THE ECONOMICAL FEASIBILITY
OF MANAGING FARM WOOD LOTS
IN THE WILLAMETTE VALLEY
OF LINN AND BENTON COUNTIES.

by

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Oregon State College.

In Partial Fulfillment
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Bachelor of Science
June 1939.

Approved

Professor of Forestry
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter I</td>
<td>Inventory</td>
<td>4</td>
</tr>
<tr>
<td>Chapter II</td>
<td>Markets</td>
<td>10</td>
</tr>
<tr>
<td>Chapter III</td>
<td>Transportation</td>
<td>14</td>
</tr>
<tr>
<td>Chapter IV</td>
<td>Silvicultural Problems</td>
<td>17</td>
</tr>
<tr>
<td>Chapter V</td>
<td>Management Problems</td>
<td>30</td>
</tr>
<tr>
<td>Chapter VI</td>
<td>Summary and Conclusions</td>
<td>41</td>
</tr>
</tbody>
</table>
Introduction

As a person who has lived on a farm practically all of my life, I naturally have accumulated a great deal of interest in farm problems. Also for many years I have been interested in forestry. However, I have never in the past connected, to any great extent, the practice of forestry with agricultural problems. The theory of forestry, that all land not used for agriculture and some land that is used at present should be used to grow trees, has brought to mind the possibilities of increasing income by proper management of farm land. The actual possibilities of managing certain lands under more or less intensive forestry practices on a paying basis is brought out by the success of some such operations in the eastern states. Of course, many of the problems are different here than in the eastern states and therefore success there does not necessarily assure success in the same kind of a project in the Pacific Northwest.

The purpose of this study is to attempt to determine if it is economically feasible for such lands to be so managed in this section of the country. Due to familiarity with the area, the Willamette Valley of Linn and Benton Counties, Oregon were chosen for the study, which I believe would apply almost as well in any section of Western Oregon and Washington. The need for such study has been further emphasized by the passage of certain acts by Congress in the last few years pertaining to farm forestry.

The problem is not important so much to any one
individual today but rather is of great importance to communities and to those that will hold the land in the future.

The problem today is one of areas from which forests have been removed and, through lack of management, have grown up to inferior species or brush. Other areas have been cleared leaving the way open for erosion. The problem is one in which at least three groups should be interested. First, the farmers because of the increased income and efficiency of their farms. Second, the foresters because it would be a large step toward their goal of managed forest lands. Third, the soil Conservationists, whose work of preventing or stopping erosion is largely accomplished through the correct usage of trees. There are other groups to which the problem should be of at least minor importance, such as the recreationists, the fish and game managers, and the wood-using industries.

Probably the biggest problem concerning this topic arises from the fact that of all the groups that should be interested in the question, only the soil conservationists seem to realize its importance, and they are only starting to do any work on it. Therefore, the problem that should come first in any field work is to create an interest in the topic among these groups. Although that is not the primary purpose of this paper, it is hoped that some interest might be aroused.

There have been several studies made on the topic of farm woodlots in Eastern United States and in the Midwest, but little material has been located which would
indicate that any comprehensive study has been made of farm woodlot management in the Pacific Northwest. Part of the material from the studies of eastern woodlots may be used as a basis for studies in the northwest, but conditions are so much different in the two sections of the country that material found in the eastern studies cannot be used to form any definite conclusions in formations of a plan for woodlots in this section of the country.

The procedure of this study has been to secure as much basic data as possible that might effect the management of farm woodlots. This material has been organized to the best of my ability upon the basis of knowledge of forestry, farm problems, and intelligent analysis, so that a conclusion might be reached as to the feasibility of management. The source of data has been first, from personal contacts with farmers and mill men, second, from the offices of the County Agents of both Linn and Benton Counties, and third, from forestry books, especially silviculture books.
Chapter I

Inventory

There are two main questions to be answered by the inventory for this paper. First, how much timber is there in the area and second, how much woodland is there included in the farms of Linn and Benton counties. Both of these questions are impossible to answer definitely at this time without a thorough survey. Lack of both time and money made such a survey impractical for this paper.

The first question will be answered by naming the main species that are to be found in the area. These are listed only from observation, and the amounts are estimated comparative amounts. A fairly good estimate is available (1)* which gives the acreages for wooded area, but it gives no data concerning the species or the quality or quantity of timber to be found.

The species to be found are 1, Old growth Douglas fir, *Pseudotsuga taxifolia* (Poir.) Britton, of which there is very little. What is to be found is mostly rough, wolf trees of little value commercially. 2, Second growth Douglas fir. This probably makes up the most valuable part of the farm woodlands as far as wood products are concerned. It is scattered throughout the area, some in pure stands and some mixed with other species. The pure stands form the greatest part of the value. That in mixed stands is usually the

*Numbers in parenthesis refer to the bibliography at the end of the paper.
residual stand of past cutting in practically pure Douglas fir in which reforestation has been largely ash and scrub oak. This decadence of stands due to poor practices in the past is a strong argument for the management of farm woodlands while there is still a possibility of rebuilding their past value. 3, Oregon white oak. Most of the merchantable white oak has been removed although a few groves and scattered individual trees are to be found over the entire area. Most of the woodland area covered with oak is "scrub" oak and the stands are so thick that growth is practically stagnant. These stands offer a great problem in how to either increase the rate of growth of the oak stands or to get the area into a more rapidly growing species. 4, Oregon ash. This species is found in sloughs and along creeks. In most cases it is found on land that is definitely submarginal for farming. In many areas it has replaced more valuable species after cutting. 5, Cottonwood and aspen. These species are found, usually mixed with ash and/or willows along creeks and sloughs. They are also found scattered over the flat prairies. 6, Balsam fir is found throughout the area but not in such amounts as to be economically important. It is often mixed with Douglas fir stands. 7, Bigleaf maple. This tree is of considerable economic importance when taken over the entire area, but is not found to any large extent as pure stands. 8, Red alder is found along some of the creeks, but not in great amounts. 9, Ponderosa pine is found along the Willamette River, in places forming pure stands of considerable extent.
Although the species on the area at the time management is started is theoretically not important, actually it makes it very hard to start a management program. Most farm owners would find it difficult to put their money into a forest management program when there is little or no income to be expected for several years.

