of this belt were hewn out of virgin forest before or during the period of lumbering in the Lake States, largely between 1820 and 1900, and the woods on them are remnants of the original timber. The southern belt contains 11 million acres of forest land, of which 8 million acres is in farm ownership. About two-thirds of the farm woodland is stocked with hardwood timber, chiefly maple, basswood, oak, and elm. Much of the remainder at present supports no forest stand, but only brush or sparsely scattered trees. The farm woods have a sawlog volume of 8.6 billion board feet. The typical farm woodland of 27 acres thus contains 29,000 board feet of timber—an average stocking of 1,052 board feet per acre.

FIGURE 1.—Three farm-forest belts and 10 farm-forest economic districts of the Lake States, and location of farm-forest case studies.

FIGURE 2.—Natural vegetation of the Lake States.

The Mississippi Valley district of Minnesota (district 3) lies mainly within the State's most intensively developed dairy region. Here, the chief problem is how to increase the capacity of farm woods for supplying home needs. Many of them are now capable of producing the bulk of the farm-timber requirements. In Carver County, for example, 40 percent of the wooded farms have more than 14 acres each of timber with good management possibilities. In some other counties, however, they have been so severely abused that they now contain only a few cords of timber per acre—growing stock mostly of low grade, producing mainly fuel wood. One step in planning for this area must be to determine the proper balance between timber growing and pasturing.

The southwestern woodland district of Wisconsin (district 5) includes most of the State's hilly, unglaciated territory. Because of its steep topography and loessial soil this area is subject to severe soil erosion, and one of the major reasons for maintaining its farm woods and creating new ones is to protect critical slopes and the lands below them from damage. Some farms are heavily wooded, and timber products on many are harvested for sale. In a number of localities, however, such as the Yuba area, returns are less than they should be, because of the dominant place held by the inefficient portable sawmills and other noncompetitive local markets as outlets for farm timber, and because the farmers are at a severe disadvantage in dealings with logging contractors. Furthermore, little of the timber produced on farms reaches the better timber markets of southern Wisconsin, much of it going for products of low value, such as ties, and consequently yielding a poor return. On the whole, this district presents the best opportunities to be found in the Lake States for improving the farm-forest situation through cooperative timber management and marketing.

Dairying here is nearly universal, and woods pasturing is more prevalent than anywhere else in Wisconsin. How to maintain forest cover on the lands most threatened by erosion, bring the forests into productive condition, conserve soil and water, and at the same time provide sufficient crop and pasture land for economical farming is a serious problem.

The central pine district of Wisconsin (district 6) is characterized by sandy soils which limit agricultural development. Farm income is lower here than in any of the other southern districts. Low returns from agriculture force the farmers to depend to a considerable extent upon supplemental income, chiefly from the woods. Fortunately a large share of the farm woods is made up of jack pine, which finds a ready market at the pulp mills. Improving utilization and marketing of farm-forest products is a major problem.

The southeastern industrial district of Wisconsin (district 7) is an area of intensive land use. The presence of large urban centers has led to a comparatively highly developed and specialized agriculture, with cheese making, market-milk production, and truck farming as the most prominent specialties. The average farm of the district is relatively small, and the typical farm woodland is both small and badly depleted through pasturing and overcutting. Timber production for home use is the primary function of the farm woodlands of the district, although there are a number of wood-using indus-

tries which offer an excellent market for any farm timber available for sale.

The southern woodland district of Michigan (district 10), likewise, is one of considerable urban development and intensive land use, where woods occupy only a small proportion of the farm land. Unlike southeastern Wisconsin, however, the Michigan district contains many stands of excellent timber, and its potentialities for farm-timber production are among the best to be found in the Lake States. A sample of farm woods measured in Eaton County, for instance, indicated an average hardwood stand of 6,300 board feet per acre. The various markets available for this material are at present supplied chiefly from other regions. It is desirable that the farm woods fill home requirements for timber in addition to producing a surplus for sale, but much of the high-grade hardwood timber which can be grown here will probably yield greatest returns if sold to local industries.

NORTHERN FOREST BELT

The northern forest belt includes the cut-over conifer region of northeastern Minnesota, the north woods district of Wisconsin, the Upper Peninsula of Michigan, and the northern half of the Lower Peninsula, and embraces some 53 million acres. Here most farms have been developed in the wake of logging operations.

Farm-forest conditions differ greatly from those in the southern belt. The 6 million acres of farm woods constitute only 15 percent of the forest land, and the 4.6 billion board feet of farm timber represents an average of only 771 board feet per acre of farm woods scarcely three-fourths of the average stocking of farm woods in the southern belt. The typical northern farm woods covers 48 acres and contains 37,000 board feet of timber.

Of the total farm-woodland area, about one-third is covered by second growth of the original forest species—white and red pines, spruce and balsam, northern hardwoods, elm, and ash. Nearly all the remainder is taken by aspen, jack pine, and brush, which have come in after logging and fires.

The northeastern forest district of Minnesota (district 2) is still predominantly forest land. Most of the forest is in Federal, State, county, and nonfarm private ownership; only 14 percent is on farms. The forests, especially those in public ownership, play a major role in the general economy. The chief forest problem of the district is managing public forests and farm woods so that they may supply employment needed to supplement the insufficient returns from agriculture. The farms are small; 51 percent of them are part-time farms, the operators of which need to supplement their incomes by off-farm work, particularly in winter. The area contains a number of good markets for farm timber. Industries at Cloquet, for example, manufacturing pulp, matches, lumber, and other products, require a large quantity of various forest materials, half of which are purchased from farmers. In the poorer farming communities are possibilities for small-scale industry based upon forest byproducts—berries, nuts, Christmas trees and wreaths, peat fertilizer, and wooden souvenirs.

The north woods district of Wisconsin (district 4) resembles the northeastern forest district of Minnesota in the meager development of agriculture and in the close connection existing between farming and forestry. Here, too, more than half the farms are part-time farms. The use of county-owned, tax-reverted lands to provide winter employment for local settlers is a possibility coming into general recognition. In Frog Creek Township, Washburn County, for example, county officials have, for the past several years, arranged for winter employment of needy settlers in cutting pulpwood, excelsior bolts, and snow-fence bolts. In 1939, the settlers organized their own cooperative association for buying stumpage from the county and selling the rough products.

The Upper Peninsula of Michigan (district 8) is, in general, characterized by the same farm-forest conditions and problems which exist in the northern parts of the two other Lake States; it has, however, a greater remaining area of old-growth timber, supporting large sawmills and other forest industries which provide farmers with many opportunities for off-farm employment. As elsewhere in the northern forest belt, the undeveloped state of agriculture is reflected in a small farm-land area and in a high ratio of farm woodland to cropland. In the better farming sections, land clearing is progressing steadily; in the inferior farming sections, where agricultural development was early arrested but many farm families still cling to their homesteads, little clearing is under way and on most farms the woods are gradually encroaching upon the improved land. In the Upper Peninsula as a whole, 52 percent of the farms are operated on a part-time basis.

The northern part of the Lower Peninsula of Michigan (district 9) is transitional from northern forest to southern woodland. The farm woods consist mainly of aspen, scrub oak, jack pine, and young second-growth maple. All the old growth and virtually all the merchantable hardwood timber has been logged. In the northwest, in the vicinity of Antrim County, the problem is how to manage farm woods so as to produce part of the timber needed by the remaining forest industries. Here a number of important wood-using mills, their own timber supplies exhausted in the recent past or nearing exhaustion, are now greatly dependent upon farm woods. The central part of the district contains large stretches of cut-over and burned-over sand plains. On these, both crop farming and forest farming are precarious. Rehabilitating these plains through timber growth should be a national and State undertaking. Much of the land is already in Federal and State ownership, and large-scale planting is in progress. Through much of this section there is little place for farm woods, though in some parts the farm-forest situation resembles that in the central pine district of Wisconsin. Along the southern border of the district good farms and farm woodlands are numerous. Here, the chief problem is to maintain a supply of timber for domestic needs.

