SEEDING CERTAIN CUT-OVER LANDS OF NORTHWEST OREGON FOR GRAZING SIMULTANEOUSLY WITH REPRODUCTION OF TIMBER

By

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Seeding Certain Cut-Over Lands of Northwest Oregon for Grazing Simultaneously With Reproduction Of Timber

By

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Approved:

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Professor of Forestry
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R.E.K.
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INTRODUCTION

With the cutting out of a great majority of timber in Northwest Oregon and the southward movement of the lumbering industry, the question has been asked: "What can be done with the cut-over lands to insure economically sound utilization?" This paper is being written to reach some reasonable solution to the problem. Upon investigating the problem it has been found that it overlaps into the fields of both Agriculture and Forestry.

The typical land owner of this area is particularly interested in getting his cut-over lands back into production again, that is if he has complied with the Oregon Reforestation Act. Otherwise he most likely chooses to let it revert to the county through tax delinquency, for he cannot afford to replant it to forest trees by artificial means and wait for the new timber crop to mature.

If he does keep it, there must be some yield from the land to pay his taxes whether it be from grazing, farming, bee-keeping or poultry raising. The production of forage crops for livestock grazing appears to offer a means of obtaining immediate return from these lands. A small part of the lands in question is of such character and so situated as to make it suitable for this type of use.

The remaining area, while used for either watershed, mining, recreation, fish and game, is primarily a forest area. It should continue to be so used and, if properly handled, produce an annual increment which would balance the annual cut of saw timber under an approved forest management plan.
Reasonable deduction shows us that the northwest area of Oregon is one of the best, if not the finest timberland region, in the United States. Its climate and soil characteristics make it such. With this in mind, the Oregon Agricultural Experiment Station has set up an experimental area in Clatsop County known as the Northrup Creek Experimental Area. Research is being carried out on various methods of grazing, forage cropping and beef production. The Agricultural Experiment Station of Washington has set up a similar project in that state.

While favorable results have been achieved by these experiment stations insofar as the utilization of these lands go, it is readily apparent that grazing should not be extended for a period longer than seven to ten years. The value of the land for timber growing very definitely outweighs its grazing value.

It is interesting to note that the Clatsop County Land-Use Committee made the recommendations for the Northrup Creek Area to be established, and in the same year (1936), it was carried out. Thus it can be seen that the public is concerned, especially since it is so vitally affected by the economic situation presented, resulting from the vast areas of non-productive cut-over land. Nature has given it to us clothed with forest trees -- these we have consumed, now a way must be found to derive the most good from the land while awaiting a new timber crop.
Financial Returns: The grazing income in a Coos County survey shows a five per cent return on the investment in the less profitable areas and an average of eight and three-tenths per cent for the entire survey. The average cost of establishing grazing operations was $33.00 per animal unit (one cow, five sheep, or five goats), with 0 to $5.75 per acre for slashing; 0 to $2.00 per acre for burning, and fencing at $0.63 per rod for barbed wire alone, or $0.90 per rod for woven wire with two barbed wires. The average cost of a desirable seed mixture on a twelve pound per acre basis, as determined in seeding the Northrup Creek Area, was $1.59 with the seeding cost at $0.40. (3)

The average farmer or land owner in the problem area probably has some portion of his holdings in timber. He is wondering just what he will do with it after it has been logged. The cost of clearing the land of stumps is very high when conversion to agriculture is in mind — perhaps the land is hilly or slopes greatly which would affect the holding of his soil.

The small land owner cannot afford to operate his land on anything but a strictly maximum profit basis. The high return from timber today looks fine. But after he harvests his timber crop and considers further use for his land — the desirability of quick returns may push long-term investments out of consideration.

Yield tables show that his financial return will be higher up to a certain point, the longer he holds onto his timber crop. Meanwhile
the rest of his land must be paying for the taxes on this growing crop of trees.

