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LIGHT BURNING AND THE GENERAL PUBLIC

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LIGHT BURNING AND THE GENERAL PUBLIC

Introduction:

The Source of the Information

The information and data in this paper have been drawn from reports of Forest Service officers in Oregon and California. The bulk of this presentation has been taken from reports by Messrs. S. B. Show, Duncan Dunning, and E. I. Kotok. I want to especially thank Geo. M. Gowen, Carl Ewing, and the Forest Service officers in the Portland office, together with Prof. R. E. Stephenson of the Soils department of this college, for their valuable assistance in making this study possible.

LIGHT BURNING AND THE GENERAL PUBLIC

Part I. The Two Methods of Forest Protection.

Speaking generally, there are two radically different theories of forest Protection. The first is called "fire prevention," used by the United States Forest Service, and scientific foresters, and the second is "light burning," advocated by people who think that the policies of fire prevention are detrimental to all concerned with forestry.

Fire prevention is based on the assumption that fire in all forms is absolutely harmful to the establishment of the reproduction which is needed for the perpetuation of the forests; that it causes considerable damage to merchantable timber and that the prevention of fires is possible at a lower cost than any plan of controlled or light burning.

Light burning, or controlled burning is designed to protect the merchantable timber, and in its later phases its advocates claim that it not only protects the existing reproduction but it is an essential aid in the establishment of new reproduction. As a matter of fact all stipulations made by the fire prevention policy are met with controversies by the light burners. As a consequence the debate is on, with the fire prevention supporters support-

ing their arguments with scientific experiments to prove their points, and the light burning supporters with mostly observations with the naked eye and but few hither and skelter experiments that tend to prove to them conclusively that light burning is the only salvation. It is my attempt in this paper to add to the points brought out by the fire prevention supporters.

The History of Light Burning

The light burning agitation has largely been centered in California. It is in that state that much brush lands are found, and as a consequence the light burners maintain that the presence of brush is a result of the fire prevention policy being carried on. It is of interest to Oregonians that light burning agitation really received its start in California becuase the controversies found in California are likewise applicable to Oregon. The Forest Service has been committed to a policy of absolute forest protection ever since it was charged with the administration of the National Forests, but it has always been interested in any impartial and careful study of the light burning theroy and all aspects of its application. A few years ago the California Forestry Committee was formed, and it included representatives of the Forest Service, the California White and Sugar Pine manufacturer's Assoc-

iation, the S.P. Railroad Company and the University of California. This committee gave open-minded attention to the light burning methods and spent three years of attention to the problem. In its final report it discards light burning and advocates the fire prevention policy. In my own study of material on light burning I have found numerous scientific data against light burning, and but scattered inferences for light burning. Light burning, however, is by no means a dead issue becuase of the verdict of the California Forestry Committee, and Forest offices will be called on even more frequently in the future than in the past to defend the absolute protection against fire which the Forest Service is trying to render on the National Forests, and which most of the private protective agencies are agreed best seemes the interests of the timber owner.

The findings of the California Committee unquestionably greatly strengthens the case against light burning, especially since the committee carried on its work with entire fairness but many people need yet to be convinced that our present protective policies are the best thus far devised.

We therefore find many light burning agitators in Oregon who feel the need of some policies which will im-

prove grazing, quality of timber, and many other things which they believe that the fire prevention policy is not giving to them. We cannot discourage a person from expressing his or her beliefs and as a consequence the Forest Service has alwyas been interested in agitations of this kind and it has encouraged controversies so that it might better fortify itself in the minds of the people that its policies are being carried through to protect the peoples' forests.

Prior to 1919, then, for a period of ten years or more the Forest Service gave attention to light burning. Most of this study was done in District 5, but some has been conducted in Oregon. The fires which covered a part of the Fort Rock area on the Deschutes several years ago have served as a basis to indicate what timber and reproduction losses can be expected for a number of years following both light and severe fires in ponderosa pine. T. T. Munger and E. H. MacDaniels have both prepared reports on "The Fallacies of the Light Burning Method of Forest Protection" and "The Effect of Surface fires in Preventing Subsequent Fires." All of the observations made in this district correspond with the findings of the California Forestry Committee and of the Forest Service in California.

Advocates of Light Burning

There appears to be little connection between light burning and incendiarism, although we usually find that in sections where light burning is strongly advocated there are usually frequent incendiary fires occurring. It may be that incendiary fires are started because of one's conclusive belief that light burning is the one and only system of proper protection and believing that fire prevention is foolish he or she sets fires in the forest to carry out his or her belief. Nevertheless, we are convinced that a true light burner advocates the use of fire only in those seasons of the year when moisture conditions are right to prevent a disastrous severe fire. A light burner abhors a fire in the summer times as much as you or I, because he can see the disastrous effects of our hot summer fires. Isn't it reasonable to think that fires at any time of the year would cause damage at a proportional rate of the hazard?

Three classes of light burners are usually found in any locality. The first class is the imbred whites who are found in regions of low intelligence. Halfbreed Indians, octoroons, and other mixtures are to be classed in this group, and they advocate light burning because their ancestors practiced it in order to make grazing and

hunting better. The second class is the business men, who in their associations with the forementioned class, and with ranchers, hunters, guides etc. have taken it upon themselves to sympathize with these people and have led themselves to believe that the foresters are making mistakes and that the policies of the Forest Service are open for improvements. This type is the strongest agitator for light burning because the business men aare quite influential, but they ought to be the easiest type to convince, because of their higher mentality, though in reality we find that some of them are not. The third class is the middle-man, which includes ranchers, stockmen, etc., who thinks that he can advance his own interests by burning.

The Case For Light Burning

Many claims have been brought forth by the above three classes of light burners. Many of these claims can be grouped together and treated as one, so the following claims will be briefly stated as follows:

1. That there are no records of early conflagrations, that is fires, which caused great damage to timber.
2. That light burning is practicable in all ping forests and will prevent damaging fires.
3. That as a result of the practice of fore prevention great amounts of litter have accumulated, which results in very

damaging fires.

4. That the fire prevention policy was introduced from Europe and that in Europe the inflammable material is removed by hand, and that consequently no serious fires occur.

5. That the damage to mature timber by the practice of light burning is negligible.

6. That fires do not fire-scar living trees.

7. That the clear trunks of much of our virgin timber are due to the occurrence of fires.

8. That fires kill the destructive bark beetles in living trees; that the fires control epidemic infestations and prevent new ones from starting.

9. That smoking and charring of the bark of living trees by fire prevents the entrance of insects into the trees.

10. That fire is a cleansing agent and fills the same function in the forest that disposal of refuse does in cities.

11. That burning always secures reproduction on the areas burned.

12. That reproduction is undesirable in the virgin forest because it hinders growth of the mature trees.

13. That fire has a beneficial selective action in dense stands of reproduction, thinning out the weaklings and bringing the stand to the desired density without entirely obliterating it.

14. That brushfields within the timber belt are not the result of fire but are natural phenomena.

15. That light burning prevents serious fires.

16. That light burning does not damage the soil and that it prevents surface runoff and induces seepage of water to the water table.

17. That light burning is cheaper.

It seems to me that the fundamental assumption back of the light burning theory is that the methods of the Forest Service will not work; that disastrous and uncontrollable fires will result from the accumulation of litter and that light burning will give protection.

