

THE DEVELOPMENT OF GRAZING ON CUT-OVER LANDS
OF WESTERN OREGON AND FACTORS RELATIVE
TO THEIR USE

by

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THE DEVELOPMENT OF GRAZING ON CUT-OVER LANDS OF WESTERN OREGON AND FACTORS RELATIVE TO THEIR USE

INTRODUCTION

The "cut and get out" policy followed in the Pacific Northwest was based on the "legend of inexhaustibility". As the virgin timber stands were cut the legend was questioned, but the "cut and get out" policy continued to prevail.

The land use problem on cut-over land was not serious on the Pacific Coast before 1930. However, a decline in taxable valuation in the counties having large areas of cut-over land had been going on before 1930. Nearly all the decline in taxable valuation in such counties can be accredited to the cutting of timber and the resulting decline in the valuation of the timberland.

During the depression of the 1930's, the lumber industry suffered severe economic difficulties. Many owners of cut-over land found it undesirable and in some cases impossible to continue to pay taxes on such land. A rapid increase in tax delinquent land resulted. The revenue received by counties having large areas of cut-over land was not sufficient to provide adequate government and maintain facilities. When faced with this situation, the counties of western Oregon having large areas of cut-over land sought to increase their revenue by developing the cut-over

lands for grazing use. In this way the owners, with an immediate source of income from the land, would be encouraged to keep the taxes paid and the county assessors could maintain land valuations on the tax rolls.

Statement of the Problem

During and since World War II, the cut-over counties have improved their financial conditions and the problem of raising revenue is less pressing than during the 1930's. At this time, 1951, the cut-over land use problem arises primarily from three sources:

1. The need for more range land.
2. The demand for cut-over lands for timber production.
3. The increase in population on the Pacific Coast.

Purpose of the Study

The specific purposes of this study are:

1. To review what has been done to utilize cut-over lands for grazing purposes.
2. To determine the factors which influence land use policy decisions for cut-over lands.

The Study Area

The Douglas-fir region is a narrow strip approximately 100 miles wide extending from the Pacific Coast

to the upper slopes of the Cascades and from southwestern British Columbia almost to the Oregon-California boundary. This thesis is concerned only with the Douglas-fir region of western Oregon. However, to carry out the purpose of this thesis it is necessary to draw upon the results of grazing experiments conducted in southwestern Washington where the conditions are considered similar to northwestern Oregon. Moreover, no other alternative exists because few detailed studies have been made of grazing cut-over lands in the Douglas-fir region.

Topography: Rough mountains and broad valleys are characteristic of western Oregon. The general height of the crest of the Cascades varies from 5,500 to 7,000 feet and the crest of the Coast Range varies from 1,200 to 1,800 feet. A plain from one to ten miles wide extends along the coast. Three valley provinces occur between the Cascades and the Coast Range. These provinces are the Willamette Valley, the Umpqua River Valley and the Rogue River Valley. The Klamath Mountains stretch from the Cascades to the Coast Range in the area south of the Rogue River Valley.

Rainfall: The precipitation for the Coastal region varies from over 60 inches to about 130 inches annually. The annual precipitation of the valley provinces varies from less than 20 inches to 70 inches in

the valley foothills. Most of the precipitation is in the form of rainfall. Temperature extremities are rare. However, there is very little rainfall anywhere in western Oregon from June to September.

Soils: Usually, the mountain soils are clays and loams, and the valley soils are loams and gravels. However, the different soil classes are often found intermingled in parts of western Oregon. Douglas-fir grows and yields best on deep well-drained sandy loam soils; clay soils rank next in productivity for this tree. (52, p.9)

Forest Resources: The forest land of the Douglas-fir region comprises 29,000,000 million of the 35,000,000 acres included in the region. Oregon has over one-half of the 26,000,000 acres of commercial forest lands available for cutting. The map on page 6 is based on the 1942 data given in Table I. The forest land classified as nonrestocked includes recent and old clear-cut areas and deforested burned over areas.

TABLE I

AREA OF GENERALIZED FOREST TYPES IN WESTERN OREGON
BY OWNERSHIP 1942¹

Kind of forest land	Ownership		
	Private	Public	Total
(Thousands of acres)			
Unreserved commercial			
Conifer			
Saw timber	3,046	5,077	8,123
Immature	2,222	1,654	3,876
Nonrestocked	1,492	560	2,052
Total	6,760	7,291	14,051
Hardwood	265	134	399
Total unreserved commercial	7,025	7,425	14,450
Unreserved noncommercial	260	602	862
All unreserved	7,285	8,027	15,312
All reserved	-----	264	264
Grand total	7,285	8,291	15,576

¹ (62, p. 13)

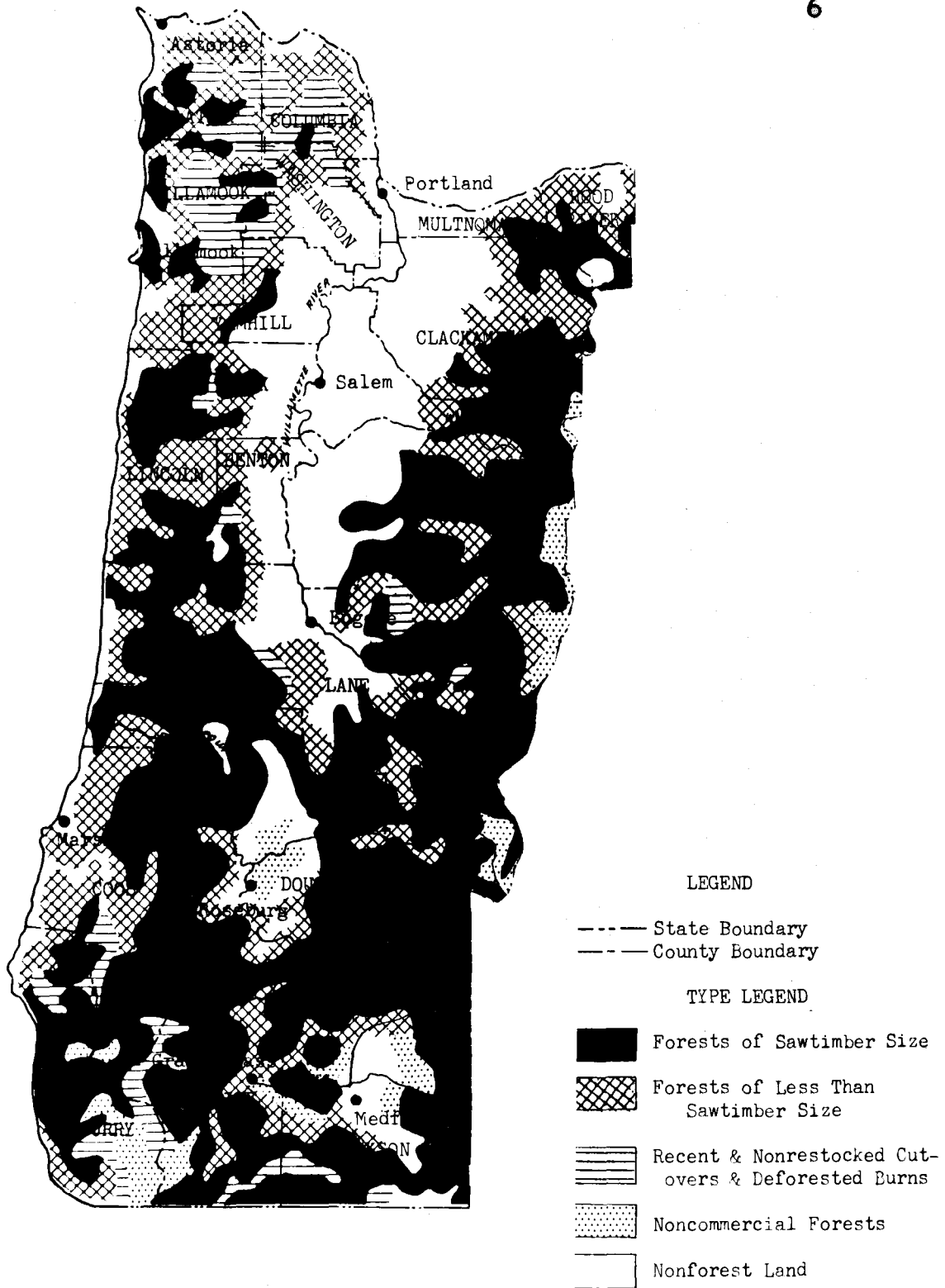


Figure I Western Oregon Generalized Types (62)

Cut-over land, like the other kinds of forest land, is not static in area and location because of fire, logging, land clearing and regeneration of forests. Logging operations in western Oregon have been shifting southward for some time. At the present time logging is centered in Lane County. A map based on 1951 data would show larger areas of cut-over land in the southern half of western Oregon.

The Douglas-fir region is not homogenous in many respects even though Douglas-fir is the predominating species for the region as a whole. In western Oregon the fog belt along the coast favors the growth of western hemlock and Sitka spruce. The valuable Port Orford white cedar occurs in Coos and Curry Counties in the southern part of the fog belt. Douglas-fir predominates on the slopes of the Coast Range and the lower slopes and foothills of the Cascades. On the upper slopes of the Cascades Douglas-fir is replaced by white pine, western red cedar, western hemlock, mountain hemlock, Alaska cedar and balsam firs. In Josephine and Jackson Counties Ponderosa pine and sugar pine predominate.

It was estimated in 1942 that the volume of unreserved timber in western Oregon totaled over 275 billion board feet, log scale, Scribner rule. Several log rules are used; measurements made by different log rules

vary over a wide range. Over 215 billion board feet of the unreserved timber was Douglas-fir. More than one-half of both the total volume of unreserved timber and the volume of Douglas-fir timber in western Oregon is located in Douglas, Lane and Linn Counties.