Although the species and value of the stands were not ascertainable, some material was available on the area in woodlands. From the precinct data (1) the acreages for woodlands were determined as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>% of total farm acreage</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linn County</td>
<td>32.6%</td>
<td>60,977</td>
</tr>
<tr>
<td>Benton County</td>
<td>19.5%</td>
<td>71,004</td>
</tr>
<tr>
<td>*Oregon</td>
<td>19%</td>
<td>3,349,944</td>
</tr>
</tbody>
</table>

Another interesting item is the fact that 11% of the total forest land in Oregon is in farm woodlands and 5% of all raw forest products in Oregon comes from farm woodlots. (Figure 1).

The answer to the second part of the inventory problem is just as difficult, if not more so, than the answer to the first part. The definition of farm woodlands is quite simple: "Any forest or potential forest land on farms, or operated in connection with farms, where the economy of the entire farm holding is based primarily on production of other than forest crops." (4)

Although this definition is simple, the classification of "potential" forest land is an impossibility for any
**FARM WOODLANDS OF OREGON**

**LAND AREAS IN STATE**

<table>
<thead>
<tr>
<th>Land Area</th>
<th>Millions of Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Land Area</td>
<td></td>
</tr>
<tr>
<td>Total Forest Land</td>
<td></td>
</tr>
<tr>
<td>(Includes Farm Woodlands)</td>
<td></td>
</tr>
<tr>
<td>Land in Farms</td>
<td></td>
</tr>
<tr>
<td>Woodland on Farms</td>
<td></td>
</tr>
</tbody>
</table>

*1935 CENSUS

**FARM FAMILIES BENEFITED**

<table>
<thead>
<tr>
<th>Income Source</th>
<th>Thousands of Families</th>
</tr>
</thead>
<tbody>
<tr>
<td>By Potatoes*</td>
<td>28.9</td>
</tr>
<tr>
<td>&quot; Forest Products*</td>
<td>28,175 Families</td>
</tr>
<tr>
<td>&quot; Wheat*(threshed)</td>
<td>11.2</td>
</tr>
</tbody>
</table>

**FARM FAMILIES IN STATE**

Total Families*:

*70.7

**COMPARISON OF PRINCIPAL INCOME SOURCES**

<table>
<thead>
<tr>
<th>Income Source</th>
<th>Millions of Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Products</td>
<td></td>
</tr>
<tr>
<td>Field Crops**</td>
<td>89.4</td>
</tr>
<tr>
<td>Livestock**</td>
<td>41.0</td>
</tr>
<tr>
<td>Forest Products**</td>
<td></td>
</tr>
<tr>
<td>**  5 % of Raw Forest Products</td>
<td></td>
</tr>
<tr>
<td>Other Products</td>
<td></td>
</tr>
<tr>
<td>Raw Forest Products**</td>
<td>86.7</td>
</tr>
<tr>
<td>(Logs, Ties, Poles, Fuelwood Etc)</td>
<td></td>
</tr>
<tr>
<td>Forest Industries**</td>
<td></td>
</tr>
<tr>
<td>(Finished Products)</td>
<td></td>
</tr>
<tr>
<td>All Manufactured Products**</td>
<td></td>
</tr>
</tbody>
</table>

*1935 CENSUS

**1930 CENSUS

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Division of Private Forestry

Figure I.
one person. It brings forth the need for a definite land classification. From observation it will be stated that most land not cleared for agriculture at this time should be classified as woodland as well as considerable land that has been cleared or that was originally clear. Such a statement would not be readily agreed to by many farmers, especially to taking any present crop land from an annual paying basis.

The lands that offer potential forest lands will be found in the following classes: First, crop failure. This section of the valley has not been farmed for so long that the land should be "worn out" except where the land was originally poor for farming. This may account for continual crop failures. As well as these areas of complete failure, there are areas which produce very poor crops that scarcely pay for the seed. These lands should be taken out of agricultural use. Second, idle or fallow. There would probably be only a small portion of this that should be taken out of production. That would be those lands that were idle because they were "worn out" or had not paid as farm land. Probably not more than 10% of this class should be classified as woodland. Third, other pasture (not woodland pasture) not plowable. Probably 75% of this land should be classified as woodland. This would be even higher if it were not for the large amounts of grazing lands in the southern portions of the counties. Much of this could not readily be converted into forests. Fourth, another class of land that will not be found classified is the land along river banks that is good for crops but which should be planted to trees to prevent the
river from cutting the banks away. There are probably several hundred acres of such land especially along the Willamette, Mary's and Santiam rivers.

