

WOOD AND WOOL

Plan for Combination of Grazing
and Timber Growing on Cutover Lands
in Clatsop and Columbia Counties

by

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INTRODUCTION

The purpose of this thesis is to present a practical plan for the use of some types of logged over and denuded land in Clatsop and Columbia counties. At the present time the growing of timber by private operators although physically practical is too costly to attempt. By means of a dual use of land through which an annual income by grazing would sustain the growth of timber, it is hoped that forestry may be put on an economical basis for the small landholder.

IMPORTANCE OF THE PROBLEM

Northwest Oregon has been a major source of timber since the very first settlers arrived in the state. Clatsop and Columbia counties, especially, were adjacent to an excellent natural highway, the Columbia River, which influenced early settlement of the bottom lands and early use of the timbered hills. The exact original amount of timber in this part of Oregon will never be known. It is not until comparatively recent years that any approximately accurate surveys of timber have been made. In a publication dated 1915 (3) Clatsop and Columbia counties were listed as having a total of 24,223,000 MBF of timber which covered 541,390 acres of timberland, all of which was in private ownership. Logging of a nature had been going on since the late 1800's in both counties; although systematic, large scale logging did not take place until well beyond 1900.

Today the timber volume in Clatsop and Columbia counties has dropped to 9,400,000 MBF and timbered land amounts to only 187,000 acres. (5,6) The results of this rapid depletion of timber resources are now quite evident. The following quotation, from an address by Judge Guy Boyington of Clatsop county, summarizes the situation as it affects county government. (24)

"County, city, port, and school officials in the coast counties are faced by a complex financial problem which is, in some counties, rapidly becoming acute. Briefly stated, the problem is to find enough tax value to sustain necessary public services such as schools, roads, ports, and city and county governments, without increasing tax levies beyond the paying capacity of property owners. The chief cause of this problem is the rapidly dwindling stands of timber, which constitutes the bulk of the tax base of these counties."

Increased levies on private property owners has resulted in increasingly larger tracts of former timber lands reverting to county ownership. The total accumulated delinquent taxes as of December 31, 1937 amounted to \$937,377 in Columbia county and to \$3,337,312 in Clatsop county. (7) Clatsop county at the time of this compilation topped all Oregon counties in amount of delinquent taxes.

Perhaps originally it was thought that once timber had been removed from the land the succeeding use would be agriculture as is indicated in the following paragraph. (3)

"Nearly 200,000 acres, or about half the county's area (Columbia) can ultimately be cultivated, after the timber is cut and the remaining felled logs and brush are removed."

Such expectations for cutover lands have not materialized, however, and the reasons are readily apparent. Collectively at least one-half of these cutover lands consist of slopes too steep for agriculture. The occasional flat lands and rolling hills, although possible for agricultural use, are low in fertility for farm crops. The cost of clearing away the stumps and preparation of such land for farm crops will exceed the value of the land after it has been put into agricultural use. (23)

The problem, then, resolves itself into finding some sustained use other than farming cutover land that will restore it to a productive condition and result in an immediate tangible value. The potential value of cutover land for producing another crop of timber can not be denied. But this will not furnish a taxable asset for the immediate needs of the counties, nor can they wait until such time as another timber crop will mature. Grazing cutover lands in conjunction with timber growing presents an alternative use which might fulfill the requirements in restoring an immediate value to cutover land.

INVENTORY AND DESCRIPTION OF COUNTIES

General Description of Counties

Clatsop county is located in the northwest corner of Oregon bounded by the Pacific Ocean to the west and the Columbia River to the north. Clatsop county is approximately thirty miles square and has a land area of 525,475 acres. The coast range extends through the county from north to south and although not very high in elevation, the country is exceedingly rugged. The highest point in the county measures 3,266 feet and most of the land is well below this elevation. The Klaskanine, Youngs, and Lewis and Clark rivers drain almost two-thirds of the county and are tributary to the Columbia river. The remainder of the county is drained to the south-west by the Nehalem and Necanicum rivers which flow directly into the ocean.

(5)

Columbia county is bounded on the west by Clatsop county, and on the north by the Columbia river. Columbia county is approximately thirty miles square and has a land area of 420,810 acres. Approximately three-quarters of the county is drained by the Nehalem and Clatskanie rivers, the Clatskanie being tributary to the Columbia in the north. The eastern slopes of the coast range extend over most of the county, and consequently topography is rugged. Although changes in elevation are abrupt, the highest elevation amounts to only 2000 feet.

(6)

Population

The population of Clatsop and Columbia counties is about 40,000 people, evenly divided between the two counties. Of these, approximately 18,800 live in towns of over 1,000 and the remainder live in the smaller crossroad towns or are employed in fishing, logging, agriculture, or the tourist trade.

(8) A large number of the town populations are employed in timber mills,

especially in the coast and river towns which support the larger mills of the region.

The following is a compilation of occupations and number of people gainfully employed in the main industries of the state according to the 1930 census: forestry, 5,608; agriculture, 2,068; and fisheries, largely in Clatsop county, 1,060 people. (8) The remainder of the population are in miscellaneous occupations such as caring for the large tourist trade and the normal business establishments and government of the counties.

Land Ownership

The land in Clatsop and Columbia counties was originally almost completely owned by private individuals. At the present time, however, delinquent tax foreclosure is turning increasingly larger amounts of forest land back to county ownership each year. (Tables VI, VII) Farming has been found possible on only about 10% of the land. Such land is found along the streams and larger rivers, and on the flood plains of the lower Columbia. This leaves 90% of the land which was originally in timber and which now is classified either as "cutover" land or as timber land. The narrowing tax base mentioned by Judge Boyinton (24) has been equally detrimental to the remaining old growth timber present. An increased tax burden on timber owners, who are largely the big timber companies, forces them to liquidate the remaining timber at an even faster rate. The resulting cutover lands are either thrown back on the county through delinquent tax foreclosures or in some instances are deeded or exchanged with the county for lands which they may own. The recent land acquisition laws whereby cutover lands may be acquired by the state and administered by the State Board of Forestry as forest units is an attempt to put such lands back into a productive condition. (18)

Land Types

As set forth in tables III and IV there are over 750,000 acres in Clatsop and Columbia counties in site class II and III. Less than 2% of the total area or 16,312 acres is in site classes IV and V for timber growth. As mentioned in the general description the land is characterized by steep slopes and ridges with the only flatland being found adjacent to the larger streams and rivers. The upper slopes, although very little eroded due to the rapidity with which invading brush enters, are typical of the steep cutover lands of other localities. The soil is thin, rocky and too poor for forage grasses or agricultural crops. The lower slopes and occasional comparatively broad ravines have possibilities for the planting of the more desirable kinds of forage grasses. Such areas have deeper, more fertile soils and their main drawback to use as grazing land is the smallness of the area in any one unit. Farming is possible on these lands, but in comparison to the richer lands along the streams and rivers it rates rather poorly. When the cost in both money and back breaking labor to clear the logs and stumps is added to the price of the land it proves a risky and discouraging investment to the hardest farmers. Estimates on the actual cash cost of clearing cutover land are placed between \$100 and \$300, depending on the amount of material encountered. (4, 23, 25) At present all such land is classified as cutover land and supports brush and weed species and conifer reproduction which is gradually retaking the land by natural means.

Climate

Climatic conditions are favorable to all types of growth. The temperatures range from about 15 degrees above zero in winter to 90 degrees above zero in the summer. The average winter temperature is usually much higher

than 15 degrees except on the very high hills. Annual rainfall averages about 50 inches for this region. Most of the rain comes in the fall, winter and spring months but there is some rainfall during the summer. In mid-summer, which is the usual critical period, farm crops can be grown in most of the area without irrigation, due to the accumulated moisture from occasional rains and a very humid climate. (5, 6)

The following table shows rainfall averages over a period of years for several northwest Oregon locations. (19)

	Vernonia	Jewell	Reehers	Forest Grove	Doraville
Jan.	7.52	10.74	19.59	7.40	7.22
Feb.	7.79	8.69	15.80	6.23	5.56
Mar.	5.90	7.87	12.56	4.44	4.83
Apr.	4.44	4.90	8.96	2.83	4.83
May	2.25	3.39	5.92	1.95	2.56
June	2.54	1.89	3.60	1.21	1.82
July	0.48	0.42	1.29	0.39	0.83
Aug.	0.82	1.21	1.34	0.57	0.97
Sept.	2.95	3.60	5.56	1.81	2.17
Oct.	4.32	6.38	9.08	3.22	3.66
Nov.	9.84	9.85	24.68	2.89	7.23
Dec.	<u>9.87</u>	<u>12.42</u>	<u>22.15</u>	<u>7.91</u>	<u>7.62</u>
Totals	58.72	71.29	130.53	45.85	47.87

Transportation

Transportation is provided by a branch of the Spokane, Portland, and Seattle Railways, a primary and secondary road system, and the Columbia river with port facilities in both counties. The railroad extends from Seaside north along the coast to the Columbia river then east up the river to Portland.