(62, p. 60)

HISTORICAL BACKGROUND

Grazing preceded the plow in the agricultural development of western Oregon. The Indians burned over large areas of the valley and foothill lands of Benton County each year before the coming of the white man. Apparently, this was done to increase the grazing area for game animals. When the settlers became numerous enough to assume command, they prohibited the Indians from engaging in their annual custom of burning. Gradually, the Indians were forced to discontinue their annual fires. In a few years, a heavy growth of brush and reproduction appeared. The settlers then resorted to burning large areas each year, but forest growth continued to reduce the area that could be grazed. By 1885, many acres in the valley and foothills were covered with a dense growth of conifers and hardwoods. At the time of the arrival of the white man, these areas had been grasslands. (48, pp. 52-54)

In Curry County the earliest settlers first used fire as a means of destroying the cover of brush and timber which shielded the Indians and thus facilitated their attacks on the white man. After the settlers became established, they adopted burning as a means of increasing the grazing area. Livestock grazing is known

to have been carried on in an extensive manner in Curry County and to some extent in Coos County for approximately eighty-five years. (31, p. 9)

This brief look at the historical background of the development of grazing indicates that fire has played an important part in maintaining or in attempting to maintain lands in grass which are adapted ecologically to forest production.

THE DEVELOPMENT OF GRAZING ON CUT-OVER LANDS, 1900 TO 1930

Introduction

The stream of immigration to the United States reached an all time peak between 1903 and 1914. During this eleven year period over one million people entered the United States each year. The beginning of land-clearing cost studies in the Lake States coincided with the end of this period of mass immigration and the beginning of World War I.

By 1915, it had become evident that settlers were having difficulty in converting stump land to profitable farms. The high cost of land clearing continued to occupy an important place in the minds of research workers, but it was realized that attention would have to be given to the problem of what other factors and what farm practices were essential to the successful establishment of a farm on cut-over land. For these reasons, farm management surveys were begun. Men trained in farm management continued to deal with the problem of settlement on the cut-over lands almost exclusively until 1920. In this year, men trained in general economics undertook a study of the credit needs of settlers on cut-over lands in northern Wisconsin. Salter (73, pp. 83-103) in his review of these early studies concerning the cut-over

lands of the Lake States concluded that the studies did not achieve complete success in ferreting out and coming to grips with the problems of the settlers on the cut-over lands.

The problems encountered in utilizing the cut-over lands on the Pacific Coast are not identical with the problems encountered in the cut-over areas of the Lake States. However, there is a relationship between the research that has been undertaken in these cut-over problem areas. Salter (73, p. 127) has stated that, "In general the development of land utilization in the Lake States, particularly in Wisconsin and Minnesota, set the pace for similar work done in other cut-over problem areas."

An Early Study on the Development of Cut-over Lands for Pasture

In 1911, Hunter and Thompson (39, pp. 1-18) published a bulletin on how to utilize the cut-over lands for pasture in western Oregon and western Washington. During the decade 1900 to 1910 there had been a rapid increase in the population of both Oregon and Washington. As a consequence of this increased population, there was a great demand for farm produce. At this time "enormous quantities of food supplies" were being shipped into Oregon and Washington. A good market for farmland

existed and people were interested in developing cut-over lands. The authors of this 1911 publication divided the cut-over lands into three broad classes.

These classes were: (1) cut-over lands that were in the process of being cleared for cultivation, (2) cut-over lands which were suitable for cultivation but were not being cleared, and (3) cut-over lands that should be allowed to reforest.

Hunter and Thompson were concerned about the second class of cut-over land, because the rate of cutting timber was much greater than the rate at which cut-over land was being cleared. The cut-over land produced a growth of brush and evergreens when clearing was delayed; this made clearing more difficult.

The objectives of Hunter and Thompson were:

(1) to show how cut-over lands could be used profitably for pasture and (2) to show how grazing would reduce the fire hazard and reduce the cost of clearing cut-over lands. The authors recognized two important problems in utilizing cut-over lands for grazing. One problem was to prevent invading brush and weeds from crowding out pasture plants. Pasture management was the second problem. The pasturing of Angora goats was considered the answer to the first problem. Preventing overgrazing and choice of the right class of livestock were considered to be the solution to

the pasture management problem. Fencing, deferred grazing, rotational grazing and supplemental feeding were believed to be necessary to prevent overgrazing. Cattle and goats were regarded as the best class of livestock to graze on the cut-over lands. Four seed mixtures were given. Care in selecting the seed was emphasized.

No data, other than the seed mixtures, were presented. The practices recommended in this publication of 1911 are essentially the same as those recommended by Hunter (38, pp. 39-40) in 1906.

Views on the Future Development of Cut-over Lands

The interest shown in utilizing the cut-over lands throughout the period 1900 to 1930 had its origin, for the most part, in the demand for more farm land. One obstacle to the settlement of the cut-over lands was the high cost of clearing the land. For this reason, cheaper land-clearing methods were sought. The "Char-Pit System" came in to prominent use because it was an economical method of clearing stump land.

"In applying this method, the bark is first removed from the stump and a ring of kindling some six or eight inches thick is then formed around the stump; the kindling is covered with sod and lumps of clay, with the exception of a small opening where the fire is applied. When the entire circle of kindling is ignited, the opening is likewise closed over with sods and the fire is thus driven into the heart of the stump. When properly prepared, such a

fire will burn completely through the stump, and if given some further attention, will follow the roots of the tree into the ground and burn them entirely out; thus leaving them ready for the plow." (26, p. 17)

However, char-pitting did not solve all the problems of the settlers. The price of cut-over lands exceeded that which many settlers could pay. Prospective settlers with limited finances had to go into remote areas poorly adapted to agriculture to find cheap cut-over lands. Favorably located cut-over lands suited to agricultural use were by-passed because of their high price. Foresters were incensed at this state of affairs. Lands capable of producing good forest crops were being misused and uneconomical settlement was taking place. The situation was not improved when it was urged that the National Forests be thrown open to settlement. Foresters reacted by urging that a line be established between agricultural use and forest use of cut-over lands. (80, pp. 64-88)

In 1922, Jardine, (44, pp. 1-17) Director of the Oregon Agricultural College Experiment Station, was concerned with the problem of formulating a comprehensive land use policy for Oregon's cut-over lands. At this time, prices received for agricultural products hardly covered costs. This situation showed little sign of improvement in the near future. From the short-run point

of view, Jardine saw little need for developing cut-over lands for agricultural purposes; but in the future cut-over lands would, he believed, be cleared for agricultural use. The ability of the cleared farm land to compete with other kinds of farm land was the chief factor determining how much cut-over land would be cleared for agricultural use. "To compete" was used by Jardine to mean competition in respect to psychic income and services available as well as money income.

Land classification was believed by Jardine to be the first step in any future development plan for the cut-over lands. Cut-over lands roughly classified as agricultural would need to be further classified on the basis of soil, topography, accessibility and difficulty of converting into farms. The need for more detailed and reliable data was emphasized by Jardine. Farm management studies were considered necessary to obtain data relative to methods and costs of clearing land. The establishment of an experimental area in a representative location on the cut-over land was regarded as essential to the future development of the cut-over lands for agricultural use. In 1922, the type of agriculture best adapted to the cut-over lands was not known. Jardine believed that a type of agriculture suitable for cut-over lands would probably be found to be more exacting in its requirements for

success than agriculture on most irrigated lands. He also stated that roads, schools, churches and community life should be given consideration in any plan for the development of the cut-over lands for settlement.

In 1922, the Oregon State Experiment Station published a bulletin on the reclamation of stump land in Oregon. The Oregon State Experiment Station had been experimenting with various methods of stump removal since 1907. At this time, the cut-over land problem was regarded as interesting and important but as yet still in an infant stage. Reclamation of the stump lands in a manner similar to that used to develop arid lands for irrigation had been considered but little had been done in this respect. The reclamation of stump land was regarded by some as the greatest remaining field of reclamation work. Some of the cut-over land was considered valuable for grazing use. (75, pp. 1-10)

Interim Grazing

In 1925, the Forest Service (4, pp. 178-180) became interested in grazing as a means of utilizing the cut-over lands between timber cuts as a partial solution to the cut-over land use problem. A scientific approach was taken by the Forest Service. The objective of the Forest Service was to determine if cut-over lands could be grazed for a temporary period after the timber was

cut without interfering with the establishment of a second crop of timber. At this time, the interim period of grazing was expected to be from fifteen to twenty years in length.

Major lines of investigation to be considered by the Forest Service in carrying out this study of interim grazing were: (1) the influence of grazing on tree reproduction, (2) the effect of reburn in preventing conifer re-establishment, (3) the influence of grazing in decreasing the fire hazard, (4) the seeding habits of coniferous species, and (5) the demand for cut-over land for timber production and livestock production.

To carry out its program of investigation, the Forest Service established representative experimental areas on the cut-over lands throughout the Northwest. One such experimental area was located near Powers, Coos County, Oregon in 1925. Another experimental area was established on the Columbia National Forest in southwestern Washington in the same year. Cattle were used to graze the experimental area near Powers, Oregon. Sheep were grazed on the experimental area in southwestern Washington.

Observations made of the Powers, Oregon experimental area during the year of its establishment indicated that: (1) grass was effective in controlling

brush growth, (2) forest reproduction was not damaged by grazing cattle, (3) coniferous reproduction was slowly coming into the area, and (4) reproduction was lacking where a heavy stand of grass occurred.

The Interim Grazing Experiment in Southwestern Washington

Fire Prevention: Data obtained by Ingram in his study of grazing on unseeded cut-over lands in southwestern Washington indicated that moderate grazing did not seriously damage forest regeneration. The damage that did occur to forest regeneration was more than compensated by the reduction in fire hazard. (41, p. 417)

Management: Ingram (41, pp. 411-417) stressed the difficulty of managing the cut-over grazing lands to secure a reduction in fire hazard and not damage the forest regeneration. Changes in plant cover were studied to determine the grazing-management practices. However, utilization of forage alone was not regarded as a reliable indicator of the point at which the conflict between grazing and forest regeneration occurred. The symptoms of this conflict were not fully determined by Ingram.

Class of Livestock: Sheep were considered more effective in reducing fire hazard than cattle because they utilized the forage more closely. However, some

difficulty was experienced in handling the sheep among the logs and debris; this was particularly true during the spring rains. Predatory animals were also a source of trouble.

