THE ROLE OF FIRE PROTECTION IN THE MANAGEMENT OF CUTOVER AND BURNED OVER AREAS IN WESTERN OREGON AND WASHINGTON

Thesis 1929

By Glenn Voorhies

SCHOOL OF FORESTRY
OREGON STATE COLLEGE
CORVALLIS, OREGON

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Glenn Voorhies

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Introduction

Forest protection is one of the underlying principles of forestry, as is protection an underlying principle in any other industry. Regardless of the intenseness of the silvicultural practices, all is lost if fire consumes the forest before it can be or is ready to harvest.

In order that this great natural enemy of our forests may be combated efficiently there has evolved systems of fire protection in the various parts of the country, and with good results in so far as they have been applied. But this is not enough, for as yet, there is altogether too much acreage destroyed and burned over for the ultimate prosperity and good of the commonwealth as a whole. We have a long way to go before we will have attained the maximum that can be expected in forest protection or adequate protection which is defined by Col. Greeley as that degree of protection which will render forest property as safe on the average from destruction by fire as are other forms of destructible property in which moderately conservative investors are willing to place their funds. He also adds that we have now reached a point where protection which really guarantees protection in bad years as well as good must be provided without further delay.

The aim of this work is not so much to commend or attack the present practices, but to make a survey of the general attitude and trend of thought and of conditions of the deforested areas of the North Pacific Region with reference as to what may be expected to

be the practice of handling these areas in the future in light of the present trend of both research and economical conditions. The major problems to be considered in this field are the management of cutover lands, handling of old burns, administrative policies and control, taxation, and timber insurance.

Forest Types in the North Pacific Region

In order that a clear conception of the areas in this region, it may be well to consider the major forest types for they have a definite bearing on the protection problems and reproduction problems. Three general types may be said to constitute to forests in this region:

1. The Douglas fir type proper. This type is one in which Douglas fir comprises 60 per cent or more of the entire volumes, and covers three fourths of the forested area of western Oregon and Washington. Associated with Douglas fir is western hemlock, western red cedar, sitka spruce, silver fir, noble fir, lowland white fir, western yellow pine, and several other species of minor importance.

2. The fog belt type. This type is confined to the western slopes of the Olympic and Coast range Mts. Here the principle species are Sitka Spruce and western Hemlock, although Douglas fir is never absent over a large area. Western red cedar, and in the southern part of the region, Port Orford cedar may be found in quite large proportions.

3. The Upper Slope types. This type is found in the upper slopes of the Cascade, Olympic, and Siskiyou Mts, and comprises the upper type

upper type species such as silver and noble fir, mountain hemlock, western white pine, Alaska cedar lodge pole pine, and Douglas and Alpine firs.

The following Forest Figures were compiled by the western Forestry and Conservation Association:

Present Virgin Timber areas:

	Federal	State	Private	Total
Oregon	12,700,000	50,000	8,000,000	20,750,000
Wash	7,500,000	100,000	5,600,000	14,200,000

Immature Forest Area, Watershed and other area requiring forest protection:

Oregon	5,100,000	25,000	2,600,000	7,725,000
Wash	4,100,000	200,000	5,400,000	9,700,000

Total Land Area requiring Forest Protection:

Oregon	17,800,000	75,000	10,600,000	28,475,000
Wash	11,600,000	1,300,000	11,000,000	23,900,000
				54,375,000

-- OREGON --

Immature Forest Area, Watershed Area, Etc.

	Private, State, Federal			Total	% of all
Cut or burned over in some stage of fairly satisfactory restocking Fire protection only	2,000,000	15,000	3,800,000	5,815,000	76%
Not likely to reforest without artificial aid	6,000,000	10,000	1,300,000	1,910,000	24
Total	2,600,000	25,000	5,100,000	7,725,000	100

-- Washington --

Cut or burned in some stage of repr. etc.	4,600,000	150,000	3,650,000	8,400,000	87%
Not likely to reforest etc.	800,000	50,000	450,000	1,300,000	13%

At present in Oregon and Washington alone there is a total of 17,425,000 acres of immature forest areas, watershed, and other areas including old burns and cut over lands that require a high degree of protection. There are 3,210,000 acres of cut over and burned over areas in Oregon and Washington which are not likely to reforest without artificial aid. At the conservative estimate of a planting charge of ten dollars per acre, this would mean an outlay of$32,100,-000 to place these areas in a position which would enable them to grow timber, assuming of course adequate protection. Is it not time that we consider some means of preventing the continuance of such devestation now, while we still have 35,000,000 acres of virgin timber upon which to continue our operations while we are allowing these other areas to grow new crops?