County roads, most of which are surfaced with gravel, and forest roads constructed under the supervision of state forest officers, supplement the main highway system, which bounds the two counties on the north and west. When finished a road now being built across the southern portion of the counties will connect the area directly with Portland and the Willamette valley by a short route. Port facilities capable of accommodating ships of large tonnage are located at Astoria and other points along the Columbia river. (5, 6) In all, the improvement in transportation facilities is one of the major factors marking this region for greater development. Heretofore, although one of the earliest settlements in Oregon was made at Astoria in Clatsop county, the back regions have been unmolested. The improved and expanding network of roads which are now opening up this region will greatly facilitate the transportation of products which northwest Oregon is destined to produce.

Labor and Markets

The labor supply as affecting this plan should be adequate in normal years. The demand for hired labor will be approximately the same as it is for farmers now in the region. Extra labor will be needed only seasonally as at shearing time or when some special task in which the time factor is important calls for immediate accomplishment. One or two permanent hired hands for care of the stock when the maximum capacity of the ranch is reached present no special labor problem and will be relatively easy to obtain at any time.

The market for both timber products and for stock is adequate and at no great distance from the producer in northwest Oregon. Logging having been one of the oldest industries of the region will without doubt still be in existence when the present second growth timber stands reach maturity.

The products of the grazing portion of this plan will find a ready market at the major livestock center in Portland and in the smaller markets of the Willamette valley. The above mentioned well developed road system will play an important part in the transportation of these products to the nearest favorable market.

USE OF CUTOVER LAND FOR FORESTRY AND GRAZING

Adaptability

The foregoing resume presents the general economic and physical condition of Clatsop and Columbia counties. As has been noted, the foremost problem now facing the county governments is the prevention of tax delinquency of cutover lands, and the restoration of a taxable value to them. Coniferous trees will grow on nearly all of the land and present large areas of natural second growth timber attest to the ability of the country to produce this product. Over 95% of Columbia county is classified in sites II and III while at least 50% of Clatsop county is in site II for forest production. (5, 6) H. A. Lindgren in a "Report on the Feasibility of Grazing Livestock on the Cutover Timberlands of Columbia and Clatsop Counties," estimated in 1935 that at least 250,000 acres in each county could be utilized in this manner. (1) His plan for grazing such lands, however, was largely the utilization of the present weed species and browse plants growing naturally on such areas. The Northrup Creek Experiment Station which was started in 1936 in Clatsop county began experiments in the seeding of Northwest cutover lands for intensified use in grazing. (9) The early results of this experiment have demonstrated that good stands of forage for livestock can be established, if the correct procedure in preparation, seeding, and management of cutover land is followed. The use of similar cutover lands in Coos and Curry counties in southern Oregon has proved highly satisfactory. (10) With the exception of slightly heavier rainfall in the north, conditions are very similar in Clatsop and Columbia counties to those in Coos and Curry counties.

Plan

The proposed plan for returning at least a part of the cutover lands of

Clatsop and Columbia counties to a productive use is briefly as follows. Cutover land would be divided into units of forest land and units of grazing land, managed under one ownership. The sale of products of grazing and miscellaneous uses would be used to provide an annual income to the business until the maturation of the forest crop which will provide the long time or periodic income. Physically the division would be between the fertile small tracts of bottom lands and the gentle slopes adjacent to them, practical for grazing, and steep and rugged hillsides and ridges which could not be used in grazing but are exactly suited to the growing of a timber crop.

Requirements of Plan

Although a total of some 500,000 acres of Clatsop and Columbia counties has been estimated as possible of use for grazing, (1) a relatively small portion of that amount can be used for grazing in conjunction with timber growing. The general requirements of cutover lands when used as stated in this plan will be as follows:

1. The cutover land to be grazed must be adjacent or within a short distance of areas of bottom land on which a home ranch may be established.
2. Hill land must consist of some gentle slopes on which grass may be established, interspersed with steeper slopes on which forestry can be practiced.
3. Cutover grazing land must balance in carrying capacity the home ranch lands and both must be economically large enough to support the timber crop and provide sustenance for the owner.
4. Transportation, roads or railroads must be available for shipping stock and for receiving supplies at the ranch.

The amount of cutover land that can be used for forestry and grazing is limited by these requirements to approximately 250,000 acres in both counties. (2) Bottom land suitable for home ranches is found along the Necanicum, Lewis and Clark, Nehalem, and Klaskanine rivers in Clatsop

county, and along the Nehalem and Clatskani rivers and their tributaries in Columbia county. Cutover lands which are adjacent in many locations, to bottom lands will fulfill the requirements (especially in the southeast section of Clatsop county). (2)

General Considerations in Use of Land

The ability of cutover lands to support the grazing phase of this plan will determine its success. Therefore in the choice of a site, an operator must be certain that the land to be used for grazing is adequate to support the amount of stock he expects to manage. The carrying capacity of the range is of course the first consideration, and unfortunately the one least likely to be determined from a preliminary survey of the land. Only through comparison of topography, soil fertility, and texture, and the general aspect of the land with like areas already in use may this be indicated. The soils of northwest Oregon in general have been found fertile on the lower slopes and little trouble should be experienced in establishing the grass. An adequate year-round water supply can be found almost universally in any part of Northwest Oregon. In the coast region especially, the humid climate keeps even the smaller streams and rivulets running during midsummer, and farther east the springs and larger streams will furnish water for the use of stock each day.

Although weed species are present in great abundance, poisonous plants are almost non-existent. Occasional patches of Lupine and Water hemlock have been found but no special problem in eradication is evident. (1) Ravines which are filled with logs and the debris left after logging should be excluded from the land to be grazed. The open grazing land should also be free of logs and impediments to the use of stock. It has been found that cattle and sometimes sheep become caught among the logs and are unable to free themselves.

This is especially true in deep ravines where the animals will go for water. The thorough burning of the remaining logging debris before seeding the land, and in this plan the use of fences to confine stock to the grazing areas, will prevent this damage.

The division of cutover land into units of forest land and grazing land may be done on the basis of slope steepness. Slopes above 25 to 30 per cent in steepness have been found to be very poor for grazing. (2) Although there is probably no very close correlation between soil fertility and slope steepness of 25 or 30 per cent, and grasses can be grown on steeper slopes than this, the grass becomes increasingly harder to maintain. Lighter use of steep grass land slopes is necessary or trailing will take place. Also in northwest Oregon occasional summer rainfalls will keep the topsoil softer and subject to greater damage through trampling than in drier regions.

The size of an economic unit, under one ownership depends on a number of factors. The carrying capacity of the land grazed which will depend on the physical factors of land fertility, slope steepness, requirements of stock, and the efficiency of the operator, are all variables which make it impossible to set any one size to an economic unit. For this plan the area size on which costs are based is 3,000 acres divided approximately equally between forest land and grazing land. This is based on an existing ranch in the vicinity of Jewell, in Columbia county, which is successfully practicing forestry and grazing.

MANAGEMENT OF TIMBER LAND

Natural Seeding

On all but the more recent cutover lands second growth timber has reseeded itself by natural means. Tables I and II show the varying degrees of stocking by species and age classes. In all, over 300,000 acres in both counties have a sizeable amount of young second growth timber. The owner who wishes to supplement his annual grazing income with a long time income from timber growing will need to manage such timber land more intensively than natural seeding will allow.

Tree Planting

Natural seeding such as has provided these cutover lands with their present number of seedlings would in time completely cover the area. If this natural process is supplemented by planted stock, however, the total time necessary to recover full growth capacity of the land will be shortened greatly. It cannot be expected that an operator may spend a major part of his time on the survey and determination of the exact number of plants needed. Probably only a small portion of his time during slack seasons can be utilized in the actual planting of young seedlings. A cursory examination of the potential timberland will quickly show which areas are in greatest need of planted stock, and these areas can be given first attention. Since the main objective will be to speed up the natural process rather than attain an optimum stocking in a short time, trees may be planted at relatively wider intervals than might obtain if the objective was only forest management. It is recommended that trees be planted at 7' x 7' intervals which will require 890 trees to each acre. One man on an average site can plant from five to seven hundred trees in a day. It is more important however to have the trees well planted at a slower rate than a large number haphazardly put

in and subsequently lost. Information on specific planting practices may be found in The Planting and Care of Trees on Oregon Farms, Bulletin # 4, Oregon State Board of Forestry. (16) Planting in most parts of the state is done in the fall and early winter months, and again in the spring after the ground has thawed out. (16) In northwest Oregon, which has exceptionally mild winters, it may be possible to plant seedlings well into December and again starting in March of the next year.

Source of Tree Stock

In former years private planting of seedling stock would have involved a good deal of expense and effort in order to obtain trees. Prospective tree planters in Clatsop and Columbia counties are very fortunate in having a nursery within about 150 miles, depending on the location of their land. The Oregon Forest Nursery, located just beyond Corvallis, is now able to furnish several species of trees to private planters at the rate of \$2.50 per thousand. Information on methods of ordering stock and description of the various kinds available may be had from the Oregon State Board of Forestry Circular #5, Forest Tree Seedlings for Farm Planting. (11)

Costs

The cost of planting trees will vary greatly with the individual operator. It is recommended for planting under this plan, when the operator must also concern himself with the grazing of part of his land, that the slack seasons of the year be used. Late winter and late spring months and even during the summer in a wet cycle of years the operator may utilize his time to advantage in the plantings, keeping the actual cost of such work at a minimum. The bare areas and the areas of low and medium stocking may be planted progressively a little each year until the work is completed.