If he plants it to range grasses he will derive an annual income off this land by grazing either cattle or sheep. Experiments report a return of from 45 to 100 pounds of beef per acre and gross returns of $9.50 per acre per year on sheep grazing these planted cut-over lands. (1)

Soil Improvement: A large part of the soils of this area is the Red and Yellow podsols. These are strongly leached clays, acid in reaction, and highly productive. Unplowed land of this type is mostly devoted to timber, with grazing secondary. Another type is the Gray-brown podsols. These are of little range importance, and are formed under heavy precipitation and leaching. The brown surface layer is high in organic matter but shallow. It is underlain by a light-colored gray subsoil. This soil is easily eroded and unsuited to cultivation. (11)

Stephenson, (20), Soil Scientist of the Agricultural Experiment Station of Oregon, says:

"The hill lands of Northwest Oregon are commonly deficient in active humus content. Hill lands as contrasted with bottom soils are often shallow — they are also acid and deficient in minerals generally. This poverty of the soil makes it all the more difficult to grow crops that renew humus."

It has been found that legumes not only renew this organic matter, but they are very effective in improving the physical conditions of the soil. The average organic matter in forest soils of Northwest Oregon is as follows:
Humus conservation and soil conservation are closely related problems. Erosion is a major cause in humus depletion. It exposes the raw sub-soil by taking top-soil and humus together. Thus it is seen that by legume seeding, the land owner is encouraging new forest reproduction -- for the soil becomes loose and easily broken. This is particularly valuable on the heavy soils of cut-over lands.

The accumulation of ash resulting from the burning of large quantities of material left on the land after logging and burning has a definite favorable effect in temporarily reducing the soil acidity of the surface soil and increasing availability of plant nutrients. The persistence of a grass stand is dependent largely upon the amount of ash left on the soil and the ability of these particular grasses to tolerate the unfavorable soil condition and compete with the native species.

In plant succession, the general movement of forest toward the climax is closely related to the gradual changes which take place in
the soil profile. Wilde (8) reports:

"Soils are subject to progressive weathering and in a long run tend to increase their colloidal content and water-holding capacity. The accumulation of humus and podsolization of the soil have a similar effect on the distribution of species since both of these processes have a tendency to increase the water-holding capacity of soil."

It has been found after studying a number of forest stands, that soil has been a dominating influence upon the rate of forest growth. This gives the land owner in this area all the more reason to look to his soil for the best support of his potential timber crop.

The soil of cut-over or burned-over lands has no protection from wind and the rays of the sun. Lacking the protective layer of forest litter, their available nutrients are soon leached away by rains. With these conditions, only fine soil material is left, and successful seedling survival is doubtful.

Fire Protection: Benefits to the forest resulting from the use of the range may often offset the slight damage done by regulated grazing. These benefits may consist in direct aid to forest reproduction or in lessening the danger of serious fires. The most important benefit to the forest which can be attributed to grazing is the reduction in quantity of inflammable ground cover and the consequent decrease in fire hazard. While it is not probable that the number of fires can be reduced in this way, intensity, size and amount of damage done is bound to decrease with a decrease in the quantity of fuel on the ground. Light or moderate grazing does not remove enough of the cover to stop fires, but may considerably reduce their heat and rapidity of spread and make them easier to combat.

Repeated burns result in soil impoverishment and slowing up of the successional process of the secondary vegetation and forest regeneration. Damage to timber reproduction and other forms of vegetation on
cut-over areas by any form of grazing use can be greatly offset when compared with the loss of seed trees, seedlings, and other plants caused by recurring fires. (9)

Howell (18) of the John Jacob Astor Experiment Station, Astoria, Oregon, has this to say about fire hazard reduction:

"Grass planted to this land has been very successful in reducing fire hazard -- if it is grazed. It is not good practice to plant grass and never graze it, for the fire hazard becomes just as serious then as before planting."

The forest fire protectionist often regards grasses as a "flash" fuel type; however invariably these are wild grasses and weed plants and not planted grasses of the type recommended for interim grazing in this area. The essential thing about fire prevention is to keep the causative agents away from the potentially dangerous fuels -- this would be the land owner's responsibility.