Other investigators found that the class of livestock grazed was not important. The range management factor was recognized as the key factor. If satisfactory forest regeneration was to be secured, the management factor had to be such as to maintain a maximum of those forage species high in the successional development of the vegetation of the area grazed. (16, pp. 398-399)

Carrying Capacity: Ingram (40, pp. 1003-1004) noted the great variation in the carrying capacity of the cut-over grazing lands of the Douglas-fir region. However, the cut-over ranges in the region were considered the equal of other summer ranges in the Northwest. Cut-over lands which were burned over soon after being logged-off and sown to grass were superior to other cut-over range lands.

The Influence of the Interim Grazing Experiments

The Forest Service had inaugurated its program of interim grazing research with the hope of aiding in the solution of the cut-over land use problem. Observations made of livestock operators utilizing natural forage on

cut-over lands indicated that the length of the interim period of grazing varied from ten to fifteen years in length. Interest in grazing the cut-over lands was stimulated by the fact that a profit had been realized on the sheep grazed in the southwestern Washington experiment. However, at this time, 1928, cattle grazing in small herds of 25 or less were the principal users of cut-over lands. Usually the cattle grazed cut-over areas adjacent to the home ranch. Ingram had found sheep to be more effective in reducing the fire hazard. In 1928, there was a need for more summer range but the freight rates from the arid sections of eastern Oregon prohibited the importation of the sheep that Ingram (40, p. 1005) believed should be used to graze the cut-over lands of the Douglas-fir region.

Ingram did not believe that the cut-over lands could be permanently used for grazing. In the absence of reburn, reforestation was assured.

Summary of the Era 1900 To 1930

At the beginning of this era the cut-over lands were recognized as problem lands of the future. The decade 1900 to 1910 marked a rapid increase in population and a rise in land values. The increase in land values caused some uneconomic settlement to take place and accelerated research on the development of land-clearing methods suited to the limited means of the settlers.

Throughout the era, foresters became more interested in the cut-over land use problem. At the close of this era, authorities were generally agreed that most cut-over lands could grow another crop of timber before being called upon for agricultural use.

Some of the cut-over lands adjacent to farm lands were developed for permanent grazing use during this era. Other cut-over lands were developed for grazing use until the land could be cleared for farming; or in other cases, until nature reforested the grazing area. The need for land classification and the difficulty of the grazing-management problem on cut-over lands received attention during this era.

THE DEVELOPMENT OF GRAZING ON CUT-OVER LANDS
DURING THE DEPRESSION OF THE 1930'S

County Committees and the Cut-over Land Use Problem

County governments were perplexed by the financial problems which arose when so much cut-over land became tax delinquent. The County Land Use Committees and the County-Commodity Committees studied and promoted specific adjustments needed by the county governments to ease their financial difficulties. The county committees were instrumental in getting studies made to determine the feasibility of using the cut-over lands for grazing purposes.

County committees of various kinds played an important part in the nation's land-use planning program during the depression of the 1930's. Some of the land use planning done during the depression received its orientation from a national land utilization conference held in Chicago, Illinois, in 1931.

The Expansion of Grazing on Cut-over Lands in Columbia County

In 1935, more than 20,000 eastern Oregon range sheep were transported to Columbia County, Oregon. The need for summer range land by eastern Oregon stockmen and a reduction in the freight rates from eastern Oregon shipping points had turned the attention of the stockmen to the

cut-over lands of western Oregon. Ingram's studies had indicated the feasibility of this expansion. The possibility of a feed shortage in August and the difficulty of herding sheep on cut-over lands were the two main problems confronting the stockmen. In 1934, the feed shortage during August had been averted by moving the sheep to higher range lands. (7, pp. 32-34)(47, p. 12-13)

Establishing the Northrup Creek Experimental Grazing Area

The financial distress of cut-over counties in western Oregon had become intolerable by 1935. The cut-over lands were considered as a possible source of revenue. Past experience and observation had indicated the possibility of using cut-over lands for grazing purposes. With this knowledge in mind, the Clatsop County Agricultural Outlook Conference of 1936 suggested that an experimental area be established on county-owned land to study the problems and potentialities of western Oregon cut-over lands for grazing purposes. (17, pp. 21,25-27)

In 1936, the Oregon Agricultural Experiment Station leased 1,280 acres from the Clatsop County Court for an experimental grazing area. The Clatsop County Court, the Oregon State Board of Forestry, the Soil Conservation Service and the Oregon Agricultural Experimental Station entered into a cooperative agreement for the experiment.

The John Jacob Astor Branch Experiment Station at Astoria was designated to carry out the experimental work.

The purposes of the experiment were:

- (1) To determine the value of cut-over lands for grazing livestock.
- (2) To determine the grasses and legumes best suited to the acid forest soils of western Oregon.
- (3) To determine the relationship between grass planting and the fire hazard as it affects timber reproduction.
- (4) To determine the best methods of livestock management for cut-over lands in western Oregon.
- (5) To establish a possible use of the cut-over lands between logging and reproduction.

(35, pp. 1-9)

Location of the Experimental Area

A cut-over area of 1,280 acres was selected near Birkenfeld, Oregon in eastern Clatsop County. This area, located on Northrup Creek in the Nehalem River watershed, was considered representative of thousands of acres of cut-over lands in western Oregon.

Physical Characteristics of the Experimental Area

The topography of the Northrup Creek Experimental Area may be regarded as rough and broken. Two-thirds of the area that has been seeded to grass has a slope of 30 per cent or more. At the time of seeding, approximately 14 per cent of the ground surface was covered with stumps and logs.

Experimental Procedure

The entire experimental area of 1,280 acres was burned over in September 1936, to destroy the vegetation present and to produce a heavy ash for a seedbed. Approximately 500 acres of the experimental area was seeded to various grass mixtures in the fall of 1936.

Four seed mixtures were seeded; the sod-former was the only variable in the four mixtures used. The general mixture and the sod-forming grasses used were as follows:

General mixture	Pounds
Common ryegrass	4
Perennial ryegrass	3
Orchard grass	2½
Chewings fescue	2
Timothy	2
White Clover	2
Alsike Clover	1
Sod formers	
Highland bent	1
Astoria bent	1
Kentucky bluegrass	2

The fourth mixture was obtained by combining the general mixture with a mixture of the three sod formers given on page 26. The four mixtures were sown each on 125 acres, at the rate of ten to twelve pounds per acre. The stumps and logs on the ground made it necessary to seed by hand.

In addition to the 500 acres sown in 1936, a nursery of some 40 acres was seeded. One-acre tracts in the nursery were seeded to individual species and mixtures of species. The grasses and legumes used to seed the 500 acres were also sown in the nursery plots. By 1937 about 700 acres were under fence. This area was later divided into pastures of 40 to 80 acres. (81, pp. 594-599)

Progress Reports on the Northrup Creek Experimental Grazing Area

Early reports on the Northrup Creek experimental project state that on the whole the experiment is progressing satisfactorily. These reports bring to light some of the problems encountered in grazing cut-over lands.

Fire: In July 1938, fire burned over one-half of the experimental grazing area. The total damage was estimated to be about \$500.00. The fire destroyed feed and handicapped the development of the experiment. This fire did not spread into the closely grazed area, thus indicating the effectiveness of grazing on certain lands as

a measure of fire prevention. This fire during the summer of 1938 also demonstrated the danger of losing livestock, equipment and buildings as a result of fire sweeping through cut-over areas. (34, p. 3)(74, p. 1)

Acclimatization: The 1938 report mentions the long period of acclimatization required by the "wild" cows imported from the dry climate of eastern Oregon to the wet climate of western Oregon.

Log Traps: Only cattle were grazed on the experimental area in 1937. After that year sheep, cattle and goats were used until the predatory problem made it impractical to graze sheep. Cattle and sheep experienced difficulty in grazing in the area because of logs and stumps. Cattle as well as sheep were trapped among the logs and had to have assistance in freeing themselves. Sheep experienced more difficulty and had to be watched more carefully than cattle. (34, p. 50)

The Elk Problem: Elk had grazed the experimental area before it was fenced in 1937. Nearly two miles of fencing were destroyed by elk after the area was fenced. An electric fence placed along those sides of the experimental area where the elk had been most active was successful in keeping elk out of the experimental area. (53, pp. 2,18)

Meyers (53, pp. 4,17) contended that the elk problem arose because the experimental area had been the "home" range of the elk in the past and not because a better supply of feed existed inside the fenced area than outside the area. However, Meyers did state that the elk might have a preference for the forage inside the fence.

Bracken Fern Control: Over one-million acres in western Oregon are infested with bracken fern. (36, p. 1-4) This plant invades soon after an area is logged-off or burned-over. In 1939, Hansen (30, p. 1-4) started ecological studies of the control of bracken fern by grasses and legumes to determine their effectiveness in resisting the invasion or crowding out of bracken fern.

The Northrup Creek experiment will be terminated at the end of the summer of 1951. A complete report can be expected subsequent to the termination of the project.

Research Conducted by the Resettlement Administration

The Land Use Planning Section of the Resettlement Administration made county land use studies for several western Oregon counties. A land use study report was issued for Curry County in 1936. A similar report was made for Coos County in 1937. In these two reports the land was classified on the basis of its best use as established by an analysis of the physical and economic resources of the county. The land was classified on an area basis as agricultural areas, grazing areas or forest areas.

The lands classed as grazing areas had at least 50 per cent of the acreage suitable for grazing use. The forest and grazing lands were too intermingled to treat each land use separately. Hence, the areal classification of the land. The carrying capacity of those lands suitable for grazing use in the so-called grazing areas was one-third sheep or more or its livestock equivalent per acre on a ten to twelve months basis. Each of the grazing areas contained sufficient land and resources to support ten families with each family operating five hundred to one thousand acres of grazable land. (55, p. 6)(56, pp. 11-12)

The land use studies of Coos and Curry Counties stimulated interest in land classification as a means of attaining desirable socio-economic land use and needed adjustments of public services.

A Report by the Oregon State Planning Board

The Oregon State Planning Board in cooperation with various agencies and citizens conducted a land use study of Curry County. The report of this study was published in 1937. In 1935, the Oregon State Planning Board had been requested to make a study of land use in Curry County and report its findings "...together with its recommendations as to legislation, if any, which is necessary in order that said lands of Curry County shall be classified and used to produce a maximum income." (63, exhibit A)

The study revealed a need for land classification on a legal basis and legislation to permit corrective burning. Those who made the study felt that their efforts could only give direction to additional investigation needed to solve the complex land use problem in Curry County.