Planting stock may be kept for a considerable length of time by 'heeling in' or lightly covering the roots with earth to prevent moisture loss. The cost of planting when done on a commercial scale varies from eight to ten dollars per acre. A private operator planting 500 to 600 trees a day on his own time may reduce this to an actual cash cost of \$2.33 per acre of bare land, the cost of the plants.

Species

Douglas-fir (*Pseudotsuga taxifolia*) is recommended for extensive planting on open cutover land. Cascara (*Rhamnus purshiana*) may also be recommended for local plantings along water courses and in ravines. Cascara is found growing naturally in many portions of Clatsop and Columbia counties, and average annual production from these wild sources amounts to about 70 tons each year. (5) Cascara plantings will provide an extra source of income for the operator as well as help in the total utilization of the land. Cascara grows swiftly and will occupy the narrow margins of streams and rivulets and protected ravines where the soil is moist and rich. Although very little is known as to how much bark trees will yield on a yearly basis, a ten inch tree may produce from 20 to 50 pounds of bark. (16) The price of bark ranges between four to seven cents per pound although it occasionally goes higher when the demand is heavy. The trees once established will sprout from the stump after the bole has been cut and so may be used to produce a second crop.

Growing Stock

Once the growing stock has been established, no labor will be required to keep the trees growing. As a stand of timber grows towards maturity the effects of competition will begin naturally to kill out the poorer trees.

A theoretically fully stocked acre at 20 years of age might contain 1210 trees; at 100 years, if normal growth is maintained, this number would be reduced to about 180 trees. (12) A certain amount of competition is necessary in the young stand to promote growth in height and to shade out the lower limbs for good clear logs.

When the stand is in the seedling stage, however, trees growing closer than six feet apart may be removed at a benefit to the remaining stand. Such thinning for a private operator will be possible only at a profit and this may be provided through the sale of the young trees for the Christmas tree market. The grazing areas may also be kept free of seedlings at a profit by the same method. On some of the better sites of Clatsop and Columbia county it has been found that young seedlings will invade the area faster than they can be utilized. One operator successfully contends with this problem by breaking or cutting the terminal shoot or 'leader' of the young trees. This destroys the height growth of the tree, throwing more energy into the lower branches which become more bushy and of superior shape for commercial sale. This practice can be easily accomplished walking or riding through the area in connection with managing the grazing stock.

Protection

The risk of losing the timber stand through forest fires will be negligible. The timber will be scattered through areas of grazing land which act as natural barriers to the spread of fire provided the grass is kept well cropped. (9) The cutover lands of both counties are under the jurisdiction of the Northwest Oregon Fire Protective Association which maintains lookouts, fire guards, and fire patrols throughout the region. The annual cost of such protection varies slightly each year but usually ranges between one-half to one cent per acre of forest land. Further protection against the

likelihood of fire starting on forest land is had through the management of the grazing lands. Parts of the area will be patrolled each day during the summer months in the normal course of caring for the stock.

Yield Expectations

The yield in board feet from timber lands can be no more than an estimate at the time the trees are planted. The operator should have a definite plan in mind, however, as to when to harvest the timber and how much roughly may be expected at the time of harvesting. In so far as the owner is not dependent on timber products for annual income, he can afford to wait for the most favorable market conditions. The length of time necessary before the timber crop can be harvested will be at least 80 years by present standards of logging practice. As the timber advances in age, however, profitable stand thinnings may be made for poles and piling or cordwood. Until the timber stand has attained its height and started to put on diameter growth it will be difficult to judge the growth rate, except as it may be determined from general site class and similar stands on like areas. It is to be expected that an operator will be more interested in the establishment of the timber and grazing land rather than intensive management practices of timber in the years preceeding maturity. Expert information and advice can readily be had by contacting state or federal forest services or the Oregon State College School of Forestry for such information.

Taxes

Oregon laws provide that cutover lands on which new timber crops are being produced may be classified under the Reforestation Act, officially known as the Oregon Forest Fee and Yield Tax Law. This provides for a flat five cents per acre annual charge in lieu of taxes with a $12\frac{1}{2}$ per cent yield

tax at the time the timber is harvested. (17) This law was provided for the purpose of lessening the tax burden on growing forest crops until the actual income from such land could be realized. Although classification under this act is voluntary the benefits of placing land under such classification are worthwhile, especially to a timber owner who expects to retain the land until the crop is harvested. Under the general property tax the tax burden in later years as the timber crop becomes more valuable would become very heavy.

Logging Methods

Douglas-fir being an even age stand, it can be harvested most economically by clear cutting entire tracts. Since the timber will vary in age by groups, portions of the stand will be ready for cutting while others are still maturing, and cutting will necessarily be done by an area selection. Cat logging is most economical for this type of cutting and should be planned by the operator for hauling the logs out of the woods. Timber may be sold either by stumpage or if the facilities for logging are available the ranch owner may sell the logs on the market.

Cutting the timber by small tracts will greatly facilitate slash disposal as small areas may be more easily controlled and more thorough burning of tops and branches can be accomplished. The adjacent stands of immature timber will also provide an excellent source of seed for succeeding timber crops.

MANAGEMENT OF GRAZING LANDS

Early Experiments

The grazing of logged off land has been tried in various parts of Oregon for over 40 years. (10) Early attempts at grazing cutover lands utilized the natural vegetation which invades such areas after slash burning. Weed and brush species such as fireweed, annual grasses, huckleberry, broadleaf and vine maple, and willow thickets provided fair forage for cattle and sheep. Stockmen used such land during the summer months to relieve the pressure on more important range lands. Although this practice lessened the fire hazard by checking brush growth and opening the ground cover to natural seeding of valuable tree species, it had a disadvantage to the grazier in that forage was of poor quality and the stock were forced to cover large areas for daily food necessities.

Experiments in sowing grass seed met with little success at the first trials. Cost of seed was high, and commercial 'burned land' mixtures often consisted of inferior grades of seed and leftovers of all species. Cutover lands sown to such mixtures, which were largely annual grasses, failed to endure under normal grazing use and were soon abandoned by stockmen. In late years, however, with larger areas of cutover lands following logging operations and with expansion of stock raising, especially in the coast regions, real efforts have been made to adapt cutover lands to grazing. It has been found that if the proper preparation of land is made for sowing and if the right combination of grass species is used, former timber lands make excellent range land, under good management, for periods up to ten or fifteen years. (2)

Land Preparation

The first step in preparing cutover land for grass establishment is to burn off such weed and brush species which have found their way into the area since the original slash burn. The competition of these natural invaders would make it impossible for grass to gain a foothold unless they are eliminated. (19) The ideal time for seed sowing would be immediately following the original slash fire when the grass stands would stand an equal chance with invaders for the lands. In most cases this will be impossible in Clatsop and Columbia counties as lands available for this plan have been cutover for some years. Burning should be done in the fall just after the first light rains when a good hot fire will consume a maximum of brush and debris. The resulting deep ashes following the fires provide an excellent seed bed, rich in nutrients which the grass may use on germination. (23) All possible precautions should be taken to prevent the spread of the fire to adjacent land which will be used for timber growing. The state laws governing slash burning must be complied with in all cases. A fire trail must be constructed around the areas to be burned and snags adjacent to and likely to throw sparks over the line must be felled. (18) Since the areas to be burned will be relatively small, the fire will be easier to control and a more thorough burn can be made. The cost of burning will be approximately fifty cents per acre.

Sowing

The seed should be sown as soon as the ashes of the slash fire have cooled. It is important that the seed be sown immediately and before rain has fallen and packed the ashes. (23) The sowing may be done by hand most economically on small areas such as will obtain in this plan.

Mixture of seed

Mixtures of seed to be used on cutover land vary with the general regions in which the land is located. The adaptability of grass species to particular types of climate and soil conditions will vary as with any other kind of vegetation. It is very important therefore that the species sown is one that will do well in the region in which it is used.

The purpose of sowing several species of grass and some clover can be summarized as follows:

Fast growing annual grasses	to provide early forage for stock and crowd out invading weed species.
Slow growing perennial grasses	to provide forage over a maximum number of years and after annuals have died out.
Clover	to provide nitrogen for the grasses and early forage for stock.

Annual grasses become established on the new land very quickly, effectually crowding out the lesser weed species such as fireweed and bracken fern. They provide an abundance of forage during the first period of grazing, thereby relieving the pressure on the perennial species which require a longer time to establish themselves. The perennial species, however, will bear the largest part of grazing use over the total life of the range. The best types of perennials are those reproducing vegetatively, by stolons and rhizomes, as well as by seed. Once taking over the area, sod grasses may successfully compete with the perennial weed species which might soon crowd out the annual grasses if they alone were planted. The third necessity of cutover land mixtures is also very important. Early mixtures used were deficient in clover as well as in sod forming grasses, probably the main reasons for their failure. Clover through its symbiotic relation with nitrogen fixing bacteria provides this nutrient for both itself

and for the grasses. Nitrogen is one of the most necessary and at the same time usually least available nutrients on cutover land soils. It is therefore very important that it be included in the mixture.