In applying the above proportions, all of land having crop failures, 10% of idle or fallow, 75% of the non-plowable pasture (1) and adding several hundred acres for river banks we find the following acreages:

<table>
<thead>
<tr>
<th>Class</th>
<th>Linn Co.</th>
<th>Benton Co.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Woodland Pasture</td>
<td>65,794</td>
<td>55,270</td>
<td>121,064</td>
</tr>
<tr>
<td>2. Woodland not pasture</td>
<td>5,210</td>
<td>5,707</td>
<td>10,917</td>
</tr>
<tr>
<td>3. Crop Failure</td>
<td>1,581</td>
<td>593</td>
<td>2,174</td>
</tr>
<tr>
<td>4. Idle or Fallow</td>
<td>1,000</td>
<td>496</td>
<td>1,496</td>
</tr>
<tr>
<td>5. Non-plowable Pasture</td>
<td>32,293</td>
<td>24,853</td>
<td>57,146</td>
</tr>
<tr>
<td>not Woodland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. River banks</td>
<td>800</td>
<td>500</td>
<td>1,300</td>
</tr>
<tr>
<td>Total</td>
<td>106,678</td>
<td>87,419</td>
<td>194,097</td>
</tr>
</tbody>
</table>

Therefore there is 194,097 acres, approximately, of woodland in the area. Of this amount 131,981 acres are listed as woodland at present. The general practices in the eastern states call for about 100,000 acres of farm woodlands in order to form a farm forest cooperative. Therefore the possibility of forming a management cooperative would not be hampered by lack of sufficient land for an economical working unit.
Chapter II
Markets.

The question of markets first brings to mind the number and size of sawmills that are located within hauling distance of the forests. There are other possible markets that should receive considerable consideration in such a study as this. Some of these are just as important to farm forests at the present because of the "run down" conditions in which most woodlots are to be found. These other markets include fuel wood markets, posts, poles, piling, pulpwood, and shakes.

In the way of sawmills, we find one medium sized mill and a small mill at Corvallis. These mills cut Douglas fir, hemlock, and fir. Three mills are now being installed at Albany. At least one of these is going to depend largely upon logs from farm woodlands. It is at present just starting up and is cutting second growth Douglas fir. Another of these mills is cutting Douglas fir, hemlock, and fir. The third one of these mills has not been working. It was made primarily for a hardwood mill. All of these mills are small and will not offer quite such close utilization as would be found in the larger mills.

Also a possible market in Albany is the Veal's Chair Factory, which has a small mill in connection with it. This mill cuts lumber for the furniture that is made at the plant and offers an especially good possibility as a hardwood market. About half of the lumber sawed there at present is maple and one third is cottonwood. The remainder of the
present cut is divided between oak, alder, ash, and Douglas fir.

Other small mills, cutting mainly Douglas fir, are located at Lebanon, Crabtree, and Philomouth, as well as some others that are close to the fringe of foothills.

As well as sawmills, there are pulpmills located within easy hauling distance of the area, one being at Lebanon, and others at Salem and Oregon City. These mills use many thousands of cords of wood annually. The main species used from this location are balsam fir, Douglas fir, black cottonwood, and aspen. There is also a market in these mills for hemlock if it were grown in the area. These pulp mills offer a possibility for using poorly formed trees and small trees that are taken out of a stand in thinning operations. They are one of the markets which probably offer an even greater outlet at present than the sawmills because of the great need for improvement cuttings which will largely remove trees that are not valuable for saw timber.

Another market that is practically as important as, or possibly even more important than the sawmills, as far as farm woodlots are concerned, is the fuelwood market. One does not usually consider the fuelwood market as important to forest management except as a possible place to market thinnings. However, when one studies the size of the fuel market in this area it seems to offer possibilities for more than a mere market for thinnings.

From the survey that was made it was estimated that each farm uses approximately ten cord of wood a year. This
would mean a total of 41,250 cord of wood per year for the farms of the area. And then there is the fuel market of towns such as Albany and Corvallis. One dealer in Albany handles three or four thousand cord of wood besides slabwood, mill blocks, and sawdust. Another dealer handles approximately the same. A large part of this wood is being hauled 25 or 30 miles. In the Corvallis fuel survey (8) it was estimated that 12,150 cord of wood are used annually. This does not include slabwood, mill blocks, or sawdust. In comparing the size of the two towns, and checking by the amounts handled by the large dealers it is easy to see that the two towns would be using 25,000 cord of wood a year. This means that there is a market, within the area itself, for at least 66,000 cord of wood annually.

The other markets that have been mentioned are harder to estimate as to size because no material was found upon which an accurate estimation might be based. However, an attempt will be made to show the importance of these markets based upon general knowledge and certain assumed data.

In trying to estimate the number of posts it was found that posts on all or a large share of all farms are put in at one time and no more posts will be used for several years. In making an estimate it was assumed that the average farm, which for this area is 134 acres, is square and fenced on all four sides. This will give the minimum circumference for a rectangular farm. It makes no allowance for division fences within a farm, nor for fences common to two farms. With this method it was determined that the
average farm has a circumference of 146.4 chains. Posts are usually placed at a distance of one rod or four posts per chain. This makes 585 posts per farm. If the average life of a post is assumed to be 15 years this means 39 posts for each of the 4,125 farms of the area.
Chapter III

Transportation.

There are three main transportation systems within the area. These are roads, railroads, and water.

Roads are by far the most important of the three as far as farm woodlots are concerned. The road system is composed of two main highways running north and south, one on each side of the river. Another primary road crosses the area in an east-west direction, connecting Lebanon, Albany, Corvallis, and Philomouth and extending farther in both directions. Then there is the state secondary roads throughout the area. Most of these state roads are hard-surfaced roads. In Linn and Benton counties, there are approximately 300 miles of state primary and secondary roads. Of this amount probably 200 miles are located within the area of this report. As well as state roads there is a vast system of county roads in the area. Most of these are graveled. There are few farms within the area that are not located on a road that is passable the year around by trucks and cars. Most farms not so located are shut off for short periods of time by high water closing the roads. The main roads also offer a possibility to ship things into other areas, such as posts, and poles.