Douglas fir and its associates are exceedingly virile and prolific, resistant to most of the enemies of forest trees, and would be quite able to perpetuate themselves even in spite of the most destructive methods of logging were it not for uncontrolable fires. The growing of continuous crops of timber then, hinges largely upon the fire problem. According to Kümmel, repeated burning is the major cause of devestation, and methods of cutting are only minor agencies.

According to McArdle's Figures, the following are the percents of each type of the total area burned:

Second Growth	0.6
Brush	1.2
Merch. Timber	7.1
Old Burn	23.5
Cut over	67.6

-- Management --

In the last few years, there has sprung up a considerable different viewpoint on the methods of slash disposal in the Douglas fir region, but it is quite generally agreed that the clear cut or seed tree method either is the practical way in which to handle the areas silvically. In U. S. D. A. Bull 1493, Munger explodes the idea that slash fires are necessary to reproduction by the following; "but detailed study strongly points to the conclusion that reproduction of Douglas fir starts more promptly and more abundantly where slash is not burned." The chief reason for slash burning as a forestry measure is to reduce the fire menace of the vast amount of dry litter that there may be less chance of accidental fires later. For most of the Douglas fir region broadcast slash burning has been accepted by foresters and lumbermen as an essential practice, "A necessary evil." It is a well known fact that merely burning over an area does not make it fireproof, in fact there is greater danger of more fires after the initial burn, for in many instances any advanced growth upon the area as well as other material is well dried out and is

more

more inflammable than it was originally. Furthermore, any fire that is hot enough to consume enough of the material to make the area fireproof also destroys all seed that may be in the duff, and is very apt to consume or kill any seed trees that are left on the area. Slashing fires that occur in the spring and fall (the usual time of burning) cannot consume all of the material because of the moisture content at that time of year. Thus a "safe fire" does not on the whole make the area free from susceptibility to farther fires.

To review the slash disposal and burning idea, an abstract of Legalized Forest Destruction by Frank H. Lamb in Timberman for July 1925 presents a summarization of the probable solution.

1. The present policy of slash disposal in Oregon and Wash. is endangering the safety of the remaining standing forests of the Pacific Northwest.

2. Present policy of slash disposal.....is seriously delaying reproduction on a large part of the area and absolutely prohibiting it on the remainder.

3. Cut over lands can be fire-proofed cheaper, in less time, and with a greater degree of safety by natures method; the covering of the land as soon as possible with second growth

II. The above statements are limited to the coasts regions of Oregon and Washington.

It is based on 25 years experience in handling cut-over lands.

Observations not confined to one tract, but to several.