The following mixture has been recommended for use on cutover lands of Northwest Oregon by Leroy R. Hansen of the Farm Crops Department, School of Agriculture, Oregon State College:

Highland bent	1 pound
Creeping red fescue	$\frac{1}{2}$
Chewings fescue	3
English Ryegrass	2
Orchard grass	3
Subterranean clover	2
Greater trefoil,	
Birdsfoot trefoil	<u>2</u>
Total	$13\frac{1}{2}$ pounds

Seed may be bought from any of the large reputable seed firms of Oregon. All such seed should be bought as separate quantities and personally mixed to insure that the right amounts of each seed are included. Although several grades of seed are sold it will pay an operator to purchase the best grade of seed possible. State laws require grass seed to be certified as to the species and purity.

GRAZING PRACTICES

Grazing Period

The grass should be sown in the fall of the year preferably early enough for the young plants to become well established. In the spring, grazing should be deferred until after the spring growth has been put on. Light grazing may then be had until about the time of flower stalk production. Stock should not be turned in for grazing at the beginning of the growing season. At this time the grasses are utilizing foods which have been stored from the previous growing season. If the young shoots are cropped, the plant is forced to use further reserves for additional new growth. Heavy early grazing will reduce the carrying capacity of the range at the beginning of the season and may cause the death of the plants if repeatedly practiced. As the season advances heavier grazing can be done and after flower stalk production the range may receive its heaviest use. Heavier grazing is actually beneficial after the seed has fallen, in that the stock trample the seed into the ground. (13)

Fencing

Since grazing in this case is to be done on the lower slopes and flat land, while the upper slopes are used for timber growing, it will be necessary to fence the boundaries of the grazing land. Fencing is important not so much to keep the stock out of the timbered region as to insure even use of the forage and progressive use of the range as a whole. It has been found that grass species rate differently in palatability or "taste". Stock will therefore eat the most palatable species first so that actually one species may be overgrazed while others on the same range are hardly touched. A system of fencing will insure that all species are used to the fullest extent before stock is moved to the next area.

Carrying Capacity

Before grazing is begun the carrying capacity of the range should be determined as accurately as possible. Although forage should be used to its full capacity, undergrazing will prove a better practice than that of having just a few more animals on the range than forage will adequately support. In Northwest Oregon carrying capacity may be figured roughly at one animal unit for each five acres of range, providing that a good grass cover is present. The range should be watched closely at all times for indications of over use such as the invasion of weed species or erosion.

The grazing land may be expected to furnish forage on an average of nine months out of the year. This is possible largely because of the mild climate of the region with a growing season beginning in late March and carrying through almost to December in good years. A practice which will lessen costs during the winter months is the use of stock in preliminary cleaning brush from cutover lands which will later be planted. A small amount of forage plus what the animals may glean from brush land will cut the costs of winter feeding and at the same time prepare the land for clean burning in the next fall.

COSTS AND INCOME

Expansion

The foregoing plan for both grazing and forestry was conceived principally in the interests of men with small amounts of capital to invest but willing to start in a small way and work for the expansion of their investment until it produces a worthwhile income. The amount of forest land and grazing land which is estimated in this plan as a workable or economic unit is 3,000 acres. Although this is the final amount which it can be expected that one operator can work successfully, the beginning acreage might be one half or one quarter of this amount. As the number of stock increased over a period of years additional tracts of land may be bought and put into use in conformity with this plan. When the original purchase is made, the operator should make sure that the total amount of land which it may be expected will be needed when complete expansion takes place is available for purchase.

Cost Variables

The costs of establishing and running a ranch on which both grazing and timber growing are attempted can be enumerated in general. The fixed costs of land purchase, taxes, fire protection, and interest charges will apply to all operators indiscriminately. It is a relatively simple matter to record the land costs at one dollar per acre, or the reforestation tax at five cents per acre. The success of this plan, however, rests on how well the operator is able to keep at a minimum the variable costs of seeding, fencing, tree planting, and the general expenses of running the ranch once it has been established. The initial cost of a home ranch will naturally be high. The cost of such a ranch if it alone was worked for income would

be all out of proportion to the profits, if the operator's labor were valued at a standard union wage in large industry. This would probably be true on almost any land used for agricultural crops if averaged over a number of years. If, however, the comparatively small income possible from a strictly agricultural and grazing use of land can be supplemented by a large accruing income at the normal retiring age of the operator, the years of labor spent may be justified in the final cash return.

Sources and Methods of Handling Costs.

The necessity for a home ranch in this problem is for the production of winter feed for the stock and also as headquarters from which the care of the livestock, and management of the land may be accomplished. In as much as this paper deals only with the uses of cutover timber land, the management practices and problems of running the home ranch are immaterial. It can be assumed that a large portion of the expenses of the home ranch can be sustained by the products which it may produce. The portion of ranch expenses charged to grazing stock would therefore be only that amount which they consumed in feed during the winter months. An estimate of the cost of feeding stock from home ranch products would be ten cents per day per animal unit, and this would amount to a charge of \$1.80 per acre of grazing land.

As no costs are available specifically for land under this type of management in Clatsop and Columbia counties, the following listed costs for grazing are estimates based on similar costs in other regions. In general the following sources were used for reference on costs: Ranch Organization and Range Land Use in Coos and Curry Counties, Oregon (10); Cost, Efficiency, and Management of Dairy Cattle Pastures, Coast Region, Oregon (14); Costs and Grazing Values of Willamette Valley and Southern Oregon Farm Pastures (20); and Forest Tree Seedlings for Farm Planting (11). Other sources of

information were Mr. L. R. Hansen of the Farm Crop Department, Oregon State College School of Agriculture, and Mr. J. C. Moran of the State Forester's office, Salem, for land and general home ranch costs, and Mr. C. H. Willison, Oregon State College School of Forestry, for timber management costs and incomes.

Costs.

Timberland

Investment

1500 acres @ \$1/acre	\$1500
annual interest @ 5%	\$0.05

Annual Costs

Tree Planting

\$2.33 /acre trees
4.00 /acre labor
<u>\$6.33 /acre total</u>

Estimated 15 acres/year planted . .	\$0.07
Fire protection	0.01
Taxes	0.05
Miscellaneous	<u>0.01</u>
Total	\$0.19/acre

Grazing

Investment

Land, 1500 acres @ \$1/acre	\$1500
annual interest @ 5%	\$0.05
Seeding, \$5/acre at 5%	\$0.25
depreciation over 15 years	0.33
Fencing, \$4/acre at 5%	\$0.20
depreciation over 10 years	0.40
Stock, original investment	
estimated @ \$1/acre at 5%	0.05

Annual Costs

Taxes	\$0.03
Labor--2 men @ \$50/month and found	1.28
Winter feed from home ranch	1.80
Miscellaneous	<u>0.10</u>
Total	\$4.49/acre
Grand Total	\$4.68/acre

Income

Timber

Cascara, estimated 8 tons produced annually @ 5¢/pound (marketed)	\$800
Christmas trees, estimated 6,000 marketed annually @ 7¢/tree	<u>420</u>
Total	\$1220
Timber income	\$0.813/acre

Grazing

Stock

50 sheep @ \$2.50 each	\$ 125.00
450 lambs @ \$7.15/cwt.	2252.25
30 cattle @ \$6.48/cwt.. . . .	1749.60

Wool

1000 sheep ave. 9.5 lbs./animal 9500 lbs. @ 28¢/pound	<u>2660.00</u>
--	----------------

Total \$6786.85

Grazing income \$4.524/acre

TOTAL INCOME \$5.337/acre

Total income \$5.34 per acre less expenses of \$4.68, leaves
net income of \$0.66 per acre of grazing land.

Net income equals \$990 annually and amounts to approximately 33 cents per acre over the total acreage of grazing and forest land. The above figures for grazing would vary exceedingly, depending on what the operator

wished as a final product of grazing. In this case it is managed for the production of wool and beef. Increases in the sheep flock would be sold probably in the fall of each year.

It must be understood that the above costs would not apply to the first year of management of forest and grazing land. Costs and incomes were estimated for a normal year when the total amount of land to be used was in production. In actual practice this might not be obtained for ten or fifteen years after the initial program was launched. It was felt, however, that costs and expectations would be more representative if applied to a normal year rather than at the beginning or during the period of development.

SUMMARY AND RESULTS

Both costs and incomes were taken as of before the present general upswing in labor and material costs, and before the equally high prices for wool and livestock were in effect. It is believed that conservative figures have been used throughout and that the results are a fair estimate of what might be produced on a ranch of this size in a normal year. It should be noted that cost of planting trees has been handled as an annual charge against income.

The net income of \$990 per year represents the amount the owner may make as personal income. This income may be increased by the amount charged to labor, providing he is able to do a major part of the work of planting trees, seeding grassland, and the various other more expensive items of establishment and maintenance.

