

A Proposed Slash Disposal Plan for Western  
Oregon

by

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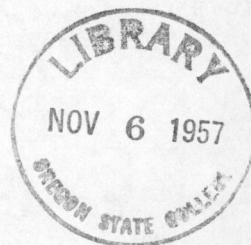
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## INTRODUCTION

Slash disposal in certain parts of the state is becoming somewhat of an involved problem. Modifications and changes in logging methods in Western Oregon have created a problem in slash disposal which has not yet been solved. In this paper new methods of slash disposal will be proposed to take the place of the old methods which have now become obsolete for this region.

The idea to date has been to remove the slash with the primary purpose of eliminating the fire hazard. This principle has been a purely selfish one and has shown very little forthought for the generation to come.

The present system of slash disposal may be classed as legalized Forest destruction.<sup>2</sup> The State has laws requiring that all slash must be removed following logging operations. This burning is supposed to abate all risks by removing the hazard. The question involved is as to whether the hazard removed by burning compensates for the damages which follow the present system of broadcast burning which is the present practice in Western Oregon.

The slash disposal system has been in operation in Oregon for a number of years. This is controlled by State laws. During this period there hasn't been any changes in the policies followed. They have stuck to

the original purpose of slash disposal for reducing the hazard from cut over areas on the standing stands of timber. When these laws were passed there was little thought of the new stands which the future generations must be dependent upon after the present crop has been removed.

### PURPOSES OF SLASH DISPOSAL

The following is a list of the purposes of slash disposal.<sup>5</sup> These purposes will be discussed in the following pages.

1. Clean up of debris.
2. Protect the young growth on the areas.
3. Protection of adjacent areas by eliminating the hazards.
4. Keep fire out of remaining seed trees.
5. Reduce the general fire hazard.

1. Clean up of debris. Slash burning was proposed to remove the debris which is left on the ground after logging. When the logging operation has been completed there is an accumulated mass of limbs, tops, and trunks which when dry become a very inflammable source of material.

2. Protect the young growth on the area. Slash removal was designed to remove the hazard on area and

this in turn will protect the present young growth and that which will come. With the debris removed from the cut over lands the excessive hazard is removed from the area.

3. Protection of adjacent areas by eliminating the hazards. With the removal of debris from the logged over areas the danger to the adjacent areas is removed. It was recognized that unburned slash areas are of great hazard to the surrounding areas during periods of dryness and low humidity. By burning the logged off areas it is much safer for the remaining stands.

4. Keep Fire out of remaing seed trees. With slash disposal the seed trees left on the area were made more secure from future fires which might ravage the area. These seed trees will eventually seed in the area and are very important to the future condition of the areas. The removal of the slash from the area will prevent future fires from gaining access to the seed trees.

5. Reduce the fire hazard in general. With the removal of debris from the logged over areas the fire hazard is removed. The condition of the country is bettered and the danger of fire is removed by slash disposal. The danger to lives and property thus being removed.



The reasons here given for slash disposal by burning would have been very justifiable if they had satisfied their purpose. But they have failed. It is on these grounds that this paper has been prepared. There are too many cases where burning has caused an opposite result than hereby stated as their purpose. There are too many areas in Western Oregon which are bare desolate wastes. The ground is covered with low type vegetation instead of a Douglas Fir Type. The waste is caused by uncontrolled broadcast burning. The following states kinds of burning.

#### KINDS OF BURNING

There are several different methods of slash disposal which are applicable to the various regions.<sup>2</sup> These various methods are proposed to secure the desired results in the different regions. As to whether the desired results are obtained, it will be discussed as this report progresses. The methods of disposal are:

1. Piling and burning. This method of slash disposal is practiced in cultivated forests, hardwoods, pineries, and European Forests. This method involves the piling of the limbs, tops, and trunks that are not utilized. These piles of refuse are burned when the time is right so that there will be little danger of spread. This is a very good method of slash disposal,

but is impractical for the Douglas Fir Region because of the large amount of waste that is left after logging. The expense involved would be too high for the business to stand. This is probably the best method of disposal in practice because it removes the hazard without any danger of spread and without any destructive influences on the site.

2. Broadcast Burning. This is the method that is in universal use in this region. It involves a complete burning of the logged off area within a year following the operation. The burning is usually done in the fall just previous to a rain which is supposed to help keep the fire under control. This is the method prescribed by law for slash removal in Oregon. Those that do the burning keep in touch with the weather bureau previous to burning. When the weather conditions are promising, that is if a period of rain and high humidity is in store, the slashing is touched off. Those interested then must set back and pray that all goes well with them and their timber. This is the system that must be changed because of the bad results that often result. This type of burning is apt to result in damage to life, property and the general condition of the land.