LOCAL PROBLEMS SUMMARIZED

The foregoing makes clear that each of the three main geographic belts has problems in farm-woods management peculiar to itself, differing to some extent among the economic districts described.

In the western prairie belt, the main problem is successful establishment of shelterbelts and farmstead plantings.

Throughout the southern woodland belt, farm-woods problems have a particularly intimate relation to the farm economy as a whole, and the main problem is how to integrate woodland management with management of the rest of the farm. On most of these farms, forestry may be dovetailed with other farm activities. Timber production provides profitable employment for farm labor at times when other work is slack. Also, it can be carried on profitably on land unsuited to other uses. Yet relatively few farmers regard woods work as an integral and potentially productive part of farm management.

In southern Minnesota, as a result of the run-down condition of most farm woods and the scarcity of wood-using industries, opportunities for marketing commercial timber are limited, and the problem is that of maintaining a continuous supply for home needs. In southern Wisconsin, an important dairy region, one important problem is finding the best use for lands now used simultaneously as woodland and pasture. In the rugged sections of southwestern Wisconsin and adjacent sections of Minnesota, an additional problem is that of increasing the effectiveness of farm woods as a preventive of excessive soil erosion.

Southern Michigan and other districts where woodlands are capable of producing a surplus of products over home needs present the problem of improving utilization and marketing of home-grown timber, thereby helping to maintain forest industries. Cooperation in managing and marketing timber, now practiced by an almost negligible fraction of woodland owners, offers to farmers a means of placing their forest enterprises on an efficient basis. Through collective action they can surmount the handicaps arising from small volume of production and lack of specialization.

In central Wisconsin and throughout the northern forest belt, where field-crop yields are relatively small, the chief problem is that of supplementing farm income by work in the woods. Here farm woods are potentially of greatest value, since agriculture alone in many cases fails to provide adequate farm living. But it is in this part of the region that farm woods have been most depleted by large-scale logging and fire and least is being done to improve them.

FARM WOODS AS A SOURCE OF TIMBER SUPPLIES

Since the peak period of lumbering in the Lake States, which culminated in 1891 with an estimated volume for that year of about 9 billion board feet, the output of sawmills in this region has declined precipitously. In 1936 the total saw-timber cut was estimated at less than 1½ billion board feet. Lumbering in the Lake States is no longer a matter of booming sawmill towns, with great bands of migratory lumberjacks following the crest of the wave of timber depletion. During this period, the number of individual sawmills in the region in operation at least intermittently has changed little. But today, save on the few areas of northeastern Wisconsin and upper Michigan where patches of old-growth saw timber still remain, lumbering is largely a matter of little mills, most of them portable, fed by local

residents with timber from the scattered left-overs of early logging and from the farm woods.

For this reason, farm woods of the Lake States perform a vital function in relation to the region's wood-using industries. Some 4,200 primary wood-using mills in the region use logs and bolts direct from the woods as raw material. Of nearly 1.5 billion board feet and 2 million cords of wood consumed annually by these mills, it is estimated that farms supply 488 million board feet and 92,000 cords.

In the southern woodland belt of the Lake States, farm woods are estimated to provide nearly 90 percent of the needs of wood-using plants other than pulp mills. The material supplied includes chiefly rough logs, posts, and chemical wood, but also products of higher quality such as veneer logs. Farmers sell relatively little cordwood-size material to the industries of the southern belt, but provide a large share of their yearly needs for sawlog timber—about 275 of the 310 million board feet, or 89 percent. Out of some 2,430 primary plants of all types there are more than 2,000 sawmills that draw virtually all their timber supplies from farms. In the northern belt, where there is still some large-scale logging, farm woods contribute probably about 25 percent of local industrial wood requirements other than those of pulp mills. This contribution is increasing as the timber holdings of the large mills wane and the field of production is taken over by small mills suited to operation on scattered timber tracts.

An excellent example of the close relationship that can exist between farm woods and forest industries in the northern part of the Lake States is furnished at Cloquet, in northeastern Minnesota, where, since 1920, a booming sawmill industry has been converted to a group of plants of a size and type suited to the reduced timber supplies. Two pulp mills, a match factory, and a wood-conversion plant provide a good market for 125,000 to 150,000 cords of small-sized aspen, spruce, balsam fir, and other wood, of which probably close to half comes directly or indirectly from surrounding farms. About 425 nearby farmers make direct sales to the Cloquet industry each year, receiving an average return of more than \$300 each, thus not only gaining much-needed supplementary income but also helping sustain the Cloquet industry, with its direct employment of some 2,000 persons and its vital contribution to the region's prosperity and economic stability.

The Cloquet situation, however, presents a number of problems. Depletion of industrial timber supplies has been a key factor in the increasing importance of the farm woods as a source of industrial raw materials. But overcutting, especially of the better species and grades of trees, is steadily depleting the farm-forest resource. Prices for their wood have, until lately, been falling and farmers have had little economic incentive to practice forest management. On the other hand, recent increased demand has stimulated overcutting. If the farm woods continue to be depleted at the present rate, it is questionable whether the open market for timber products supplied by farmers will last long. Because of the depletion of nearby stands, the industry is already obliged to obtain much of its supply from considerable distances.

Many of the larger wood-using establishments of the Lake States have been adopting a definite policy of reducing or entirely eliminat-

ing their own logging operations and obtaining a good share of their timber requirements by purchase in the open market of timber offered by farmers and by small contractors who operate partly in farm woods. This, for example, has been the policy of the Cloquet mills, which have purchased much of their material from farmers and settlers, and have logged their own lands largely on contract. In many other cases owners of large mills, who formerly conducted their own logging operations, have turned to the contractor and the farmer in an effort to escape certain operating risks—notably labor difficulties, which have become increasingly formidable in recent years. This, in turn, has occasionally resulted in conflict between timber workers and farmers.

In some cases the remaining commercial holdings are at a disadvantage because of inaccessibility, which involves high costs of logging and transportation. Some mill owners hold their own forests as a reserve, obtaining timber elsewhere as long as the supplies last. Taxes and fire risks discourage this policy, however.

Under present conditions in the Lake States, the small operator, such as the farmer, has several immediate advantages in timber production over the large forest owner. As a rule he is located close to centers of population and industry, and close to good roads. Living near his woods, he is better able to protect them from damage and can use his spare time to advantage in managing and harvesting his timber, getting the most out of the potentialities for forest growth offered by the good soils of the agricultural areas. He can meet current taxes with current small harvests of forest products. He is seldom concerned with labor troubles. Although only about one-sixth of this area is in reasonably fair condition, the farm woods as a whole are receiving better treatment than other private forest lands in the Lake States, probably less than one-tenth of which are under forest management.

The advantages are largely outweighed, however, by disadvantages that are difficult to avoid. The small size of the farm woods tends to be unfavorable to growth. A patch of timber open on all sides is exposed to drying winds. In other ways the forest conditions may fall short of those on large timber tracts in encouraging natural reproduction. Furthermore, a farm woodland is usually subject to grazing and trampling by cattle, and, in general, to being used as the backyard of the farm. In the long run, the small scale of his operations constitutes a great disadvantage for the farmer as a timber producer—and one which he is slow in correcting. He has difficulty in avoiding inefficiencies arising from lack of specialization in managing, marketing, and processing his timber. His woods may be in poor shape for timber production simply because he does not know how to take care of them. He often loses much of the value which he can produce because his logs and lumber are graded, sawn, and seasoned poorly and in such small quantity.

One serious disadvantage the farmer faces in timber production is well illustrated in the present practices of the great furniture industry of Grand Rapids, built upon the hardwoods of Lower Michigan, and of the woodworking plants of the Twin Cities, which long drew upon the pine and hardwoods of Minnesota and the other Lake States. These now use little timber from the nearby farm

woods but are sustained largely by timber imported at great cost from the Southern and Western States. Timber of the requisite kind and quality is still available in the nearby States, but the large manufacturers are interested neither in the small, ungraded lots offered by individual farmers nor in the poorly sawn and seasoned output of the local portable mills. A medium of contact between the farmer and these industries is in most cases utterly lacking.