Potential profits from the sale of the timber crop has not been included in the foregoing amounts since it is not an actual, useable income at the present time. An estimate of this amount might be made as follows:

At 90 years, at least 1000 acres should have timber of a merchantable volume. Assuming all timber land in site III, 80% of full stocking; the stand would contain approximately 50 MBF on each acre. (12) At a selling price of \$3 per thousand this would amount to \$150 per acre from which the deduction of $12\frac{1}{2}\%$ for yield tax leaves \$131.25 per acre as the value of the timber at 90 years. The present value of this future net income at 3% interest rate amounts to \$9.18 per acre of timber land.

During the present precarious times, and perhaps for some years in the future, the incomes that can be made from highly paid jobs will far outweigh the risks taken in waiting for the future profits from forest crops. In the normal times following the present emergencies, however, men will once more

be looking for steady occupations. It can be at least hoped that when those times arrive this plan in some measure can be put into practice on cutover lands of northwest Oregon.

FIGURE 1

OUTLINE MAP

OF





CLATSOP COUNTY, OREGON

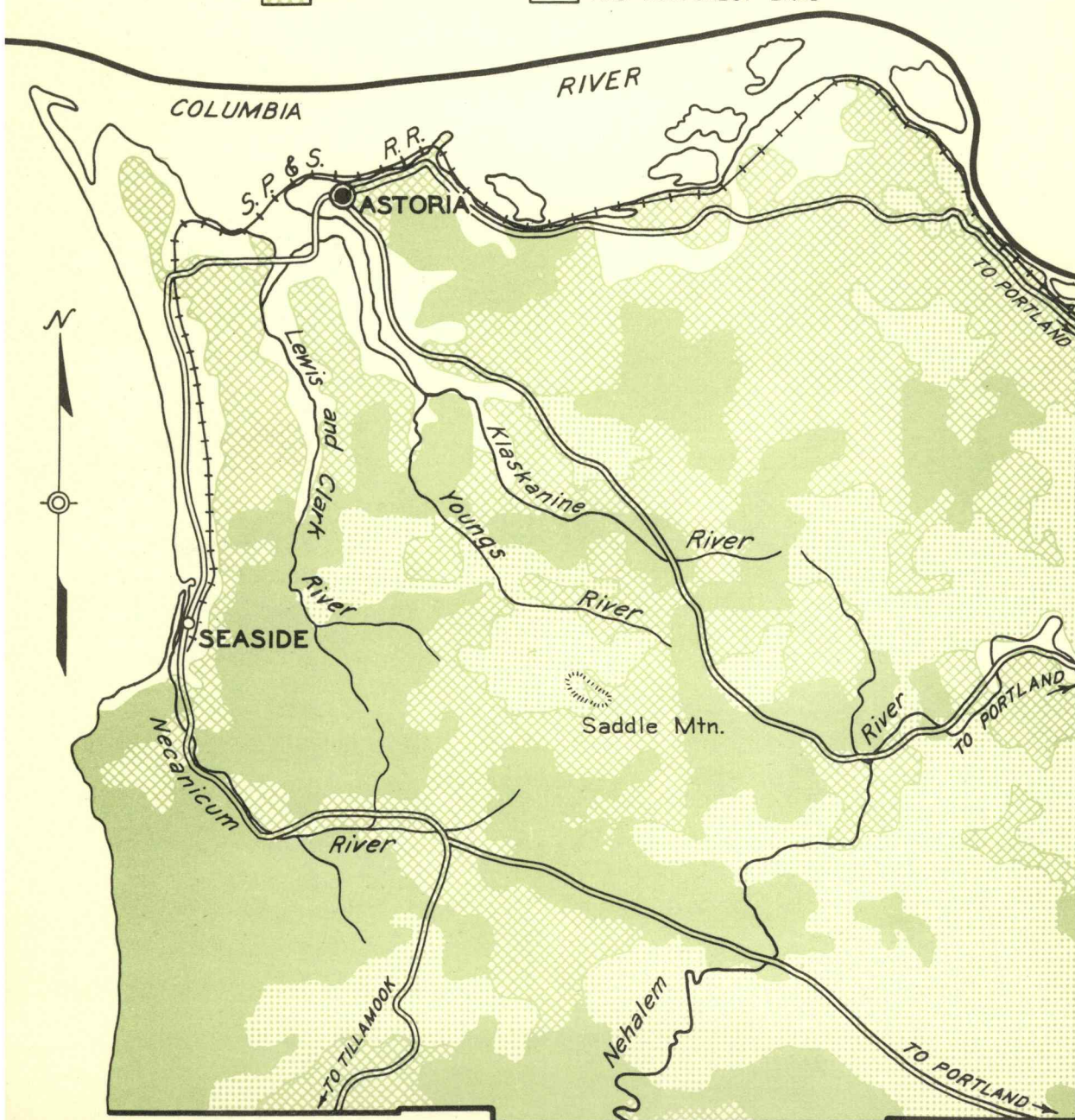
1938

SCALE

0 5 10 15 MILES

LEGEND

	SAW TIMBER		DEFORESTED CUTOVERS AND BURNS
	SECOND GROWTH		NONCOMMERCIAL FORESTS AND NONFOREST LAND



OUTLINE MAP OF COLUMBIA COUNTY, OREGON

1938

SCALE

0 5 10 15 MILES

LEGEND



SAW TIMBER



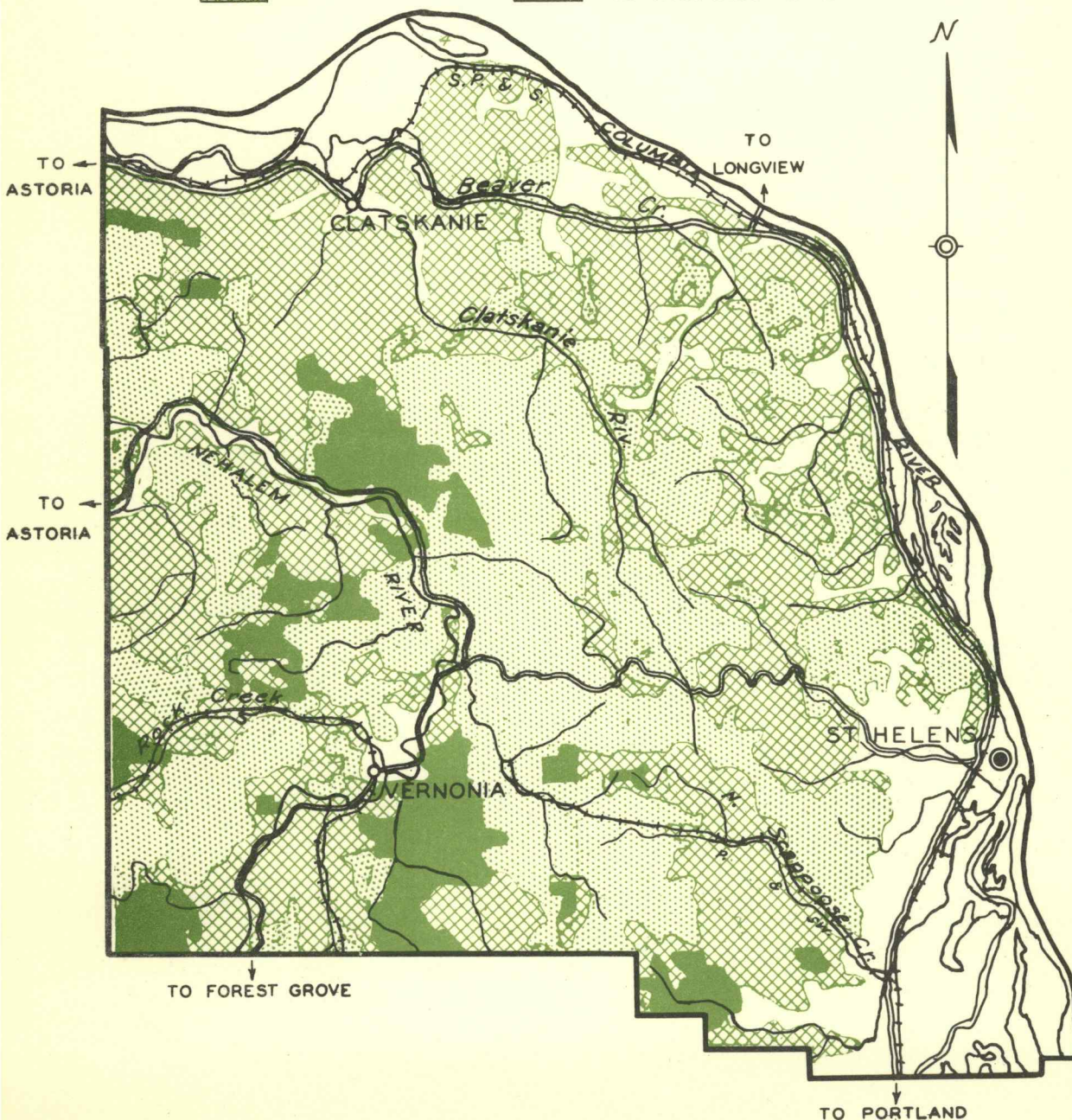
DEFORESTED CUTOVERS
AND BURNS



SECOND GROWTH



NONCOMMERCIAL FORESTS
AND NONFOREST LAND



FROM INVENTORY PHASE OF FOREST SURVEY

Figure 3.

