

**A REGIONAL PLAN OF FIRE PROTECTION  
FOR PRIVATE INDUSTRY IN THE  
DOUGLAS-FIR REGION**

**by**

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A REGIONAL PLAN OF FIRE PROTECTION  
FOR PRIVATE INDUSTRY IN THE DOUGLAS-FIR REGION

I. INTRODUCTION

The purpose of this thesis is to present a plan of fire protection for private lands in the Douglas-fir region, based on organizing, selecting, training, and mobilizing key men for overhead duties and standby crews.

It is not the purpose of this plan to displace any of the existing organizations, but to present a program for unifying and coordinating all fire control agencies in the region. Whereas these agencies are at present restricted in their spheres of action to limited, local areas, the plan would be regional in scope. It is designed to help any forest operator in need of assistance at the time of a major fire, by providing the regional overhead personnel to supplement his own force.

The organization would consist of regular employees of all forest agencies within the region. In the plan offered here, these men would be trained for their particular duties, and would be on call to go to the assistance of any forest agency in need of help on a major fire. Calls for these men would be spread among several units, and the release of one or two men each would not cripple any protective organization.

Before outlining this plan in detail facts are presented following showing the economic necessity for increasing fire protection on privately owned forest lands. In summary these facts illustrate first, the fire protection problem, and second, the protection performance of state and private organizations in the region, and the analysis of this performance. This is followed by a plan of organization, selection of overhead personnel and standby crews, the training of these men, and their mobilization and administration.

## II. THE PROTECTION PROBLEM

In general this problem may be stated as one dealing with the over-all hazard, reduction of fire damage, protection of cut-over areas, and prevention of man-caused fires.

Historical records of fire occurrence and destruction show that the problem of protecting the forests in the Douglas-fir region from fire is very important. Lumbermen are aware of this as is shown by their initiative in supporting the enactment of protection laws in Washington and Oregon, by the formation of tree farms, and by the Keep Oregon Green and Keep Washington Green movements. Forest fires are recognized as a detriment to private forest management. This fact is borne out by the statements of various operators in the region. According to Greeley (4, p.8) fire protection is the greatest problem in Douglas-fir forestry.

It is a problem involving great risk, based upon the threat of fire occurrence and the threat of major conflagrations. Douglas-fir operators know that the fire hazards created in this region are so numerous and so varied that the problem of protecting forest lands is greater than in any other region. According to Greeley (4, p.6) it is a problem that dominates the thinking of timber owners in the

region everywhere; makes timber cropping insecure; and makes the forests a non-insurable risk. A glance at the records of state and private protection agencies will show that the potentiality of fire occurrence and major conflagrations is great. The figures show that during the period 1935-1941 an annual average of nearly 1,800 fires occurred; and from 1933 to 1945 at least four major conflagrations (over 100,000 acres each) resulted, three of these occurring in the same area, northwest Oregon.

A major portion of the problem is the protection of out-over lands and the reduction of man-caused fires and subsequent damage.

According to Munger and Matthews (6, p.5) the greatest protection problem in the region is on the out-over lands; MacDaniels (5, p.41-42) states these areas have been the origin of fires which represented more than twenty-eight percent of the total area burned in the region from 1931 to 1940; and they have been the scene of many destructive fires. According to local history several of these have covered as much as 50,000 acres or more. (6, p.11)

The problem of reducing man-caused fires is as critical as the out-over land problem; the two are in fact intermingled. According to the records of state and private protection agencies, human beings were responsible for at least eighty-six percent of the fires occurring from 1935 to 1941. These fires, therefore, were theoretically preventable.

### III. THE PROTECTION PERFORMANCE OF STATE AND PRIVATE ORGANIZATIONS

All attempts by industry to solve the protection problem have been directed toward the reduction of area burned and reduction of damage. Among the attempts have been efforts (1) to have various codes enacted into law making it unlawful to permit hazardous conditions to exist in the forest; (2) to establish organizations for the purpose of protecting forest lands from fires; and (3) to establish movements designed to prevent man-caused fires through education and information. That these attempts have been inadequate is proven by the fact that desirable standards of the industry in fire protection have not yet been attained. The most apparent weaknesses of the present protection performance are the lack of unification and lack of coordination of the fire protection program throughout the region.

According to records of state and private protection organizations, a tremendous amount of property and an acreage larger than that allowable under acceptable forest practices are burned each year by forest fires. These records indicate that efficiency must be improved if the efforts and money expended for the protection objective of industry is to be attained.

In tabular form data are presented on the following pages showing the protection performance of state and private organizations in the Douglas-fir region for the following periods; 1920-1943; 1928-1943; 1920-1929; 1930-1943; and 1935-1941.

The data for the period 1920-1943 are presented to give an over-all picture of protection performance for the total number of years covered in this study; those for the period 1928-1943 are listed because in some instances complete information from 1920 to 1927, inclusive, was not available.