The waterways are limited to the Willamette River and creeks and rivers for a short distance off of the Willamette. The main use of the river at present has been for one purpose. It has been an important means of transporting poles, piling, and logs to both local and outside markets. The usual method is to cut close enough to the river so that
during the periods of high water they may be taken out and made into rafts which are taken down the river with small tug boats. Due to shallow places along the river these rafts can be taken down only during a fairly high water level. Sometimes, instead of being logged next to the river, the products are hauled to the river by trucks and then made into rafts. This is most common with piling which are going to Portland and other markets that are considerable distance down the river. Although it has not been used for such to any great extent, the river offers a great possibility for getting pulpwood from this area to the pulp mills in Salem and Oregon City. Most of the potential land for growing pulpwood is found close to the rivers that could be so used.

Railroads are not as important as far as farm woodlots are concerned as are roads and waterways. One of the most important facts concerning railroads in this area is that they assure an outlet for finished products. Such an outlet for lumber has been incentive enough to draw mills into the area even when prospects for getting logs without a long haul were very poor. This should be assurance enough that if the woodlots are managed so they will produce saw timber there will be mills to handle it. The railroads also offer possible means of shipping pulpwood, piling, and posts practically direct from the farm. This is especially true of places located away from the rivers.
Figure II Transportation in Linn County
Chapter IV
Silvicultural Problems.

When one brings up the problems of silviculture that pertain to the management of woodlots in this area it is soon recognized that there are many, in fact practically all, questions concerning management, in which no definite answer may be made. Therefore much of this chapter concerns itself with silvicultural theories of the author and others more capable of theorizing upon silvicultural methods than the author. Future studies may disprove many or all of the theories here advanced. It is hoped that studies along such lines are carried on in the near future, for there is need for much research and experimentation of this kind in this area.

One of the first and most important problems to present itself is in connection with the species to be grown. This can be answered only after a thorough study of several important factors. Probably the most important is the site factor. Much has been written on site and measurement of site for Douglas fir in the Pacific Northwest. However, it is quite difficult to measure site quality, even for Douglas fir, on areas that are as "run down" as are many of the farm woodlots of this area. And then, even if it were possible to determine with any degree of accuracy the sites for Douglas fir, there is even less ways of measuring site for other species. From observations made of some of the stands in the area which have thus far escaped the full effects of poor management it has been conservatively estimated by the author
that the average land upon which it is practical to grow
Douglas fir at all could be classified as a high site III.
Probably 75% of the forest land in this area could be included
in this as far as site is concerned. This would be all of the
land that is fairly well drained. Probably for some of the
lowland species, the sites along the river bottoms would be
ideal, but no method of measuring them has been devised. An-
other problem in the measurement of site is encountered when
one considers species not so commonly found in the area.
Among such species which should be considered would be
Ponderosa pine, Scotch pine, Black locust, Russian mulberry,
and Redwood.

To definitely answer the question of what species to
plant would be impossible without a study of site conditions
and probably would require considerable experimental plantings.
For the purpose of this paper, therefore, a review of the
desirable sites for various species will be made in such a way
that a comparison may be made between the desirable site and
the general sites of the area.

Douglas fir is adapted to a great variety of soils
and sites but prefers fresh, well-drained, porous, deep,
loamy soils. This means that, as far as site is concerned,
Douglas fir would be desirable on all of the area except the
poorly-drained sloughs and river-bottoms and the flat, heavy
prairie lands.

The balsam firs are found on moist, preferably well-
drained soils. This would take in much of the same land and

*Desirable site qualities have been obtained almost entirely
from Sudworth's "Forest Trees of the Pacific Slope." (7)
some of the lower lands than those in which the Douglas fir would be successfully grown.

Like Douglas fir, Ponderosa pine is not very exacting in its soil requirements. It is found on much the same type of soil that Douglas fir, preferring even more porous and drier soil.

White oak or Garry oak is the only timber oak of this region. It grows best in the deep, fresh humous soils of high bottoms and valleys but is also found in a "scrub oak" form on dry, rocky hills. It is practically the only species to be found on some of the hills in the area, but it is of such poor form and slow growth that it seems as if a more profitable species could be found, possibly Ponderosa pine.

Oregon ash is found along streams and sloughs. It desires rich, deep, humous, sandy soils but will grow on poorer sites that are moist. It will usually be found in the area on sites that are too wet for most agricultural purposes. Another characteristic in its favor is that it is so tolerant. This will allow it to be used in preventing erosion much more successfully than most species because reproduction may be obtained without opening the stand as much as is necessary with many species.

Bigleaf maple makes its best growth in the rich alluvial river bottoms in moist soils or close to foothill streams.

Abundant moisture and rich soil is required by red alder for best growth. It is another species that has the advantage of being very tolerant. It is found along streams
usually where the soil is richer than that required for ash and maples.

The black cottonwood and aspen, along with willow is found along streams often where most other species will not grow naturally. They are also found, though not making such rapid growth, on dry hills and on semi-arid sites. In this area it could be grown along streams in about the same places that ash, alder, and maple grow best. It is important to note, however, that of all the species growing in the area, it probably has the best chance to survive when grown on the flat, heavy prairie soils of part of the Willamette Valley.

Another species that desires rich, humous, well-drained soil, but is found growing singly in practically all kinds of soils and sites throughout the area, is the black locust. The species is not usually considered as native to this area. However, single trees and small groups of trees have been planted, usually for shade, in various sections of the area and have made such good growth that it is safe to say that the tree will grow on most sites of the area.