Full Utilization: Use by livestock of the naturally produced forage on cut-over and burned-over lands during the early and critical period of restocking is one important method of reducing fire hazard. At the same time a secondary forest product can be converted into valuable animal products; otherwise it merely becomes a liability. Utilization such as this may enable production of enough revenue which can in turn be used to pay protection costs, interest charges and taxes until such time as another crop of timber can be grown and marketed.

To get to this ideal level in the Douglas-fir region, the correct grazing-management principles must be developed to assist with reforestation on cut-over and burned-over lands. At the same time that the fullest grazing is being carried on, palatable vegetation must not be utilized to the point where it permits the encroachment of less palatable species or those more inflammable. The point at which
utilization conflicts with forest regeneration is not fully understood even today. The chief problem seems to be how and when to use the range.

Figure 1

Farm-Forest Economy, N. W. Oregon

Courtesy of U.S.D.A. Soil Conservation Service
CHAPTER II

GRAZING

Grasses: Desirable stands of grass are obtained from seed mixtures which include a long-lived sod-forming grass, a bunch grass and a legume. Seed selection should be discriminatory as to quality, quantity and place of origin.

The following was taken from the Progress Report of 1943: (1)

"Years have elapsed since first seedings were made and the better of these plantings have steadily shown improvements in stands and definite control of native species. Of the original grasses planted, those which have shown the longest life include: Astoria and Highland bent grass, Chewings fescue, Alta fescue, New Zealand Akorora orchard grass, and English rye grass. Creeping red fescue was found to be more palatable than Chewings.

"Kentucky blue grass, timothy, and domestic rye grass are very short-lived and did not thrive possibly because of the high acidity in the soil."

Field observations show Astoria bent (Agrostis tenuis Astoriana) to be persistent, thick, and a good sod builder. It produces some seed every year. Highland bent (Agrostis tenuis) is similar to the preceding. Chewings fescue (Festuce rubra commutata) is persistent on poor soils but good for bracken control. Creeping red fescue (Festuce rubra arundinaceae) is better than the preceding in that it fills voids in the soil. Alta fescue (Festuce elatoir) is persistent on poor soil, stays green longer under drought conditions, and makes quick regrowth after being grazed off. Cattle and sheep like it.

Legumes: It has been found at the Northrup Creek Experimental Area that (Lotus corniculatus), a deep-rooted perennial legume, is one of the most promising legumes for these acid soils. However care must be used in securing the proper strains as this plant has many variations. This
plant becomes established slowly and requires its own special inoculant, is very palatable, yields heavily, long-lived, stays green all summer and fall long after the grasses have ripened and turned brown. Commercial seed sources for this plant are not available.

It was also found through experiments in this same Area that (Lotus uliginosus) thrives in moisture, has shallower root habit, vigorous spreading root stock enables it to stand competition. This latter point would make it very desirable for fern-lands, but it does require its own inoculant. (1)

Range-seeding Costs: The average cost of a desirable mixture on a twelve pound per acre basis as determined in seeding the Northrup Creek Area was $1.59 with the seeding cost at $0.40.

Livestock Management: Experiments made at Northrup Creek have shown some very favorable results as far as yield from grazing on cut-over lands are concerned.

The yield of beef on seeded pastures has varied from 45 to 100 pounds per acre depending upon kinds of grasses planted, the slope, exposure, depth of soil and the type of cattle grazed. An average return of 80 pounds of beef per acre with an average gross value of $8.00 may be expected from areas of average contour when seeded to recommended grass and legume mixtures. Beef cattle may be expected to graze normally about 8 months of the year, and if full growth of grass on some pastures is reserved for winter use, the amount of supplemental feed may be cut in half. Winter feed requirements for cows carried in feed lots average one ton of hay per head at an average cost of $10.00. For cows wintered on range and fed supplemental hay in sheds, the requirements are one-half ton of hay per head.
Cows with calves have maintained their weight on the average during the entire nursing season -- and there has been no loss in weight during the summer and fall. Yearling and two-year old heifers without nursing calves have gained an average weight of 235 pounds during an average grazing period of 214.5 days.