It appears that the farm woods in many parts of the Lake States could, under good management, contribute a fair share of the region's industrial timber requirements; but that in the long run—important as the farm woods will always be—the greater volume must be supplied by well-managed large timber tracts, whether in public or private ownership.

In addition to the saw timber and other timber which the farm woods contribute to wood-using industries, farmers market from their woods annually some 41 million board feet of sawlog-size timber (mostly in the form of fuel wood and fence posts) and 923,000 cords of other wood which does not go to wood-using plants. The total annual sale amounts to 529 million board feet and 1,015,000 cords. In addition, they use on their own farms about 306 million board feet of sawlog-size timber and 6.8 million cords of smaller timber per year, all taken from their own woodlands.

Fuel wood is the chief product harvested from farm forests. Next in importance are sawlogs and fence posts. Pulpwood, hewn ties, bolts, poles, and mine timbers are other leading products, especially in the northern belt.

With their large yields of fuel wood and fence posts, farm forests contribute more than half the entire quantity of timber cut in the Lake States.

PRESENT AND POSSIBLE RETURNS FROM FARM WOODS

The farm timber products marketed by Lake States farmers bring them \$10,000,000 in cash annually, and those they utilize annually on their farms are valued, in rough form, at \$34,000,000, making a total annual return⁴ of about \$44,000,000, which is somewhat less than 5 percent of the annual returns from all products of farms in the Lake States. Of this total return, fuel wood represents 79 percent; sawlogs, 13 percent; and fence posts, 6 percent. Divided among the 456,000 wooded farms of the region, it represents an average annual return of only \$96 per farm, or \$2.92 per acre of farm woods—and even this is obtained at the expense of depletion of forest capital. In view of the fact that farm woods occupy one-fifth of the total farm area of the Lake States, and supply more than half the total volume of timber (of all kinds) cut in the region, farm-forest returns appear very low.

As might be expected, annual farm-woods returns per acre in the northern part of the Lake States are markedly lower than those in the southern and western parts. They average \$106 per wooded farm, or \$2.20 per acre of woods. In the southern woodland and western prairie belts the value of farm-forest products harvested an-

⁴ "Return," as the term is used here, means the amount the farmer receives for forest products at the farm, representing not only stumpage value but the value of the labor expended in cutting and piling.

nually averages \$93 per wooded farm, but \$3.40 per acre of woods. However, in the northern forest belt farm-woods returns constitute 12 percent of the entire farm returns, as against about 5 percent in the southern belt and only about 1 percent in the western.

The farmer's cash receipts from the sale of timber of all kinds, calculated on a cord basis, average less than \$4.50 per cord, while going market prices at the farm range from \$4 to \$7 per cord for fuel wood, from \$4.50 to \$9.50 for fence posts, and from \$4.50 to \$15 per cord (400 board feet) for sawlogs. In other words, the average price which the farmer receives for wood is about the equivalent of the market price of his lowest-grade product, fuel wood, although only two-fifths of the wood he sells actually is fuel wood.

The farmer's failure to obtain prices commensurate with the quality of his products, low though it may be, has several explanations. Farmers, as a rule, fail to cut their timber in such a way as to obtain the best possible products and grades. They quite naturally are not specialists at this work, and are usually unfamiliar with market specifications and grading rules. Often they do not reach the best markets, either because they do not know that these markets exist, or simply because of their handicap as individual small producers.

Of the 5 M or 10 M board feet which the individual farmer may produce at one time, a few logs may be suitable for veneer, a few for heading bolts, and so on. Even if the farmer could recognize each of these grades, it would be impossible for him to seek the best buyer for each, nor would that buyer be greatly interested in such a small quantity of logs. Furthermore, the cost of transporting a few odd logs to a distant market is prohibitive. Consequently the farmer turns to the local timber dealer, who, because of the sporadic and risky nature of his business and his better knowledge of values, usually exacts a substantial discount. Or he may sell directly to local industry. But local wood-using industries and markets are seldom sufficiently diversified to provide for the highest use of the various kinds of timber supplied. Especially in the southern part of the Lake States, the chief local market is at the inefficient portable sawmill, turning out low-quality lumber and consequently paying only the lowest prices for raw material.

In some localities, farmers sell their timber on the stump to loggers who have large contracts with wood-using plants. Many plants prefer to obtain timber by contract, for in this way they are better assured of a supply adjusted to their requirements and also are free of the responsibility of determining whether the original seller has clear title to the timber. Such contracts are often based on fairly large-scale production, and many farmers who can go into the woods only infrequently, at times when other farm activities permit, are unable to consider operations of this kind.

The contractor usually buys the farmer's timber for a lump sum; and the farmer, lacking knowledge of timber measurement and valuation, is invariably the loser. Even if the sale is made at a stated price per unit of product cut, the farmer still loses the return which he might have received for his own labor and profit on the operation if he had done the cutting and hauling himself in his spare time. For example, one farmer near the Yuba area in southwestern Wisconsin, to whom a contractor offered \$195 for his timber (a fairly

typical offer), instead cut the timber himself, hauled it to market, and received \$1,197 for it, at a cash expense of only \$160. Not only did he receive five times the price originally offered, but he also was able to leave his woods in good condition for regrowth, whereas woodlands entrusted to contractors, whose sole aim is maximum immediate profit, are generally devastated.

Another, and in fact the basic cause of low farm-timber returns is woods depletion. To obtain greater returns, greater timber yields are fundamentally necessary. There is no lack of demand for forest products in this region, which now imports large quantities of forest products of types which may be grown on farms, and apparently will continue to do so. Greater returns, then, can come in the long run only from a well stocked and continuously productive forest made so through protection from grazing and good management in harvesting.

Old-growth forest subjected year after year to grazing is transformed by degrees into open wooded pasture having no young tree growth to replace the timber stand. First, all seedlings and very small trees are browsed off, and at this point the forest ceases to reproduce. As time passes, the largest trees in the stand die or are cut, leaving bare openings. Finally, where not long before stood a virgin forest, no trees remain except a few veterans scattered over an area covered with sod. Many farm woods in the Lake States, especially in the southern part, have now reached this final stage of depletion.

Again, poor cutting practices and inadequate protection are responsible for much farm-woods depletion. Farmers who cut their own timber seldom resort to clear cutting, but the form of partial cutting which they practice often amounts more nearly to a creaming process than to stand improvement. In many stands, cutting of the more desirable kinds of trees and of the better-formed trees has resulted in increasing the proportion of inferior timber. Fire has had an important part in the depletion of farm woods in the past, and in the northern forest belt still causes considerable losses. Some settlers burn their woods as a preliminary to clearing, and the fires often spread over wide territories before being extinguished. About 1.5 to 2 percent of the northern woodland area is burned over in an average year.

About five-sixths of the farm woodland of the Lake States is in various stages of conversion from dense forest to open pasture or brush land. Only one-sixth is being cared for in a way which favors perpetuation of the timber stand. In the northern forest belt, for instance, of 50 farm woodlands studied in the vicinity of Littlefork, Minn., not 10 percent were being handled in a manner to avert depletion; and a similar study in Antrim County, Mich., though it showed more favorable conditions, revealed only 400 out of a total of 1,400 woodlands, or less than one-third, that were fairly well managed. In Carver County, Minn., in the southern woodland belt, only 14 percent of the farm woodland is free of serious damage.

In some parts of the region, such as the more intensively farmed areas of the southern counties, farm tenancy has an important bearing upon the farm-woodland situation. Few tenants take even the slight interest in the farm woods which is taken by owners; and while farm

rental contracts usually place a restriction upon timber cutting by tenants, they seldom make proper provision for care of the woods.

In pleasing contrast with this picture of low timber returns and farm-woods depletion, are a couple of examples of what farm woods can yield, both in products and in money, when owners have cared for them properly.