There are some places where light burning has been found to be partically successful. From reports written about these areas it appears that only occular estimates have been made and very little measurements have been taken to determine what effects light burning has had upon the mature timber, brush, forage, and soil. Until real intensive experiments can be made by the light burners it will be difficult to accept their claims, and we may go on with our own studies of plots where light burning has been carried on.

Part II. <u>The Case Against Light Burning</u>.

In the literature on the subject of light burning one finds constant reference to the alleged practice of the Indians to burn over the forests of the state periodically. The reason for this alleged practice is variously stated as, to protect the forest, to improve feed, to make hunting easier and to make travel easier. This practice is one of the bulwarks of the controlled burning theory, since it is stated that these fires were light fires which caused no damage and that by the use of these fires serious and damaging conflagrations were prevented. So far as I have been able to learn, no real study of the past fires history of the California forests has been made by any of the advocates of light burning. It has remained for the office of Forest Pathology and the Forest Service to work out in detail the fire history of the State, and since this has been established in considerable detail I believe it will be profitable to sketch the actual proven facts before proceeding with the discussion. We find on representative areas, ranging from Siskiyou County in the north to Los Angeles County in the south, including the northern California cross ranges, the Main Sierra Nevada system and the southern California mountains, that on the average up to about the year 1900 the forests had been burned every eight years. Fires, as everyone of course knows, record themselves on living trees, either by burn-

ing out part of the wood or killing the cambium, and the dates of fires which result in such injuries can readily be determined by a count of the annual rings. Since the occurrence of the fires on the areas which have been studied are definitely known, we find with remarkable uniformity that the 8-year average period holds good and that generally speaking fires as far apart as Siskiyou County and Los Angeles County occurred in the same calendar years. In studying the individual trees we find that certain of them bear marks of over twenty fires, and it is certain that many trees have lived through many more fires than that.

We have perfectly clear evidence that very extensive and disastrous forest fires have occurred in California in the past. For example, in 1872 a fire starting in late June covered an area of over 100,000 acres in the drainage of Pitt River, Squaw Creek and the lower McCloud River, reducing the stand of timber by over one-half. This fire burned unchecked for over four months and was finally put out by rains in the fall of that year. In 1898 substantially the same area was again covered by fire, lasting for nearly four months, although in the intervening quarter of a century it had been the practice of the local stockmen to set fires to burn off the brush and litter nearly every fall.

The Destruction of Merchantable Timber by Fire

Even under the best possible conditions, the heat of the fires will frequently kill mature timber in considerable quantites. Heat killing of large timber depends, of course, on the intensity of the fire which in turn is dependent on the amount of inflammable material, the topography, weather conditions, etc. Even in the early spring, on steep south and west exposures, where the litter has dried most rapidly, or at the heads of draws where air currents are the strongest, a light fire may flare up and destroy large trees.

Munger has shown in typical yellow pine stands in Oregon, burned over by frequent light, surface fires, five per cent of the merchantable trees may be burned to death by a single fire. Four fires were studied.

Up to 1919, Show had studied the results of five fires in California in sugar pine--yellow pine forests, which occurred under conditions like those which light bufners have to contend with. He found that on a total burned over acreage of about 12,000 acres over one per cent of the timber was killed by fire. The conditions were similar to those in southern Oregon.

After three years of study, the California Forestry Committee came to the following conclusion on this phase of the problem:

"No burn yet critically studied failed to cause damage to mature timber, which was considerably larger than would be apparent to the casual observer."

Light Burning Results in Accumulation of Litter

On the various areas on which light burning has actually been employed, we find that it is very difficult to secure a complete burn. For example, on the Walker area, large crews of men were employed to start fires and even by working for some weeks, and spending several cents an acre, only about forty per cent of the area finally were burned. On the Walker area the amount of inflammable material was actually increased by the use of light burning. The top layer of the litter is of course consumed, but after wind and rain have ruffled up the remaining part of the litter, fires can very easily spread. Light fires do not consume all of the brush and earth reproduction which they ultimately may kill so that after the burning more fuel is added to the next fire. A recent study of an area of 200 acres on the Plumas, which contained a considerable number of down logs and standing snags, showed that after burning, only about 25 per cent of the logs on the burned area were consuedm and very few snags.

And the question might be asked--what becomes of the fire scarred trees? From the findings of Show, with a conservative one per cent of the timber being killed outright, and with a widening and deepening of fire scars in other trees making them liable to windthrow, there isn't a doubt in the world but that more down logs and snags will be present with the use of repeated fires. Much of the brush that is not consumed by a fire, but that which is killed will undoubtedly add more inflammable material to the next fire. I admit that fire will consume some of the brush and I will discuss this problem later.

Fire History in France

The claim has been made by the light burners that in France the inflammable material is removed by hand and consequently no serious fires occur. They also claim that crown fires are unknown in France becuase of this removal of the debree and forest litter by hand. It is true that fires are very rare in certain parts of France, as for example in the fir and spruce forests of the Vosges and Jura. Why? Largely because rainfall occurs at frequent intervals throughout the summer. In southern and southwestern France, in the maritime pine regions, where climatic conditions more nearly appraach those of California, fires cause great damage. In 1893, for instance, more than 100,000 acres were burned over

in Gascony alone, while five years later over 40,000 acres were burned. Moreover, the very real danger from fire is fully recognized, both by exceedingly strict laws and regulations governing the use of fire and by practices such as grubbing out brush, the construction and maintenance of fire lines or breaks, and in many other ways.

Damage to Mature Timber

The light burners maintain that the damage to mature timber by the practice of light burning is negligible. From the history of fires that occurred in California as far back as the sixteenth century showed damage by fire scarring. These fires scars may be gradually deepened and enlarged by later fires until the trees are finally burned down or blown down. Monger studied four fresh burns in Northeastern Oregon. The per cents of the trees scarred by the fires on these four burns were found to be 32 per cent, 43 per cent, 47 per cent, and 45 per cent. Mumger found further that yellow pine in eastern Oregon was very much more susceptible to fire-scarring than Douglas fir. In northern California, in a yellow pine forest, Show tagged 321 trees, both with and without fire-scars, prior to light burning of the area. Of these trees, 120 had fire-

scars on them, and the light burning enlarged and deepened over 85 per cent of these fire-scars. Of the 201 trees without scars, 22 developed scars as a result of the light burning. The striking thing brought about by Show's data is that once the fire-scars are formed, a subsequent fire enlarges the far greater proportion of them. The significient thing brought out by fire-scarring is that the enlarged scars decrease the value of the butt log of the tree, the butt log being the most valuable log in the tree. The injury that fires cause through infestations of insects and fungi will be brought up later.

It is also maintained that the clear trunks of much of our virgin timber are due to the occurrence of fires.

We are desirous of obtaining clear trunks in all trees for lumber purposes and the question is whether or not we should allow nature to perform its duty of natural pruning or whether we should use fire to burn the lower limbs of a tree. A fire which has a sufficient volume of heat to reach the lower limbs of a tree is certainly hot enough to be highly dangerous when it comes to fire scarring the butts of the trees. We can control fire to do many things but it appears far too hazardous to attempt to burn the branches off of trees

Insect Infestations Due to Fires

A distinction is made between an infestation of an epidemic haracter and an endemic one. An endemic situation occurs at all times, as there are always a certain number of insects found in the forest. When the insects occur in such numbers as to cause serious damage they are known to be epidemic in character. The light burners maintain that light fires kill the destructive bark beetles in living trees and that fires control epidemic infestations and prevent new ones from starting.