The returns from grazing beef cattle have been better than the returns from sheep when all factors are considered.

The returns from grazing sheep are more difficult to compute than those on beef cattle. This is largely due to lack of facilities and labor for making checks. Grade Romneys bred up from fine and medium wool types by the use of purebred Romney rams were used. On the average, a lamb crop of 85 per cent has been marketed. These lambs born during March have weighed from 65 to 75 pounds by October 1st, and classed as feeder lambs. The reason for not having fatter lambs is due to either insufficient legume in the pasture or the Romney strain may be slow maturing.

Wool production has averaged 9 pounds for the ewes and sold for an average price of 43 cents per pound. One acre has provided sufficient pasture for a ewe and lamb for an 8 months pasture season. Gross returns per acre have averaged $9.50 per year. However it has been definitely found that sheep damage conifer reproduction more than cattle.

Angora goats are a help in the control of brush and native plants. Without goats, vine maple would become a "weed" menace to the range.

Range Management Practices: Many logged and burned-over forests in the Northwest have reverted to chaparral, which sometimes furnishes grazing where the brush is not too dense. Species of Salix, Alnus, and Acer are important forage species. Many grasses and forbs occur as an understory to the chaparral where it is not too dense. Seeding burned forest
immediately after the fire gives promise of good results.

Most important among the factors that determine the best kind of stock for each range are: topography, amount and distribution of water, character of vegetation including timber reproduction and economic factors. Cattle graze level to hilly land best. Observations on mountain ranges indicate that often only half the acreage is used by stock, whereas the flats are overgrazed. Maximum slope upon which cattle may be expected to graze is practically impossible to designate. Length of slope, character of the vegetation and distance from water will determine this more readily. Sheep of course are better adapted to grazing steep terrain. Under control of a herder they can be encouraged to graze steep slopes.

As to water, cattle can more effectively use small springs for water than sheep, which require large water holes. Cattle are regarded chiefly as users of grass, although they like shrubby plants as well. Sheep prefer shrubby plants and eat grass more fully when it is young and green.

In forested areas, the presence of tree seedlings may be important in determining the kind of stock. Consideration of the inter-relationships of timber and forage produced on the same area is necessary. (17)

To determine the advisability of grazing forests it is necessary to: 1.) Evaluate the forest resource compared with grazing; 2.) understand the relation of each to society, and 3.) discover the extent to which each use is incompatible with the other.

Conifers are not highly preferred by livestock, but certain deciduous trees such as aspen is grazed readily. Damage to young timber varies with the kind of stock grazed. Sheep and goats are the worst offenders. Trampling is the most serious offense, with browsing necessarily repeated to cause permanent injury. Sheep are more likely
to congregate and trample seedlings.

The amount of competing vegetation occurring on cut-over or burned over forests may be such as to prevent or impair tree reproduction. Grazing may remove this vegetation — and actually aid tree-seedling growth.

Survival of Douglas-fir in the Northwest was as good on heavily grazed areas as on those fully protected. On moderately grazed areas the survival was 20 per cent greater. Land should be so managed as to give the maximum yield consistent with its conservation. Unless grazing on forested lands causes losses exceeding the grazing income, then forage should be a forest product receiving consideration equal to an equal area of timber. This applies conversely to grazing. (5)

Some foresters have advocated the practice of sheep grazing on cut-over lands without seeding artificially with grass. No investment is necessary for fencing, seeding and the like, and the owner receives a small income while his land is not returning any profit from forest products to him. A year-long residence can be practiced with transient sheep. Fire hazard will be lessened, and if the animals are handled properly, favorable conditions will be secured to put the tree-seedlings off to a good start. Native plants such as fireweed, huckleberry and peavine can be made to furnish forage in diminishing amounts for a period up to ten years from cutting time until forest re-establishment. The crux of the situation is good range management practices. This means regulation of grazing to discourage the browsing of seedlings. (4)