One farmer of Calhoun County, in the south-central part of the Lower Peninsula of Michigan, purchased a farm in 1908 on which, in 1900, the previous owner had logged off the 35 acres of hardwood timber, leaving only a light stand of trees too small to yield sawlogs and a scattering of larger trees not worth cutting. In 1908, a fire burned over part of the woods, but since this first fire, the woods have been so well protected as to be free of damage either from fire or grazing. In 1911 this farmer cut 34,000 board feet of timber for a new barn, and up to 1939 had cut an additional 12,000 board feet for building repairs. In addition to the sawlogs, he cut 744 cords of fuel wood and 1,100 fence posts. The value of all these products, in rough form at the farm, was \$5,779. The average annual return was thus about \$186, or \$5.31 per acre of woods. Meanwhile, the volume and quality of the remaining timber have been increasing steadily. Today the woodland supports a fine stand of second-growth hardwoods, with a volume of more than 6,500 board feet per acre.

Another farmer, of Huron County, in the east-central part of the Lower Peninsula, owns a 280-acre farm which his father cleared about 1890. The woodland on this farm was severely damaged by fires which swept the region in the 1870's and '80's, and later its condition was made worse by grazing. Some years ago, at an agricultural extension meeting at which the question of woodland management was discussed, this farmer was induced to think of his timber as a crop. In 1930 he built a fence around the remaining woodland to exclude cattle. The tract now contains 15 acres of mature timber including 82,500 board feet of sugar maple and other hardwood saw timber, an average of 5,500 board feet per acre. A good stocking of young trees has become established. Each year the farmer further improves the condition of his woods by cutting out the dead and mature timber for his fuel-wood and sawlog needs and for sale. Each spring he taps the large sugar maple trees and makes syrup. Since 1918 he has kept a record of his yields of forest products. During 20 years he obtained a total of 32,000 board feet of sawlogs, about 800 cords of fuel wood, and 200 gallons of maple syrup—worth in all \$4,315. The value of products yielded annually has averaged \$215.75.

Studies of the timber yield of well-managed farm woods indicate that at normal prices, annual returns of \$5 or more per acre are entirely possible on most of the better woodland areas of the region. Examples of such returns, compared with the amount which the average farmer receives from his timber crop, serve to emphasize the inefficiency of typical farm-woods management. The inefficiency becomes particularly apparent when it is realized that even the small return from the average farm woods may not continue for long, since it is accompanied by increasingly serious timber depletion.

INTERRELATIONS BETWEEN FORESTRY AND FARMING

The conflict in the use of farm-forest land for pasture and for timber production in the southern part of the Lake States has already been noted. Here 5.5 million head of livestock are grazed. Since the 8.7 million acres of open pasture within this belt represents an average of only $1\frac{1}{2}$ acres per head of stock, the chief concern of many farmers, especially those whose farms are small, is to provide enough additional forage to maintain a full dairy herd, keep farm labor occupied, and bring in as large a cream check as possible. Thus farmers are inclined to regard their woodland as supplementary pasture and today use 7 million acres of it for that purpose, bringing the total pasture area per head of stock to nearly 3 acres.

There is question, however, whether so much pasture is actually needed. In individual cases, woodlands are pastured, not because of necessity or even because they offer much forage, but simply because no fences separate them from adjoining open pastures and cattle are free to wander into the woods. Again, pasture studies made in the LaCrosse area have shown that while 1 or 2 acres of good open pasture will support one head of livestock, it takes 5 to 10 or more acres of woodland to provide forage for one head of stock, since the presence of trees interferes with the growth of grass. All studies of pasturing in the farm woods, in fact, point definitely in one direction—the need of increasing forage production on the existing pasture lands by better management and in some cases of actually clearing a part of the woodland for pasture (perhaps leaving a few trees for shade), reserving the remainder for timber production.

The question of the use of land for pasture or for forest, the question of the use of labor for woods work or for other work—in fact, the whole question of the place of forestry in the farm business—resolves itself into a matter of budgeting the use of all the farm resources for the greatest sustained return over an extended period of years.

A complete farm-budget analysis of the place of forestry in farm management in the southern part of the Lake States has not been made; but pertinent facts and figures are available for a number of farms in southern Minnesota.

One example is a typical 160-acre dairy farm in Carver County, containing two tracts of wooded land. One tract of 20 acres is located about one-half mile from the farmstead, is relatively inaccessible to the cattle, and is used as pasture only occasionally. The timber stand is of fine quality and adequate density, averages 30 cords per acre in volume, and has excellent management possibilities. The other tract comprises 15 acres of heavily grazed woodland lying near the farmstead, with a timber volume of only 15 cords per acre. The farm contains 36 acres of open pasture in addition to the grazed woodland, and normally carries 24 head of grazing livestock.

Several possibilities of reorganizing the land use on this farm were studied. It was estimated that if grazing were eliminated from both tracts and they were devoted to timber production, the better growth of timber on both woodlands would increase net returns to the farmer at least \$25 per year. On the other hand, if the trees were cut from both the tracts and the land converted to open pasture, the livestock returns less the value of present timber growth per year would represent a

greater net return of at least \$50. But the plan of land use which seemed likely to yield the highest income of all was that in which the better (20-acre) timber tract was devoted to timber growing exclusively and the poorer to grazing. With such a combination of maximum growth of high-grade timber, and forage production on the more accessible 15-acre tract, returns at least \$75 larger than at present seemed assured.

Forest use of farm land has a strong advantage up to the point where all home needs of timber are being met and the farmer's own time is fully occupied. Beyond this point, at which it becomes necessary for the farmer to seek market outlets for his timber and to hire special labor for woods work, two opposite tendencies appear. On the one hand, the advantage of forest use is retained well beyond the point of self-sufficiency if the farm is large, if there is much land of rough topography or otherwise unsuited to uses other than forestry, if the farm operator has a personal aptitude for timber management, or if timber markets are especially favorable. On the other hand, forest use beyond the point of self-sufficiency of land suitable for open pasture is relatively disadvantageous on small farms, especially those where the dairying enterprise is intensively developed.

Regardless of whether forest or pasture use of land is more profitable in any particular case, and to what extent, one fact appears to hold true universally—combination of timber production and forage production on a single tract of land is inefficient. This dual use of land produces neither good timber nor good pasture, the trees shading out the grass and the grazing cattle reducing the yield of wood. In Carver County, Minn., again, the highest returns from woodland are obtained from forage where the timber stocking is very light (less than 1 cord of wood per acre), or from timber yield where stocking is more than 30 cords per acre. Returns from woodland which is neither good pasture nor good forest (containing 7 to 10 cords per acre) are from \$3 to \$4.75 less per acre than in either of the other cases.

In relation to part-time farming, the role of forestry is far different. Part-time farms are numerous in the northern part of the Lake States, where farm income from all sources averages only about half as much as in the southern part. Some 30 percent of the farmers in the northern forest belt work outside the farm more than a month during each year, and nearly 50 percent obtain part of their income by work outside the farm. A considerable number of these part-time farmers have as their off-farm occupation either woods work or the transportation or milling of forest products.

Results of a study of the farm-forest situation in the vicinity of Littlefork, in northern Minnesota, show how close is this tie between agriculture and forestry on northern areas of the Lake States, even where agriculture is relatively well developed. The 240 farms within the Littlefork area, comprising about 29,000 out of some 213,000 acres, have somewhat better than average soil and yield a slightly higher than typical income. The remaining land is in forest and largely unsuited to agriculture. Of this the State of Minnesota owns about 108,000 acres, large lumber and paper companies own some 40,000 acres, and nonresident small owners own most of the remaining 36,000. Of the rural families in the Littlefork area about 40 percent

give their full time to farming, 20 percent find it necessary to supplement their farm income with some work off the farm, and the remaining 40 percent, though they live on the land, are chiefly occupied with some form of activity other than farming—in most cases woods work or trucking. Nearly a third of this last group receive no cash income whatsoever from farming. The typical part-time-farming family engaging in woods work receives about \$100 per year from this source.