The facts for the period 1920-1943 were divided into two periods, 1920-1929 and 1930-1943, first as a comparison between the period when private industry practiced very little forestry (1920-1929), and the period when private operators began to recognize the value of forestry and federal allotments for protection began to be of material assistance to private protection (1930-1943); and second, for a comparison of each of these two periods with the over-all period.

The facts for the period 1935-1941 were selected first, to show the latest information on protection performance under normal conditions, and second, for comparative reasons as related to the over-all period, and to each of the other two periods (1920-1929 and 1930-1943). This period was selected as that giving the best information on present protection performance.

Other reasons for dividing this information into periods were for the purpose of analyses of protection performance during these periods and of evaluating the efficiency of the protection dollar.

**DAMAGE.** The tangible losses to forests and other properties on state and private protected areas resulting from forest fires, and the economic importance of these losses are shown in Tables I, II, and III.

TABLE I

TIMBER DAMAGED ON STATE AND PRIVATE PROTECTED  
FOREST AREAS IN THE DOUGLAS-FIR REGION <sup>1</sup>

In thousands of board feet

Period	Merchantable Timber <sup>2</sup>		Logs Destroyed	Total Destroyed
	Killed	Destroyed		
1920-1943 <sup>3</sup>	3,743,515	2,062,840	288,261	2,351,101
1928-1943 <sup>3</sup>	2,717,822	1,735,850	119,835	1,855,685
1920-1929	1,779,507	611,636	223,537	835,173
1930-1943 <sup>3</sup>	1,964,008	1,451,204	64,724	1,515,928
1935-1941	1,131,764	890,714	51,031	941,745

<sup>1</sup>Compiled from: The annual reports of: Washington Forest Fire Association; Division of Forestry, Department of Conservation and Development, State of Washington; and the State Forester, State of Oregon.

<sup>2</sup>From 1931 to 1943 the value only of the timber destroyed in the State of Oregon was listed; volume was not available. The volume for these years was estimated by applying average stumpage prices for each year to the value of timber destroyed. These prices were obtained from: Henry B. Steer, Stumpage and Log Prices, United States Forest Service, United States Department of Agriculture, Washington, D. C. Numbered Statistical Bulletins.

<sup>3</sup>Years 1933 and 1934 not included; all records for these two years for the State of Oregon were destroyed in the State House fire in 1935.

TABLE II

DAMAGE CAUSED BY FIRE ON STATE AND PRIVATE PROTECTED FOREST  
AREAS IN THE DOUGLAS-FIR REGION IN DOLLARS<sup>1</sup>

Period	Merch. Timber <sup>2</sup>	Logs <sup>2</sup>	Repro- duction <sup>3</sup>	Logging Equipment	Settlers & Others	Total
1920-1943 <sup>4</sup>	4,350,152	4,212,717	4,144,268	7,193,623	3,546,121	23,446,881
1928-1943 <sup>4</sup>	3,492,113	1,872,474	3,533,829	4,052,417	2,288,852	15,239,685
1920-1929	1,427,289	2,999,313	1,253,072	4,584,601	1,438,975	11,703,250
1930-1943 <sup>4</sup>	2,922,863	1,213,404	2,891,196	2,609,022	2,107,146	11,743,631
1935-1941	1,569,469	773,380	1,661,303	1,308,691	1,634,408	6,948,251

<sup>1</sup>Compiled from: Annual reports of: Washington Forest Fire Association; Division of Forestry, Department of Conservation and Development, State of Washington; and the State Forester, State of Oregon.

<sup>2</sup>Value of merchantable timber and logs destroyed that were not given were estimated by applying average per thousand board feet stumpage and log values to volume lost. These values were from: Henry B. Steer, Stumpage and Log Prices, United States Forest Service, United States Department of Agriculture, Washington, D. C., Numbered Statistical Bulletins.

<sup>3</sup>Reproduction values lost for Washington prior to 1942 were estimated on the basis of average annual per acre loss by counties. These values for Oregon prior to 1931 were estimated in the same manner.

<sup>4</sup>Years 1933 and 1934 not included; records for State of Oregon were destroyed in State House fire in 1935.

TABLE III

ECONOMIC IMPORTANCE OF FOREST FIRE DAMAGE ON STATE AND PRIVATE  
PROTECTED FOREST LANDS IN THE DOUGLAS-FIR REGION

Period	Annual Property Loss	Loss Per Acre of Area Burned	Annual Destruction	Daily Capacity of Sawmill to Utilize This Loss	Loss in <sup>1</sup> Employment	Annual <sup>2</sup> Payroll Loss
	Dollars	Dollars	Thousands of Board Feet	Thousands of Board Feet	Number of Men	Dollars
1920-1943	1,065,767	5.37	106,868	495	855	1,496,250
1928-1943	1,038,549	5.63	132,548	614	1,060	1,855,000
1920-1929	1,170,325	4.89	83,517	387	668	1,169,000
1930-1943	978,636	5.84	126,327	585	1,011	1,769,250
1935-1941	992,608	6.38	134,535	623	1,076	1,883,000

<sup>1</sup>Loss in employment was estimated on the basis that eight men are necessary to produce one million board feet per year.