Observations made at the Wind River Valley in Washington to learn the effects of unseeded Douglas-fir cut-over land pasturage on sheep and vice-versa gave some very informative results. A study was made upon level ground, showing better Douglas-fir seedling establishment
within fenced enclosures than on the grazed area outside during the first years of grazing use. Later during years when vegetation inside the enclosures became excessively heavy, seedling establishment was better on the grazed area outside. In localities where the sheep were bedded, cropping and trampling damage to reproduction was noted. Fireweed made up half of the total cover when grazing started, and diminished by half in the first two years of use. (4)

By the second year of grazing and the seventh after logging, palatable plants began to disappear and by the end of another seven years, very little forage of value was left. Ten years is considered the maximum grazing period if natural reforestation is desired and is to be obtained.

Another point of view is taken by Harry F. Hopkins (15) of the United States Forest Service, District Ranger on the Siuslaw National Forest, who has this to say about interim grazing:

"Slash burning converts soil into a soluble ash form. Plants must get started before leaching sets in. Grasses and clovers grow during the first three years following a burn. Grazing is good during this period. The next two or three years finds the grazing decreasing in value, due to the soil converting to semi-acidity, fern starts crowding out the grass. A five or six year grazing period is all which can be expected."

The author has not personally made observations of the Northrup Creek experimental area, but feels that it is a true representation of the Northwest Oregon area. This explains the presence of so much material gathered by the John Jacob Astor Experiment Station at Astoria, Oregon.
Figure 3
Cut-over and Burned-over Lands in Clatsop County, Oregon, Being Grazed by Cattle.
Courtesy of John Jacob Astor Experiment Station, Astoria, Oregon.

Figure 4
Typical Cut-over Lands Planted to Grasses in Clatsop County, Oregon.
Courtesy of John Jacob Astor Experiment Station, Astoria, Oregon.
CHAPTER III

FORESTRY

Investment and Return: Owners of cut-over lands in Northwest Oregon who are desirous of intensive timber cropping usually have two alternatives. Either, 1. leaving more seed trees; or 2. planting to aid the barren areas get started. To leave a good sound seed tree every so often involves an investment. To get full use of the ground space and to produce a second crop of fair quality there should be at least 600 established seedlings to the acre, five years after the slash is burned.

Many of the forest lands of this area are classified as reforestation lands and under state statutes of Oregon are exempt from the ad valorem property tax. They pay a 5¢ per acre flat tax or fee until the timber is harvested. At this harvest time, a 12½ per cent gross yield tax is imposed. The assessed valuation of forest lands not classified under this law range from $1.00 per acre to well over $100.00 per acre, depending upon forest type and cover.

To show just what the average owner could expect as to yield per acre in a fully stocked stand of Douglas-fir, gross saw timber volume of trees 12 inches and over by the Scribner rule of scaling, the following table is presented:
<table>
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<th>Age of Stand (years)</th>
<th>Quality of Land</th>
<th>Excellent Bd. Ft.</th>
<th>Good Bd. Ft.</th>
<th>Fair Bd. Ft.</th>
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</thead>
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<tr>
<td>20</td>
<td></td>
<td>400</td>
<td>--</td>
<td>--</td>
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<tr>
<td>40</td>
<td></td>
<td>214,400</td>
<td>11,900</td>
<td>4,500</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>62,000</td>
<td>42,800</td>
<td>23,800</td>
</tr>
<tr>
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<td>92,500</td>
<td>70,000</td>
<td>45,700</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td>115,100</td>
<td>90,400</td>
<td>62,800</td>
</tr>
<tr>
<td>120</td>
<td></td>
<td>131,100</td>
<td>105,100</td>
<td>75,000</td>
</tr>
</tbody>
</table>

From Hunger (6)

The rate or return on a sustained yield unit of high site III and better land if handled with a cutting operation will yield 3.94 per cent on the investment. The return is lowered to 3 per cent on the investment for lands starting with planting of trees and adding the necessary taxes, fire protection and maintenance. The foregoing figures are based upon a complete operation including logging, transportation and milling.(12)

The initial cost of tree planting as derived from experiments made by the State Forestry Department of Oregon is placed between $10.00 and $15.00. The distance of transportation into areas inaccessible to trucking facilities brings the cost nearer the upper limit of the cost range.