A study of living standards in the Littlefork area indicated that for 37 percent of rural families income is at the distress level. Gross receipts of the average family in this group—including both cash income and the value of farm products used at home—amount to about \$500 per year. For 57 percent of the rural families income appears to be fairly well above the distress level, gross receipts averaging nearly \$800 annually. The remaining 6 percent of the families enjoy a comparatively high standard of living.

The average Littlefork settler owns 120 acres of land, of which two-thirds is in woods and brush. The typical farm woods are in poor condition, although they provide nearly all the settler's own timber needs and, in addition, furnish in an average year about \$18 worth of wood products for sale. Because of the extremely depleted condition of the farm woods, settlers cannot hope to get much cash income from their own timber; and those who require additional income must look elsewhere for most of their winter employment. Most of those who seek off-farm woods work are experienced and potentially productive woods laborers. Under usual conditions, however, the opportunities for additional woods work are few. Probably about 30 percent of those who want supplementary work in the woods find enough such work to meet their needs. Another 30 percent find occasional work in the woods, but not enough. The rest in normal times must eke out an existence as best they can on their farms, or depend upon relief.

Unemployment or underemployment of woods workers in the Littlefork vicinity appears to result not so much from insufficient markets for timber products as from lack of adequate plans of management for available forest resources. Potentially there is a good market for woods products. Pulp and wallboard mills at International Falls consume annually some 250,000 cords of pulpwood, and sawmills in this town and elsewhere in the region demand logs of various kinds. Cedar products may be sold through a yard at Littlefork, and mining timbers are in demand in the Iron Range towns. Railroad cross ties and fuel wood are other products for which there is a ready market. An inventory of State-owned timberlands in the Littlefork area has shown that under management they are capable of yielding each year, perpetually, some 7,000 cords of pulpwood, 900,000 board feet of sawlogs and ties, 64,000 pieces of cedar products, and 3,000 cords of fuel wood. This is nearly three times the quantity of timber that is being cut from these lands at present. It is sufficient, in itself, to provide all the winter work which the residents of the Littlefork area who need such work can undertake.

The opening of State timberlands for planned use by the people of the area, and sale of timber under a system which would encourage

individual cutters or cooperating groups of cutters to conduct their own logging operations, would appear to offer a solution to the problems both of unemployment and of low returns to those employed. An estimate of the potential returns to Littlefork settlers from woods work on State land indicates that the winter income of the average worker would be \$350 and that of the average family \$530, in addition to what they can get from their own woods. Off-farm revenue of this amount would help to lift the income of Littlefork families above the distress level.

The story of the Littlefork area illustrates the great potential significance of public timberlands in the farm economy of the northern forest belt. In all three Lake States, the possible role of Federal, State, and county forests in influencing the development and ensuring the stability of rural communities is coming into recognition. The possibility of integrated use of agricultural and timber resources opens up new horizons on the farm-forest scene.

POSSIBILITIES OF COOPERATIVE MANAGEMENT AND MARKETING

How to obtain higher returns from the farm woods, especially higher cash returns from sale of timber, is the pivotal problem of farm forestry in the Lake States. The small areas and small output, the farmers' lack of specialized knowledge regarding marketing, and the individual owner's lack of bargaining power are responsible to a large extent for the present low cash returns. These handicaps are somewhat analogous to those once experienced by farmers in marketing their field crops, which have subsequently been lessened or overcome through cooperative organization. May not the solution of the farmer's difficulties as a seller of farm timber, also, lie in the direction of cooperative management and marketing?

The Lake States region, having a long history of agricultural cooperation and exceeding all other regions of the United States in proportion of farm business handled through cooperatives, is a naturally fertile field for cooperative development. In the development of cooperatives for management of woodlands and marketing of timber products, however, progress thus far has been slow. There are at present several forest cooperatives in the Lake States but most of them are insignificant in size and imperfectly organized. They are chiefly concerned with marketing products and little or not at all with the management of woodlands—yet both these functions are essential for a sound forest cooperative.

The most obvious function of the cooperative is, of course, efficient marketing. A forest cooperative must protect the farmer from unwise or unnecessary transactions with middlemen and enable him to reach markets otherwise inaccessible. It must bring together a sufficiently large number of timber producers to assure a volume of business large enough to provide economies in operation, permit diversification of products, and assure to wood-using industries regular delivery of standardized products. Farmers acting as a group would probably find a great many timber markets open to them in which their individual small and ungraded lots would not be accepted. Wood-using industries, also, would benefit from the establishment of

a forest cooperative, since it would insure a steadier and more certain supply. Cooperatives should help to develop a stable and permanent basis for the wood-using industries in the southern part of the Lake States, where manufacture of wood materials is at present on an insecure and somewhat haphazard basis.

But timber management is an equally important function of farm-forest cooperatives. Only if they go beyond the marketing function and undertake to assist members in handling their woodlands for permanent timber production can they prevent the depletion which otherwise is involved in getting increased returns for timber products. The experience of the Edgar Equity Association of Edgar, Wis., illustrates this fact. The favorable contract which this association obtained with the operator of a local sawmill, coupled with the fact that the association had direct access with its graded products to good lumber, tie, and log markets, allowed it to pay patrons the high average price of \$20 per M board feet. But the deep inroads made into the members' woods in response to this high price, and the resulting depletion of the forest resources during the 3 years of the association's operation in the timber field, were a major factor in causing it to withdraw from this field in 1938.

There are many difficulties inherent in farm woods which handicap the organizing of such dual-function cooperatives on a wide scale in the Lake States. Perhaps the most serious, especially in the southern part of the region, is the fact that timber is a minor farm crop, providing less than 5 percent of the total farm returns and therefore tending to be of little concern to farmers. The agricultural cooperatives that have been organized successfully are creameries, livestock-shipping associations, and grain elevators, each of which markets a crop of major importance. There is good reason to believe, however, that cooperation is fast becoming established as a generally useful business expedient and will spread to minor enterprises in which savings and economies can be effected through collective effort, perhaps as a part of cooperative handling of major agricultural products.

A second handicap is the generally run-down condition of the farm woods and the difficulty of finding areas with a sufficient volume of standing timber to assure an adequate supply on a permanent basis.

The forest-cooperative movement also may be expected to encounter the type of private price competition which proved ruinous in early days of cooperative elevators and other associations in the Middle West. To protect themselves against such competition most associations now include in their contracts the so-called maintenance agreement, binding members to pay the cooperative a small proportion of the amounts received for any products sold outside the association. Again, forest cooperatives must combat the indifference of members and their unfamiliarity with timber practices. In fact, the whole problem of membership relations is of vital importance in an association the members of which would normally have but infrequent contact with each other.

To explore the possibility of farmers' cooperation in managing and marketing timber in the Lake States, a study was made of the farm-woods area surrounding the village of Yuba, in Richland and Vernon Counties, Wis. Here, within a radius of 15 miles of the village, are nearly 3,000 farms, having an average area of 150 acres, including

about 48 acres in good farm woods (aside from sparsely wooded pasture), made up of maple, basswood, elm, oak, and hickory. The woodland is still in better condition than in most other parts of southern Wisconsin, but improper cutting is rapidly depleting it and, together with grazing, has already greatly lowered its productivity.

The Yuba community is fortunate in having a small, permanent wood-using industry, including two well-equipped stationary lumber mills, several tie mills, a cheese-box plant, a bowling-pin mill, a furniture factory, and a lath mill. The principal outlet for marketed timber at the present time, however, is the 40-odd portable sawmills and tie mills within the area.

Timber is marketed largely through tie contractors and this is an important cause of low average timber returns. At present, the timber cut annually from the good woodlands and the sparsely wooded pasture lands of a typical group of farms amounts to about 5,000 board feet and 16 cords per farm. At \$10 per thousand and \$4.50 per cord, it is worth \$122. It is reasonable to expect that farmers could improve these unsatisfactory conditions and increase their incomes through cooperative effort in selling sawlogs and other marketable products and at the same time improve their woods.