The increases in killing of merchantable timber by beetles after fires ordinarily vary from three to ten times what it was before the fires. Special attention to this situation has been given in or near the Shasta, Sierra, and Plumas National Forests in California and the Crater and Whitman National Forests. The data bear out the fact that large increases in killing of merchantable timber by beetles after fires can be expected. The severity of the fires do not appear to have any influence on the degree of these increases.

On the Sierra National Forest, Ralph Hopping, formerly of the Forest Service, watched the progress of the infestation on a burned and an adjacent unburned area for four years. On the burned area, the pine beetle loss for the four years following the fire amounted to about

350,000 board feet per section while the four-year beetle loss per section immediately adjoining the burn totalled less than 50,000 board feet per section. In other words, the beetle loss on the burn was seven times as severe for a four-year period after the fire as it was on the adjoining unburned area for the same period. The timber was largely yellow pine.

It has been found that fires which are hot enough to kill beetles inside the bark of a tree are also severe enough to kill the cambium layer of the tree. Under such conditions, that of either killing the tree outright or of injuring it in such a way that the vitality of the tree is lessened, an insect attack will usually occur. A study of trees which have been burned show that the insects prefer trees which have a low vitality. This is seen by inspecting trees which have been burned. The entrycourts which the beetles make are through the charred bark of the tree. And so we find that fires are quite a deciding factor in the occurence of insect infestations.

Fungi Injury Due to Fire

Fire injury makes it possible for heart-wood-destroying fungi to gain entrance. Dr. E. P. Meinecke and Dr. J. S. Boyce, forest pathologists of the Bureau of Plant

Industry, have shown that, through the fire-scars, wood-destroying fungi very commonly enter the heartwood of living trees. Carefully collected data are available on this point. In some species of trees, the amount of wood deterioration brought on by heartwood-destroying fungi, which secure their entrance through fire-scars, is very much greater than the other losses for which fire-scars are responsible, such as, for instance, lowering the value of the butt-logs for lumber, hastening the burning down, or blowing down of merchantable timber.

In the detailed studies of white fir by Meinecke, it has been shown that only in very rare cases did the Indian paint fungus (Echinodontium tinctorum) obtain a foothold in uninjured trees. Of 59 firs wounded by fire, he states that only 11 had decay not traceable to the fire wound. Out of a total of 109 cases of decay, the causes of which were definitely determined, 48 cases were due to fire, 25 to frost, 23 to lightning, and 13 to other causes.

That smoking and charring of the bark of living trees by fire prevents the entrance of insects into the trees, has been brought out to be false. Careful examinations of trees which have been burned and attacked by insects shows that the entrecourts appeared through the charred bark. Some of the control measures for eradicat-

ing insect infestations are Solar heat treatment, burning the entire tree, bark and burning the tree, and others. A proper interpetation of the use of fire in these methods is the use of fire and burning the whole tree and consequently the insects. But to use a fire on a living tree which has but a few insects in it will reduce the vitality of the tree and insure the possibility of a severe insect attack.

Light Burning and Reproduction

Some of the light burners claim that burning always secures reproduction on the area burned. There is a certain school of light burners who are convinced that light burning leaves uninjured a sufficient proportion of the reproduction to enable a forest to perpetuate itself. The position is sometimes taken that light burning does not kill sufficient reproduction to prevent the new forest in coming on. An experiment was made in Lason County, California, where light burning was practiced on a young growth of western yellow pine. Here it was found that the younger the growth was, the more susceptible it was to fire killing. Seedlins under two inches showed 97 per cent killing, while those of 8 inches in diameter were only slightly damaged. The results of this experiment tends to show that light burning in some

cases might tend to weed out weaker and younger seedlings. If such conclusions were drawn one might ask the question: Where will the future timber supply come from? If the smaller seedlings were wiped out by fire killing a future stocking of the forest would not seem likely. Even if it were granted that fire does weed out the weaker seedlings and thin out dense patches it would be almost impossible to direct the fire to burn out the desired weaklings. With these things in mind it seems impossible that reproduction can always be secured by light burning.

Until recently, the greater majority of timber owners have been interested only in the protection of merchantable timber. To them, reproduction usually meant increased logging costs and greater fire hazard. That is why many timber owners have been interested in a plan of light burning which would result in the destruction of the so-called "brush" and in the safe-guarding of the merchantable timber against fire. The timber owners' policy has been to cut the matured timber with little regard to reproduction. Consequently any method of desposing of the reproduction has been a lessening of logging costs.

Reproduction is not undesirable in the virgin forest

because it is for the prepetuation of the forest that seedlings are found. They usually occur in open spaces in a forest where they may obtain as much sunlight as possible. Consequently seedlings tend to maintain a fully stocked stand. Whether or not seedlings hinder the growth of mature trees appears to be questionable. It is known that mature trees do hinder the growth of seedlings. And the denser the reproduction, the more growth trees usually put on in order to fulfill the old proverb, "Survival of the fittest."

Brush and Light Burning

In regards to the statement that brush fields within the timber belt are not the result of fire but are natural phenomena is answered by Show's quotation as follows:

"Probably most of the men who favor light burning make it a point of their creed that light fires keep the timber open and free from brush. Our own studies made over wide areas and for a considerable period of years show what is now generally recognized, namely, that fires may kill out timber but they do not kill out brush. We find in a great many cases that certain brush species show remarkable vitality and vigor in coming back after fire. For example in southern Oregon and northern California, it has been found that the number of manzanita

plants has sometimes been increased as much as 900 times following a fire. On specific light-burning areas where white-thorn, manzanita, and similar brush species occurred scatteringly before the fire, we found that the number of shoots from a given clump increased two or three times after the fire."

(From a report called, "Forest Fire Protection in California"and dated November, 1919.)

In many of the present brush fields of California, charred snags and stumps furnish convincing evidence of a former forest. In very old brush fields, there may remain nothing but remnants of roots of trees or a shell of bark to prove that large trees once occupied the ground now covered by brush.

Dr. J. V. Hofmann of the Wind River Experiment Station investigated the history of the brush fields in southern Oregon and found that all of them had their origin in repeated fires. He found, further, that fires merely served to make the brush gradually more vigorous and plentiful until unbroken brush fields were the final result.

The point brought out that light burning prevents serious fires has been mentioned earlier in this paper.

The fact that light burning does not burn all of the litter on a forest floor during one burning shows that the intention of light burning has not been fully accomplished. If some of this litter remains in patches the area is just as much a fire hazard as it formerly was. That part which has been burned is open to the action of wind and rain which ruffle up the remaining litter underneath and adds more fuel to a fire. If light burning is practiced repeatedly, then in time all of the litter will be consumed and consequently all of the organic matter that is intended to replenish the soil has been destroyed.

Light Burning and Soil

Many experiments have been conducted by the soil departments of various institutions to determine the effect of fire upon soil. These experiments have brot out various conclusions, some of which are the relation between fire and soil erosion and the depletion of the organic matter in the soil. In regards to the organic matter in the soil, it has been found that fires reduce the nitrogen content of the soil, thereby reducing one of the most important elements for plant growth. With the destruction of the humus on the soil the organic mat-

ter is reduced to ash and the carbon has been used up, thereby reducing one of the most important factors which add to the organic matter of the soil.