Silvicultural and Protection Aspects: Any method which will reduce natural fire danger by removal of inflammable material is worthy of profound consideration. Use by livestock of the naturally produced forage on cut-over and burned-over lands during the early and critical period of restocking is one important way of reducing fire hazard. At the same time a secondary forest product can be converted into valuable
animal products — otherwise it merely becomes a liability.

Utilization such as this may enable production of enough revenue which can in turn be used to pay protection costs, interest charges, and taxes for 10-20 years until tree crowns close. To get to this ideal level in the Douglas-fir region the correct grazing management principles must be developed to assist with reforestation on cut-over and burned-over lands.

Study of the plants in the early succession stages is important because: 1. Their presence in abundance creates a dangerous fire hazard; 2. Study is essential because the vegetation has possibilities as livestock feed and its use and removal would reduce the fire hazard.

In early successional stages, vegetation is really a nurse crop for the types of vegetation coming later. The density, uniformity, and composition of this early vegetation will cause different grazing-management objectives to be sought. When considering these vegetational changes and the effect of grazing upon them, it is important to remember its influence in: 1. Reducing the fire hazard; 2. Shortening or prolonging the grazing cycle, and 3. Reforestation.

The cutting and removal of Douglas-fir stands and the subsequent broadcast slash burn result in a definite ecological change. Following slash burning, the elementary stage occurs which includes certain mosses. Then comes the first weed stage in which the vegetation is composed of annuals and short-lived perennials. This is rapidly followed by an association of shrub species and seedlings. It is at this time that the area is subject to re-burn to the highest degree. (9)

Fireweed, bracken, and trailing blackberry are the most frequent and abundant species in the first weed stage. They are indifferent to site limitation, such as difference in soil, slope or aspect. Although
only moderately palatable to cattle, fireweed has high value as a forage plant for sheep when it is in full bloom. However, when it is the principal feed, sheep become restless, difficult to manage, and craving a change in diet. (9)

It is known that repeated burns result in soil impoverishment and slowing up of the successional process of the secondary vegetation and forest regeneration. Damage to timber reproduction and other forms of vegetation on cut-over lands by any form of grazing use fades into insignificance when compared with the loss of seed trees, seedlings, and other cover plants caused by recurring fires. (5)

From 1925 to 1927 a series of experiments were run upon the Columbia National Forest in Washington to find the best degree of range use by sheep. It was found that on old cuttings, fireweed was grazed much more closely than upon newly cut-over lands where the fireweed predominated due to the monotony of the diet. Grazing of palatable shrub and tree species such as willow, vine-maple, and blueberry elder was largely limited to that part which could be reached by the sheep. (9)

The grazing of cattle and sheep on logged-off lands of this region has been practiced to some extent for many years. The effect upon the land and reforestation measures has been variable and is not easily appraised. At the present time (1943) there are two categories of grazing upon these lands. One artificially supplements the pasturage by sowing grass seed on newly logged and burned lands — this is done by airplane and hand. The other uses the natural pasturage of browse and weeds which follow normal logging and burning without the planting aids. (7)

Specifically, it is not known what the effect of this grass sowing and subsequent grazing upon Douglas-fir regeneration is. From
observations the indications have been that this type of practice is discouraging to timber reproduction, but seedlings are not necessarily cleaned off. Much has been found to depend upon the sod cover density and the use intensity. It has been proven that a heavy sod is not conducive to good Douglas-fir establishment and trampling of animals where the forage is heavy does great injury to young trees. (7)

On the other side of the picture is seen the lessening of fire hazard which has been one of the propounded advantages of grazing on logged over lands. That is, if the brush is kept in check by both the sod and livestock, then the seedlings may have excellent changes for survival.