<sup>2</sup>Annual payroll loss was estimated on the basis of an average annual wage of \$1,750 per man.

In order to reduce the fire loss a more intensified program of protection is necessary. Economically the necessity of such a program is based upon the importance of the forest lands of the region, first as a basic land resource, second, in the importance of the manufactured forest products to the nation, and third, in the importance of the forest products to the economy of the region.

Of the 35,127,000 acres in the Douglas-fir region, 29,002,000 acres, or eighty-two percent, is forested. Some 25,900,000 acres, or eighty-nine percent of the total forest area, has been classified as commercial forest land, capable of producing timber for industrial purposes. (5, p.3) (8, p.257).

Because of the major role it plays in the forest economy of the nation, the Douglas-fir region is considered one of the two most important forest areas in the United States, the second being the southern pine region. This northwest region supplies thirty percent of the lumber, ninety percent of the wood shingles, and twenty-three percent of the wood pulp consumed in the United States. (5, p.9). In peacetime, forest products from the Douglas-fir region are distributed to every state in the Union, all United States possessions, and some 120 foreign countries. (7, p.5).

The forests and their industries form the basic economy of the region. The future role of these industries is

expected to be even greater than in the past. The economic importance of the forest has been manifested in the development of the region, in stabilizing and supporting its communities, in the dependence of the transportation companies on forest products; in the investment in timber properties; and in the field of employment. According to MacDaniels (5, p.9) the bulk of the revenue for all transportation agencies in the region has come from forest products. Andrews and Cowlin (1, p.81-82) state that over one billion dollars are invested in timber and other forest industries; and that they furnish employment for approximately fourteen percent of the population of the region.

**FIRE OCCURRENCE, CAUSES, AND AREA BURNED.** Through the tree farm movement, industry has established an objective of allowable burn of one fifth of one percent of the area protected. Records show that this objective has not been reached and is not likely to be reached without improvement of present practices and increase of current expenditures. In addition to the initiative taken in the enactment of forest laws, the methods employed toward reaching the protection goal have been the establishment of tree farms, the Keep Oregon Green and Keep Washington Green movements, and the formation of protective organizations comprising many ownerships.

The results of fire occurrence and area burned on state and private protected forest lands in the Douglas-fir region are shown in Tables IV and V. These data afford a measure of the effectiveness of protection under past practices.

TABLE IV

NUMBER OF FIRES AND AREA BURNED ON STATE AND PRIVATE  
PROTECTED FOREST LANDS IN THE DOUGLAS-FIR REGION<sup>1</sup>

Period	Fires		Area Burned			
	Total Number	Man-Caused Number	Merch. Timber Acres	Reproduction Acres	Other Lands Acres	Total Acres
1920-1943 <sup>2</sup>	40,293	3	626,443	954,615	2,777,656	4,368,714
1928-1943 <sup>2</sup>	27,472	24,550	403,374	822,374	1,483,464	2,709,693
1920-1929	16,835	3	346,084	246,059	1,798,311	2,390,454
1930-1943 <sup>2</sup>	23,458	20,677	290,359	708,556	979,345	1,978,260
1935-1941	14,593	12,538	158,464	426,829	503,931	1,089,224

<sup>1</sup>Compiled from: Annual reports of: Washington Forest Fire Association; Division of Forestry, Department of Conservation and Development, State of Washington; and the State Forester, State of Oregon.

<sup>2</sup>Years 1933 and 1934 not included; records for these two years for the State of Oregon were destroyed in State House fire in 1935.

<sup>3</sup>Man-caused fire data not available for State of Oregon for the years 1920 to 1927, inclusive.

TABLE V

ANALYSIS OF FIRE CAUSES AND AREA BURNED ON STATE AND  
PRIVATE PROTECTED FOREST LANDS IN  
THE DOUGLAS-FIR REGION

Period	Man-caused Fires Related to Total Fires Percent	Burned Area Related to Total Protected Percent	Fire Rotation Years	Annual Burn Acres
1920-1943	—	1.8	58.5	198,578
1928-1943	90	1.5	66.4	193,549
1920-1929	—	2.4	42.1	239,045
1930-1943	88	1.3	78.4	164,855
1935-1941	86	1.2	84.3	155,603

PROTECTION COSTS. In order to attain its desired goal in protection, the forest industry has estimated that an annual cost of fifteen cents per acre would be necessary. Protection records of state and private organizations show that the actual costs have been much lower, and they indicate that, in order to attain the desired objective in protection, annual expenditures exceeding the estimated fifteen cents per acre will be necessary.