The Oregon Forest Land Classification Act

In 1937, the Oregon Forest Land Classification Act was passed in response to the expansion of the livestock industry in western Oregon and the desire of the public to know what lands were to be burned as a land-clearing measure.

This Act provides that the County Court of each county has the authority to establish a county forest land classification committee consisting of five persons, three of whom are appointed by the court. One of the other members is appointed by the State Board of Forestry and the other by the director of the State Agricultural Experiment Station. One of the three members appointed by the court must be an owner of grazing land and another must be an owner of forest land. (69, p. 64)

In classifying the land the committee considers "... climate, topography, elevation, rainfall, soil conditions, roads, availability of school facilities, extent

of fire hazards, recreation needs, scenic values, and other physical, economic and social factors and conditions relating to the land involved." (69, p. 65)

After making an investigation the committee makes a preliminary classification of the land as follows:

"Class I, or timber class, shall include all forest land primarily suitable for the production of timber.

Class II, or timber and grazing class, shall include all forest land primarily suitable for joint use for timber production and the grazing of livestock, as a temporary joint use during the interim between logging and reforestation.

Class III, or agricultural class, shall include all forest land primarily suitable for grazing or other agricultural use." (69, p. 65)

The committee must publish and post notices for a hearing and hold a hearing to receive objections, remonstrances or suggestions relating to the preliminary classification. The final classification is made after the hearing. The State Board of Forestry may instruct the State Forester to classify the land if the county fails to appoint a committee. A landowner has the right to appeal the classification of his land to the circuit court of the county. (69, p. 66)

Three provisions of the Act were designed to improve the administration of the fire laws. First, the Act provides that all forest and fire laws shall promote

the use for which the land is classified under the Act. All burning is done by permits and in accordance with fire laws. Secondly, the owner of Class II and Class III lands shall upon request receive the assistance and supervision of the State Forester or his wardens in carrying out burning operations to develop the land for grazing or agricultural use. If there is a possibility of unwarranted hazard resulting from burning, the forest officials may refuse to issue a permit. The third provision of the Act authorizes the forest official, at his discretion, to require the land owner to agree in writing to seed the land after the burning operation has been conducted. If the land owner fails to seed the land, the County Court may pay to have the land seeded. The cost of seeding becomes a lien on the land. This provision was included in the Act to assure an improvement in the range. (69, pp. 66-67)

A conservative view was taken of the Act because the administrative policy for the development of grazing land was not clearly defined. However, burning as a means of land clearing became more common after the Act was passed.

A Study of Ranch Organization in Coos and Curry Counties

In 1939, Hochmuth and Gorton made a study of ranch organization in Coos and Curry Counties, Oregon. This study was made at the request of the land use committees of the two counties.

Objectives of the Study

The objective of the study was to gather the latest data to determine the desirability of the expansion that had taken place, and the feasibility of further expansion in the livestock industry of Coos and Curry Counties.

Procedure

Forty ranches operating primarily on hill-land pastures were included in the study. These ranches were classified as follows:

1. Sheep ranches included those ranches having 75 per cent or more of their total animal units represented by sheep.
2. Cattle ranches included those ranches having 75 per cent or more of their total animal units represented by cattle.
3. Mixed ranches, major dairying included those ranches having a net production value from dairying in excess of the income received from either beef or sheep.
4. Mixed sheep and cattle ranches included those for which dairying was of little or no importance.

Results of the Study

Class of Livestock: Sheep were believed to have a natural advantage in utilizing the forage on cut-over ranges in Coos and Curry Counties. However, Hochmuth and

Gorton stated that probably a mixture of cattle, sheep and goats would utilize the forage of such ranges more fully and lead to better maintenance. (31, p. 33)

Maintenance of Stand: The study revealed that good pastures could be established on adapted hill lands in Coos and Curry Counties. Seeded pastures which had been producing forage over 40 years indicated that in some areas pastures could be maintained successfully. In other areas seeded pastures had returned to brush in a few years; pasture management is critical to maintenance.

In the opinion of representative ranchers in the two counties, a good burn followed immediately by the sowing of adapted forage plants was essential to the establishment of a good stand. In some cases, the burned areas have been seeded as soon as the ashes have cooled enough to prevent injury to the seed. Delay in seeding reduces the effectiveness of the forage plants in resisting the re-establishment of brush. The ranchers considered intensive grazing by goats and spot burning of dense stands of brush necessary to maintain the stand of forage plants. No data were available to indicate the method or results obtained by practicing some type of rotational or deferred grazing, but it was considered essential to maintaining the stand to let the grass reseed itself periodically.

Death Loss: Parasitic diseases accounted for the greatest loss in sheep. Disease losses were believed to be closely related to range and livestock practices. Predatory animals and sheep-killing dogs accounted for some sheep losses. The number of animals lost from particular causes could not be determined because of the difficulty of finding the carcasses of the dead animals in the brush and timber areas of the range lands.

(31, p. 31)

Conclusions of the Study of Ranch Organization in Coos and Curry Counties

Hochmuth and Gorton believed the profitability and future expansion of the livestock industry in the two counties studied depended upon: (1) the improvement of the existing ranges and the adoption of better pasture management practices, (2) the development of more cut-over lands for grazing purposes, and (3) the adjustment of the taxes to the paying ability of a livestock industry requiring low cash costs to survive.

The authors recognized the difficulty of obtaining large blocks of grazing land, the possible losses from brush and timber fires, and the restrictions on burning as possible hindrances to the future development of grazing on the cut-over lands of Coos and Curry Counties.

(31, p. 36)

A Report on the Institutional Factors of Land Use Adjustment in Coos County

In 1939, Coos County, Oregon was selected as an experimental area in Oregon for "unified" action and planning by all Federal, state and local planning agencies concerned with land policy. A study of institutional factors relating to land use adjustments in Coos County was made to aid in the development of the unified plan of action. The specific objective of this study of institutional factors made by Upchurch was to study the land use problems that arise from major changes in land use. (83, pp. 1-3)

The development of grazing land played an important part in the study. An extension of grazing on cut-over lands was regarded as a means of broadening the Coos County tax base but it was also the area in which great caution would have to be exercised to avert further difficulty to the counties from costs associated with isolated settlement.

Rural zoning and the blocking out of areas by exchanging county lands for state and Federal lands were suggested by Upchurch as possible aids to the economic development of grazing on cut-over lands. Such development was regarded as a means of broadening the county tax base.

Clatsop County Land Use Reports

In 1940, Baker made a study of land use in Clatsop County at the request of the Clatsop County Court and the Clatsop County Land Use Committee. These two county bodies wanted data collected, analyzed and coordinated in such a manner that it could be used to develop a sound land use program.

Baker segregated land according to its best use under the economic conditions of 1940. Six major areas were delineated. Physical factors considered in this classification were soil, climate and native vegetation. The economic need for land in a particular locality and the location of the land with respect to public services were factors which were given prime consideration in delineating the areas. Small acreages of land within the six general areas were not classified separately. Baker classified 125,000 acres in southeastern Clatsop County as grazing land. (5, pp. 8, 39)

Clatsop County Land Use Committee's Report

The Clatsop County Land Use Committee cooperated with Oregon State College and the United States Department of Agriculture in making a study of the land use problems of Clatsop County as they existed in 1941. As a result of this study, approximately 118,000 acres in the Nehalem

River watershed were classified as grazing land. This area in southeastern Clatsop County was the same portion of the county which Baker had considered suitable for grazing land. (14, p. 2)

Summary of the Development of Grazing on Cut-Over Lands During the 1930's

The recommendations of the agricultural economic conference held by the county-commodity committees of Clatsop County led to the establishment of the experimental grazing area at Northrup Creek. In this manner, an intensive study of grazing on western Oregon cut-over lands was started.

Land classification was emphasized throughout the depression period as a means of guiding the further development of cut-over lands for grazing use. Local government data and criteria were relied on to a great extent in classifying the land. Further investigation and public action were considered necessary to achieve proper land use. The farm management type of study made by Hochmuth and Gorton departed from the approach used by other research workers. The experiences of actual operators were studied. However, Hochmuth and Gorton recognized public action as necessary to overcome some of the obstacles to the development of cut-over lands for grazing use.

The expansion of grazing on cut-over lands that took place during the depression years was made possible by improved varieties of grasses, improved transportation and cooperation by foresters in permitting the use of fire to combat brush and other competing vegetation.

THE DEVELOPMENT OF GRAZING ON CUT-OVER LANDS SINCE THE DEPRESSION OF THE 1930'S

A search of the literature published on the development of cut-over lands in the Douglas-fir region for grazing purposes indicates that no study as thorough as that made by Hochmuth and Gorton in 1939 has been published. However, a project designed to study the possibilities of utilizing non restocking cut-over lands was started by the Washington State Agricultural Experiment Station in 1941. A preliminary report on this project was made by Daniel and Ensminger in 1945.

A Preliminary Report on Utilizing Nonrestocking Cut-over Lands in Western Washington for Grazing

Objectives of the Study

The objectives of the study are to determine the methods and forage species to be used in establishing and maintaining pastures on cut-over lands in western Washington.

Method of Study

The first step taken in developing the project was to observe successful and unsuccessful attempts to establish permanent pastures on cut-over lands. The extent of the experimental work of the project consisted of a study of the value of flat pea (Lathyrus sylvestris var. wagneri) as a forage plant for cut-over lands and a trial study

using Angora goats to control brush. Nurseries for forage plants were established on soils typical of cut-over lands.

Results of the Study

Class of Livestock: Mixed grazing was considered necessary to secure proper pasture management. However, it was stated that in the future it might be possible to emphasize the production of fat lambs on some of the seeded cut-over lands. Angora goats were successful in controlling brush in the experiment conducted as part of the project.

Trespass Grazing: The authors recognized trespass grazing as the cause of two evils. First, when free range was available a livestock man neglected to develop the home range for his future use. Secondly, foresters developed a distrust and refused to cooperate with stockmen because of trespass grazing.