III. The state laws are impractical. The Forest service regulations are more discretionary and practical.

IV. Four methods of slash disposal.

1. Piling and Burning-Used largely in the east.

2. Broadcast burning, used largely in west.

3. Spot burning

4. Natures method.

V. Safe fires are worthless for the disposal of slash.

1. Broadcast method often covers more area than intended.

2. Any fire that gets hot enough to burn the slash clean is very apt to be dangerous to other material.

VI. One burning increases the liability of fire.

1. Most foresters agree that only one burn should be employed.

2. As a matter of fact, liability of fire is greater after one burning.

3. First slashing fire usually kills the seed trees.

4. The amount of seed left in soil depends on the severity of the burn.

5. With each burn we are encouraging other burns which become harder and harder until there is no trace of reproduction.

VII. Fires frequently become uncontrollable.

1. When weather is such that a hard burn ensues, the fire easily becomes uncontrollable.

2. Instances show where the fire has escaped and done considerable damage.

VIII. Summarization of single burn results.

A. Safe burns.

1. Absolutely innefectual

2. Consumes most of the humus.

3. Kills any reproduction on ground.

4. Spring burns many times escape.

B. Complete destruction of slash.

1. Complete destruction of humus.

2. No reproduction for long period.

3. No insurance against repeated fires.

4. The harder the fire , the greater the danger of ensuing fires.

5. If hot enough to consume slash, often uncontrollable.

C. Expectation when fire is kept out.

1. First year a great amount of vines grass etc. that is not inflammable.

2. Second year reproduction of hemlock usually started.

3. By the end of five years this reproduction is waist high, and the slash started to rot.

4. All slash flattened to ground and holding a high moisture content.

5. Hemlock reproduction helpful to D. fir.

IX. When young growth is least inflammable.

1. 10-15 years the growth is least inflammable.

2. Young firs begin to outgrow hemlock at this period.

3. Driest weather does not dry out the ground cover.

4. Instances show that fire does not penetrate into these dense thickets.

5. Had the area been burned over and the stocking thinner, fire would doubtlessly entered.

X. Olympic blowdown hazard sited as one in which fire was kept out and reproduction allowed to come on. Now it offers a low hazard.

Xl. Hemlock Seedlings valuable for fireproofing.

1. Should not be considered a dangerous asset in the stand for in 65-75 years hemlock will be a valuable tree.

XII. Important points.

1. Safe broadcast burning is an impossibility.
2. There is no safe season for slash burning.
3. Fire protection must extend to cutover land.
4. Fires must be caught at the start.
5. Keeping out fire cheaper than controlling fire.
6. Limiting the slash burn to one an impossibility.
7. Burning is not an aid to reproduction and control of species.
8. A protecting cover of shrubbery the only way to fireproof cutover lands.
9. Present legislation regarding slash burning a great menace.
10. Decided need for openminded study of slash disposal in the Pacific Northwest.

These figures are convincing as to the necessity of increased, or adequate protection on old burns and cut over lands, for they show that of the total areas burned, by far the largest percent comes first in cut over lands and second in old burns. This is made plain, that if we are to grow timber crops on these cutover lands and on old burns, these areas must be protected or else the reproduction on these areas cannot thrive, be it either planted or natural. It is to be admitted however, that certain concessions or adjustments will have to be made before private concerns will attempt a reproduction and protection system on their cutover lands, notably of which is the problem of taxation. Some of the operators in the northwest have already seen the light, and have started ahead in their plan of continuous production.

The difference in cost of the two methods probably favors that of added protection as against broadcast burning. A conservative estimate of broadcast burning would be one dollar per acre to start, with a continuos charge of protection, whereas, in the added protection on these cut over areas, say a flat rate of even as much as 10¢ per acre, which is large, for a period of five years equals 50 cents per acre. Say that 50¢ per acre is used for blocking off the areas into quarter sections by the construction of fire lines, and this estimate may be too high due to the fact that logging spurs and skidding roads may be used in making up the fire lines, this still leaves a margin of at least 5¢ per acre which in five years would amount to a margin of 25¢ per acre in favor of the increased protection without regarding compound interest.

Of course some operators have a prejudice against hemlock, which forms a greater part of the stand in the case of direct protection, and burning in their minds will further the percent of Douglas fir. However in the minds of many, hemlock in the future will be just as valuable as douglas fir, for the reason that it can be more easily pulped, and furthermore, the lumber is equally as good for many uses. As per T. J. Starker, "The despised species of today will be the prized species of tomorrow".