TABLE VI

AREA PROTECTED AND TOTAL COST OF FIRE PROTECTION ON STATE AND PRIVATE  
PROTECTED FOREST LANDS IN THE DOUGLAS-FIR REGION<sup>1</sup>

Period	Average Annual Acreage Protected in Acres	Asso- ciation	Protection Costs in Dollars <sup>2</sup>				Total
			State	Private	Logging	Federal	
1920-1943 <sup>3</sup>	11,617,192	9,894,743	3,469,609	3,205,888	3,682,523	558,600	20,911,363
1928-1943 <sup>3</sup>	12,848,400	7,300,441	2,974,925	1,245,925	2,775,965	421,450	14,717,995
1920-1929	10,054,668	3,352,831	821,990	2,257,568	1,462,577	262,098	8,157,064
1930-1943 <sup>3</sup>	12,919,296	6,541,912	2,447,619	1,048,320	2,419,946	296,502	12,754,299
1935-1941	13,115,335	3,299,106	1,771,401	635,728	2,037,004	137,816	7,881,055

<sup>1</sup>Compiled from: Annual reports of: Washington Forest Fire Association; Division of Forestry, Department of Conservation and Development, State of Washington; and the State Forester, State of Oregon.

<sup>2</sup>The actual costs for the classifications of State, Private, Logging, and Federal are not available for the State of Washington; these costs were estimated on the basis of per acre cost relationship between Association costs for Oregon and those for Washington; this relationship was applied to the per acre cost for the above classifications for Oregon to determine the relative costs for Washington.

<sup>3</sup>Years 1933 and 1934 not included; records for these two years for the State of Oregon were destroyed in the State House fire in 1935.

TABLE VII

PROTECTION COSTS EXCLUSIVE OF FIRE FIGHTING ON STATE AND PRIVATE  
PROTECTED FOREST LANDS IN THE DOUGLAS-FIR REGION IN DOLLARS<sup>1</sup>

Period	Association	State <sup>2</sup>	Private <sup>2</sup>	Logging <sup>2</sup>	Federal <sup>2</sup>	Total
1920-1943 <sup>3</sup>	8,393,905	3,287,655	1,503,699	1,709,341	475,612	15,370,212
1928-1943 <sup>3</sup>	6,507,890	2,815,951	949,149	1,415,977	338,496	12,027,463
1920-1929	2,492,070	786,916	680,786	427,937	231,396	4,619,105
1930-1943 <sup>3</sup>	5,901,835	2,300,739	822,913	1,481,404	244,216	10,751,107
1935-1941	2,956,343	1,643,528	581,096	1,157,463	122,186	6,460,616

<sup>1</sup>Compiled from: Annual reports of: Washington Forest Fire Association; Division of Forestry, Department of Conservation and Development, State of Washington; and the State Forester, State of Oregon.

<sup>2</sup>The actual costs for the classifications of State, Private, Logging, and Federal are not available for the State of Washington. These costs were estimated on the basis of per acre cost relationship between Association costs for Oregon and those for Washington. This relationship was applied to the per acre cost for the above classifications for Oregon to determine the relative costs for Washington.

<sup>3</sup>Years 1933 and 1934 not included; records for these two years for the State of Oregon were destroyed in the State House fire in 1935.

TABLE VIII

FIRE FIGHTING COSTS ON STATE AND PRIVATE PROTECTED FOREST  
LANDS IN THE DOUGLAS-FIR REGION IN DOLLARS<sup>1</sup>

Period	Association	State <sup>2</sup>	Private <sup>2</sup>	Logging <sup>2</sup>	Federal <sup>2</sup>	Total
1920-1943 <sup>3</sup>	1,500,838	181,954	1,802,189	1,973,182	82,988	5,541,151
1928-1943 <sup>3</sup>	792,551	158,974	296,065	1,359,988	82,954	2,690,532
1920-1929	860,761	35,074	1,576,782	1,034,640	30,702	3,537,959
1930-1943 <sup>3</sup>	640,077	146,880	225,407	938,542	52,286	2,003,192
1935-1941	342,763	127,873	54,632	879,541	15,630	1,420,439

<sup>1</sup>Compiled from: Annual reports of: Washington Forest Fire Association; Division of Forestry, Department of Conservation and Development, State of Washington; and the State Forester, State of Oregon.

<sup>2</sup>The actual costs for the classifications of State, Private, Logging, and Federal are not available for the State of Washington. These costs were estimated on the basis of per acre cost relationship between Association costs for Oregon and those for Washington. This relationship was applied to the per acre cost for the above classifications for Oregon to determine the relative costs for Washington.

<sup>3</sup>Years 1933 and 1934 not included; records for these two years for the State of Oregon were destroyed in the State House fire in 1935.

TABLE IX

## ANALYSIS OF FIRE PROTECTION COSTS ON STATE AND PRIVATE PROTECTED FOREST LANDS IN THE DOUGLAS-FIR REGION

Period	Annual Expenditure Per Acre for Protection	Cost Per Acre to Attain Industry Goal of One Fifth of One Percent of Area Protected (rated on actual performance)
	Cents	Cents
1920-1943	8.183	73.6
1928-1943	8.132	61.4
1920-1929	8.111	97.3
1930-1943	8.227	53.5
1935-1941	8.584	51.5

THE EFFICIENCY OF THE PROTECTION DOLLAR. Table X will indicate the amount of protection that \$100.00 would buy for each period; this protection is rated on the basis of actual performance and cost during the period indicated. It will also indicate the amount of protection (rated on actual performance) the same amount of money would have bought had industry been willing to spend enough money to obtain adequate protection during each period. It will further show the degree of efficiency of the protection dollar during each of these periods as related to actual performance and adequate protection.