Soil erosion studies have been carried on by W. C. Loudermilk in California. In taking two plots, one of which contained a growth of chaparral and the other which was burned over, he found that by careful adjustments in regards to artificial rainfall, etc., the runoff for the chaparral was 1.2 cubic feet, as against burned plots which showed 4.4 cubic feet. For erosion, he found that in the chaparral 15.7 pounds of material was lost as against 284.4 pounds for the burned plot. The most important results of his experiment are quoted in the following statement:

"The formation of a fine textured layer at the surface of a bare soil as a result of filtering suspended particles from percolating muddy water is, therefore concluded to be the decisive condition which increases the surficial runoff from bare surfaces."

This fact indicates that the most important function of forest litter is to maintain the natural characteristics of a soil profile by keeping the rain water clear--a function which has been overlooked. It seems clear that with an undisturbed mantle of vegatation the percolation

capacity of the soil remains at a maximum even in extremely heavy and prolonged rains.

In the conclusions that Laudermilk stated are:

1. Forest litter in these experiments greatly reduced surficial runoff, particularly in the finer textured soils; and this influence continued long after the litter was completely saturated.
2. Destruction of the litter and the consequent exposure of the soil greatly increased the amount of eroded material and reduced the absorptive rate of the soil.
3. Suspended particles of runoff water from bare soils were filtered out at the surface and sealed the pores and seepage openings into the soil sufficiently to account primarily for the marked differences in rate of absorption between bare and litter covered soils.
4. The capacity of forest litter to absorb rainfall is insignificiant in comparison with its ability to maintain the maximum percolating capacity of soil profiles.

I cannot emphasize too strongly the effect that fire has upon the nitrogen in the soil. Nitrogen is the growth element in the soil. We find that every protein must have nitrogen and that every new cell that is formed in a plant must have nitrogen. The rate of growth, then, is dependent upon nitrogen more than anything else,

and now we find that fires reduce the nitrogen content in the soil. Experiments were conducted in Florida by R. M. Barnette and J. B. Hester to compare a soil which had not been burned to a soil which had been burned over almost yearly for the past 42 years. The land on the unburned plot had a stand of virgin pine and the timber from the burned plot had been removed during the last three years. It was found that from the different soil profiles the organic matter was present in larger quantities in the unburned soil. There was an annual loss of 2,888 pounds of organic matter per acre. As far as nitrogen is concerned there was na annual loss of 27 pounds of nitrogen per acre. This may seem insignificant, but we must remember that normally there isn't much nitrogen in the soil, and a loss of 27 pounds per acre per year is in reality a severe loss. In addition it must be remembered that burning destroys the organisms in the organic matter of a soil, and the nitrates are formed through decomposition.

Part 111. **Costs**

During the five year period from 1926 to 1930, there was an average of 565,273,620 acres needing fire protection in the United States. Of this area, only

372,276,920 acres received it, or 65.9%. It was found that on an average, 1.2% of the area protected each year was burned, or a total of 4,467,697 acres. This area burned resulted in a damage of $11,356,676, or roughly $2.50 per acre. For the total area protected the damage was 3 cents per acre.

Under the most favorable conditions the cost of light burning would cost at least 50 cents per acre. This would necessitate the scraping of needles away from trees to reduce the damage by fire scarring to a minimum. At the figure of 50 cents per acre the cost would be at least sixteen times as much as the present protective system, or in value the cost would be $186,138,460 as compared to $11,356,676. If we took the total area needing protection, the cost of light burning would total $282,636,810, or over $2 per capita in the United States.

In the California region, which is the typical pine region, the total area needing protection is 36,351,480 acres. Of this area 33,614,720 acres are protected, or 92.5%. For the same five year period 1926-30, the average yearly protected area burned was 743,028 acres, or 2.21%. The damage caused by fire was over 1¼ million dollars. Light burning at the rate of 50 cents per acre would have cost $18,175,740 or 14 times as much.

In our own state, 100% of the area needing prot-

ection received it, or 25,170,210 acres. Of this area, 164,116 acres were burned over yearly (average) during the period 1926-30, or 0.65%. The damage caused by fire averaged $895,784 yearly. Light burning at 50 cents per acre would have cost $12,585,105, or 14 times as much yearly. Forest fires in Oregon during 1931 cost $885, 322, which sum does not deviate appreciatly from the five year average. And so the fires in the United States during 1931 do not affect the above quotations as the difference between the costs of light burning and of fire protection is so great.

To light burn, or not to light burn--that is the question. If it meets with the approval of the American people to light burn periodically at a cost at least fourteen times the present cost of fire prevention, then it should be done. With the present depression still staring us in the face, I rather doubt if every man, woman, and child in the United States would be willing to pay at least $2 a piece to light burn the forests when fire prevention can be obtained for one-fourteenth that price. The verdict lies with the people--the judge and the jury of this court.

Part IV.

Canyon City, Oregon

BLUE MOUNTAIN EAGLE

Chandler & Haight

"Freedom is the Right to be Wrong"

Entered at the Postoffice in Canyon City, as second class matter.

Subscription Rates

One year	$2.00
Six months	1.25
Three months	.75
One month	.25

THERE ARE 1,703,725 acres in the national forest closed to entry. Not by law, but by edict. Not by the orderly processes of law but by ukase. Absolute dominion of this vast area is in one man. He may be right or he may be wrong, but there is no one to quibble or question; for he is king. Much of it burned this year, and 10,000 men fought it in vain. And mind you this monarch, like in the time of war, can draft you onto the firing line and you go or go to jail This is not a criticism but the situations as it is and this can not be satisfactory to the forest service or to the people. This system or policy needs fixing. This year thousand of acres burned and hundreds of thousands of dollars were spent, and much of it, in hasty organization, wasted. Next year it will burn again and next year the same, and some year with dry electric storms, fires will spread beyond any hope of human control. That is the inevitable. There is a reason, of course, and that reason is the fire hazard that has accumulated during the past 20 years. There are dangerous fire traps and hazards in the forest. They are going to burn. Everybody knows that, and why not burn them, under supervision and control in the late fall rather than wait until next August, Areas could be cleaned up so that fires could not spread. Bad places could be eliminated. Half the money that we are going to spend next summer fighting fire could be spent this fall burning dangerous places. The state fire marshal compels towns like Canyon City to clean up the back alleys and get rid of rubbish and inflammable debris that is a fire hazard. We must learn as we go along. And we have learned that regardless of lookout stations, smoke chasers and closing forests, they burn in spite of all. They will burn again next year, and why not get ready now? No private enterprise would pile up old boxes, excelsior and oil-soaked rags back of their plant and put a man there to guard them. They get rid of them. There is no one to blame for the policy as it is, for it has just accumulated, like the brush. But it isn't working. Fires are consuming the forests. They will do it next summer. And, another thing, forest officials and stockmen, together in harmony and for mutual benefit, can observe the results of the recent fire on Widows creek. Watch the range and the grass on this burned over section. Watch Nature's re-forestration. Observe it next year and the year following. Look at the range now in Black canyon that was swept by fire several years ago. Go take a look at it. We are in sympathy with the work of the forest service but that don't mean that a certain policy is fixed, regardless of changing conditions, and the time may come, and it may be here now, when the forest service can prepare for the inevitable. They can burn out barriers that will limit fires to certain sections or they can work out some plan to reduce the menace of windfalls, thickets and dangerous places that are going to burn just as certain as summer seasons come and go. The present system is getting no where. We want to save the timber and it is self-evident that it can't be done with look-out stations smoke chasers and closing forests. Some other plan must evolve. We must think together plan together, work together and we will find a way to save the forests, but not the way we are going.