From this short review of site requirements it is seen that site merely divides the trees of the area into three main groups: 1. Those trees that grow on good sites of rich, well-drained soils, which would include all of the species named; 2. Those which will grow on the flat, poorly-drained, heavy prairies - cottonwood, aspen, and black locust; and 3. Those species that will grow on the dry, rocky hills - Douglas fir, ponderosa pine, white oak, and black locust.
Figure III

A Douglas fir woodlot located on a State secondary road within 5 miles of a mill. Notice the height of trees and natural pruning that has taken place on the lower portion of the stems.

Figure IV

A rolling hill within two miles of Corvallis. Notice the poor form of the trees that are present and the brush cover in the openings of the upper slopes that even prevent the land from being good grazing land. Good management is needed.
A second important factor in the determination of species to plant in the area is the rate of growth. Cottonwood and aspen are very rapid growing trees which reach a cutting size in twenty-five years. Douglas fir and pｉnderosa pine, when growing on good sites, will reach merchantable age for most purposes by one hundred or one hundred fifty years. Balsam fir is limited by a pathological rotation of approximately one hundred years, however, on the good sites it should reach an economic cutting age easily in this time. Alder and maple both make fairly rapid growth for the first thirty to fifty years but grow much slower when older. They would probably reach a logging size however in fifty to seventy-five years. Black locust is also rapid growing when young and will reach a post size in ten to fifteen years. Oak is the slowest growing species among those listed. On the better sites it required from 150 to 200 years to reach a cutting size while on the drier sites some stands become almost stagnant when only a few inches in diameter. At present there have not been sufficient tests made which would show whether the rate of growth of these thick, stagnated stands could be increased any appreciable amount by means of thinning operations.

The determination of species to plant is further affected by the factor of value. The term value should include such items as market value of products, value for use by the owner, and values other than economic.

Market value is easily understood and measured. It is merely the price paid for logs, posts, etc. in the open
Value to the owner for his own use differs from market value because of the fact that for most farmers it is worth considerable to be able to obtain wood products such as posts and fuel by labor, rather than cash expenditures. They are really paying themselves the costs of labor and a margin for profit and risk. If labor were to be computed on the same basis per hour as is ordinarily used in regular logging operations, the cost per unit of product would be considerably higher in these conditions because of experience and special types of equipment that is lacking. However, farm labor is usually considerably lower than labor in the lumber industry and, too, much of the work on the farm wood-lots could be done during the winter when other work is slack and any return that machinery, horses, or men might make could be considered as a profit over methods of farm management. Another value to the owner comes when time is considered. Farmers are used to annual returns from their crops in most cases and therefore the shorter the period between returns the more valuable a tree planting project will appear to the farmer.

Values other than economic would include such items as erosion prevention and control, stream regulation, wind-breaks and shade for both people and animals, esthetic purposes, shelter for game, wildlife, and insect-eating birds. Of these factors erosion control is the only one that would have very much affect upon the choice of species. Erosion, once it gets started, requires a tree that is easy to start,
Three views of a black walnut stand just outside of Albany. This stand was planted approximately 70 years ago and many of the trees are now more than 12 inches D.B.H. Notice the spacing that was given and the tall, clear stems formed. Compare the height of the stand with the power pole in front of it and the old growth Douglas fir at the right.
is rapid growing in the first few years at least, and has the ability to grow on poor soil. These requirements are most nearly filled probably by black locust. Cottonwood and aspen are also quite successful as erosion control species.

If one is going to plant the area, the above factors are the important ones in the decision of species to plant. If, however, natural reproduction is expected to restock an area, one of the limiting factors is the species present for seed trees. The availability of species for planting might be a limiting factor at times when artificial reproduction is being used, however with the present Clark-McNary Nursery in the area and other tree nurseries in or near the area it is believed that this would usually be of minor importance.

To summarize these factors one can say that determination of species depends almost all together on site, especially soil conditions, rapidity of growth, and value of the species, with species present at times being an important point in some cases.

When the more desirable species are selected for a given area the only silvicultural problems are to determine the methods of reproducing, weeding and thinning, cutting, and slash disposal. All of these items are closely associated with each other and with the questions of species to be grown and product desired.

The method of reproduction depends upon the species, the soil, and present cover conditions. Species affects the method of reproduction in several ways. Some species repro-
duce readily by coppice while others will not. In some species, especially cottonwood, cuttings may be used. In some, seeding will be successful while in others, plantings of seedlings will be the only practical method of getting reproduction. Some species are not available as planting stock in the area and this might have an effect on the method of reproduction used. It must be remembered that the method of reproduction also has an effect on the choice of species.

Soil has a marked effect at times on the method of reproduction. The use of cuttings and seeding would probably be fairly well limited for successful reproduction to the better grounds. Hardy seedlings that receive care in planting will probably be the primary requirement for successful reproduction on some of the dry, rocky, brush and grass-covered hills of the area.

The affects of cover conditions are also in several forms. The species that is desired must be present in the stand in order to use any natural reproduction methods. The age of the trees effects the powers of reproduction at times. Overmature trees or very young trees will not produce good seed crops and all trees often are not successful sprouters. Another possible affect that has not been definitely settled as yet by the leading silviculturalists is the question of heredity. The run-down conditions of most of the stands in this area would mean that this should be a very important factor if it is accepted as a fact that the size and shape of trees are hereditary in nature. This seems to be becoming a well-established theory at present and is probably worthy of
consideration when determining seed sources. Just as important as condition of tree cover is condition and type of other cover. A moss or grass ground cover makes conditions very difficult for natural seeding and may even require special preparations before planting. Brush competition is worthy of consideration and what species will be given the advantage by cuttings in mixed stands will also have an effect on reproduction methods.