~~FIGURE 2~~ GENERALIZED FOREST TYPES BY OWNERSHIP CLASS (FROM TABLE 3)

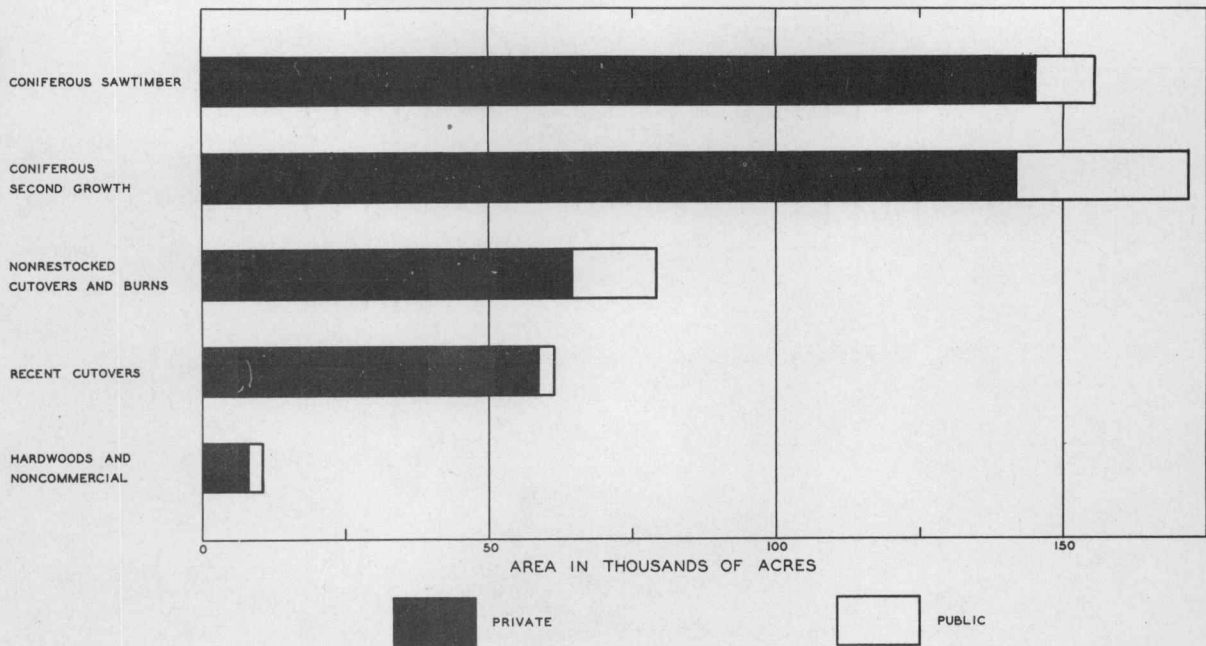
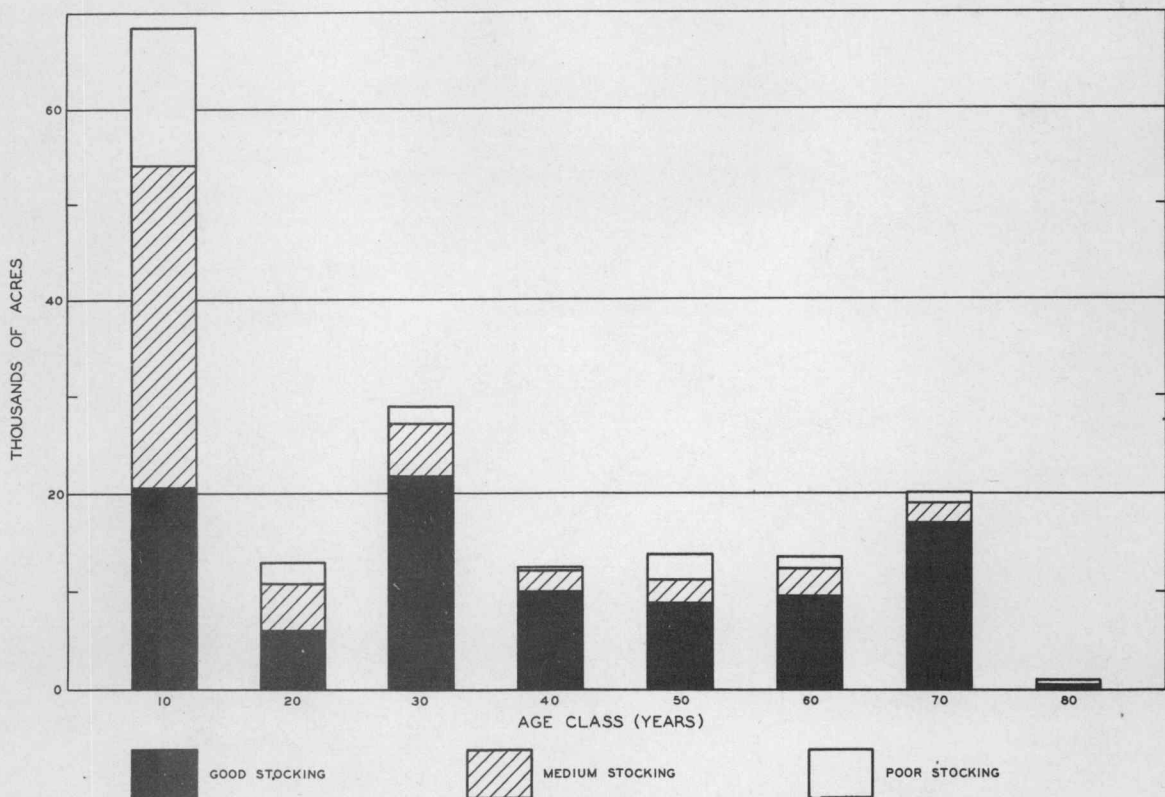


Figure 4

~~FIGURE 3~~ AGE CLASS AND STOCKING OF IMMATURE CONIFEROUS STANDS (FROM TABLE 4)

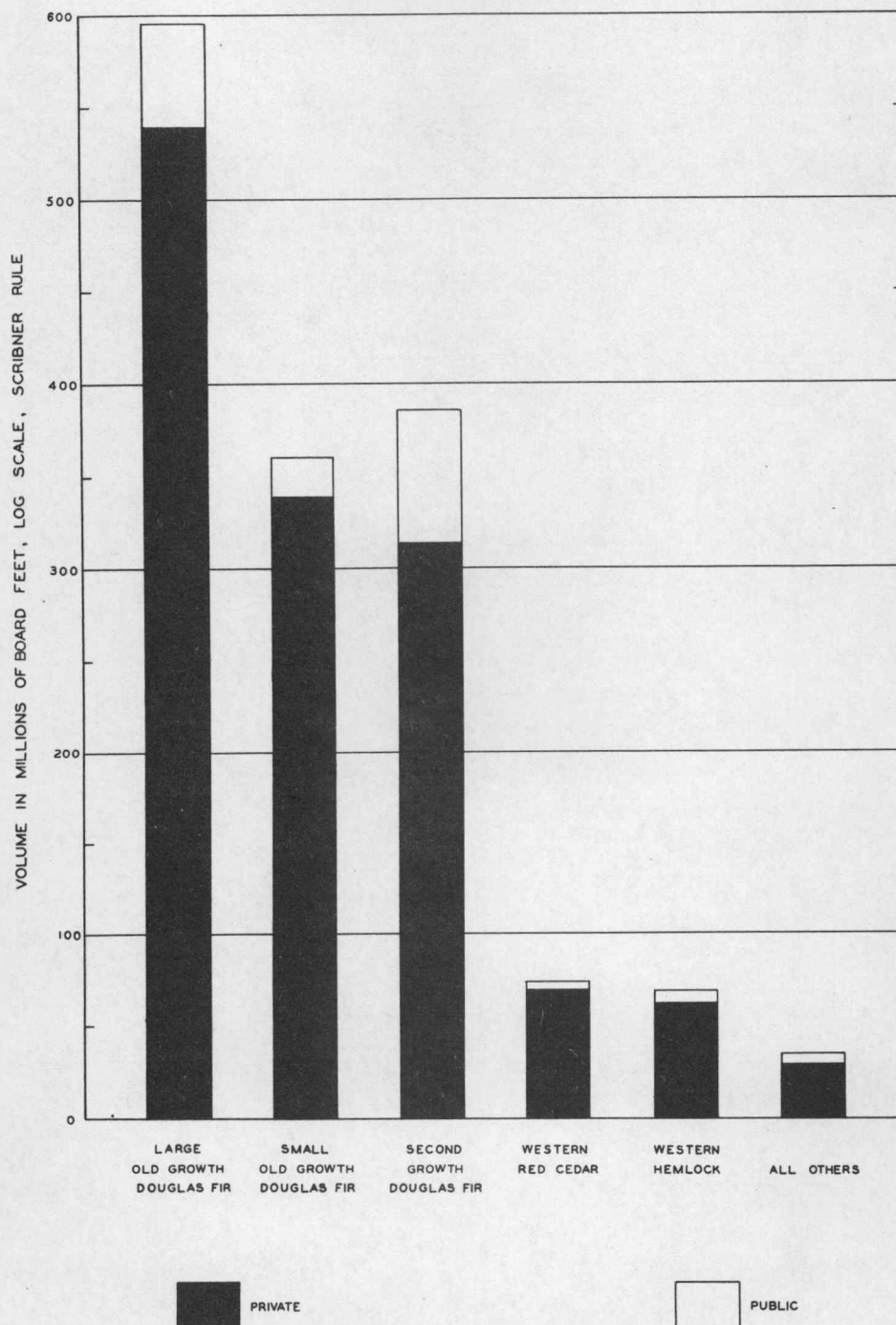


FOREST STATISTICS FOR COLUMBIA COUNTY, OREGON

FROM INVENTORY PHASE OF FOREST SURVEY

Figure 5

FIGURE 5. DISTRIBUTION OF SAW-TIMBER VOLUME BY SPECIES AND OWNERSHIP CLASS (FROM TABLE 1)