Figure 1.

FRIDAY, MARCH 4, 1932.

Forest Fire Losses Put At $885,322

Salem, March 4.—Fires in Oregon forests during 1931 resulted in losses aggregating $885,322, according to reports compiled by Lynn Cronemiller, state forester. The reports account for a total of 1621 fires during the season which burned over an area of 188,494 acres. Of the total burned area 32,007 acres were merchantable timber on which 156,125,000 board feet of timber valued at $280,720 were destroyed. In addition, 71,735 acres of reproduction timber valued at $132,924 was burned.

The greatest loss was in logs and logging equipment with the damage placed at $421,179. The Cochran fire in Tillamook county which destroyed two logging camps accounted for the greater part of this loss. The total loss to logs and equipment in this fire alone was $306,000. Damage to fences, farm buildings, livestock, etc., was placed at $50,499. Railroad fires were responsible for approximately 50 per cent. of the total damage during the season. Incendiary fires ranged second with losses totaling $160,926. Incendiary fires also burned over the largest area.

Fewer lightning fires were recorded during the 1931 season, only 85 being traceable to this cause. Ninety-five per cent. of the season's fires were man-caused, with incendiarism leading with a total of 543 fires, the largest number on record in this state for a single season. Smoker fires ranked second in number and also second in area burned. A total of 415 fires are charged to smokers, burning over an area of 33,248 acres. Other causes follow: Brush burning, 161; campers, 154; logging, operation, 60; slashings, 32; railroad, 27; miscellaneous, 139.

Josephine county ranked first in the number of fires with 197. Jackson county was second with 172; Douglas county was third with 154 and Klamath county fourth with 143. Tillamook county suffered the greatest fire loss with $448,382; Washington county was second with $87,456 and Jackson county third with $55,024.

A total of $611,353 was expended in protection of state and privately-owned forest lands during the year. This amount includes wages of patrol and lookout men and cost of improvement work such as trail and telephone line construction, cabins and miscellaneous equipment.

Seventy-three arrests were made by state officials during the year for violations of forest laws, resulting in 69 convictions with one acquittal and three cases still pending. One person was arrested for incendiarism and was sentenced to a year in the state prison.

Twenty-one persons were arrested for allowing fires to escape and 10 for burning without a permit.

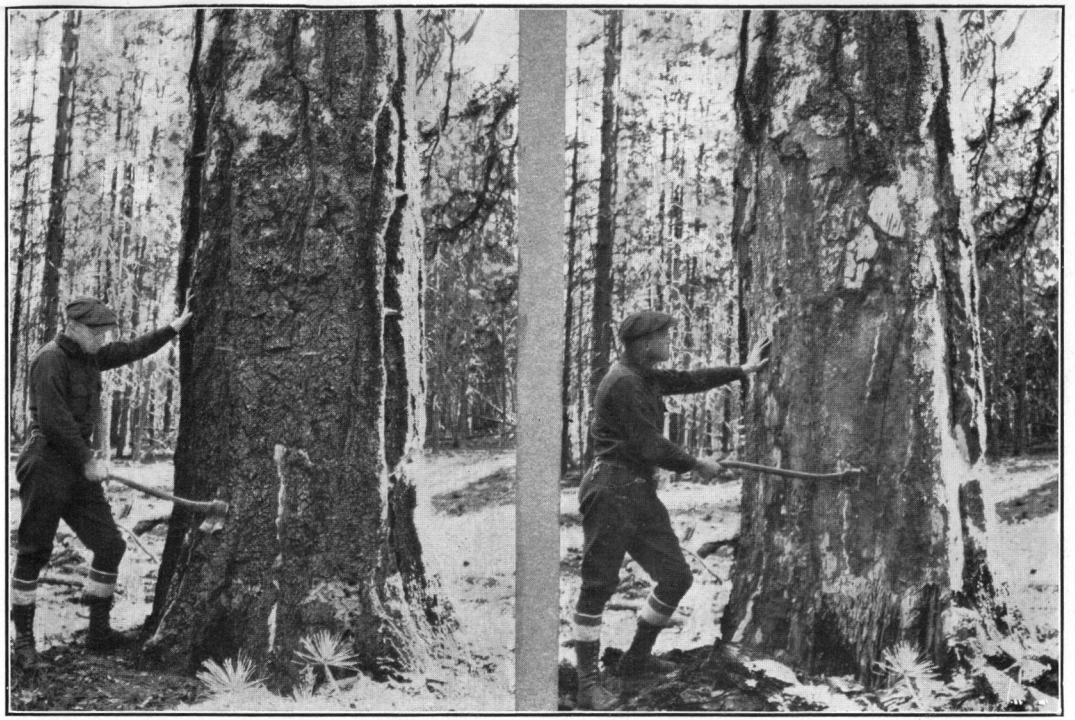
SAVE OUR FORESTS

(Jess Allen)

Not with malice toward any forest official but with a sincere desire to help save the forest from the fate which awaits them, this article is written. Nature, assisted by the lofty American Indian, built the beautiful forests, and under present forest rulings, it seems the forests are doomed. God from the Heavens sends bolts of lightning to purify the forests. Fires to the mountains are as necessary as salt is to the sea. We do not mean to convey the idea that at this late hour set fire to the timber, but unless something is done to clean the rubbish from the forest, it is only a matter of time until there will be no forests. Early in summer and late in the fall, when there is no danger of forest fires raging, the forests should be burned. Forest rulings are filling the mountains with porcupines chipmonks, ants and squirrels. When underbrush and jack pines become dense on the ground, snow cannot plaster on the ground, which is absolutely necessary, and what little moisture does go into the ground is soon sapped up by Jack pines. Pines needles when allowed to accumulate form a regular roof and rain and snow cannot penetrate through them. Turpentine from the pine ueedles has a tendency to kill vegetation. Give nature its way, guarding of course raging forest fires in dry seasons, it will not be many years until the mountains will be green and the streams carrying water as of old.

Anyone can easily see that under present forest rulings it is only a matter of time until there will be no forests. There is no possible way to stop a forest fire when fallen timber and under brush has been allowed to accumulate for a quarter of a century. It would not cost any more to clean the forests at the proper seasons than it costs to fight forest fires and besides the valuable timber may be saved.

Figure 2.



F-46118-A

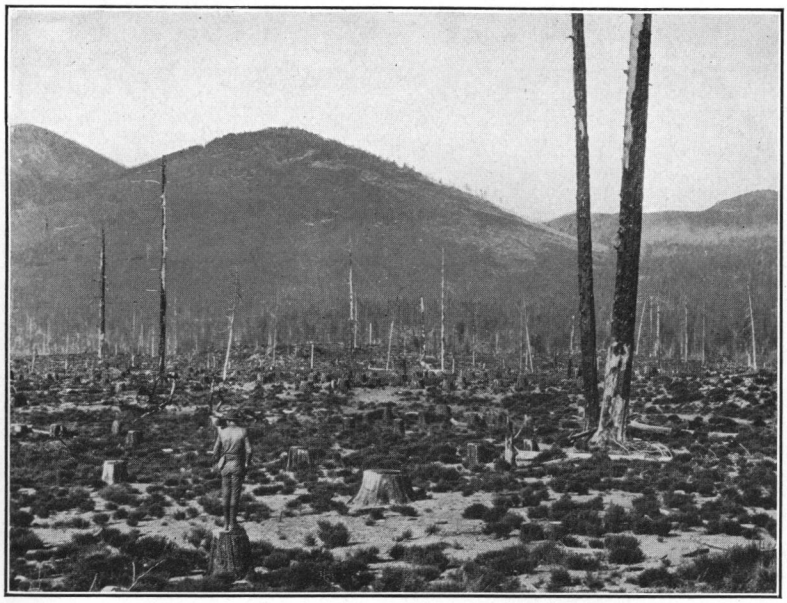
FIG. 1.—A HIDDEN FIRE SCAR

F-46119-A

FIG. 2.—THE DEAD AREA OF THE SCAR

A 48-inch western yellow pine scorched by fire 21 years previously has kept its bark on over the dead wood. Such hidden wounds, no less harmful to the tree than the open scar, are often overlooked entirely in hasty estimates of fire injury. Decay has already set in, with a heavy loss of valuable lumber, as shown at the base of the tree