The Dense, tolerant hemlock forms an excellent cover for the debris, affords quick growth and ample shade for the ground cover. The yield of the two compare----

Again, when we consider the trend of the times in closer utilization,

ization, there is going to be a lot less refuse in the woods than there is at the present time. The estimated accumulated wood waste left in the logging woods in the Pacific Northwest was 6,448,000 cords of soundwood, cordwood size and larger; in 1926 the total pulpwood cut was 4,384,766 cords. More than one third of this logging waste is made up of hemlock, spruce and white firs, and nearly two thirds being Douglas fir, and western red cedar, woods having inferior pulping qualities. The paper industry represents one of the greatest potential outlets for logging waste on the west Coast. As an average the loggers are leaving wood substance, cordwood size and larger as waste, amounting to 21,407 board feet per acre, all of which can be readily utilized. One operator on the Pacific coast salvaged four million feet of small logs in four months, and on this operation the matter of salvaging formerly what was waste, has passed the experimental stage, and is the adopted policy. With the refinements in the pulp and paper industry, and in the cellulose industry, we may easily expect the amount of debris left in the forest to decrease appreciably from what it is now and has been in the past. Quoting Geo. Cornwall of the Timberman, "we may in the future, look for ninety percent of the tree to be utilized in some phase of the industry".

Summing up the situation on cutover lands, it may be expected that:

1. In the near future we may expect a change of heart in the present opinion of slash burning.

2. Increased protection on the cutover land, with no burning, and that the areas will be blocked off in small units by fire lines which will materially reduce the risk and increase efficiency in fire control.

3. A great reduction in the amount of debris left in the logging woods which in turn means a lessened protection cost.

Old Burns

Old burns represent another high hazard in the field of forest protection. They are destined to be even a greater hazard than are the cut over lands because of the fact that they are as a rule more inaccessible, are full of snags, have no established fire lines, reproduction often sparse or lacking altogether, and they are many times covered by a heavy crop of brush which does not readily accomodate planting, and often times is highly inflammable as in the case of ceanothus velutinus.

Repeated fires on old burns are a more serious menace than the first one, because if a fire occurs before the new stand has reached seeding age it may produce areas which will remain barren for indefinite periods unless they are planted. Many believe that light burning is a solution of the brush problem, but contrary to this belief, it has been found that repeated light burning may kill out timber, but it will not kill out brush. As a matter of fact some brush species find fire an asset in continueing their spread as in the case of manzanita which it has been found in Southern Oregon that it increased 900 times in density. Dr. J. V. Hoffman

investigated the history of the brush field in Southern Oregon and found that all of them had their origin in repeated fires. He found farther that fires merely served to make the brush gradually more vigorous and plentiful until unbroken brush fields were the final result. Many thousands of acres in brush field represent potential timber crops of great value, and not only are they non-productive of timber, but they increase the danger from fire to surrounding timber. For these reasons an adequate system of protection must be incorporated on the old burns in the North Pacific areas if we are to continue the present status in timber production.

As time goes forward, there may be expected a definite action on the old burns as well as on the cut over lands. Probably the greatest will be falling of snags and cleaning up debris along the right of ways, establishing additional lines of communication thru and to the burns, added protection to areas of high hazard, closing of areas of high hazard, and facilities for research and protection studies. These will be taken up and discussed in later pages under administrative policies.

ADMINISTRATIVE POLICIES

Col. Greeley states that the fundemental weakness of the government policy in fire protection is the steadfast refusal of Congress to apropriate money to provide for a fully modern and well equiped fire fighting organization. For example, 10,000 miles of telephone line is needed to carry out the present policies, as well as 300 lookout houses and as many towers. The lack of finances is

is also a leading part in the weakness of the state policy of protection.

Probably the great lack of interest coming from private organizations in a reforestation program is the indefinite renumeration that may be expected in the future. These companies are not willing to expend money for which they can see no assured income on their investment. Chief among these is the cost of taxes, and in some cases the cost of planting, due to the neglectful way in which the areas have been handled. As for the tax question, there is no doubt that it should be revised, and another attempt to do so will undoubtedly come at the next session of the Oregon legislature. Reviewing and article by Sinclair Wislon in the Jan. 1929 issue of the Four L Lumber news, he points out the following facts in his article:
The first steps in constructive utilization and maintenance of our industries is to encourage the retention and growth of timber on private forest lands. These lands will not be retained if they are unprofitable to operate, nor is an operator going to undertake reforestation without some assurance of a reasonable constant cost. The time is at hand when reforestation legislation should be effected; much has been done in research, and practice demonstrates that we can reforest. The longer we wait, the more timber is cut, the more remote the opportunity to keep the industry always here. Many mills own timber that can be put on a perpetual cutting basis now. The first step is a land classification of timber lands, mature merchantable not being included in the proposed tax program; (2) sub-

jecting

jecting them to fire patrol laws and future state forest regulation; (Permitting a contract between state and the tree farmer if required, inoperative until March 1933); (3) Providing a 5¢ tax per acre, plus a 10% gross yield tax at the time of cropping. (4) Giving the representative of the state, the county assesor, and the private operator, his day in court.