Studies in the Yuba area indicate that an efficient woodland association could be made up of about 600 members, or 20 percent of the total number of farmers in the area. An association of this size would control nearly 29,000 acres of good woodland, with a stand amounting to some 75 million board feet of saw timber and 288,000 cords of other usable wood.

To keep the woodlands productive it would be necessary to restrict the annual cut per farm to about 4,000 board feet of saw timber and 15 cords of other wood. This would mean reducing the present cut by about 15 percent. However, with proper marketing the smaller cut would provide a greater cash income than is obtained at present.

By carefully seeking the best markets—selling the veneer logs at \$25 to \$50 per thousand, better sawlogs at \$20 to \$25, and marketing only tops and smaller cuts for ties and posts—a cooperative should be able to obtain for its members a net return (after deducting association expenses) of \$16 per M feet on the sawlog material, or more than 50 percent above the average price now obtained. This net return plus the value of the cordwood products used on the farms—15 cords at \$4.50—would total \$131.50 per member. This would indicate an increase of 8 percent over current income per farm, while the volume cut would be 15 percent less.

Theoretically, there would be a further advantage in having the cooperative operate a mill and sell processed products, since returns could be increased thereby to as much as \$157 per member. Owning, renting, or contracting for facilities for manufacturing lumber and other sawn products would also overcome the farmer's greatest handicaps in timber marketing—having to sell any part of the timber to the present portable sawmills with their technical inefficiency, and having to deal with a limited market for unprocessed timber.

Yet as a practical proposition, such an undertaking would involve greater risks than appear justifiable under present conditions in the Yuba area, where a large number of small mills and other wood-processing plants are already established and widely distributed. It

would seem more practical to foster existing plants, at least in the early stages of development.

Although the Yuba area contains somewhat above the average run of farm woods in the southern part of the Lake States, it is by no means exceptional. There are a number of other localities in the southern belt which would be suitable for cooperative effort if the farmers were given encouragement and shown the advantages to be gained from such cooperation. For the largest part of the run-down farm woodland area in the southern part of the region, however, such efforts must be restricted until, through education, extension, and technical assistance, the farm woods are built up to a higher level of productivity.

In the northern part of the Lake States there is a growing need, not only among farmers but also among other workers residing in and near public forests, for more cooperatives of a different type. Here the large acreages of publicly-owned timberlands, management of which rests with the public agencies, offer opportunities for cooperatives of woods workers to act both as a purchasing agent to buy the public stumpage, and as the selling agent to obtain favorable markets. They may also assist members in getting credit from local banks to finance logging operations and may help members to sell timber products cut from their own lands. Several cooperatives of this type already are organized in Forest, Washburn, and Bayfield Counties, Wis., and have proved effective and fairly successful.

PUBLIC PARTICIPATION IN FARM-FORESTRY PROGRAMS

The United States stands high among the nations of the world in facilities for helping farmers to follow the best agricultural practice. The results of research conducted by State agricultural experiment stations and by bureaus of the Federal Department of Agriculture are disseminated through publications, through the extension services attached to the State agricultural colleges, and through county agricultural agents located in most of the counties of the Nation. The Soil Conservation Service, Agricultural Adjustment Administration, the Forest Service, and other bureaus of the Department of Agriculture, have developed action programs designed to conserve physical farm resources and increase farm income.

A great deal of public aid is aimed toward better farming and better farm living. The agricultural staffs of the State colleges and Smith-Hughes teachers in the secondary schools are engaged in promoting a knowledge of agricultural science and practice among prospective farmers and other workers in the field of agriculture; and the colleges through short courses and the Smith-Hughes teachers through adult classes reach some of the farmers themselves with the best information available on the various branches of farming. The State agricultural extension staffs and the county agricultural agents apply extension methods in the distribution of similar information directly to farmers. Many of the activities of the State departments of agriculture give direct aid to farmers in growing and marketing their crops. The various State and Federal agricultural relief and loan agencies are directly involved in promoting better farming practices among the farmers who have come to them for aid.

Under laws recently enacted in each of the Lake States, soil conservation districts are being organized as local units of government and are operating with the assistance of Federal, State, and local agencies and individuals to aid farmers in the prevention and control of soil erosion and the conservation of soil and soil resources.

Until recently, in the whole of this broad program of public aid to agriculture, farm forestry received scant attention.

In the Lake States, as in most other farm-woods regions of the country, the burden of farm-forest education has rested largely upon the shoulders of a single extension specialist in each State. The extension forester has been charged with the duty of carrying out educational work among farmers through lectures and demonstrations, and promoting forestry-mindedness among county agents and other extension workers. But his efforts in these directions have, of necessity, been spread too thin to bring about rapid progress. Some of the educational and service activities of the State conservation departments and forestry schools have been aimed to bear directly on farm forestry, but the attention of these agencies has been directed chiefly to other fields.

Attempts have been made to improve the farm-forest situation through special tax laws designed to induce woodland owners to abandon woods pasturing and to practice good cutting methods. One type of law, in effect in Wisconsin, offers complete exemption from property taxes on a limited acreage of fenced and ungrazed woodlands. Another type of law, on the books of each of the three Lake States, provides for a merely nominal annual tax on protected woodlands, supplemented by a tax on timber harvested. Michigan passed such a law in 1917, but today has less than 2,500 acres of woodland classified under it. Even less woodland has been entered under a law of this type in Wisconsin, and in Minnesota none has been entered.

The failure of special tax laws as a farm-forestry measure has been due in part to the disfavor of local governmental units, which feared loss of tax base and therefore disapproved such applications as were submitted for entry under the law. In part, also, failure has been due to lack of general knowledge among farmers of the provisions of the laws, and because the degree of tax reduction offered was not sufficient to counterbalance certain additional costs or disadvantages, such as those resulting from requirements for fencing and restrictions on grazing.

The Clarke-McNary Act of 1924, which resulted in appointment of State extension foresters, also provided for Federal-State cooperation in furnishing forest planting stock to farmers. The States of Michigan and Wisconsin have cooperated with the Federal Government in this activity since the law went into effect in 1925; about 27½ million trees have been supplied to farmers and nearly 20,000 acres of successful plantations have been established. In 1937, 5,000 Michigan and Wisconsin farmers purchased 3½ million trees from the Clarke-McNary and State nurseries. In Minnesota, however, no acceptable arrangement has been made to take advantage of the planting-stock provisions of the Act. Federal funds provided for this activity in Michigan and Wisconsin have been increased since 1939 from appropriations made under authority of the Norris-Doxey Act.

Only within the past few years, when the whole agricultural set-up was changed, has there been a broad public program for attacking the farm-forest problem. For the first time farm forestry is beginning to be accepted as an integral part both of the rural economic problem and of its solution.

Among present programs affecting the farm-forest situation is that dealing with soil conservation. Demonstration areas established by the Soil Conservation Service since 1933 have provided an opportunity, heretofore lacking, to develop unified plans of farm, forest, and general land management based upon the need of increasing farm income and agricultural stability through good use of resources. An effort has been made to fit the farm woods into their proper place in such plans—to take advantage of their value in holding the soil, in producing an income from worn-out agricultural land, and in providing raw materials needed on the farm.

There is reason to doubt whether such a voluntary system for regulating land use will provide all farm-forest lands with adequate protection against injurious practices. More direct and positive public action may be needed.

In 1937 a comprehensive program of upstream flood control was begun in the Lake States by three cooperating agencies of the Department of Agriculture: The Bureau of Agricultural Economics, the Soil Conservation Service, and the Forest Service. Here the farm woods have had an important place in flood-control plans, because the critical lands lie almost entirely within farms of the southern part of the region.