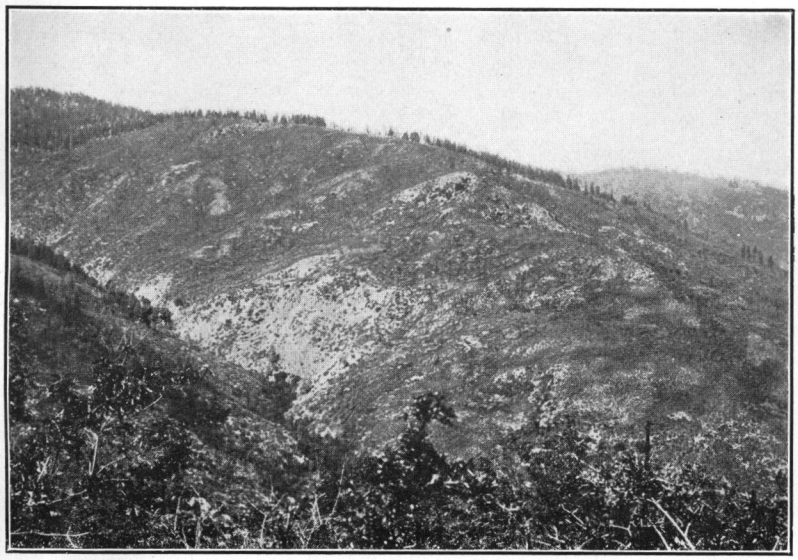
Figure 3.



F-156404

FIG. 1.—FROM FOREST TO WASTE LAND AT ONE STRIDE

Only a single severe summer fire in the slash left from logging was needed to reduce this high-grade forest land to an unproductive waste but one step removed from the desert. Centuries would perhaps be required to reestablish by natural means a complete forest cover



F-16476-A

FIG. 2.—THE SLOWER PROCESS OF REDUCING FOREST TO BRUSH LAND

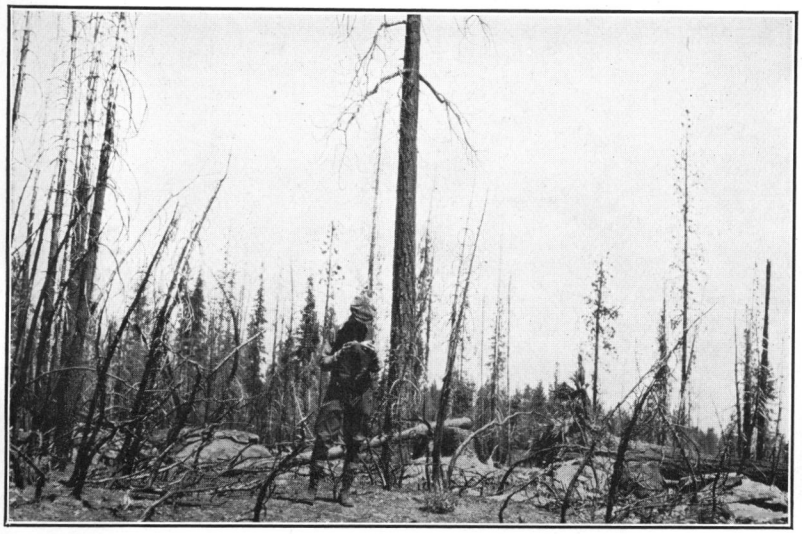
On the steeper slopes the timber has first been killed and then consumed by repeated fires, which have at the same time impoverished the soil and left it in many places bare and subject to erosion. The forest has been largely replaced by dense brush fields, which, with their high fire hazard, are a standing menace to the remaining forest as well as to the young trees that get a foothold in the brush. Reclaiming a site like this is slow, difficult, and expensive

Figure 4.

F-157078

FIG. 1.—ADVANCE REPRODUCTION BEFORE BROADCAST SLASH BURNING

Such reproduction is the result of fire protection, and means that the new crop of timber on this land is by so many years nearer maturity

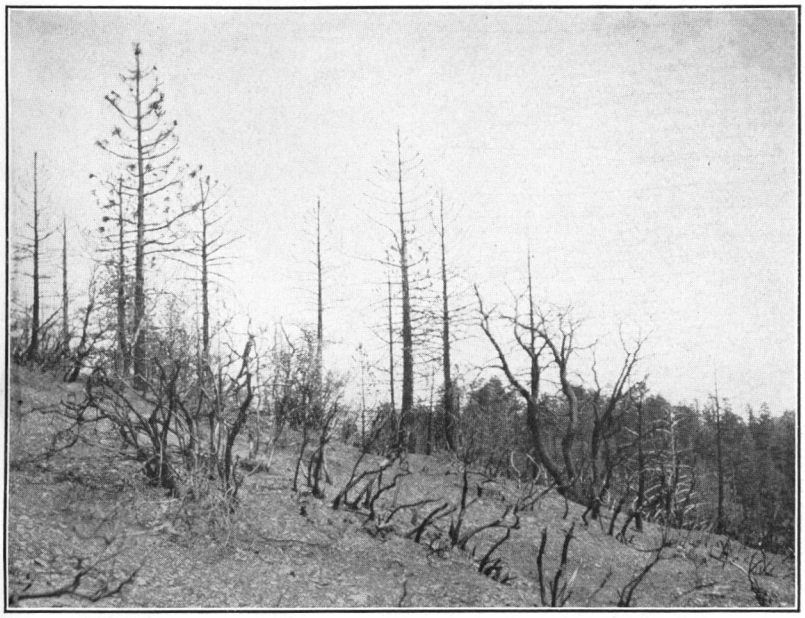


F-167515

FIG. 2.—SEED TREES KILLED AND REPRODUCTION WIPED OUT

The same view as that above, after broadcast slash burning, tells the story of a practice that has made many thousands of acres in the California pine region unproductive, a loss to the owner, the State, and the Nation

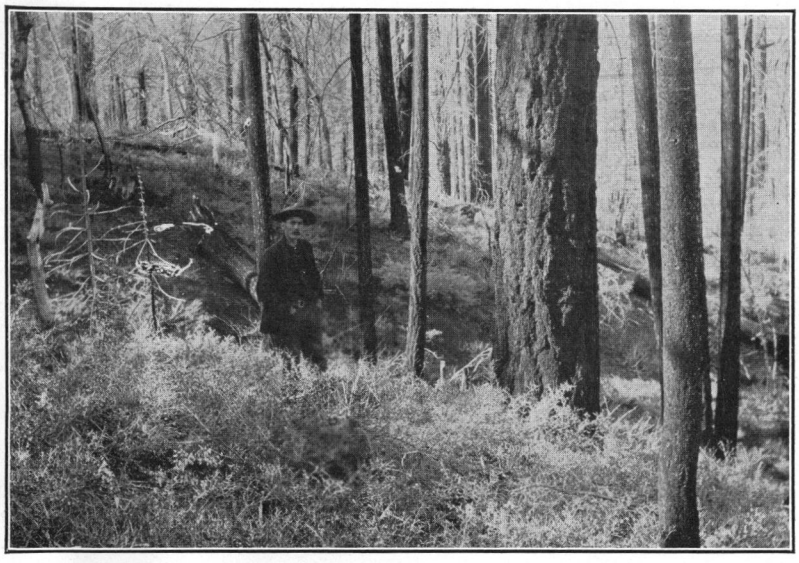
Figure 5.