Pasture Management: Rotation grazing was considered necessary to maintain the stand of grass on cut-over lands, but Daniel and Ensminger believed that deferred grazing could be postponed if a good seed mixture were used and care taken to prevent over grazing. The authors stated that fencing was probably the most important single step in pasture management since the

other practices depended on the control of the livestock. A supplemental feeding period of three months was considered necessary, because experience and observation had demonstrated that winter grazing after growth ceased was a major cause of range deterioration in western Washington. However, effective brush control necessitated winter grazing by goats.

The place of flat pea as a forage plant in utilizing the cut-over lands for grazing had not been established in 1945 when Daniel and Ensminger made their preliminary report on the project. (19, pp. 1-44)

An Administrative Policy for Controlled Burning in Western Oregon

In 1940, an administrative policy for controlled burning was approved by the Oregon State Board of Forestry. This policy was revised and brought up to date in 1946. The purpose of the policy is to serve as a guide in developing suitable forest lands for grazing purposes.

The policy provides for a division of the costs of constructing fire-breaks around the boundaries of grazing areas classified as Class III land under the Forest Land Classification Act. Fire-break construction costs are divided as follows: the county in which the grazing area is located pays ten per cent; the State Forestry Department pays 20 per cent; the local forest

protective association pays 20 per cent and the residents of the grazing area pay 50 per cent of the construction costs. (51, p. 14)

Preliminary Report on the Northrup Creek Experimental Grazing Area

Results of the Experiment

A complete report of the results obtained at Northrup Creek since 1936 has not been made. Subsequent reports may reveal some variation from the observations outlined here.

Damage to Reforestation: The class of livestock grazed and the intensity of grazing seem to determine the effect of grazing on forest reproduction. Cattle have not materially damaged Douglas-fir, but cedar has been damaged by the browsing of cattle. Almost all of the small trees were damaged when pastured by sheep or by cattle and sheep. Angora goats did cause severe damage to all coniferous species. The goats did not keep vine maple and red alder under control.

Carrying Capacity: For five or six years after the experimental area was sown to grass, one animal unit could be carried on each five acres of range for a period of eight to nine months but by 1948, the carrying capacity had fallen until one animal unit required seven acres of

range land. This decline in carrying capacity may be accredited to several factors. The burning of the area previous to seeding assisted in the process of nitrification which caused an increase in the growth of the vegetation. At first, the soil acidity was reduced by the ash left from burning but gradually the acidity returned and aided in the establishment of adapted plants which crowded out the forage plants. The dying out of the short-lived grasses was another factor in causing the decline in carrying capacity. (81, p. 598)
(77, p. 384)

Class of Livestock: Cattle have made better gains and have been more profitable than sheep at Northrup Creek. Heavy losses to predatory animals caused the withdrawal of sheep from the Northrup Creek range.

Bracken Fern Control: A legume, Big trefoil, in mixture with Alta fescue and creeping red fescue has been found to be effective in crowding out bracken fern on cut-over range lands. Control of bracken fern greatly reduces the fire hazard on cut-over ranges during the summer months. (36, p. 16)

Grazing and Fire Control: The effective control of brush plants and the removal by grazing or grass competition of native plants has clearly shown their value

as an effective firebreak to help in controlling the disastrous fires that occasionally sweep through the cut-over lands. (81, p. 598)

Improvement of Forage Species

The need for forage plants which would survive under the vigorous conditions existing on the cut-over lands of western Oregon was recognized many years ago. In 1913, the John Jacob Astor Branch Experiment Station was established and about 25 years ago nurseries were established in western Oregon. One of the major problems in developing pastures on the acid soils of the coastal counties has been the problem of maintaining a stand of legumes. To meet the conditions of these counties a legume must be (1) capable of withstanding a moderate amount of flooding, (2) capable of growing on and improving soils having low fertility and low organic matter, (3) capable of growing on an acid soil, and (4) palatable to livestock and capable of withstanding heavy grazing. (36, p. 2)

Legumes

Lotus sp.: Work started on the development of Lotus sp. at the John Jacob Astor Experiment Station in 1923. Lotus major, Big trefoil meets the requirements

given above. Big trefoil has shown more promise than any other legume for seeding cut-over lands. Identical mixtures of grass seed planted with and without Big Trefoil have shown that Big trefoil will increase the total yield by two or three times. Birdsfoot trefoil, another lotus, is adapted to dryer locations and less acid soils than Big trefoil.

Other Legumes: Subterranean clover has proven to be a good legume for western Oregon cut-over lands. White clover and hop clover have not proven themselves to be as aggressive as Lotus sp. at Northrup Creek, but they have increased slowly under grazing. Burnet, a plant which is a member of the rose family and not a legume, offers possibilities as a forage plant for cut-over lands. (37, pp. 15-17)

Grasses

Alta Fescue: This plant originated as a plant selection stated in 1923 at the Oregon Agricultural Experiment Station. Alta fescue is included in many cut-over land seed mixtures because it has a long growing season and will grow under a wide variety of conditions. (67, pp. 5, 10-13)

Orchard Grass: Seed mixtures recommended by Hunter and Thompson (39, p. 14) before 1911 included this grass, however, orchard grass has been greatly improved since that time. Orchard grass is considered well adapted to the higher and better-drained cut-over lands. (37, p. 12)

Perennial Ryegrass: This grass is used more in seed mixtures for cut-over land than any other short-lived perennial. The inexpensiveness of the seed and the fact that the plant can be grown in combination with many legumes accounts for its wide use. (81, p. 602)

Creeping Red Fescue: Experience at Northrup Creek indicates that creeping red fescue is probably the best sod former to use on cut-over lands. For this reason, creeping red fescue is well adapted to control bracken fern and other invaders of cut-over land pastures. (37, pp. 12-13)

Present Status of Grazing on the Cut-over Lands of Western Oregon

There has been an increase in the carrying capacity of some cut-over grazing lands in recent years. Payments made by the Production and Marketing Administration have resulted in more and better seed being sown. Seed pools have been formed in some counties to obtain seed at lower prices. (25)

In other areas, the carrying capacity of cut-over grazing lands has decreased in recent years. Reforestation has crowded out the forage on the Columbia County cut-over lands formerly grazed by large bands of sheep from eastern Oregon. The grazing of sheep has been discontinued in some cut-over areas because of predatory animals or because prices and costs made beef production more profitable. This decrease in sheep numbers has made it more difficult to control brush on some cut-over grazing lands. War-time restrictions on burning enabled the brush to crowd out the forage on some western Oregon grazing lands. (59)(32)

No data are available to indicate the number of livestock grazed on cut-over lands or the acres of cut-over lands grazed. In the past there has been some exaggeration of the percentage of the cut-over lands that could be grazed.

Some western Oregon counties have been declared weed control districts. Research has made progress in the control of fern, gorse, St. Johnswort, tansy ragwort, and other plants which infest some range lands in western Oregon. Gorse is a serious problem in Coos, Curry and Lane Counties. (61, pp. 27-31)(9)

SUMMARY OF THE DEVELOPMENT OF GRAZING ON THE CUT-OVER LANDS OF WESTERN OREGON

The agricultural development of the cut-over lands of Western Oregon has taken place in response to the needs of an increasing population and changes in economic conditions. This development has not taken an independent path, but has, instead, maintained a close relationship to community life. This relationship has not always been a desirable one from the standpoint of community welfare.

The development of cut-over lands for agricultural use is a part of the transition between two equilibrium points which the economy of western Oregon has been undergoing for more than one-half century. One of these equilibrium points, the origin, was represented by an economy based on a virgin timber supply. The other equilibrium point, still in the future, is represented by an economy based primarily on agriculture and sustained-yield management of the forests. With the passing of time, land use policy for the cut-over lands has been determined more and more in terms of the future equilibrium and less and less in terms of the past equilibrium point.

Historically, fire has played the dominating part in the development of western Oregon forest lands for

grazing purposes, but by an evolutionary process forest land classification, the use of suitable seed mixtures, proper management practices and controlled burning have become the basic considerations in developing forest lands for grazing.

Western Oregon cut-over lands are not alike in respect to those qualities which are favorable to the production of forage; because of this, few precise statements can be made which would be applicable to all of western Oregon's cut-over range lands. However, the general framework within which cut-over land use policy decisions can be formulated has been established. Research and the experiences of stockmen using cut-over ranges have shown that consideration of the five factors briefly outlined below is fundamental to any decision regarding the conversion of cut-over or other forest lands to livestock production.

Character of Competing Vegetation: The competing vegetation is an indication of the possibilities of success. The shrubby species which sprout readily are the most aggressive invaders of the grass lands.

Slope: The slope should not exceed 30 per cent. Southwest and southeast slopes are more favorable for pasture land development than northern exposures.

Location: The cut-over land should be near farm land where the cost to the public for supplying services does not exceed the contribution received from the grazing development.

Soils: The soils should be suited for forage production. Site classification for Douglas-fir production has not been found to be a reliable indicator of the possibilities of forage production.

Management: The managerial function is one of the chief determinants of the success of the enterprise.

THE USE OF CUT-OVER LAND FOR TIMBER PRODUCTION

Sustained Yield Forestry

Sustained-yield management for forests is generally accepted as the proper method of handling the nation's forest resources. The term, sustained-yield management, denotes a plan of land use which assumes that the amount of timber cut from a given area should not exceed that which accrues annually or periodically.

Fire, taxes and tenure are the sources of most of the obstacles to the practice of sustained-yield forestry.

Fear of Fire

The disastrous fires of 1910 in the Pacific Northwest aroused an interest in forest conservation in Oregon. In 1913, the Oregon Forest Patrol Act was passed. This law sometimes called the "Compulsory Patrol Law" requires that timberland owners must patrol their own lands against fire or else the responsibility will be undertaken by the State Forester. The fire protection costs of non-contributing timberland owners are collected in the same manner and at the same time as taxes. The procedure provided by law for delinquent taxes is applicable in the case of delinquent payment of protection assessments.

This law forces irresponsible timberland owners to make their contribution for the services of the fire protection association or other protective agency.