As soon as a definite program becomes established in relation to forest taxation in these regions, it is reasonable to believe that more operators can see their way clear to continue, establishing a definite program of reforesting and of protection.

The Fire situation

It may be well here to take up the main characteristics of fires in this region, although it is not the aim to enter on any lengthy discussion of fire suppression.

1. Marked fluctuations in intensity at different periods of the day in all types.

2. Tendency in many cases to smoulder for days in heavy duff with no appreciable spread.

3. Tendency to develop into crown fires.

4. Great persistancy in heavy duff type.

5. Rapid spread in old burns and cutover lands, leaving considerable amount of unburned material, as highly inflammable in many instances as it was before.

The Field of Research

The correlation of meteorological factors and forest conditions

in indicating existing and predicting fire hazards are very apt to play an immense part in the protection plans of the future, and even at the present time deserve ample space in the protection plans. Among those to be considered most is relative humidity; which bears out that there is a direct relationship between relative and fire danger. Wm. B. Osborne Jr. points out the fields of application of relative humidity as a measure of fire danger from the administrative standpoint, as follows:

1. For bringing about among protective agencies and members of their organizations a more thorough realization of the very sudden and extreme changes in degree of hazard which can and do occur, together with a general knowledge of the primary causes of such changes.

2. For insuring a more intelligent execution of preventitive measures, including the material increase of precautionary measures during easily determined periods of extreme hazard.

3. For permitting a more intelligent and efficient utilization of both protective and improvement forces on the basis of known variations in degrees of hazard existing.

4. For determining in a large degree the initial and follow up action to be taken on established fires.

5. For determining definitely what methods of suppression should or should not be used on different sectors of a fire at different times of the day.

6. As a major consideration determining when burning permits should or should not be issued at what time the burning should be done,

and when by all means, any outstanding permits should be cancelled.

7. As a major factor in determining when and how slashings should be fired.

8. As a definite concrete factor to be predicted in the same manner as winds, rains, clouds, and temperature.

Another prime field for investigation, and one in which not a great deal of definite knowledge has been ascertained, is that of predicting lightening storms. Predicting lightening storms with a degree of certainity even a few hours, or better a day in advance would help materially in cutting down the time element in suppression because everything could be in prepardness to sweep down upon the attack.

J. V. Hoffman puts forth the elements in forecasting of fire danger as developed at Wind River Experiment Station as follows:

I Basis for prediction

1. Seasonal and daily conditions of forest materials.
2. Humidity curve, hourly, daily, and periodic.
3. Weather bureau forecasts
4. Static electricity.

II Purpose of prediction

1. To determine the method of procedure on existing fires
2. To keep public interested in proper relation to fire hazard
3. To direct protection forces
4. To determine best time for undertaking necessary burning such as permits for slash burning, permits for land clearing etc.

III Period of prediction

1. Daily based on relative humidity, and other meteorlogical factors.

2. Periods of two or three days, based on Weather Bureau forcasts.

3. Periods of safety due to precipitation and seasonal conditions.

IV Method

1. Radio broadcast

2. Telephone and telegraph

All of this knowledge found by research in the branches of silviculture and fire suppression can be utilized to a great advantage in the program of forest fire protection which can be considered to come under two broad heads:

1. Treatment of the Forest and cutover lands during logging.

2. Treatment of the new forest crop after logging.

Considering the first case we must confine ourselves to four major acts, namely:

1. Direct protection. Have an effective protective organization with proper equipment, and personnel so that there may be no accidental fires in the operation or on cut over lands.