F-152447

FIG. 1.—WHERE FIRES RECUR BRUSH HAS THE ADVANTAGE

Without fire protection, the forest gives way to the brush field; for sprouts from the stumps and roots of the brush quickly reclaim the area, whereas timber invasion is a long-time process

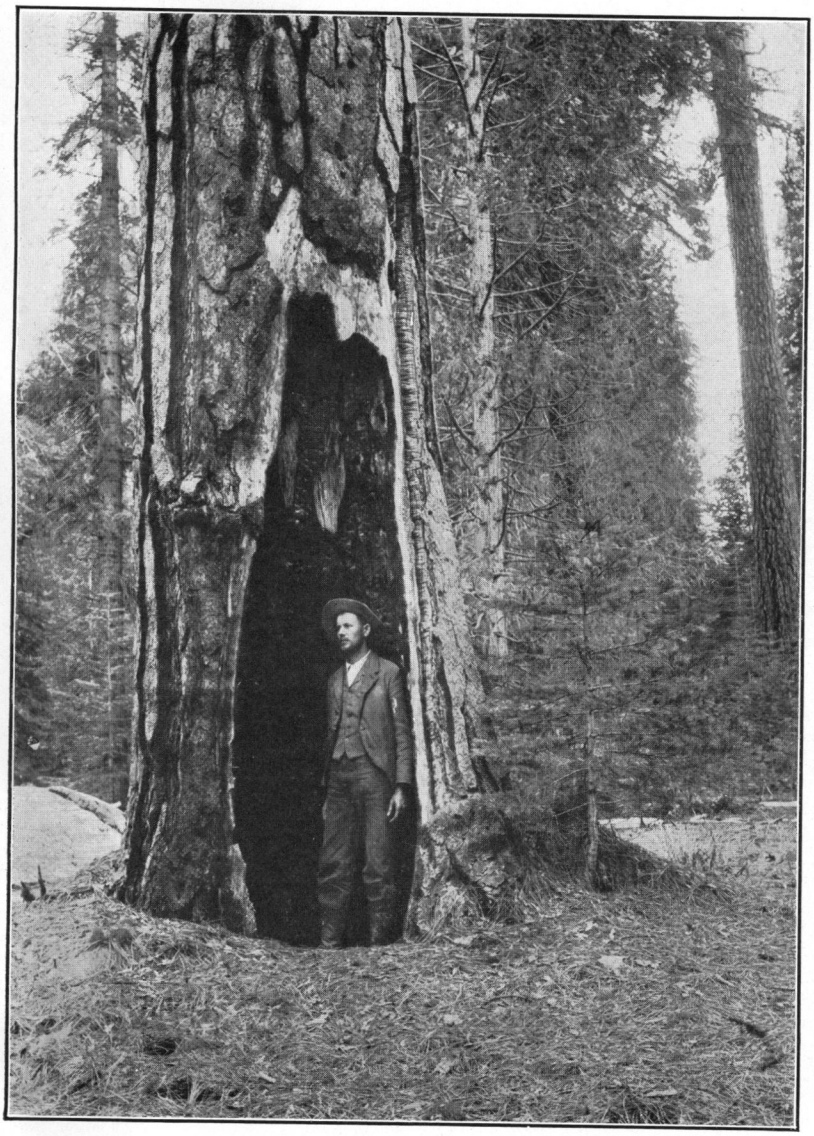


F-93000

FIG. 2.—BRUSH TAKING POSSESSION OF A FIRE-KILLED AREA

Repeated fires in timber encourage the brush which, when the timber has been killed, takes complete possession. In a few years these snags will fall and a nonrestocking brush field will take the place of the former productive forest

Figure 6.



F-54561

A RESULT OF REPEATED FIRES THROUGH PAST CENTURIES

The highest grades of lumber are obtained from the first, or butt log. This is the point of attack of every fire scar, which, as it is enlarged, not only burns its way into the heartwood but permits the entrance of fungi, a very destructive agent. Fire protection can not save this big fellow, but its results are clearly seen in the amount of reproduction already established near by

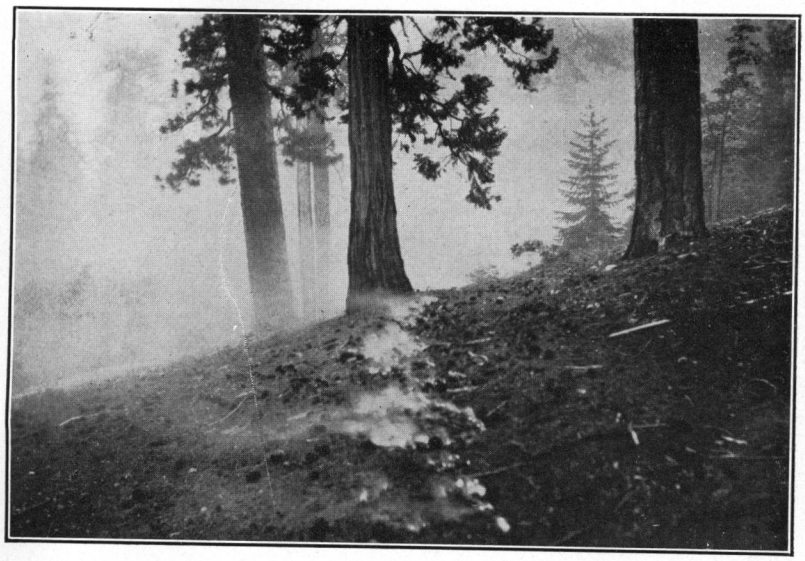
Figure 7.

THE RETURN OF THE FOREST—WHEN FIRE IS KEPT OUT

F-159510

This area was logged 20 years ago and has since been protected from fire. As a result of this protection the new stand of second growth that is coming up will far surpass the virgin stand in board feet per acre. Such growth a single slash fire, a "light burn," or a so-called "harmless" surface fire renders impossible; but with adequate protection for the future, costing only a fraction of the value already at stake here, the new forest will be assured

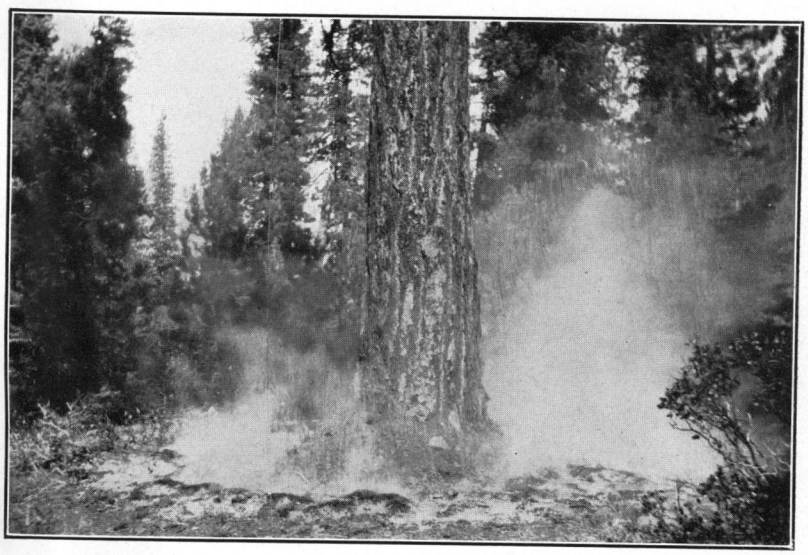
Figure 8.