The increased population and expansion of lumbering and logging in western Oregon have made the fire protection problem more complex. Despite the increased complexity of fire protection problem, fire has decreased in importance as an obstacle to sustained-yield forestry. Reorganization of fire protection districts by the State Department of Forestry has simplified and coordinated the activities of the districts to enable them to meet the more complex situation. In addition, forest protection surveys are being completed for each district. The surveys are used as the basis for determining what the standards of a district's fire protection should be. (76, pp. 18,22)

It is the fear of major conflagrations which makes the timberland owner reluctant to adopt a system of sustained-yield management. A complacent attitude on the part of forest officials could lead to such a disaster. However, it is the irresponsible nature of the public that is the cause of most forest fires. The effectiveness of fire prevention education has been demonstrated by the rapid progress made by the "Keep America Green" movement started in the state of Washington.

Forest Taxation

Oregon has a Reforestation Act sometimes called The Forest Fee and Yield Tax Law. The objective of this law of 1929 and its subsequent amendments is to encourage sustained-yield forestry by postponing part of the taxes of the timberland owner until the timber is harvested. Under the Reforestation Act, lands classified as reforestation lands are exempt from ad valorem property taxes; the reforestation lands are subject to an annual forest fee of five cents per acre in the region west of the summit of the Cascades; this fee is two and one-half cents east of the Cascades. In addition to the forest fee, a 12.5 per cent yield tax is levied upon the gross receipts from the sale of forest products from lands classified under the act. The fee and yield tax monies are distributed to the county and its taxing districts according to the ratio that each taxing unit's levy bears to the total combined tax levy. Government-owned land is tax exempt; therefore, the classification of such land under the Act is ineffective. In June, 1950, effectively classified reforestation land totaled 922, 088.03 acres; most of this land is located in western Oregon. (76, pp. 29, 101)

The Reforestation Act tends to make classification of reforestation lands unnecessary since it induces the counties to keep the rate of the property tax at a low level. It is usually the time of the tax rather than the amount of the tax that constitutes the obstacle to the practice of forestry. Large timber companies that are growing as well as harvesting timber are finding it less costly to pay annual property taxes and forego classification of their land under the Reforestation Act. (10) The Reforestation Act has not worked perfectly, but it has enabled some timberland owners to start the practice of forestry.

Assessment is the heart of the property tax system and very important to the timberland owner. Part of the inequity and uncertainty in forest taxation arises from the employment of assessors who are not familiar with forest values. Failure to adjust tax levies as timber resources are removed may necessitate complete liquidation of the stand and thus prevent the establishment of sustained-yield forestry. Federal and state inheritance and estate taxes are other sources of uncertainty. Such taxes frequently lead to division of the property and instability of ownership; this creates a situation which is not conducive to the practice of good forest management.

Tenure

Continuity of land ownership is commonly accepted as a requisite for the management of forest properties on a sustained-yield basis. Stability of ownership is necessary to develop and carry out plans required to manage a forest holding through the long years of a full rotation. Non-tax factors that affect ownership stability include ownership intent, management practices, size of the forest property and lack of forest credit.

Ownership Intent: As a factor affecting forest tenure, ownership intent has a philosophical and a psychological basis. To the extent that ownership intent is based on the philosophy of an inexhaustible timber supply it is a factor of decreasing importance in preventing the practice of forestry. But from the standpoint of its psychological basis, ownership intent must be given paramount consideration. There is a prevailing belief that the practice of forestry is not profitable. There is a cure for this attitude, but the cure is passive in respect to changes in public attitudes, economic conditions and forest management practices. These changes plus examples of successful sustained-yield

management are slowly making progress in replacing the forest land owner's psychosis with a feeling of responsibility conducive to the practice of forestry.

Management Practices: The stability of forest land ownership is dependent on how forests are cut. The Oregon Forest Conservation Act of 1941 as amended had made desirable forest practices compulsory and enforcement a responsibility of the state. This conservation act provides that strips or blocks of seed trees or individual seed trees must be left to assure natural forest regeneration on the logged-off area; or, as an alternative, the timber may be clear cut and the area artificially planted by the landowner or by the state at the landowner's expense.

Federal agencies have been a stimulus to improved forest management by insisting that private owners hold and manage their own forest lands as a requirement to obtaining Federal timber under cooperative sustained-yield agreements.

The tree farm movement is another encouraging sign of the attention being given to better forest management practices. Lumber and pulp and paper companies have established many tree farms in the Douglas-fir region. In 1947 Oregon had 27 of the 80 tree farms of the Douglas-fir region. (64)

For the most part, the large companies with large timber holdings are following good forest management practices. But for western Oregon as a whole the forest management practices being followed are not favorable to continuity of ownership in the event of an economic depression.

Size of Forest Properties: During the depression period the tendency for forest lands to revert to public ownership increased as the size of the holding decreased. Unfortunately, small holdings are often isolated and inaccessible. Such holdings are also scattered singly or in small clusters throughout western Oregon. Therefore, the tenure pattern as well as the size of the holding contributes to the instability of ownership. The majority of forest holdings are too small to be managed economically on an independent basis. In general, the owners of small tracts have no unified plan of management or experience in cooperative forest management.

Gradually, small forest properties are being fitted into various ownership categories. Title to part of the land acquired by western Oregon counties through tax foreclosure has been transferred to the state to be managed by the State Department of Forestry. Usually, the counties receive 75 per cent of the gross revenue from the lands as forest products are removed. The balance is credited to

the state forestry development revolving fund. A total of 532,762 acres of forest land has been transferred to the state by the counties. In addition, the state has purchased 83,228.97 acres of forest land to block out the land acquired from the counties. The State Department of Forestry administers a total of 687,218.44 acres of state forest lands; the state forests include the land acquired from the counties and the land purchased to block out the state forests. The remaining 70,000 acres is referred to as school land. The school land was acquired during the decade 1920 to 1930 by an exchange of school lands within the national forests for a solid block of national forest land. The school land is located in northern Coos and western Douglas counties. (76, pp. 23-25)

Lack of Forest Credit: In 1945, the Coos Bay Lumber Company arranged for a \$2,000,000 bank loan with interest at three per cent per annum on the unpaid part of the loan. Repayment was to start in 1946 and be completed in eight years. During the same year the Oregon American Lumber Company bought a tract of timber from a realty company for \$1,426,540. Over \$400,000 of this loan had been repaid by the end of the year. The balance of the loan is to be repaid in ten years at four per cent interest. (85, p. 29)

Most operators are too small to borrow on terms as favorable as the cases cited. As a rule, commercial banks seldom make loans to timbermen except for equipment needs. Credit facilities for forestry are very inadequate today. Proposals have been made for a forest credit system patterned after that provided for agriculture by the Federal Land Banks.

The development of a satisfactory forest credit system may be partially dependent on the progress made in providing forest fire insurance. In 1945, an insurance company offered a blanket policy to west coast timbermen. The companies offered to write the policy if timber owners would list at least 2,000,000 acres of forest land. The initial premium was to be one and one-half cents per acre. Indemnity was to be paid to the extent of \$10.00 per acre for each acre burned in excess of 50. The plan was not placed in operation because the 2,000,000 acres of forest land was not listed. (85, p. 30)

In the future a rate structure by forest regions, forest types and age classes may be such to enable private insurance companies to make a profit and still offer forest fire insurance at attractive rates to timbermen. Government-financed forest fire insurance programs have been suggested. Insurance against fire losses would tend

to lessen the importance of fire as an obstacle to sustained-yield forestry and lessen the number of ownership disruptions due to fire. At the present time, the only means the timberman has of recovering fire losses is by salvage logging.

Farm Forestry

Approximately 40 per cent of the area within farm boundaries in western Oregon is in some type of forest cover. Some of the oldest and best stands of Douglas-fir are found in the farm woodlots of western Oregon and western Washington. Forest surveys have shown that western Oregon woodlots average 35,000 board feet per acre. The average yearly value of products used and sold has been estimated at \$2,700,000. Products marketed include saw logs, fence posts, small round products, fuel, pulp, piling, poles, Christmas trees and medicinal herbs and roots. (60, p. 3)

Managed farm woodlots have shown a profit on a demonstration project in Clackamas County. The forestry enterprise fits in well with the other farm enterprises to provide full-time employment. The profits from farm forestry are determined largely by the extent the farmer does his own woods work and the degree to which forest products are processed on the farm. Some operators have found it profitable to have their logs custom sawed by a portable saw mill.

Farm forestry is relatively new in Oregon. It had its beginning with a farm forestry demonstration project in Clackamas County in 1940. Very few of Oregon's farm woodlots are under intensive management at the present time. Landstrom (46, p. 351) in his study of farm woodlot utilization in the Douglas-fir region found that a major obstacle to the management of farm woodlots was the lack of interest of the farmer in growing a timber crop. Fergerson (24, p. 30) in his study of the Clackamas County demonstration project concluded that the lack of information, interest, financial stability and suitable markets were the major obstacles to the development of forestry as a farm enterprise.

Oregon has a program underway which is designed to attack the long-range problems confronting farm forestry. A Farm Forestry Committee composed of woodland owners has been appointed to study the problems of farm forestry and present its findings and recommendations at a statewide economic conference to be held in March, 1952. The Farm Forestry Committee has been divided into sub-committees. At a meeting of the Production Sub-committee attended by the writer in April, 1951, the need for land classification, the lack of forest credit and the encroachment of alder and brush were discussed. These are three major problems confronting the woodlot owner in establishing and growing timber.

The work of the Farm Forestry Committee and the State Forester's office offer the best means of getting the farm woodlots on a sustained-yield basis. Their work is made extremely difficult because of the lack of interest on the part of the farmer and the high prices which are causing premature liquidation of the woodlots.

(71, pp. 1-3)(72)

Wood Utilization

Closer utilization in harvesting and in processing adds to the value of the tree crop and thereby encourages better forest practices. Private companies, trade associations and state and Federal agencies are encouraged in research to utilize low-value species and the residues of harvesting and processing now burned as slash or mill waste.