Prunings, cleanings, and thinnings will largely be determined on a basis of the condition of the stand, the species, and the final product and how much the value of it might be improved by such operations. Most of the stands of the area at present are too old to allow thinning on a paying basis. One of the primary needs of the present forests of the area is for cleanings and improvement cuttings. Thinnings might be made on a few of the present stands, but in most cases an improvement cutting or cleaning would thin a stand sufficiently at the present. All of these operations should be considered for new stands or for the second rotation of old stands. The spacing to use for planting will depend considerably upon whether the stand will be pruned and thinned or if natural pruning and thinning are to be depended upon to get the required results. If undesirable species enter into the reproduction it should be planned to remove them while they are still young. This type of work should be quite easily accomplished on farm woodlots. It offers possibilities for work during the slack winter months and at the same time gives a chance to get part of the winter's wood supply
from thinnings and improvement cuttings.

Slash disposal should offer little difficulty in the area. The fire danger is not high, because the woodlots form such small areas and are so well separated by fields and roads. Another reason for low fire hazard is the quite thickly populated farm area as compared with the usual forest land of this region, to act as a lookout and fire-fighting organization. A third, less important reason is the fact that probably most cutting would be done on a selection-cutting system or only small clear-cut areas at any one time, combined with close utilization and therefore little slash accumulation.

The question of slash disposal leads to the question of laws that might effect farm woodlots. At present there are very few and probably the most important of these is the slash disposal law. This law at present states that all slash must be burned, and this would include slash from cuttings on the farm woodlots. However, it states that any area that is considered sufficiently safe by the State Forester may be exempt from slash disposal. Considering the low fire hazard that would be created and the possibility of being exempt from slash disposal laws the author would advocate a scattering of slash method of disposal.

Another forest law of the state which would possibly be of interest in a farm woodlot organization would be the reforestation law. Essentially this law provides that land upon which there is no merchantable timber may be classified as reforestation land provided that it is being used
primarily as timber producing land. The basis of taxes for such land is five cents per acre per year plus a 12% yield tax on all material removed for use or sale. Any person may apply to the State Board of Forestry for such a classification or to enter into agreement to manage land other than that listed as primarily valuable for growing timber. This appears that farm woodlots would be eligible for such classification, however the possibilities that grazing may not be allowed on such areas would make this undesirable to many of the owners.
Chapter V

Management Problems.

The management of any forestry work should be done by a forester if it is to be successful. This is a practical statement against which there is little argument. However, to expect every farmer to be a forester or to hire a forester would be absurd. In the mind of the author there are two possible means to overcome such a condition. The first and most simple would be to have an Assistant County Agent who would be a trained forester and whose main duties would be in cooperation with farmers concerning their farm woodlots. This would mean help in all silvicultural and marketing problems. The second method would be the formation of one or Cooperative Farm Forests.

The work of a Cooperative would be practically the same as for an extension worker, however, the costs would be more directly from the owners so that more definite figures showing that it would be economically feasible would be required in order to "sell" such an idea to the owners. Another factor that would cause the extension method to be more successful would be the big problem of getting the farmers to cooperate. Farmers, as a group, are probably the most independent acting people in the country. In the first place it would take a combination of psychology, salesmanship, forestry knowledge, and an understanding of farmers and their problems in order to "sell" the idea of forming a cooperative for the management of their farm woodlots. In the next place it would take even greater powers to keep them interested in such an
organization. Some would get the initial benefits and then drop out. Others that saw a considerable initial cost and who probably need forest management more than many of the others would not join. All of these people would receive continuous benefits from an extension forester with much of the expenses being borne by the taxes, which is an indirect method of paying. Members of a cooperative would probably practice more intensive forestry, but probably would not need to do so as badly as those who were not members. If an extension forester were appointed over a county all of the farmers would feel they had a right to his help and those who need management most would receive more of the help that they so badly need.

Another means of getting the management of farm woodlots organized is through the work of the Soil Conservation Service. The main purpose behind their work is to help in the formation of cooperative farm forests up to a point where it will function as an independent cooperative and then withdrawing. Since it will finally lead to a cooperative of the same nature that was previously mentioned, only an outline of the setup and its present functions will be made.

The Soil Conservation Service has been authorized this year as the department to administer the Cooperative Farm Forestry Act. This act is part of the Norris-Doxey Bill of 1937. Activities as outlined by the act are along the following lines:

1. Informational, educational, and demonstrational
forestry activities.

2. Establishment of tree nurseries.
3. Surveying and improving farm woodlots.
4. Assisting farm woodland owners in marketing their wood products.

In the 1940 budget Congress included $600,000 for Cooperative Farm Forestry and $100,000 for Farm Forestry Extension. The probable distribution of the $600,000 is as follows:

- $400,000 to farm forestry projects including necessary investigation.
- $100,000 to cooperation with states for extension activities in development of farm forestry.
- $100,000 to the production and distribution of forest planting stock from existing nurseries to farmers. This means that probably all planting stock at the present at least will be furnished through the present Clark-McNary nurseries.