F-41638-A

FIG. 1.—LIGHT BURNING UPHILL AGAINST THE WIND: EARLY MORNING

On this project the loss due to the fire here shown amounted to 972 board feet an acre. Snake Lake, Plumas National Forest

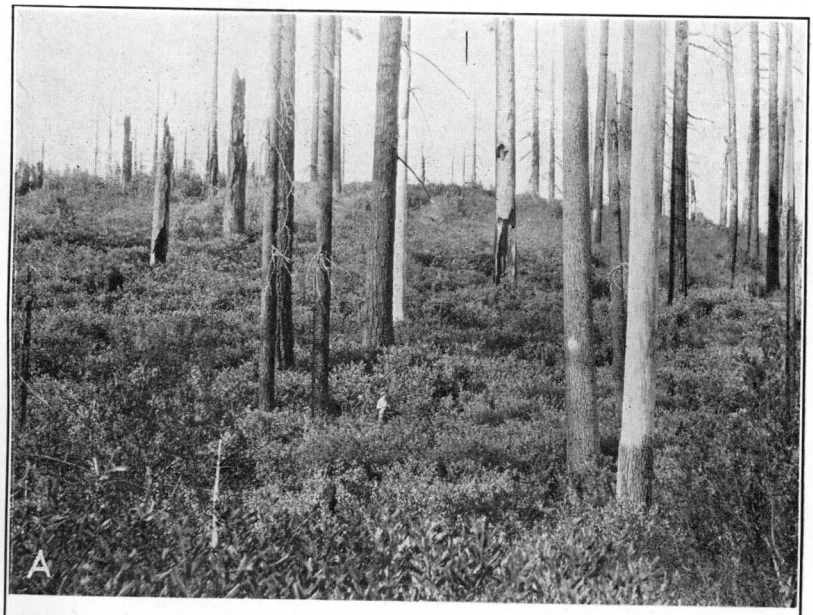


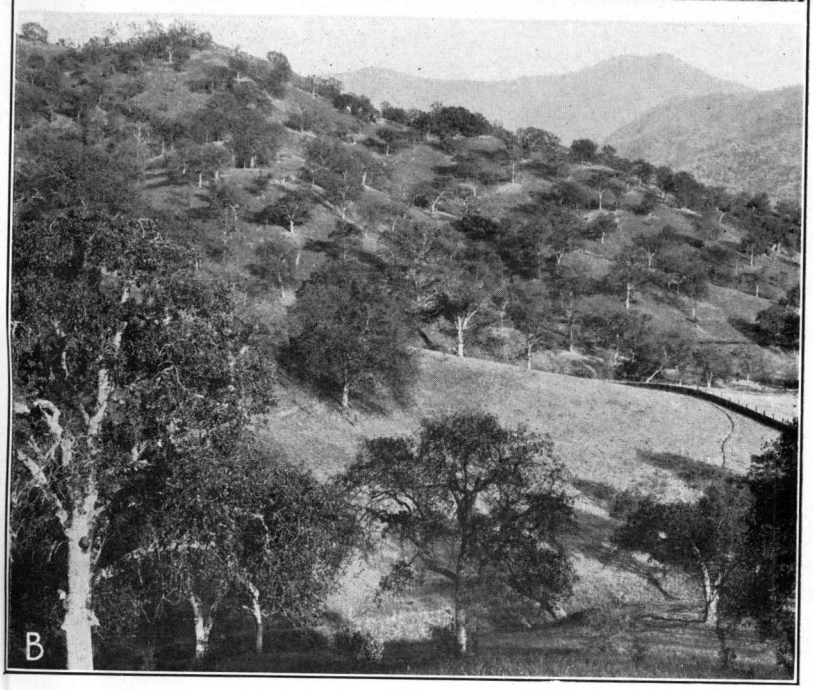
F-98912

FIG. 2.—MAXIMUM PROTECTION AGAINST INJURY FROM LIGHT BURNING

The earth is banked about the base of the larger trees to afford direct protection to the tree and also to shed falling needles and twigs that would bring the next fire too close. This method has proved both expensive and ineffective, and is impracticable on an extensive scale

Figure 9.





F-151592-48770

CHARACTERISTIC STANDS IN THE NONTIMBER TYPES

A.—The brush type is the result of fire and now consists of a dense impenetrable cover of woody shrubs where formerly the mixed conifer type prevailed. This represents land of high timber productivity.

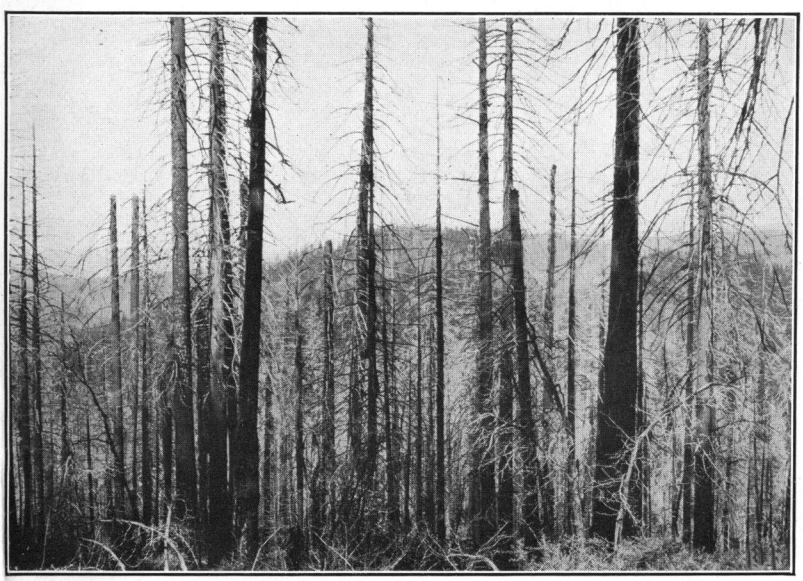
B.—The oak-woodland type forms an open parklike stand, with a ground cover of grasses and weeds and scattered shrubs.

Figure 10.

F-156401

FIG. 1.—THE VIRGIN FOREST

The California pine forests have been reduced both in volume and in number of trees by successive light fires that have run through them for centuries. An old and open stand such as this can not compare in volume with fully stocked second-growth stands. However, reproduction is gradually taking possession of the openings, encouraged by fire protection in recent years



F-94718

FIG. 2.—THE RESULT OF A CROWN FIRE IN SECOND GROWTH

Although crown fires are rare in old stands, in the California pine region, they often develop from light burns in second growth. When this occurs, the result, as in this case, is disastrous

Figure 11.

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