TABLE X

## PROTECTION GIVEN BY \$100.00 AND EFFICIENCY OF PROTECTION DOLLAR

Period	Under Actual Performance			Under Adequate Performance		
	Number of Acres \$100 Would Protect	Number of Acres 100 Percent Protected	Related to 1935-1941 As 100 Percent	Number of Acres \$100 Would Protect	Number of Acres 100 Percent Protected	Related to 1935-1941 As 100 Percent
1920-1943	1,222.0	1,201.2	104.4	135.9	135.6	69.9
1928-1943	1,222.2	1,203.8	104.6	162.2	161.9	83.5
1920-1929	1,252.9	1,203.6	104.6	102.8	102.6	52.9
1930-1943	1,215.5	1,200.2	104.2	186.9	186.5	96.2
1935-1941	1,165.0	1,151.1	100.0	194.2	193.8	100.0

**UTILIZATION OF FOREST MANPOWER.** The manner in which the men of private industry are selected, trained, and mobilized into fire fighting organizations is more or less left to the individual operators. Very few operators have their own protection systems; they depend almost entirely upon their individual association units for this protection. However, the men included in those organizations where the operator has a system are for the most part untrained for fire fighting purposes; they rely almost entirely upon the past experience of the men on fires. In a few operators' organizations there are some men who have received training from state and federal organizations as former employees of those units. For the most part the men composing the individual operator's unit do not employ the latest techniques or knowledge of fire fighting.

Although both Washington and Oregon state organizations train their employees in fire fighting techniques, nowhere in the region is there a coordinated and unified program to utilize the whole manpower resource of the forest industries.

The West Coast Lumbermen's Association estimates that there are approximately 55,000 men employed in logging operations and an additional 55,000 employed in the sawmills of the region. This is a large resource of manpower that could be used for fire control on state and private

protected forest lands. These men could be trained by a unified and coordinated regional program that would have as its objective the utilization of this manpower, first, in suppressing fires on the "home" operation, and second, the utilization of a small portion in forming a nucleus for a regional organization to suppress large fires throughout the region. It is important to have the program unified and coordinated so that all trainees in the region will be benefitted by the latest techniques and new knowledge of fire fighting methods. Also, under this plan, each staff position would have the same responsibilities in the chain of command throughout the entire region.

ESTIMATED PROTECTION UNDER UNIFIED ORGANIZATION AND TRAINING PROGRAMS. An inquiry was directed to the Pacific Northwest Forest and Range Experiment Station to determine the percentage of efficiency attributed to the regional organization and training plans for fire protection of the United States Forest Service for the North Pacific Region. In reply, the following memoranda were received from Mr. W. G. Morris of the office of Fire Behavior and Control Research, and from Mr. L. L. Colvill of the office of Fire Control, Regional Office, North Pacific Region, United States Forest Service.

Mr. Morris states:

"To my knowledge no time studies have been made to measure the relative output of fire fighters with and without training or of fire fighters working under overhead who have had training as compared to those who have not had training. General observations of line building by trained crews as compared to untrained crews are sufficient to be convincing that trained crews build better line faster.

"The 'flying 40' crew, trained intensively by the Forest Service and kept in hardened condition on standby call for any fire in the National Forests of Oregon and Washington several years ago was an outstanding example of extra output obtained by trained and hardened young men. Undoubtedly, trained overhead can also produce more and better line with any crew than can untrained overhead.

"The trained foreman knows how to avoid non-essential expenditure of work, where to do extra work that will avoid costly losses of constructed line. I can not state in percentage the value of training and probably Mr. Colvill's estimate is as good as any available."

Mr. Colvill says:

"A foreman trained in Forest Service methods of fire control line organization and fire fighting technique could take a crew of untrained loggers and construct an estimated 75 to 100 percent more hand line than would be constructed by the same crew using conventional methods of constructing fire control line. The term 'control line', as used here, means clearing, digging, removal of immediate threats to line constructed, and burning out; and presupposes that the foreman will take advantage of all natural barriers, such as roads, skid trails, etc. to reduce hand work."

The performance of the flying 40" as stated by Cliff and Anderson (3, p.61) rated this crew four hundred and seventy-four percent more efficient than other crews,

indicating the value of coordinated training and organizing programs.

Since Mr. Colvill states that foremen trained under Forest Service methods are at least seventy-five percent more efficient with untrained loggers than those using conventional methods, and since both state organizations do have some system of training state employees, a more conservative figure of fifty percent greater efficiency for a unified and coordinated training and organizing program will be used here to indicate the value of such a program.