FROM INVENTORY PHASE OF FOREST SURVEY

Figure 6

~~FIGURE 6~~ GENERALIZED FOREST TYPES BY OWNERSHIP CLASS (FROM TABLE 3)

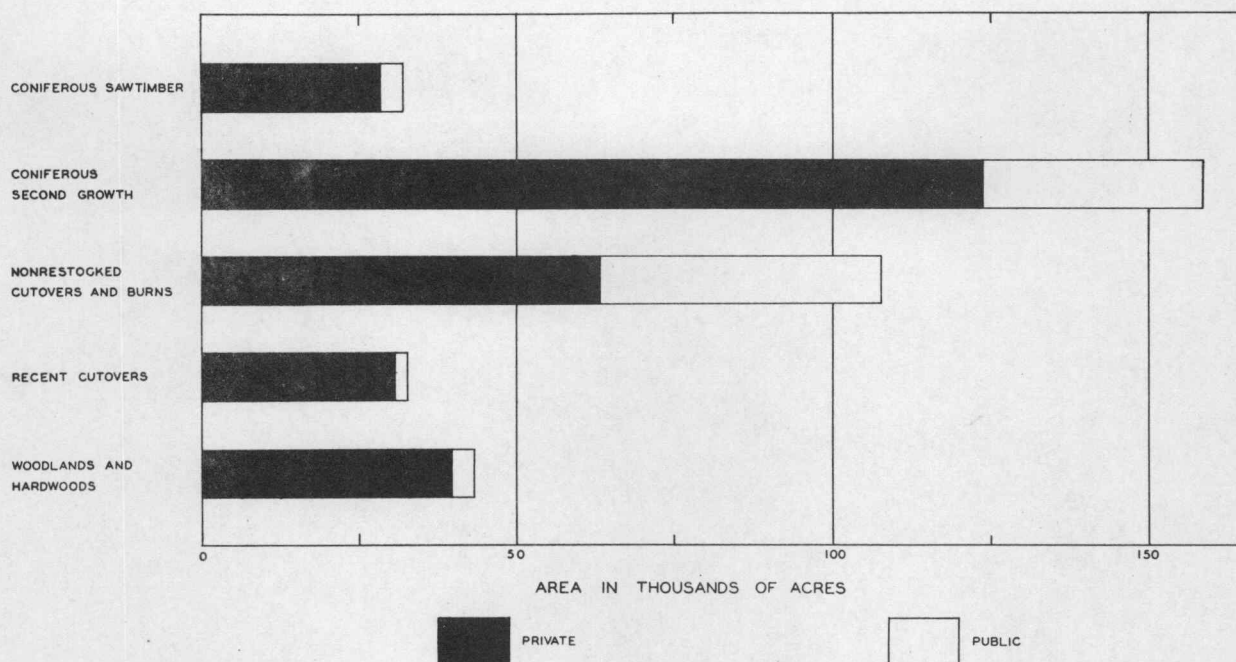


Figure 7

~~FIGURE 7~~ AGE CLASS AND STOCKING OF IMMATURE CONIFEROUS STANDS (FROM TABLE 4)

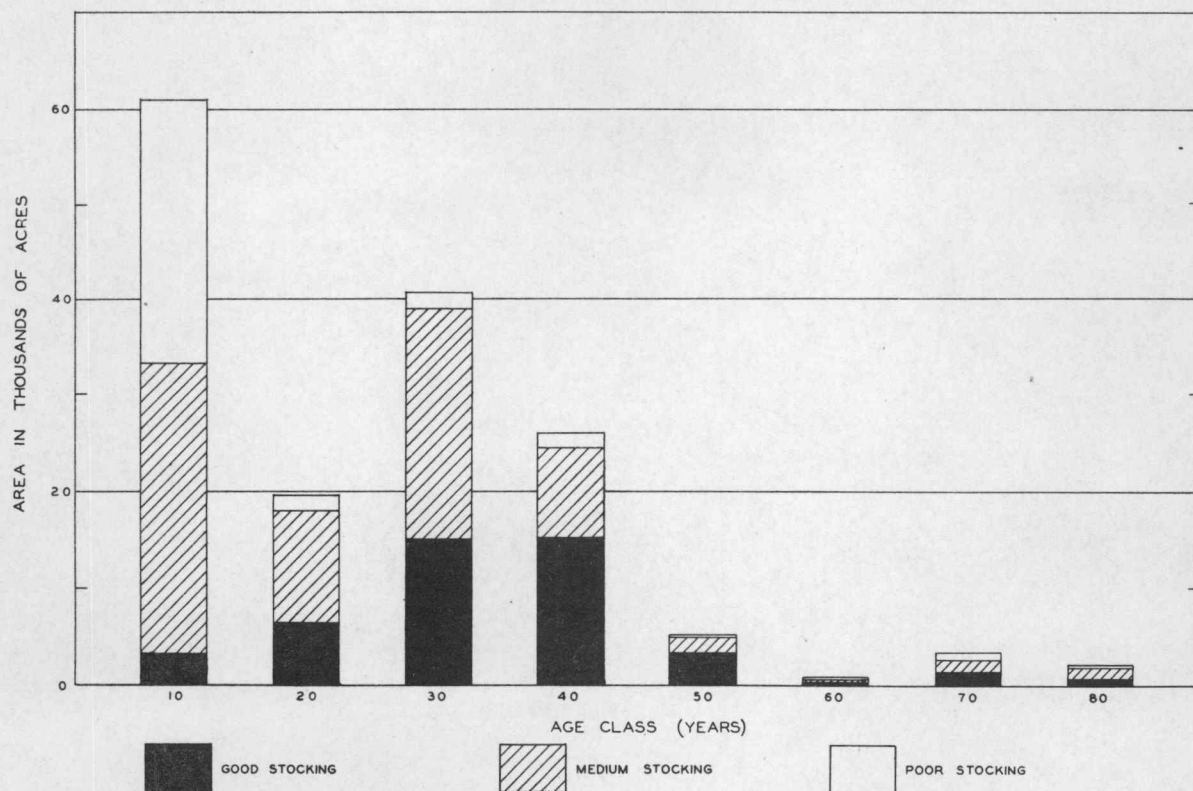


TABLE I.

FOREST STATISTICS FOR CLATSOP COUNTY, OREGON
FROM INVENTORY PHASE OF FOREST SURVEYTABLE 2. AREA, IN ACRES, OF GENERALIZED FOREST TYPES, BY OWNERSHIP CLASS
DATA CORRECTED TO NOVEMBER 1, 1937

TYPE DEFINITION	STATE				FEDERAL				TOTAL
	PRIVATE	AVAILABLE FOR CUTTING	RESERVED FROM CUTTING	COUNTY	MUNICIPAL	INDIAN, TRIBAL AND TRUST	PUBLIC DOMAIN, AVAILABLE FOR CUTTING	RESERVED FROM CUTTING ^{1/}	
HARDWOODS: ALDER AND MAPLE									
SURVEY TYPES 31 AND 31.5	7,960			1,865			5		9,830
CONIFERS MORE THAN ABOUT 20" DBH									
SURVEY TYPES 6, 7, 8, 11, 14, 17, AND 23	145,050	30	1,095	8,135	355		690		155,355
CONIFERS 6 TO 20" OR 6 TO 24" DBH									
ON CUTOVER AREAS	53,995	30	110	9,060	20			50	63,265
ON OLD BURNS	22,065	145	100	7,530			395	200	30,435
TOTAL	76,060	175	210	16,590	20		395	250	93,700
CONIFERS LESS THAN 6" DBH									
ON CUTOVER AREAS	61,965		550	9,880	160				72,555
ON OLD BURNS	3,750			1,145			360		5,255
TOTAL	65,715		550	11,025	160		360		77,810
NONCOMMERCIAL AREAS									
SURVEY TYPES 26 AND 38	155		810						965
RECENT CUTOVER AREAS: CLEAR CUT SINCE BEGINNING OF 1930									
SURVEY TYPE 36	58,900		35	2,595					61,530
NONRESTOCKED CUTOVER AREAS AND DEFORESTED BURNS									
SURVEY TYPES 35, 35A, AND 37	64,335	600	610	13,000	5	155	480		79,185
TOTAL FOREST TYPES	418,175	805	3,310	53,210	540	155	1,930	250	478,375
NONFOREST LAND									
SURVEY TYPES 2 AND 3	39,175	50	235	6,920				720	47,100
TOTAL	457,350	855	3,545	60,130	540	155	1,930	970	525,475

^{1/} MILITARY AND LIGHTHOUSE RESERVATIONS.