In 1937 Congress passed the Norris-Doxey Act, providing especially for improvement of farm woodlands through public aid to farmers in woodland management and timber marketing. An appropriation was made for the first time in 1939, to be used to match State funds to carry out the provisions of the act on a cooperative basis. As already indicated, part of the funds made available annually under this authority are used for farm-forestry research and to supplement Clarke-McNary appropriations for farm forestry extension work and for the production and distribution of forest planting stock to farmers. However, over half of the appropriations made under the Norris-Doxey authority are used to operate intensive farm-forestry demonstration projects. Four of these projects are under way in the Lake States, two in Minnesota and one each in Michigan and Wisconsin. On each of these projects, which are selected to represent the more important farm-forestry problem areas, a technically qualified forester is assigned to aid representative farmers in planning and applying the woodland management, harvesting, utilization, and marketing operations adapted to their individual farms and in recording the physical and economic results, particularly as they relate to the farm enterprise as a whole. These projects are building up a nucleus of experience in each problem area to implement and guide efforts needed to reach all farm woodland owners.

The farm woods have entered, also, into recent programs of the Agricultural Adjustment Administration. Payments have been made to farmers for planting woodlands or shelterbelts as a soil-conserving measure, for care of plantations, and for timber-stand improvement. A new feature was included in the 1940 program providing a specific allowance of \$30 per farm, to be earned solely by tree planting. This

special allowance has been reduced for later years to \$15 per farm.

The Lake States region has led all others in the country in participation in the forestry provisions of the Agricultural Adjustment Act. Although in 1939 less than 45,000 acres in the three States—only 0.3 percent of the total woodland area—was planted or improved under the act, in subsequent years this area has more than doubled and continues to increase steadily. In the prairie belt, where wind-breaks are considered almost a necessity, the A. A. A. has stimulated establishment and care of tree plantations. In the northern forest belt, on the other hand, farmers apparently give woodland improvement low priority in conservation practices undertaken, supposedly because of the large acreage of tax-delinquent and State-owned forest land to which they already have access. Some farmers in the northern counties, in fact, have stressed the need of clearing land at the expense of the farm woods. But in the southern woodland belt, A. A. A. payments have provided many farmers with the necessary incentive to undertake regeneration of badly depleted woods.

The Nation-wide forest survey, authorized by Congress in the McSweeney-McNary Act of 1928 and begun in the Lake States region in 1933, is aimed at providing a physical inventory of all forest resources, together with data on the production, and use of forest products. It will furnish in part, the information necessary for broad forestry programs and for proper integration of farm forestry into regional and national plans for timber production.

Coordination of public activities bearing upon rural land utilization has been envisioned in a number of planning projects begun in recent years. Under the agricultural planning program, launched in 1938 as a cooperative Federal-State project, specific plans for land use were developed on a county basis by the public agencies, working in cooperation with farmers in each locality. In wooded regions like the Lake States the farm woods necessarily played an important part in these plans. Through coordinated planning it may well be possible to determine what extent of farm woods and what type of farm forestry will best meet the needs of each community and each region.

Several programs of education and demonstration in farm forestry have been inaugurated or have gained new momentum in the Lake States region in recent years. Since 1939, some of the appropriations made under the Norris-Doxey Act have been used to expand extension activities in farm forestry. These resources, matched with additional State funds, have been used to employ an assistant to the extension forester in each of the three Lake States. Through the encouragement of extension foresters and county agents, a number of 4-H club projects in farm forestry have been developed. Projects of this type are valuable in that they promote an interest in the farm woods and an understanding of woods management among the younger generation of farm people, who are the woodland owners of the future.

In various parts of the Lake States, the Civilian Conservation Corps has cooperated with the State extension services in establishing woodland demonstration areas. Altogether, more than 100 5-acre demonstration plots have been laid out.

A particularly interesting program in farm-forestry education was begun in St. Louis County, in the northeastern cut-over region of Minnesota, in 1937, where the county department of education suc-

ceeded in obtaining Federal Smith-Hughes funds for the employment of two foresters as instructors.

OUTSTANDING NEEDS

The facts presented regarding the farm woods of the Lake States show that, despite their large extent and importance as a source of raw materials for both agriculture and forest industry, they contribute less than 5 percent of farm returns and, because of poor treatment, are steadily deteriorating. It is further brought out that returns from the farm woods can be increased to profitable proportions through better utilization and marketing of timber products and by building up woodland productivity. The public programs that have been outlined on the foregoing pages are making valuable contributions more or less directly toward the solution of the farm forestry problems of the Lake States. The full effect, especially of the more recent undertakings, cannot as yet be weighed. Nevertheless, in relation to the job to be done, present efforts constitute only a beginning, and additional steps appear necessary as part of the public program for farm forestry. These include: (1) Increased and intensified educational effort, including technical service aids, to acquaint farmers with the value of farm woods as a source of raw materials for use and for sale; (2) achievement of better farm woods management and timber utilization and marketing, especially through farmers' cooperative efforts; (3) effective public regulation to eliminate woodland practices injurious to the forest resources or endangering the welfare of neighbors and of the community in general; (4) additional research designed to obtain basic facts specifically related to farm forestry.

Until woodland owners are provided with expert technical advice and assistance on the ground, public efforts in farm forestry cannot be fully effective. To give farm forestry a concrete and practical direction, there must be available trained personnel having a farm-management point of view, who will work on a year-round basis in the farm-woods communities, helping farmers and cooperative organizations of farmers with their forest problems.

Relatively few farmers have adequate understanding of the greatly increased profits they can obtain from farm-woodland crops, or of the specific practices and procedures by which they can obtain such returns. In the few localities served by foresters employed in farm programs, such as in the recently initiated farm forestry demonstration projects and some of the soil conservation districts, cooperating farmers are benefiting greatly from the technical service provided them in the managing of their woodlands and the harvesting, utilization, and marketing of woodland products.

As a buttress for this program of education, a program of public regulation should be aimed at speeding up the transition from waste and neglect of the woodland resource to positive management for continuous productivity. Direct and positive public action is needed to provide all farm-forest lands with adequate protection against injurious practices and to keep these lands reasonably productive. To this end the Forest Service has proposed that the States be afforded the opportunity to undertake the necessary regulation with Federal financial assistance, but with the reservation that the

Federal Government would take over the task if a State so desired, or if it failed to take effective measures. Regulation is especially needed in the northern forest belt, where industrial holdings are intermingled with farm woodlands and where there is still opportunity to preserve some growing stock on the land and to stop the wasteful cycle of destructive cutting followed by eventual restoration at public cost.

Since the action program for farm forestry in the Lake States must be developed on the basis of sound principles of land utilization, woodland management, and economics, research on a much wider scale than is possible at present is essential.

The chief problem which still requires solution through farm-forest research is that of the proper place of timber production in the farm business—a problem understood at present only in outline. This involves not merely the broad considerations of timber and agricultural output and markets over wide areas, but also considerations peculiar to individual farms and capable of study only on an individual-farm basis. On the four farm forestry demonstration projects in the Lake States, each representing distinctive farm and woodland areas, provisions have been made for taking farm records similar to those now used by farm-management specialists, but covering the farm-woods part of the enterprise in more detail. Similar records are needed for farm and woodland areas not now represented by demonstration projects. Economic studies of farm enterprises conducted by the agricultural experiment stations could readily be expanded to give due attention to farm forestry. Records from all these sources, together with data obtained through the broader economic surveys, need to be gathered and studied to provide basic information necessary for budgeting the use of farm resources for the greatest benefit.

For the Lake States region as a whole, also, further research is needed into the possibilities of forest cooperatives, based upon a study of existing associations. Much needs to be learned about methods of cutting and grading forest products, and about types of milling equipment best suited to the processing of farm timber. Surveys are needed of the principal timber markets of the region, in order to learn what their requirements are and what part of these requirements can be supplied from the farm woods.

While the principles involved in growing and caring for timber are, in general, of universal application and require no special approach from the farm-woods point of view, several problems peculiar to the farm woods require special study. Information is still fragmentary on the general question of the best systems of cutting and regenerating such farm-woodland types as oak, scrub oak, and lowland hardwoods. In the western prairie belt, problems of nursery practice, choice of kinds of trees to plant, and means of avoiding drought injury require study. In each of the principal farm-forest belts of the Lake States, in fact, research problems of farm-woods management present themselves which must be answered in order to provide a sound basis for a broad regional program of farm forestry.