Applying this estimated fifty percent for greater efficiency to the actual performance of the 1935-1941 period, and using the actual costs of that period, the following results would have been obtained: if a portion of the 7.037 cents per acre protection costs, exclusive of fire fighting, had been used for intensive training and organization, the burned area would have been reduced to 103,735 acres per year instead of the 155,603 acres actually burned. This would have given an eight tenths of one percent relationship of burn to area protected instead of the one and two tenths percent actually experienced, thus increasing the degree of protection by thirty-three and one third percent; this would have lowered the actual cost of protection to 8.068 cents per acre per year. It would have increased the efficiency of the protection

dollar to one hundred six and eight tenths percent of the actual performance, and would have increased the fire rotation to 126.4 years.

On this basis adequate protection (allowable burn of one fifth of one percent of area protected) would have cost 32.3 cents per acre per year, as against the 51.5 cents necessary under actual performance.

Protection performance on forest lands under state and private protection agencies is far from being adequate; the cost of protection estimated by industry to make it adequate is too low, if present protection practices are continued; the efficiency of the protection dollar is declining, because it is not being fully utilized; and only through a unified program of intensive training and organizing industry can make its protection more adequate at a relatively small increase in cost. Therefore, an intensive and coordinated program of training and organizing overhead personnel and standby crews to be used in fire suppression anywhere in the region would be of material assistance in accomplishing adequate protection standards. Accordingly, the following plan of organizing, selecting, training, and mobilizing such a force has been prepared.

#### IV. THE PROTECTION PLAN

This plan has been prepared for the purpose of helping industry attain the desired degree of protection performance.

To be successful, it will be necessary to secure the full cooperation of the industry, together with state and federal organizations. Its operation must be under the police powers of the two states concerned, with full cooperation between them, in order to make it effective.

The primary purpose of the plan is to increase the efficiency of protection performance through trained and experienced personnel. This should reduce the acreage burned over by large fires, normally resulting from the use of less experienced and untrained men. It offers a more efficient and speedier program in all protection activities by unifying and coordinating them through a central agency. In turn this agency operates through the state foresters' offices, thereby insuring coordinated and concerted action in all phases of protection.

In brief this plan provides for:

1. A regional fire committee composed of representatives of public and private forest interests. These men would cooperate with and advise the state foresters on all matters pertaining to forest protection in the region.

2. The selection of a regional coordinator who would be agreeable to all agencies. He would work with the regional fire committee, and his office would be a clearing house for the two state fire protection organizations. He should be a man with extensive training and experience in fire protection, as well as in public relations. Through his office the coordination and unification of the two state fire protection organizations would be accomplished.

3. The assignment of the assistant state forester in each state to direct the organization within his state. He should be a forester with a background in all phases of fire protection.

4. A centralized and coordinated agency for prevention activities, through the regional coordinator and state foresters.

5. A presuppression program, training and selecting key men for overhead duties and standby crews that would be uniform throughout the region.

6. A suppression program, mobilizing and dispatching men to fires within the region so that the control of fires might proceed as efficiently as possible.

7. Consideration of the administration and finances involved in implementing the plan.

ORGANIZATION. The organization of this plan is shown by the following chart.

REGIONAL ORGANIZATION CHART

Regional Fire Committee (Public and Private)  
(Advisory and : Cooperative)

:  
:  
Regional Coordinator  
:

State Forester(Oregon)

United States Forest Service

State Forester(Washington)

:  
:  
State Fire Chief  
:

:  
:  
State Fire Chief  
:

Prevention

Presuppression

Suppression

:  
:  
Cooperation with  
and coordination  
of present  
agencies

:  
:  
Selection  
of key men  
:  
Camp man-  
agers;  
Communica-  
tions men;  
Division  
bosses;  
Sector  
bosses;  
Scouts; Foremen;  
and Standby crews

:  
:  
Training  
programs  
:  
Planning  
:  
Programming  
:  
Establishing  
:  
Conducting

:  
:  
Mobilization  
:  
Dispatching

The regional fire committee, composed of men in both private and public forestry, would work with the state foresters and advise them on the operation of the plan. These men would work out all cooperative agreements between the two state organizations, as well as with the federal agencies so that over the entire region the plan would function as completely as possible.

The regional coordinator would work in conjunction with the regional fire committee; his office would act as a clearing house for unification and coordination of the regional plan.

It would be necessary that the coordinator be a forester with a background in training personnel, as well as with experience in fire fighting. His background should consist of experience and training in the latest techniques and knowledge of fire control, including familiarity with new devices used in this work. He should be competent in the various phases of prevention, presuppression, and suppression activities, in order to coordinate them within the state and with the regional organization.

Each state fire chief, with the advice and assistance of the regional fire committee and the regional coordinator, would do the planning within the state for his organization, and would dispatch the men where needed on private, state, or other lands within the region. He would also assist

operators in planning their individual organizations. Upon the request of a landowner, or whenever the state forester deemed it necessary, the state fire chief could supersede any other officer in charge of control on any fire within the jurisdiction of the state fire laws.

The present activities in the field of prevention should be continued; these activities should be coordinated throughout the region so that they might function as efficiently as possible, and so that duplicate efforts might be eliminated and costs reduced.