TABLE II.

FOREST STATISTICS FOR COLUMBIA COUNTY, OREGON
FROM INVENTORY PHASE OF FOREST SURVEY

AREA, IN ACRES, OF GENERALIZED FOREST TYPES, BY OWNERSHIP CLASS
DATA CORRECTED TO JULY 1, 1938

TYPE DEFINITION	PRIVATE	STATE, AVAILABLE FOR CUTTING	COUNTY	MUNICIPAL	FEDERAL		TOTAL
					REVESTED O. AND C. LAND GRANT	PUBLIC DOMAIN, AVAILABLE FOR CUTTING	
WOODLAND: OAK-MADRONE SURVEY TYPE 4	320						320
HARDWOODS: ALDER, MAPLE, AND COTTONWOOD SURVEY TYPES 31 AND 31.5	12,850	175	1,045		10		14,080
CONIFERS MORE THAN 20" D.B.H. SURVEY TYPES 6, 7, 8, AND 14	28,655		830		2,535		32,020
CONIFERS 6 TO 20" D.B.H. SURVEY TYPES 9 AND 15	ON CUTOVER AREAS : 34,290	865	4,735	650	360	50	40,950
	ON OLD BURNS : 42,955	595	7,995	45	2,065	80	53,735
	TOTAL : 77,245	1,460	12,730	695	2,425	130	94,685
CONIFERS LESS THAN 6" D.B.H. SURVEY TYPES 10 AND 16	ON CUTOVER AREAS : 44,245	345	13,010	1,855	1,445		60,900
	ON OLD BURNS : 2,285	5	570		135		2,995
	TOTAL : 46,530	350	13,580	1,855	1,580		63,895
RECENT CUTOVER AREAS: CLEAR CUT SINCE BEGINNING OF 1930 SURVEY TYPE 36	30,900		990	15	910		32,815
NONRESTOCKED CUTOVER AREAS AND DEFORESTED BURNS SURVEY TYPES 35, 35A, AND 37	63,160	2,015	34,700	1,480	6,175	30	107,560
TOTAL FOREST TYPES	259,660	4,000	63,875	4,045	13,635	160	345,375
NONFOREST LAND SURVEY TYPES 2 AND 3	74,220	215	950	35	15		75,435
TOTAL	333,880	4,215	64,825	4,080	13,650	160	420,810

TABLE III.

FOREST STATISTICS FOR CLATSOP COUNTY, OREGON
FROM INVENTORY PHASE OF FOREST SURVEY

TABLE S. AREA OF FOREST LAND, BY SITE QUALITY
DATA CORRECTED TO NOVEMBER 1, 1937

SITE CLASSIFICATION		AREA IN PERCENTAGE OF—				
TYPE	SITE QUALITY CLASS ¹	AREA IN ACRES	COMMERCIAL:		TOTAL :	
			CONIFEROUS:		FOREST :	
			FOREST :		LAND :	
			LAND :		TOTAL AREA	
COMMERCIAL CONIFEROUS	I	17,180	3.7	3.6	3.3	
	II	288,597	61.7	60.3	54.9	
	III	151,590	32.4	31.7	28.8	
	IV	7,361	1.6	1.5	1.4	
	V	2,852	0.6	0.6	0.5	
TOTAL COMMERCIAL CONIFEROUS		467,580	100.0	97.7	88.9	
LODGEPOLE PINE		105				
NONCOMMERCIAL ROCKY		860		0.2	0.2	
HARDWOOD		9,830		2.1	1.9	
TOTAL OTHER THAN COMMERCIAL CONIFEROUS:		10,795		2.3	2.1	
ALL FOREST TYPES		478,375		100.0		
NONFOREST TYPES		47,100			9.0	
GRAND TOTAL		525,475			100.0	

¹/ THE "SITE QUALITY" OF A FOREST AREA IS ITS RELATIVE PRODUCTIVE CAPACITY, DETERMINED BY CLIMATIC, SOIL, TOPOGRAPHIC, AND OTHER FACTORS. THE INDEX OF SITE QUALITY IS THE AVERAGE HEIGHT OF THE DOMINANT STAND AT THE AGE OF 100 YEARS. FIVE SITE QUALITY CLASSES ARE RECOGNIZED FOR DOUGLAS FIR, CLASS I BEING THE HIGHEST. IN THE SURVEY DOUGLAS FIR CLASSIFICATIONS WERE USED NOT ONLY FOR TYPES OF WHICH THIS SPECIES IS A CHARACTERISTIC COMPONENT BUT FOR OTHER TYPES FOR WHICH NO SITE QUALITY CLASSIFICATIONS HAVE BEEN DEVELOPED.

TABLE IV.

FOREST STATISTICS FOR COLUMBIA COUNTY, OREGON
FROM INVENTORY PHASE OF FOREST SURVEY

~~TABLE V.~~ AREA OF FOREST LAND, BY SITE QUALITY
DATA CORRECTED TO JULY 1, 1938

SITE CLASSIFICATION		AREA IN PERCENTAGE OF--				
TYPE	SITE QUALITY CLASS ^{1/}	ACRES	COMMERCIAL:		TOTAL	
			CONIFEROUS:	FOREST	LAND	TOTAL AREA
	I	6,804	2.1	2.0	1.6	
COMMERCIAL CONIFEROUS	DOUGLAS FIR	11 : 186,139	56.2	53.9	44.2	
	AND HEMLOCK	III : 131,933	39.9	38.2	31.4	
	IV	6,099	1.8	1.7	1.5	
TOTAL COMMERCIAL CONIFEROUS		330,975	100.0	95.8	78.7	
WOODLAND		320		0.1	0.1	
HARDWOOD		14,080		4.1	3.3	
TOTAL OTHER THAN COMMERCIAL CONIFEROUS		14,400		4.2	3.4	
ALL FOREST TYPES		345,375		100.0		
NONFOREST TYPES		75,435			17.9	
GRAND TOTAL		420,810			100.0	

1/ THE "SITE QUALITY" OF A FOREST AREA IS ITS RELATIVE PRODUCTIVE CAPACITY, DETERMINED BY CLIMATIC, SOIL, TOPOGRAPHIC, AND OTHER FACTORS. THE INDEX OF SITE QUALITY IS THE AVERAGE HEIGHT OF THE DOMINANT STAND AT THE AGE OF 100 YEARS. FIVE SITE QUALITY CLASSES ARE RECOGNIZED FOR DOUGLAS FIR, CLASS I BEING THE HIGHEST. IN THE SURVEY DOUGLAS FIR CLASSIFICATIONS WERE USED NOT ONLY FOR TYPES OF WHICH THIS SPECIES IS A CHARACTERISTIC COMPONENT BUT FOR OTHER TYPES FOR WHICH NO SITE QUALITY CLASSIFICATIONS HAVE BEEN DEVELOPED.

Table V

Taxation Statistics for Clatsop and Columbia Counties (22)

<u>Tillable Lands</u>			
<u>County</u>	<u>Number of Acres</u>	<u>Value</u>	<u>Average Value</u>
Clatsop	13,068	\$ 732,110	\$56.02
Columbia	25,624	1,642,080	64.08
<u>Non-Tillable Lands</u>			
Clatsop	176,608	1,140,237	6.46
Columbia	191,861	1,823,745	9.51
<u>Timber Land</u>			
Clatsop	132,183	2,848,957	21.55
Columbia	26,330	1,823,170	44.97

Table VI

Area in acres of tax delinquent acreage real estate, as shown by 1931 acreage tax roll and still delinquent in 1932 and also area of county-owned acreage real estate in 1932. (Depression years.) (24)

County	County & Privately owned land studied	Delinquent for taxes levied 1932	Delinquent for taxes levied 1928 & prior	Foreclosed for taxes & owned by county	Total acres involved in tax delin- quency
Clatsop	512,629	275,445	57,468	34,067	366,980
Columbia	389,951	131,843	31,914	19,833	183,590

Table VII

Statistics of Tax Reverted Lands in Oregon (21) 1936

Clatsop county

Class of property	Acres	Charges Against	
		Land value (taxes, interest, costs)	
Timber	19,215		
Reforestation	9,206		
Non-Tillable	30,099		
Tillable	<u>289</u>		
Total	58,809	\$1,226,494	\$2,534,096

Columbia county

Class of property	Acres	Charges Against	
		Land value (taxes, interest, costs)	
Timber	977		
Reforestation	14,582		
Non-Tillable	66,285		
Tillable	<u>1,876</u>		
Total	83,720	\$537,547	\$179,616

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