2. Reduce the inflammability of cut over areas to a minimum by close utilization, by falling snags, and preserving all advance reproduction on the area that is possible.

3. Construction of permanent fire lines, dividing cutover areas into small tracts of from 100 to 200 acres to falicitate fire control.

4. Seed supply, Leave standing occassional seed trees which are not profitable to log, in order to insure reproduction.

Direct protection

1. In every camp of any size, there should be a competent man in charge of fire suppression, with a definite organization for the emergency of fire.

2. The camp firewarden should have under him firemen who will devote their time to fire prevention and suppression, such as watchmen around donkey settings, speeder patrols, and enforcement of the regulations.

3. Every operator should keep in touch with the fire weather warning service of the Weather Bureau, and run his operation in accordance.

4. Spark arresters should be installed and kept in repair, yarding decks and donkey settings should be cleared of all debris.

5. Firefighting equipment should be ready for use at strategic points, and locomotives and donkeys should be equiped with a small fire pump for use in emergency.

6. Equip theoperation so that water in quantity may be available under pressure on every part of the cutting area either through a gravity system, tankcar, or from a rotary pump at a sufficiently large stream.

By using the foregoing elements in an efficient manner, the amount of cut over land burned each year, and the loss of logging equipment will be reduced to a reasonable figure.

Protection of the land after logging

From this point on, old burns and cut-over lands may be thrown arbitrarily into the same class for the purpose which is to be outlined, and illustrated by an exact example. The deforested lands are now in our hands. It is up to the various administrative and fire protection agencies to carry the crop safely through to maturity which can be done if all of the various factors are considered and an efficient means of their incorporation can be secured. As a means to this end, and also what may be expected in the future, will be adopted if it is economically possible.

As timber becomes more accessible, the higher will be the monetary value, and then timber owners will begin to see the value of absolute protection (that is in the more remote forest regions) Then they will be willing to invest more in protection.

Any road that pierces the portions of old burns or cutover lands greatly reduces the protection "fear" although it may increase the actual hazard.

The airplane may be considered as a possible factor in reducing the time element as soon as it becomes economically possible to operate them. This is not original, but developed from C. M. Grangers address a year ago on the Arboretum: Consider small planes, capable of carrying 3 or four men and equipment and capable of landing on small fields. A fire starts in a remote section, say 30 miles away. To travel this distance on foot or horseback it would take from 6 to 8 hours for a crew to arrive; With a plane, 20 minutes. Which is

the more efficient as to time?, or even considering future value, economically?

In arriving at the adequte degree of protection, the personnel must be given great consideration, for upon them lie the responsibility of securing the greatest efficiency. They must be alert, intelligent, keen of mind, and capable of meeting all factors concerned, correlating them, and applying them to their particular need.

In order to arrive at this ultimate degree of protection, the plans must be laid for the future with great foresight and care. This is in all ways, destined to be a permanent feature of economic life in the Northwest, so that with this in mind, too much thought and foresight cannot be applied to carefully laying the plans for so permanent an institution.

(1) First of all there must be laid plans for prevention of fire, by education, by precaution, by constant vigilance and law enforcement. These must be adopted after they have been adapted to the particular needs in each vicinity which may vary, with the locality.

(2) There must be carefully laid plans for fire detection, and these can be ascertained only after detailed research into visible areas by means of visibility maps. Combined with this comes a systamatic system of communication, the telephone at present being the only practical method developed. But, with such rapid strides in radio and radio apparatus, no doubt verbal communication or at least a code system will be developed within a short time.

The airplane will probably play only a small role in forest

detection work, and this to be more or less confined to the recountering of larger fire, especially in mountainous country.

(3) Fire suppression is the place wherein lies a great need of <u>efficiency</u> and of <u>vision</u>. This can come only after much experience, and a careful correlation of the factors that have been before mentioned. Since time is the great element in suppression, any efficiency that may be injected into the scheme to cut down time will eventually be put forth in the following outline.

1. Due to the fact that forestry operations are of a long duration, there is consequently a changing personnel, and many times the lack of knowledge by the officer in charge of protection as to the knowledge of the topography, cover, and a general knowledge as to the means of communication and the general lay of the land, causes many misfortunes and disasters in the control of any given fire.