Presuppression activities would include the selecting and training of the personnel, as well as assembling and apportioning the fire fighting equipment. The selecting and training should be accomplished under the latest and best techniques and knowledge available; and this work should be unified and coordinated throughout the region. The qualifications and duties of the men to be assigned to the organization should be determined prior to fire season so that they might receive the training necessary to fit them into the over-all plan in as efficient a manner as possible. This will permit their most effective performance on a fire. These duties and qualifications should be uniform throughout the region so that men called from one section to perform in another section of the region

would be able to do their work as efficiently as they would in their "home" section.

The personnel of this organization would be divided into three units in order to facilitate their selection, training, mobilizing, and dispatching. These units would be: the service of supply, scouting, and fire line.

In the service of supply unit would be the chief, and a sufficient number of camp managers to make the unit complete; this number would be left to the decision of each state fire chief.

The personnel of the scouting unit would consist of the chief, chief ground scout, a number of ground scouts, and advance line locators; communications chief, and radio operators. Each state fire chief would determine the number of men necessary to make the unit complete.

The fire line unit would be made up of division bosses, sector bosses, and foremen, and at least two standby crews of twenty-five men each. The number of men to be assigned to this unit, with the exception of the standby crews, would be left to the judgment of each state fire chief.

The standby crews would be supplemental to the fire line unit and a part of it; they would consist of two full crews for each state organization. They would be trained in the latest methods of fire line construction, and would

be essentially line construction crews. They would be sent to any fire within the region by the state fire chief. Upon their arrival at a fire, they should be assigned to the most difficult section of the line.

The men comprising the overhead of these three units, service of supply, scouting, and fire line, would form the nucleus of the fire fighting organization, and around them would be built the total manpower used in suppressing a major fire.



**SELECTION OF MEN.** An important part of the plan would be the selection of the overhead personnel to be used in the organization. These men would be selected from all forest agencies in the region, with private industry having the greatest representation. In selecting them, their quality would be more important than numbers; of particular importance would be their ability to apply existing knowledge and latest techniques in fire control. Their quality could be determined by the ability with which they had planned and carried out tasks of fire prevention and presuppression in the past. An additional standard would be their skill and efficiency in fire suppression as members of individual forest operations. The basis of the selection of these men should be made uniform throughout the region. Brown (2, p.1-2) has listed seven qualifications that are of value in the selection of men for overhead duties in a fire organization. These are:

1. Indicated ability to plan and organize, particularly the ability to correlate;
2. Marked aptitude for administrative work;
3. Good health, particularly stamina;
4. Proven ability to work calmly and surely under heavy pressure;
5. Good analytical judgment coupled with a high degree of initiative, originality, and perceptive imagination;

6. Qualities of leadership which inspire confidence and build loyalties;

7. Knowledge of the physical limitations of the human machine, particularly one's own.

If men chosen for overhead have a reasonable proportion of these qualities, they could be developed by training into efficient leaders for fire suppression.

TRAINING. In the training of these men for overhead positions in the fire organization an abundance of planning is required, if they are to work efficiently into the organization. This program should be uniform and coordinated throughout the region. The objectives should be acquainting the men with the problems of the job, and how to solve them; enabling them to gain confidence in themselves so that they will be able to work under pressure; and eliminating or correcting possible mistakes and failures.

A program that would meet these objectives would be divided into three steps, preseason, training camp, and follow-up.

The preseason training would be undertaken in conjunction with the regular occupation of the men; this training would be done by some experienced member of the "home" operation. The purpose of the preseason training would be to place each man in his proper place within the individual operator's organization, and to prepare him for

the more specialized training to be given at the training camp. It would form the foundation for the instruction necessary in teaching the science of fire fighting. The work should be adjusted to individual training needs. It is important, therefore, that preseason training be thoroughly planned, because it is such an important step in the over-all training program.

The second step in this program would be the training camp, where the key men would be assembled to receive specialized training to enable them to function properly in the fire fighting organization. The objective of the training camp program would be the training of each man for his special duties within the fire organization, both operational and regional. From this training he should be able to visualize his importance to the over-all organization as well as to do his work more efficiently.

Because of its importance in over-all training, the training camp program should receive thorough preparations; it cannot be a haphazard job, but must be one requiring time and patience.

Training needs determined from the preseason training would determine the subjects to be covered and the amount of instruction necessary for this program. From the training camp results would be determined the type and extent of the follow-up training program for each man.

The third step in the training program would be follow-up training; it would be a continuation of the camp training, except that the instruction would be given individually and would be performed on the "home" operation in conjunction with each man's regular duties. Any practical experience gained in fighting fires would also be a part of the program. Each state fire chief would follow through on this training; his office would make periodical checks to see that it was being carried out, and to give assistance whenever and wherever possible.

**MOBILIZATION.** In the mobilization of the overhead personnel the objective should be the effective assembling of the manpower to do the job as efficiently and speedily as possible. It would be dependent upon the cooperation of the individual operators. They would be requested to send their trained fire fighters to the assistance of other forest owners where men were needed to supplement other forces in suppressing major fires. Each state fire chief should have a plan of effective mobilization of overhead personnel for each section of the region.