There is a considerable degree of interdependence among the four expanded or new activities herein outlined as important to the farm forestry program. Research is basic to all the other three, and must be designed adequately to serve their needs for specific technical in-

formation. Educational work likewise must underlie and march along with each of the others, and the educational process itself is strengthened when it has results and concrete examples of successful application from the other activities for use in teaching. The objectives of public regulation will be more readily attained if there is general public knowledge and acceptance of the need for improved management practices.

In the western prairie belt chief emphasis must continue to be placed on windbreak planting—an activity in which agricultural workers of the area have long taken considerable interest, but which has thus far progressed slowly because of lack of facilities for obtaining planting stock at low cost. Experience has shown that proper care of plantations during the first few years after establishment is just as important as careful planting. For this reason, coincident with a more effective program for providing planting stock, there is need in the prairie area for several forestry technicians who can devote full time to the job of helping farmers with plantation establishment and subsequent care.

In the northern forest belt, also, the need is for intensive programs of extension and demonstration, including technical assistance by forestry agents permanently stationed in small districts. These appear to be fundamental requirements for improving rural economy and the farm-forest situation, as well as for facilitating understanding and acceptance of the need for such public regulatory measures as may be adopted. In this part of the Lake States, one of the chief aims would be the use of public timber to provide employment for operators of farms of inadequate size and income opportunity. Part of the responsibility of the forestry agents would be to insure smooth operation of plans for the use of public timber, to aid settlers to form cooperative purchasing and marketing associations, and to work with the regular forest personnel in managing the resources as a community project in which each resident would have a personal stake and therefore a proprietary interest. The farm woods, however, would still be the agents' major concern. The agents would plan with farmers the best use of their timberland, encouraging forestry practice where such practice would be justified, and particularly where the possibility of marketing products for a cash return gave hope of stimulating interest in the farm woods.

In the southern woodland belt, in addition to an intensive program of education and extension, one promising suggestion, which has met with general favor, is the placing of a forestry technician in each farm-woods county or small group of counties, to devote full time to farm-forestry work. These forestry agents would be permanent residents of their communities. They would work with farmers in planning intelligent and profitable use of the farm woods as a part of the farm business, help woodland owners to form associations for cooperative timber management and marketing, and, through demonstration and technical assistance, acquaint farmers and organizations of farmers with the best woodland practices. In those southern localities where soil erosion and flood control are major problems, the forestry agents should correlate their activities with other programs seeking better land use and management.

SUMMARY

Farm woods in the Lake States—Minnesota, Wisconsin, and Michigan—cover 15 million acres of land, which is 20 percent of the region's farm land and 29 percent of its forest land. The farm woods of the region fall into three broad belts—(1) the western prairie, (2) the southern woodland, and (3) the northern forest.

In the western belt, farm woods are mostly sparse natural timber stands along streams, and planted shelterbelts. Their major contribution is protecting crops and farmsteads against unfavorable climatic conditions. Wood cut from them brings only about 1 percent of total farm returns.

In the southern belt, the woods occupy 19 percent of the average farm area, and contribute only about 5 percent of total farm returns. They are, in the true sense, farm woods. More than 80 percent of the woodlands are grazed, although they offer poor pasturage and this practice causes the timber stands to deteriorate.

In the northern belt, woods occupy 43 percent of the average farm area, and woods products bring 12 percent of total farm returns. Here farming income alone is insufficient for most of the rural population, and half the farmers seek part-time employment outside farming.

Out of a regional total of some 600,000 farms, about 456,000, or 76 percent, have farm woods. Average area of woodland on these wooded farms is 33 acres. For the south the average is 27 acres, in the west 29, and in the north 48.

Standing timber on farms, including growing stock, amounts to some 13.8 billion board feet of sawlogs and 82 million cords of other wood, an average of 30 M board feet and 180 cords per wooded farm or 913 board feet and $5\frac{1}{2}$ cords per acre of woodland.

Farm woods contribute more than half of all the timber cut annually in the Lake States—835 million board feet and 7.8 million cords. They supply nearly one-fourth of the raw materials used by the forest industries of the region—488 million board feet and 92,000 cords annually.

The value of the timber cut on farms amounts to about \$44,000,000 per year, an average of \$96 per wooded farm or \$2.92 per acre of woodland. The present low returns are due to improper utilization and marketing of timber and the depleted condition of timber stands, resulting largely from grazing and overcutting.

Well-managed farm woodlands in the Lake States are capable of yielding annual returns of \$5 or more per acre. Where cooperative timber management and marketing are economically feasible, they can often increase the prices obtained for woods products by 25 to 50 percent.

Although attention to farm forestry as a part of agricultural programs has increased in recent years, there is need for additional public effort, viz: (1) Education of woodland owners and technical assistance to promote better farm-forestry practice; (2) better utilization and marketing, especially through farmers' cooperative efforts; (3) some measure of public control over timberlands to prevent devastation and to keep the lands reasonably productive; (4) farm-forest research to provide basic facts.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE WHEN THIS PUBLICATION WAS EITHER PRINTED OR LAST REVISED

<i>Secretary of Agriculture</i> -----	CLAUDE R. WICKARD.
<i>Under Secretary</i> -----	PAUL H. APPLEBY.
<i>Assistant Secretary</i> -----	GROVER B. HILL.
<i>Chief, Bureau of Agricultural Economics</i> -----	HOWARD R. TOLLEY.
<i>Director of Agricultural War Relations</i> -----	SAM BLEDSOE.
<i>Director of Extension Work</i> -----	M. L. WILSON.
<i>Director of Finance</i> -----	W. A. JUMP.
<i>Director of Foreign Agricultural Relations</i> -----	L. A. WHEELER.
<i>Director of Information</i> -----	MORSE SALISBURY.
<i>Director of Personnel</i> -----	T. ROY REID.
<i>Land Use Coordinator</i> -----	ERNEST A. WIECKING.
<i>Librarian</i> -----	RALPH R. SHAW.
<i>Solicitor</i> -----	ROBERT H. SHIELDS.
<i>Chief, Office of Civilian Conservation Corps Activities</i> -----	FRED MORRELL.
<i>Chief, Office of Plant and Operations</i> -----	ARTHUR B. THATCHER.
<i>Administrator of Agricultural Marketing</i> -----	ROY F. HENDRICKSON.
<i>Administrator of Agricultural Conservation and Adjustment</i> -----	M. CLIFFORD TOWNSEND.
<i>Chief, Agricultural Adjustment Agency</i> -----	FRED S. WALLACE.
<i>Chief, Soil Conservation Service</i> -----	HUGH H. BENNETT.
<i>Manager, Federal Crop Insurance Corporation</i> -----	LEROY K. SMITH.
<i>Chief, Sugar Division</i> -----	JOSHUA BERNHARDT.
<i>Administrator of Agricultural Research</i> -----	E. C. AUCHTER.
<i>Chief, Bureau of Animal Industry</i> -----	JOHN R. MOHLER.
<i>Chief, Bureau of Agricultural Chemistry and Engineering</i> -----	W. W. SKINNER, <i>Acting</i> .
<i>Chief, Bureau of Dairy Industry</i> -----	O. E. REED.
<i>Chief, Bureau of Entomology and Plant Quarantine</i> -----	P. N. ANNAND.
<i>Chief, Office of Experiment Stations</i> -----	JAMES T. JARDINE.
<i>Chief, Bureau of Plant Industry</i> -----	R. M. SALTER.
<i>Chief, Bureau of Home Economics</i> -----	LOUISE STANLEY.
<i>Superintendent, Beltsville Research Center</i> -----	C. A. LOGAN.
<i>President, Commodity Credit Corporation</i> -----	J. B. HUTSON.
<i>Administrator of Farm Security Administration</i> -----	C. B. BALDWIN.
<i>Governor of Farm Credit Administration</i> -----	ALBERT G. BLACK.
<i>Chief, Forest Service</i> -----	EARLE H. CLAPP, <i>Acting</i> .
<i>Administrator of Rural Electrification Administration</i> -----	HARRY SLATTERY.