The Oregon Forest Products Laboratory was created in 1941. Since 1947, a severance tax has been levied to provide adequate research facilities for the laboratory. The laboratory conducts research in the chemical utilization of wood and wood technology. In addition, the laboratory has an industrial service section which disseminates information. Other work of this section includes studies of communities which have an economy based on the utilization of forest products. Such studies are designed to assist the communities in making needed adjustments. (6, pp. 4,10-13)

For some time a change in logging methods has been progressing from donkey engine and railroad logging to crawler tractor and truck logging. The more flexible and mobile equipment has made it possible to practice closer utilization. Prelogging and relogging operations have been conducted by some timbermen. Specially adapted and smaller equipment is used for the successive logging operations on the same area. Salvage logging has recovered downed timber and fire-killed timber. There are indications that more horses will be used as more second-growth timber is cut. (34, p. 38) (3, pp. 68-69)

Vertical integration of forest industries has made closer utilization possible. Some of the nation's largest forest industries can utilize 70 per cent of the entire tree, stump excluded. In some cases second growth Douglas-fir timber has been removed to the point where further removal would necessitate utilization of the little that must be left to prevent soil depletion and erosion. (1, pp. 104-106)

Utilization must be economical. Some of the products manufactured by forest industries have a low value. Regional markets are limited and wider distribution is restricted by high transportation costs.

THE CONSEQUENCES OF THE MISUSE OF CUT-OVER LAND

The Inter-relationships Between County Government and Land Use

No precedent existed for the counties of western Oregon to follow when they were faced with the problems which arose due to tax delinquency during the depression. County governments lack the clear-cut divisions between functions that higher levels of government have. A further handicap to efficient county government arises from the fact that many county officials have not had the training their positions demand in times of economic stress. During the depression the inefficiency of county governments contributed to the increase in tax legislation. To some extent this inefficiency can be credited to faulty tax legislation. Some of the causes of increased tax delinquency were due to the following practices: (1) inefficient methods of tax collection (2) remission of interest and principal on delinquent taxes and (3) the inability of the counties to take title when it was the owner's intent to abandon the delinquent land.

Property tax laws were changed a number of times in an attempt to reduce the volume of delinquent land. The effects of the changes in legislation in reducing tax delinquency cannot be isolated from other factors

contributing toward that end. The changes in tax laws probably did encourage payment of current taxes and a part of the back taxes. (22, pp. 6-9)

There was some variation in the combination of circumstances which led to increased tax delinquency in the various counties. Most of the merchantable timber had been removed from Clatsop and Columbia Counties before the depression. The total assessed valuation in these two counties in 1939 was only one-half that of 1925. In Coos County, logging was not in an advanced stage and total valuation changed very little from 1924 to 1939. However, changes did take place in the composition of the Coos County tax base. Forest values declined while agricultural values increased slightly during the period from 1924 to 1939. The classification of approximately 80,000 acres of cut-over lands as agricultural land accounted for the slight increase in agricultural values. Fear of an increased tax burden on farm lands motivated farmers to take action to have tax delinquent cut-over lands returned to the tax roll as grazing lands. County governments in seeking to broaden their tax base have, at times, encouraged uneconomic settlement which has added to the county's financial burden. (83, pp. 76-78)

The efficiency and economy of county government influences land use through taxation. For this reason county governments constitute a major problem of rural life. During depression years taxation became a common ground for cooperation. But for the most part individuals have not had, as yet, a sustained interest in improving county government per se. Numerous proposals have been made in Oregon to consolidate counties. Other states are also concerned with this problem. There are a few instances of county consolidation in the cut-over regions of the Lake States. The antagonism of the local political machine has been an important factor in preventing consolidation.

Economic Results of Isolated Settlement

School Costs: In 1937 Reynolds (68, p. 42) found that isolated settlement contributed to excessive school costs in Tillamook County. The highest annual cost per pupil for the county was \$177.12 and the lowest \$18.04 per pupil. In Coos County the corresponding figures varied from \$246.00 to \$25.00. (56, p. 34) A study was made of 40 isolated settlements in Coos County to determine the costs of such settlement to the county. The study revealed that taxes paid by the isolated settlers were approximately equal to the excessive costs for schools caused by the isolated settlement. This meant the

isolated settler received a subsidy equal to the usual costs of school services plus the increased costs of government services occasioned by the isolated settlement. The Coos County Land Use Committee recommended that about two hundred isolated settlements should be discontinued. All of these settlements were within a forest area. (83, pp. 134-136)

The two fundamental factors which brought about small schools and the social situation in which they operate were the low density of the population and transportation difficulties. Modern means of transportation and improved roads have removed the need for many country schools. A larger school can provide an effective teaching staff, develop a satisfactory physical plant, build an adequate curriculum and carry on a desirable extra-curricular program. Usually the annual cost per pupil decreased as enrollment increased. Consolidation of schools has been in process for some time, but the necessity of providing transportation for the children of the isolated settlers to the consolidated school is a burden to be borne by either the tax payer or the settler. Oregon school districts are not obliged to provide transportation, but they may vote to do so.

Costs of Roads: The entire cost of roads cannot be charged against isolated settlement. The roads are often

needed for fire protection, logging operations and recreational purposes. However, if it were not for the isolated settlers the roads could be maintained as summer roads. The rough topography and high rainfall necessitate more expensive construction for year round roads. The demand for year round roads by isolated settlers can usually be attributed to the presence of school children in the community. Not all isolated settlements are served by good roads. If children are present in such areas, separate schools may have to be maintained. Operation of the school during the summer months has been done where transportation could not be provided during the winter.

A large part of the cost of isolated settlement is borne by the timberman. The cost of road upkeep and school upkeep falls more heavily upon him. The timberman may have to pay more for fire protection because of the scattered settlements. The isolated settler bears very little of the total monetary cost resulting from isolated settlement. Where continuous supplemental employment is available near the area of settlement, the settler can make a living of a sort; without continuous employment, the settler in isolated areas usually either abandons the "stump" ranch or else depends on public funds for support. Most of the 40 isolated settlements studied in

Coos County did not have the resources to permit the development of economic livestock units. Too often the isolated area did not have sufficient cultivated land to raise the necessary winter feed even though land suitable for grazing development was nearby.

Services: The services of the county agent, county nurse and other public officials are supplied to the isolated settler at excessive costs to the public if such services are supplied at all. Often electrical power and telephone service are not available. Further inconvenience and expense are incurred when the settlement is not located on the road traveled by the rural mail carrier, the milk truck and the school bus.

Sociological Results of the Misuse of Cut-over Lands

The availability of "cheap" cut-over lands and other raw land has been responsible for the establishment of many submarginal farms. It was estimated in 1935 that 5,000 to 6,000 farms in western Oregon were problem farms, submarginal as full-time self-sustaining units. Most of these submarginal units were "stump" farms or farms in "shoestring valleys". Some people were left stranded on such farms when logging operations migrated and left them without off-the-farm employment. Other individuals settled on isolated tracts of cut-over land because they liked to live apart from society. (11, p. 10)

The scattered settlements usually have a shifting population; the community has no identity. Although the population may become stabilized, the community will remain under-organized until community consciousness is achieved by the recognition of common needs such as roads, schools and fire protection.

The social costs of uneconomic settlement are high. Such settlement is particularly undesirable from the standpoint of the opportunities available to the settler's children. In order to give their children the opportunities available to children in more populous areas, the parents deprive themselves of needed medical and dental attention as well as farm equipment which would make their work easier. The level of living is adjusted downward, and the opportunity, if such exists, for bettering their lot is foregone.

Misuse of Cut-over Land and Damage to Site Quality

It is difficult and costly to re-establish forests on cut-over lands abandoned by stockmen and settlers. The site quality of the land is lowered for forest production by the practice of burning to maintain the land in grass. The extent of damage done by burning depends on the nature and amount of fuel available. The soil may not be damaged if the heat is not intense. If the soil temperature becomes too high, soil bacteria and

organic material will be destroyed. The degree of injury is influenced by the amount of soil litter, air humidity, wind velocity and soil moisture. Frequent burning increases the possibilities of low fertility and soil erosion resulting from the high rainfall of western Oregon. The watershed may sustain permanent damage if increased run off occurs. The practice of burning has also led to the destruction of adjacent timber stands which would have been a source of seed for abandoned cut-over land. (58, pp. 32-34)

Misuse of Cut-over Lands and Joint Land Use

Consideration must be given to recreational, wildlife and watershed values in determining the best use of forest land.

Recreational values: Motoring through forest areas is the form of forest recreation available to the greatest number of people. Approximately 16 per cent of western Oregon state and Federal highways are bordered by stands of old-growth timber. Most of the saw-log size timber along the highways is privately owned and very accessible for logging. Cut-over land has very little recreational appeal to the motorists. However, the hunter might argue that cut-over lands provide forage for game animals. There is evidence that timber has been burned in western Oregon in recent times to provide forage for game animals

just as the Indians used to do in the Willamette Valley. The state of Oregon has been slow in taking action to reserve roadside timber from cutting. With the exception of the streams and lakes and the old-growth forest along the highways the low-altitude forests of western Oregon offer little recreational appeal. The dense growth of brush and young timber makes travel by foot too difficult for the recreationists. (3, pp. 117-118)

The high-altitude forests are mostly publicly owned. The low-altitude forests are mostly privately owned; frequently these forests are posted against trespass. The high-altitude forests have greater recreational appeal and less timber production value than the low-altitude forests.

Most of the conflict which exists between recreational and timber production can be resolved. The demand for recreational facilities has increased in recent years. The interest in winter sports has tended to lengthen Oregon's tourist season. (79, pp. 10-12)

Wild Life: There is a close relationship between the amount of good big-game range in heavy forest type in western Oregon and the area of land cut-over during the past twenty years. Deer and elk concentrate their feeding on cut-over areas to the detriment of conifer reproduction. One animal unit (1000 pound base) is

equivalent to 2.37 elk or 10.28 black-tailed deer. The figures indicate that the production of elk in western Oregon may prove to be too costly because the game habitat is limited and the hunting intensity is high.

(54, p. 27)

The relationship which exists between animals, trees and forage plants is almost infinitely complex. A research program in forage and forest production should provide for a thorough study of all the predominant organisms in the biota and their environment. This is a goal that has not been achieved by the experimental work on the grazing of cut-over lands. Improved wildlife management is needed to ease the conflict that exists between wildlife, grazing, timber production and other forest land uses.