The present program is to form districts where there is interest in such work. A large enough area must be included in such a district that a project unit will be feasible. The Soil Conservation Service then makes plans for the district as a whole, recommending what and where to plant, care of stands, and cutting practices. The amount, under the present plan, of aid in marketing is unknown at this time.
The results under any of these management plans will be practically the same. In all, the main thing is to secure a trained forester to advise the owner in any actions pertaining to his farm forest land. The costs of securing this forester in one case is directly upon those being benefited. In the case of a man working through the county agent's office, the costs are indirect through the state. If handled by the Soil Conservation Service, the costs of hiring the forester is borne by the Federal government at least temporarily. Other costs will be approximately the same, except that the Soil Conservation Service may be able to reduce costs somewhat on planting stock. This is not very probable, however, when one considers that any of the organizations could secure trees from the present Clark-McNary nursery in the area at a price close to cost of producing them. Since the cost of securing a trained forester would be a minor consideration in a district as large as should be formed, it would be permissible to say that problems as well as the results would be about the same under any organization.

The first and probably the greatest problem of management would be to create an interest and a feeling of cooperation among the owners of the farm woodlots. As a group, farmers are very independent in their thinking and in their action. They do not care to have anyone tell them how their farms should be handled. They do not usually care to sign any kind of agreements that they will handle their land in certain ways or harvest and market their products only under certain conditions. They do not realize that,
because of mismanagement, the farm woodlot areas of Oregon, and this area is no exception, are producing less than half their potential capacity. Cooperative efforts are needed to reach capacity returns from the area, especially in marketing.

Interest in the subject of managing farm woodlots is low in this area. The most common attitude toward the subject is that woodlots at present are of very little value as timber, and if the owner puts money into managing it so the value will increase there will be no return from it anyway during his lifetime. In other words, there is very little interest shown in a crop for the next generation. Another common idea that is a carry-over from early pioneer days is that all land is agricultural, and will eventually be cleared and cultivated. There is also the common idea throughout the area that there is an unlimited supply of cheap timber in the mountains surrounding the area, and therefore there is no need to try to grow timber. Interest might be created by a good "sales" talk showing some of the benefits for correct management. This could not be handled successfully in most parts of the area as a prepared speech before large groups. For the best success it should be brought into the discussion of small informal groups or with individuals. This would be a job for a person that knows farmers and how and when to talk to them. Any other person would cause more antagonism toward the subject of farm forestry than he would create interest.

If the interest is created it will be along the lines of costs and returns, primarily direct monetary costs and the
Farm Woodlands of Oregon

Farm Land Areas

Acres (Millions)

- Other Land: 3%
- Pasture: 54%
- Woodland: 19%
  (Pastured 16%)
  (Not Pastured 3%)
- Crop Land: 24%

Cash Income from Six Largest Crops
(Also Value of Used Forest Products)

<table>
<thead>
<tr>
<th>Crop Land (all classes)</th>
<th>Area (Acres)</th>
<th>4,197,454</th>
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<tr>
<td>Pasture Land</td>
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<tr>
<td>Plowable and &quot;Other&quot;</td>
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<tr>
<td>Woodland pastured (see Woodland)</td>
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<td>Woodland (all classes)</td>
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<tr>
<td>Woodland pastured</td>
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<td>Woodland not pastured</td>
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<td>Other Land</td>
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<tr>
<td>Total Farm Land</td>
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<td>17,357,549</td>
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</tbody>
</table>

Cash Income from Leading Farm Products

Forest Products cut and sold, Year 1934 $2,233,000
Rank among all crops

- Fruits (all kinds) and Nuts $9,440,000
- Wheat $7,490,000
- Truck Crops $3,395,000
- Hay $2,825,000
- Potatoes $2,325,000
- Forest Products $2,233,000

Value of all Forest Products, used or sold, Year 1934 $2,700,000

* Census, 1935.
** Estimates by Bu. Agr. Econ.

U.S. Department of Agriculture
Forest Service
Division of Private Forestry

Figure VI
time until there is a monetary return for those costs. These would be impossible to list exactly; however, an estimation of costs and returns can be made from present-day figures.

The initial costs for an area, which required planting would include cost of planting stock, tools, and labor. Under the present set-up the Clark-McNary Nursery will furnish planting stock in most of the species that would be desirable in the area for $2.50 per thousand trees. The Forest Service usually recommends planting six feet by six feet (6x6) which is approximately 1,200 trees per acre which would be $3.00 per acre for growing stock. Suitable planting tools could be found on almost any farm and others could be made in farm blacksmith shops at little cost. If special tools were desired one set would do for a large portion of the area. Depreciation on tools could not be figured more than $0.05 per acre. Labor would be a considerable item in the initial costs. The planting would, in most cases, be slower than for professional tree planting crews, at least for a short time. On most farms there will be only a few acres to plant so no great amount of training or organization would be advisable. The soil conditions on many of the planting areas is not conducive to rapidity of planting and in some cases may require preparation before planting. These conditions would lead to a conclusion that two man-days per acre for planting would probably approach the average. The usual wages for farm labor is close to $2.50 per day, so that would make an initial labor cost of $5.00 per acre. The total initial cost under these conditions is $7.05 per acre.
Through the proper management of present stands this cost may be eliminated in great many cases.

On areas where there is a stand at present, the first cost will be for a survey of the area. On places having only a few acrea of forest land, as most of the places in this area, a 100% survey would be advisable. Some of the places having larger amounts would make a percentage survey feasible. These surveys should show the amount, condition, and distribution of stock on the area. In handling forests under this system where there are many small units under a single management plan there is great possibilities for considerable selection to be made. For this reason and because a large percentage survey need be made anyway for statistical accuracy there would be much incentive to make a thorough, 100% survey. As has been stated, this should be thorough and kept in such a form that a running account of the material found on each farm would be possible.