2. In order to prevent any misunderstandings due to the above conditions on the part of either the administrative organization or the temporary firemen in the field, a fire plan should be constructed.

3. This plan should consist of:

a. A topog map of about four inches to the mile.

1. This may be and is usually obtainable from the logging operation records.

2. Show 100 foot contours.

3. Show all cultural features in such a manner that they may be moved up to date by appropriate or progressive symbols.

4. Show all lines of communication and transportation

5. Location of probable fire camps and the best route to them.

6. Location of streams and water supply which would enable the operation of a fire pump.

7. Location of all fire lines or physical features which would be useful in a fire suppression campaign.

8. Location of all artificial works such as houses, fences, irrigation ditches etc.

9. In many instances topog may be taken from U. S. G. S. Quadrangle maps.

10. Cultural features to be shown are:

    a. 1-10 large snags per acre

    b. over 10 large snags per acre

    c. Heavy down material

    d. Ground cover mainly reproduction

    e. " " " brush

    f. " " " grass

    g. Areas of practically no tree reproduction

    h. Ground cover, none.

    i. Young growth, 10-20, 20-30 etc.

    j. Mature timber in burn.

    k. Character of the border of the burn

b. Written Report of the area giving:

    1. General status, ownership etc.

    2. Soil and cover conditions.

    3. Any peculiarities of the area.

    4. Note on reproduction, seed trees, and species.

    5. General plan in case of fire:

        a. initial action

b. Follow up

c. Tool and equipment supplies

d. Organization.

6. Panoramic maps of the area if available, showing type of cover, drainage, and any peculiarities of the land

c. Hour Zone maps, and hazard maps, reducing each to as low a minimum as possible, with the aid of increased efficiency.

d. Distribution of maps and reports among the various protective officers and fireman, so as to thoroughly acquaint them with the areas in which they are working.

e. All in all, taking each phase of the problem which effects, fire protection (Management, Slash disposal, logging, silvicultural research, fire weather search, administrative policies, direct protection, etc.) Studying each and giving them proportionate weights, and then developing an adequate and efficient protection system, which probably never will be developed until each has been studied and correlated with one another and then tried experimentally until the faults are eliminated.

Standing Timber Insurance

Up to the present time there has been little demand for standing timber insurance in the U. S. In fact there are only 3 major companies which will write timber insurance probably because the demand to date has not been sufficient to warrant the expenses which would be involved in actually soliciting the business. This may possibly be explained by the fact that only at the present time we are beginning to enter the period of economic development wherein

it is cheaper to grow timber for production than it is to cut that which is standing.

Forest fire insurance, if available to those who practice reforestation, would serve the double purpose of protecting the outlay of capital involved, and of assisting in bringing about better fire protection methods because of their influence upon insurance rates.

As before stated, there seems to be only small demand for timber insurance, but the Western Forestry and Conservation Ass. estimate that it is reasonable to suppose that $100,000,000 would be offered if some specific satisfactory terms are suggested.

European experience bears out the fact that timber insurance is highly reasonable and practical in working out a forestry program. From Chapman, Insurance may be considered one of the most useful social devices for the protection and stimulus of forest property.

-- Conclusion --

Present indications point to a highly efficient and effective Fire protection system on deforested as well as on mature timber, with a material decrease in area burned over, brought about by economical influences of:

1. Taxation, which will tend to make timber investments more appealing to the investor.
2. Timber insurance, allowing protection on investments of monetary nature.
3. Closer utilization, made possible by higher price of product; thereby lessening debris left in woods.

Silvicultural Research:

1. Slash disposal in relation to reproduction, soil benefits, and relative hazards;
2. Selection of fire resistant stock.

Administrative polices stressing:

1. Efficiency in organization
2. Selection of personnel
3. Coordination in fire research and fire plans
4. Intensive study of areas concerned, to facilitate quick action and consequently reduce area burned.

When these problems are fairly well worked out, and correlated, reproduction will have its chance to reach maturity and the timber grown a chance to realize the profit.

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