Watersheds: Considerable stands of old-growth forests and the abundance of vegetation which covers the deforested lands in a period of two or three years render the protective function of forests in the Douglas-fir regions less important than in many other parts of the nation. It has been estimated that 20 to 30 streams west of the summit of the Cascades cause \$1,000,000 to \$2,000,000 or more damage each year. (3, p. 76) The danger of damage to the watersheds will increase as more and more steep slopes are logged-off. Modification of

forest practices in respect to clearing, cutting and slash-burning will be necessary to reduce run off. Very little study has been made of the relative effectiveness of various forest types or of forests compared to grass in reducing run off in the watersheds of the Douglas-fir region. The occupancy and use of forests has been restricted in respect to the watersheds of several streams supplying water for municipalities.

THE DEMAND AND SUPPLY FOR WOOD AND MEAT

For the nation as a whole the ratio between the saw-timber growth and timber removal was 1:1.53 in 1944; this same ratio was 1:1.49 in 1936. (2, p. 6) Western Oregon forests are being overcut at the present time; this is particularly true of second-growth stands. However, the desirable cut in western Oregon does not depend on the current annual growth, because considerable over-ripe timber is available for cutting. The rate of decay exceeds the rate of growth for such timber. Over-ripe timber sustains an annual net loss of wood and should be cut to spare the younger stands. Other considerations such as watershed protection and recreational needs should spare the over-mature forests from too rapid or complete liquidation. Most of the old-growth timber is publicly owned. Access roads may be constructed to the inaccessible mature timber in the near future. (15, p. 4) Western Oregon cannot maintain its present annual timber cut on a perpetual sustained-yield basis. The timber cut for western Oregon was approximately 6.3 billion board feet in 1948. (57, p. 5) Kirkland (45, p. 11) has estimated that the Douglas-fir region with no change in the present degree of utilization or Federal control would support an annual cut of 5.7 billion board feet perpetually if all timber were managed for sustained-yield. However,

Kirkland pointed out that great opportunities exist for increasing the yield by thinning young stands, "re-logging" slashings and salvaging over-ripe trees or stands.

The long-time demand for forest products has been downward. This is true in respect to both per capita consumption and total consumption. However, in recent years the demand for forest products has increased because of the increase in population and incomes. In the future, the use of wood in its crude form is expected to decrease. That is, lumber and fuelwood will decline in importance and the refined products such as pulpwood, plywood and chemical products will increase in importance. This change in the composition of the demand has been active for sometime. Approximately three-fourths as much lumber was produced in 1937 as in 1899, but pulpwood production in 1937 was five times above the 1899 figure. However, lumber still constitutes the principal demand for wood. The demand for wood products taken as a group is elastic. Lumber has an elastic demand but pulp has a relatively inelastic demand.

(12, p. 227)

Wood should have a long-run advantage over most non-renewable competitors. However, the raw materials for making aluminum and glass are plentiful. Glass, aluminum

and agricultural and industrial wastes are long-range competitors of wood. Evidence seems to indicate that wood can meet its competition in respect to service and quality. Wood competes primarily on the basis of price. The prices of competing products made from different raw materials tend to be set by the lowest priced product. Forest products can only command the market where they are cheaper or better adapted to specific uses. It is expected that Douglas-fir lumber prices will rise relative to the price of second-growth timber in the South and elsewhere and, also, in relation to general commodity prices. However, as less virgin timber remains, producers and lumbermen in the Douglas-fir region will have to rely more on their ingenuity in producing and selling forest products instead of depending on high quality lumber and plywood to offset transportation costs to Eastern markets. It is expected that Oregon and Washington will carry the brunt of the nation's timber demands until the Northeast and Southeast achieve a higher status in the national forest economy. Oregon is expected to play a more important part in this transition than Washington. The Douglas-fir region accounts for about 30 per cent of the nation's lumber output and 40 to 60 per cent of the export trade. At the present time, the United States is a net importer of forest products.

From a long-term future point of view, the Forest Service expects the forests of the nation to produce more wood than the nation will require, even though the long-term future demand is expected to increase. (78, p. 165)

If this actually occurs, the price of stumpage will decline. However, for the next two or three decades the price of mature stumpage should remain high and size will continue to be a criterion of quality.

Oregon is a surplus producer of beef cattle and sheep. Most of the surplus is shipped to California and Washington, which are deficit areas in the production of both cattle and sheep.

The national per capita consumption of meat declined 10 per cent from 1909 to 1944. The low point was reached in 1935 when annual consumption fell to 117 pounds per capita. Usually the per capita consumption of meat in the west is about 17 per cent above the nation's average. In recent years the consumption of meat has increased at approximately the same rate as the increase in population. (82, p. 49)

The number of beef cattle has been increasing in Oregon in recent years but sheep numbers have declined. It is expected that Oregon may experience some increase in total animal units of range livestock in the future.

The expansion of Oregon's livestock industry is primarily dependent upon the improvement of pastures and ranges; increased volumes of good low-cost roughages, especially in western Oregon; improvements in marketing and the agricultural production policies of the Federal government.

As the population of the United States, and particularly the Pacific Coast States, continues to increase, the demand for beef and sheep products in Oregon can be expected to increase in relation to other commodities.

DISCUSSION

The margin between timber production and livestock production has shifted to a higher plane during the past two decades. This is true in respect to techniques as well as economic conditions.

The pre-depression years served as an incubation period for many of the innovations which were introduced during and since the depression to modify the relations of forest and livestock production to the cut-over land problem.

The development of grasses and legumes adapted to forest soils has acted as a major innovation for livestock enterprises utilizing cut-over lands. The construction of highways in the southern coastal counties and the consequent development of truck transportation during the 1930's was another factor which has facilitated the expansion of the livestock industry on the cut-over lands. The emphasis on land classification during the depression years has had many ramifications of an economic and sociological nature. Land classification work subsided during the war but interest in this field is now reviving.

Innovations in the forest products industries and in timber production have been frequent and spectacular.

The development of harder metals has made it possible to produce better cutting tools and other mechanical equipment making great accuracy possible. Lumber is now cut close to the required thickness without so much allowance being made for subsequent processing. The use of thinner gauged saws made of the new metals has reduced the volume of sawdust. New glues and laminating methods now permit the utilization of wood which was formerly burned. In the forest replanting, reseeding, legislation requiring that seed trees be left and the changes in methods of cutting and logging are part of the program designed to help nature grow trees.

The succession of changes which continue to occur in forestry and in livestock production result in a shifting margin between these two alternative uses for the cut-over lands, since the margin is determined by the relative profitableness of the competing uses. However, there are obstacles to changing land uses as the margin shifts. The present need for income and the risks of uncertainty of future returns place an income which is deferred for many years on an entirely different basis of estimate than an income which can be obtained in a matter of months. It is desirable that shifts in land use result in better distribution and stability of income. The amount and type of employment that is

associated with each alternative use and the size of the operating unit that can be established under each alternative use are considerations that are important to society as well as to the individual. Cost comparisons must measure the direct and the indirect benefits of each alternative use. The income must be sufficient to maintain adequate social institutions. The goal is to maximize social net returns.

The income derived from an enterprise yielding a present income can be compared with an enterprise yielding an income in the future by obtaining the present value of the future net returns for each alternative land use. Data needed for this analysis of incomes includes an estimate of the physical qualities of the cut-over land for timber and livestock production. Estimates must also be made of production costs and net returns from the cut-over land in each use. This part of the analysis requires a prediction of the future demand, supply and price relationships for timber and livestock products.

Usually, the same rate of interest is used in making the calculations for timber and livestock production on the cut-over lands. Generally, the rate of interest is approximately equal to the rate of interest paid on government bonds. This rate approximates the pure rate

of interest. The risks of producing timber and livestock products on cut-over lands are not compared. The same rate of interest is used because of the difficulty of determining the appropriate rate of interest for each alternative use of the cut-over land. A low rate of interest approximately equal to that paid by government bonds is used because it is believed that this rate of interest will remain relatively stable over the long period of time required to produce a timber crop.

The comparison of a present income with a delayed income is more appropriate for the individual landowner than for society, because the individual is usually interested in land from the standpoint of one use. The individual usually gives no more than token recognition to the recreational, watershed and wildlife values associated with each major land use. The tools of economic analysis are not complete enough to measure the increment to society in terms of products and revenue which would result from major changes in land use. Also, an accurate measure cannot be made of the possible shift in the distribution of the real incomes of the population affected by major changes in land use.

Work now being conducted by the Forest Service will supply data on the suitability of the soils of the cut-over lands for timber production. This kind of data will

be useful in making land use decisions. Other data needs to be gathered for this same purpose. Input-output data could be obtained from livestock operators utilizing the cut-over lands. Input-output data could also be obtained from operators engaged in logging stands of second-growth timber and from owners of lands in the process of reforestation. As forest management and range management practices change, the data will have to be revised.

Public records could be utilized to determine what the impact of major changes in land use will be on the community. However, data obtained from public records, such as data on tax delinquency, unemployment and relief payments, must be studied in relation to the data obtained from research conducted by the experiment station, and data obtained from the experiences of operators on the land. This form of analysis considers socio-economic data and the technological variable.

There are practical and theoretical limitations encountered in comparing the income from a timber enterprise with an income which can be obtained from a livestock enterprise in a few months. However, a comparison of the present values of expected future net returns from each alternative land use may be used as a guide in determining which cut-over lands should be used for livestock production and which cut-over lands should be used for timber production.

CONCLUSIONS

The cut-over land use problem is not static. Some of the factors which influence land use policy decisions change with time, but others remain constant. The factors which influence land use decisions for western Oregon cut-over lands include climate, topography, elevation, soil conditions, the extent of fire hazard, recreational and scenic values, access to roads, availability of supplemental feed for livestock, the availability of school facilities and other public services, and the effect the change in land use would have upon the income of individuals as well as the income of the community. The physical factors and the sociological factors have economic implications which are reflected in present and future costs and returns to both the individual and the community.

Much of the cut-over land is too steep or otherwise not suitable for grazing use. As logging operations proceed into the remote areas, it is not expected that much of the logged-off land will be suitable for grazing use, for both physical and socio-economic reasons.

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