Such a survey would need the direct supervision of the trained forester. Under him he would need a crew of three or four men. The salary of the forester would probably be paid on a year basis, but it would come close to $6.00 per working day. Such a crew should be able to cover 40 acres per day, which would make a cost of about $0.35 per acre or if the salary of the forester were not included in the estimate the cost would be about $0.20 per acre.

Most of the present stands are badly in need of improvement cuttings. All of the undesirable species and poorly formed trees should not be removed at one time, so
the improvement work would be carried on at different periods over several years. It would therefore assume the characteristics of a selection thinning except that low value products are removed. These products should, however, pay for the cost of the cutting, which would be to a large extent labor during slack periods. Probably most of the produce secured will be for use on the farm for such items as fuel and posts. As far as costs and returns are concerned for improvement cuttings and thinning, they will practically balance each other.

Cleaning will be necessary in some of the young stands and planting areas. These are made while the areas are yet too small to give returns that will cover more than a small fraction of the costs of cleaning them. The time required will vary from a fraction of a day to two days or more per acre, probably averaging close to one day per acre. Possible returns would probably reduce this cost to about $2.00 per acre.

Other costs and returns will occur at the time of cutting. These would vary considerably in amount with the product removed. The costs in most cases would be for labor and transportation to market and the returns would be divided between the actual money returns from sales on the market and use on the farm.

Labor costs would usually be for two or three men and a team of horses or a tractor. Seldom should one place be cutting more than could be felled and logged by such a crew in two days. This would be about $20 to $30 per average farm
every five or ten years. This would amount to about $0.10 per acre per year. The average transportation distance would be about 10 miles to a suitable market for it at present. There are several possible means of transporting products to market, probably the more important in such an operation as this would be regular logging trucks, farm trucks, and tractors with trailers. As with the logging, transportation would require even less than one day in most cases because a large part of the produce will be used on the farm and will need little or no secondary transportation. The cost would come close to the same as that for logging, namely $0.10 per acre per year.

The returns will be even more variable than the costs. Each product brings a different market price and is measured by different units than most other products. Second growth Douglas fir logs are bringing about $8.00 per thousand in Albany at the present. Cordwood is selling for an average of about $4.50 per cord. On a hundred year rotation, assuming stocking 75% of normal site III Douglas fir will produce approximately 10,000 cubic feet or 70,000 board feet. Assuming 100 cubic feet per cord of fuel wood this would be $450 per acre. At the same time the logs would bring $560 per acre. Other products would probably approach these figures in returns per year.


**TABLE OF VALUE OF FARM WOODLOTS**

<table>
<thead>
<tr>
<th>Original costs</th>
<th>Value at 4% compound interest to end of 100 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returns:</td>
<td>$500 per A.</td>
</tr>
<tr>
<td>Costs: Planting</td>
<td>$7.50</td>
</tr>
<tr>
<td>Survey</td>
<td>.20</td>
</tr>
<tr>
<td>Thinning (costs equal returns, not entered)</td>
<td></td>
</tr>
<tr>
<td>Cleanings</td>
<td>25th year 2.00</td>
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<tr>
<td>Logging &amp; Transportation</td>
<td>100.00</td>
</tr>
<tr>
<td>Forester (1¢/Ac./yr.)</td>
<td>12.37</td>
</tr>
<tr>
<td>Total costs</td>
<td>$548.12</td>
</tr>
<tr>
<td>Net returns</td>
<td>Minus $48.12</td>
</tr>
</tbody>
</table>

It will be noted that when planting is necessary there is a great possibility that the land would return a negative value. All of these figures have been carried to the end of a 100 year period at 4% compound interest. When planting is unnecessary these figures show a profit of about $340 per acre. Another fact that can be found from these figures is the large percent that is paid to the owner or other farmers for labor during slack periods at harvest season wages.

There are a few other problems of management such as the state laws concerning cooperatives if one is to be formed. These points will be minor in nature and will not be considered in this general survey of the situation.
Chapter VI
Summary and Conclusions

This survey has shown that the problems to be solved before farm forestry will be practiced in this area are mainly not problems of forestry. There is sufficient forest land and at this time there is still sufficient timber to allow at least one economic unit to be set up easily without a very great expense. The market within the area would be sufficient to absorb most of the products and where it will not there is good outlets to other markets. Transportation within the area would be a minor consideration as state and county roads form a quite complete network as well as rail and water transportation for a large part of the area. The only important forestry problem is the problem of silvicultural management. What species are to be planted or encouraged to reproduce and what, how, and when to cut are the problems that need be solved by a forester to most nearly satisfy the desires of the owner.

The main problems, rather than concerning forestry itself, are concerned with getting such a practice started. Creating interest in farm forestry among the farm owners is one of the largest of these. The values of timber on farm property need to be realized for things other than monetary returns. Studies of costs and returns for various products need to be made.

Probably several conclusions could be formulated from this short, incomplete survey of the situation concerning
farm forests in this area. Probably all could be backed by good sound arguments. For this reason the following is not set up as the only logical conclusion.

It is economically feasible to practice farm forestry in this area. Even when planting is necessary and a money profit is not shown it must be remembered that a large share of the expense was for labor, of the owner in many cases, which occurred when there was little other work to do. The most satisfactory organization would be handled through the extension service and the county agent. It is improbable for the owners to set up a satisfactory cooperative organization, and the Soil Conservation Service work along this line, although it may advance rapidly in the near future, is not now well enough organized or recognized to create the interest that must be necessary before it can set up such a project. A forester is needed that, as well as being a well-trained forester, knows farmers, their problems, and their methods of doing things.
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