Figure 2

Typical Cut-over Area, N. W. Oregon

Courtesy U.S.D.A. Soil Conservation Service
CHAPTER IV

SELECTION OF THE BEST USE OR COMBINATION

Economic and Sociological: In looking over this northwest region of the State of Oregon we find that its cut-over and now forested foothills are dotted with deserted homesteads -- here an economy of grazing has failed. The lands have reverted for the most part to brush instead of forest. By determining which lands are suitable for permanent grazing use with seeded range and those which offer but temporary grazing off the native vegetation, a repetition of the foregoing tragedy will not be repeated.

There is some danger in attempting to maintain grazing on lands chiefly valuable for forest purposes, because it may be done at the expense of forest regeneration by re-burning, overgrazing or slashing.

Certain economic and social factors tend to militate against forest regeneration on seeded cut-over lands. In this practice it is generally presupposed that there will be year-long residence by the owner of this stock and land operation. If he makes a somewhat extensive investment in seeding, fencing and buildings, he will certainly desire the maximum return from his land, and will no doubt practice close utilization. If this small land owner can be brought around to recognize the profits of forestry, perhaps he will use his land more and more for this dual purpose. It must be remembered that the final harvest of saw logs is not the only crop to be expected. Thinnings will net the owner poles, posts and firewood.

Like the Great Lakes States, which were devastated by destructive logging in the nineteenth century, this northwest Oregon area needs a
a definite economic remedy applied to sustain not only its resources but its population as well. This calls for a permanent farm-forest economy, with improved tax assessments, like that of Wisconsin.

An area or region must qualify in three different ways to fulfill the criteria of land use. Under the first, which is physical, we find soil fertility, climate and topography. Under the second, which is economic, we find income value. This includes increase of income, permanence of income, and income dispersion. Under the third and last factor, which is social, recreation, wildlife, watershed and environment are found.

The marginal utility for timber production is determined by distance of the timber from the mill, which in turn affects transportation costs. In passing it should be pointed out that northwest Oregon is within a reasonable radius of both Portland, Oregon, and Longview, Washington -- both important milling and transportation centers.
CHAPTER V

CONCLUSIONS

To summarize, I believe that the practicability of interim grazing is dependent upon:

1. The land owner's desire to participate in a full usage of his land.

2. The access to markets for livestock produce coupled with a steady demand.

3. Accessibility to mills and transportation for forest products.

4. The effect upon society of the surrounding immediate area by such an economy.

In concluding upon such a land use problem we find that only limited areas of former forest land favorable to economic and physical development have a definite place for grazing in their advancement in northwest Oregon. Reclassifying forest land as grazing land entirely does not seem to be conducive to a well balanced economy in this case.

The practicability of seeding these cut-over lands has not been definitely proven due to rapidly changing costs of labor, and also the absence of sufficient samples to be used in order to reach a completely suitable conclusion. We do know that the return on investment has been good in experiments conducted up to the present.

Planting of seedlings upon the lands in this area is good practice insofar that it prevents influxes of undesirable species. On the other hand, it is expensive from the standpoint of the initial investment. The present practice of leaving seed trees on newly logged over lands will allow concentration of improvement forces on areas having no
vegetation or undesirable vegetation. This natural seeding is also best for use with seeding to range grasses for it is much less expensive to plant but one crop on this type of land.

From the protection point of view, a dual use such as timber growing and grazing is very desirable -- that is if the grazing practices are carried on in the correct way. Nothing is so dangerous to the mind of a forester as the presence of flash fuels when the humidity is low. Fern and bracken already cause him sufficient worry when the fire danger rating goes up, the presence of ungrazed grasses or legumes would simply double this risk.

The actual difference in the income between grazing and forestry is from two to six per cent, with the returns on grazing coming in annually. Such a financial view as this should not be misconstrued as being the final set rule for use of these former forest lands. Only those lands which will become a self-sustaining grazing unit or a portion of such a unit will permit permanent grazing use on forest lands.
BIBLIOGRAPHY


No. 4. The Pacific Northwest Forest and Range Experiment Station, 1938 Forest Research Notes. Plant Succession on Cut-over, Burned and Grazed Douglas-fir Area.


No. 10. Stephenson, R. E. Oregon Agricultural Experiment Station, 1941. Humus for Oregon Soils.