In calling these men, he should exercise discrimination; he should be careful not to call all of the men from one operator, since this could seriously weaken an individual protective organization. However, he should call men from operators near enough to the fire to make

the travel time as short as possible, reducing travel weariness. It is essential that the men be in good physical and mental condition upon reaching the fire so that they can perform their duties as efficiently as possible.

**ADMINISTRATION.** In the administration phase of the plan there should be definite understanding upon these points: (1) responsibility for the execution of the plan; (2) authority for its execution; and (3) financing.

The responsibility for the administration of the plan within each state should rest with the state fire chief; the responsibility for making it regional should rest with the regional fire committee and the regional coordinator. Each state fire chief would bear the burden and responsibility for planning the organization within his state; he would plan and conduct the training program and mobilize and dispatch the personnel to the various fires. Through the state forester he would be accountable to the regional fire committee. With him should rest the responsibility for the coordination of all fire protection activities within his state. He should be given the full support of the industry, and he should have full authority to put the plan into action.

This authority should be vested in the state forester through the state fire laws in such a way that he could

step in with this emergency organization and take command of a fire situation to the best interests of the state; he should be given authority to hire men and to dispatch his overhead personnel to any fire within the region. He should be given authority to ask for assistance from the emergency organization of the neighboring state.

As an example, let us assume a fire of major proportions in northwest Oregon, on which the state forester of Oregon has taken action with his emergency organization. The entire available manpower of the Northwest Oregon Forest Protective District is already on the fire. The state fire chief has dispatched the nearest of his standby crews. He has called for one division boss from an operator in the Clackamas-Marion area, another from an operator in Linn County. From other operators in the northern portion of the Willamette Valley he has dispatched four sector bosses, eight foremen, and two scouts. The fire fighters have been hired in Portland and neighboring towns.

This is not enough. He still needs additional overhead. He calls the Forest Service and asks for such key men as they can spare, especially foremen and scouts; these are dispatched from neighboring national forests by the Regional Office of the Forest Service. He calls the

state forester of Washington in Olympia for his southwest Washington standby crew and six foremen. These are dispatched by the Washington fire chief.

The entire cost of fighting this fire would be borne by the Northwest Oregon Forest Protective District, with assistance only if necessary from the state fire fighting fund.

The financing of this plan would be accomplished as it is at present, that is, through assessments. The present cost of protection is approximately 8.5 cents per acre per year; a program of intensive training and organization necessary to assure adequate protection could be accomplished for approximately 32\* cents per acre per year.

Since the state fire laws hold an operator responsible, either as an individual or through his protective unit, for fires originating on his lands, his protective unit would become responsible for the expenses incurred by the personnel of the regional unit in combating such fires. These expenses should be paid through the state organization and paid to the individual members for their services from that office.

In financing the training program, the cost should be paid by the state organization, except in the payment of the wages of the individual trainees. Each logging

\*See pages 24 and 25 for estimated annual per acre costs necessary to accomplish adequate fire protection.

operator should pay the wages of his trainees while they are traveling to and from the camp and while at the camp as well. By assuming this cost of the training program an operator could not be limited to the number of men he wished to have trained, and he would, therefore, have opportunity to strengthen his individual organization. The expense of employing instructors, and establishing and conducting the camp should be charged to the funds of the state organization.

The expenses of the standby crews should be borne by the individual operators or protection units employing these men on the various work projects or fires. In the fire suppression work, the wages earned would be paid in the same manner as those earned by the overhead personnel of the organization.

When not employed on fire suppression activities, these crews should be used by various companies in the area in presuppression work, such as building roads, trails, and telephone lines, in hazard reduction, and in maintenance throughout the year. Their wages should be paid by the company for whom the service is rendered; and their wages would be based on the union scale for similar activities.

The assignment of these crews to the various work projects throughout the region would be done by the state

fire chief having jurisdiction over the men; this would be done on a "first come, first served" basis, unless such an obstacle as distance would be a limiting factor, in which case nearness of work projects would govern.

The crews should be fully equipped for fire fighting activities, including transportation. All equipment would be supplied from the headquarters office, so that when called to a fire they would be able to go to work immediately on arrival with a minimum loss of time.

## V. CONCLUSION

The economic importance of this region is based on timber products vital to the needs of the nation. Its forests are the most important natural resource, and it is vital that these lands be kept continuously in full production.

Before this can be accomplished, it will be necessary to solve the major problem of fire protection. The solution lies in intensive planning, followed by definite action. As a means toward this end, a comprehensive plan for protection by private industry, featuring overhead personnel and standby crews, would be both advantageous and desirable.

In order to make such a plan succeed, it would be necessary to have the full cooperation of industry as well as state and federal organizations, and a well planned training program for the personnel would be vital.

It would be important to have such a plan unified and coordinated throughout all fire protection agencies in the region.

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