3. Spot Burning. This is a type of slash disposal that involves the spot burning of the points of greatest

danger, such as landings, rollways, and the accumulation of slash in the canyons. Fire trails are built around those areas that are to be burned and thus the burning can be controlled with very little danger of damage. The burning is usually conducted in the fall under the same conditions which are applicable to broadcast burning. So far this method hasn't been used to a very large extent in Western Oregon. This method has many advantages and its future use should be encouraged.

4. Rotting & Disintegration. This is the system that mother nature provided to take care of the vegetative debris on the surface of the earth. Man has substituted methods of his own which many are commencing to question now. Nature provided insects and fungi to reduce the vegetative elements back to their origin, the earth. These elements go back to the soil and provide the nutrients which are necessary for future growth. Fire destroys many of these elements and removes the balance of nature. It is believed by the author that in this respect man cannot improve the actions of nature. The sooner that nature is allowed to care for the debris the better. Man must protect these areas to keep fire from entering and nature will do the rest to the best advantage of all.



## PRESENT PRACTICES OF BURNING IN WESTERN OREGON AND THEIR RESULTS.

The present laws of Oregon require that the slash be burned in the fall following the operation. The cheapest method of completing this operation has been to broadcast burn with little thought to the results. The one thing that this method usually accomplishes is to leave the area in a black, ruined condition. Under the present administration this practice will continue because it fullfills the purpose for which it was designed in that the immediate hazard is reduced by the removal of the slash.

The results of broadcast burning are listed giving a description of each.<sup>4</sup> By no means in order of importance.

1. Spoils Fishing and Hunting. It is noticed by all sportsmen that in the years following a burn there is a shortage of fish and game in the area. With the game this can be charged to lack of food, shelter and practically all the other controls which are fundamental to game life. The shortage of fish can be charged to the effect of the ashes in the water; is the explanation of Professor R. E. Dimick~~k~~ of the Fish and Game Department. The shortage of food in the water caused by burning tends to cause the fish to move out. Ero-

sion usually sets in immediately following a fire and this tends to change the course of the stream in such a way that it becomes unfavorable to the natural habitat of fish.

2. Creates Erosion Burning is the largest source of erosion in Western Oregon. Most of the timber is on slopes of 15% or greater. With the removal of the litter and decomposed vegetation the rain water tends to run off of and therefore is a source of erosion. Litter on the surface acts as an absorbant and tends to level off the flow, thus acting as a restraint to run off.

Figures show that there is 10 to 30 times more run off on a recently burned over area than are in its natu- ss. ral condition.<sup>4</sup> New litter is not as good an absorbent as those that are partially decomposed.

The following table by Toumey will show the comparative run off figures for burned and non burned areas.

These figures demonstrate that broadcast burning is a source of erosion.

Area of catchment basin	Condition as to cover	Precip.	Run of per Sq. Mile	Run of in% of Precip.
Square Miles		inches	acre FT	%
.79	Forested	19	26	3
1.05	"	19	73	6
1.47	"	19	73	6
.53	Non For- ested of Burned over area.	13	312	40

3. Removes Duff. Broadcast burning under its present practice in many cases removes the duff from the forest floor. This duff is the decomposed and partially vegetative materials which covers the forest floor.

With the removal of the duff, nutrients are destroyed which are an important factor in tree growth. This tends to slow down the tree growth. The duff acts as a sponge in that it absorbs moisture which is later used by the trees. With the removal of the duff, the vegetative plants are apt to suffer from dessication.

4. Removes Soil Organisms. In the soil are num-



erous organisms and bacteria which act on the vegetation to change it into nutrients that can be used by the trees. Fire tends to kill these organisms and this has a very harmful influence. The increment is slowed down very much when the nutrients are not available to the tree. It takes time for these organisms to come back into the area and this can be charged to lost time caused by broadcast burning.

5. Destroys the living trees on the Area. Most of the slashing fires are very hot and burn at a fast rate. The heat is so intense that it results in the igniting of many of the seed trees which are left on the area. In most cases these trees are left because of defect or ill shape but if properly protected can be utilized to a very good advantage for the restocking of the area. (This pertains to clear cutting.) As an example a Forty acre tract was cited just north of Mill City on the ridge between the North Fork of the Santiam and the little North Fork of the Santiam. This 40 acre tract was logged in 1931 and burned that fall under the present regulations. There were two and one half million board feet removed from the area leaving some 35 trees remaining which would have been very suitable for seed trees. The fire was properly controlled but today there is only 3 of the 35 trees remainig. The

rest are snags. These snags are a hazard to the future growth on the area but there is no law demanding their removal. The 35 trees would have been ample to reseed the area within five years, but it will take the three trees many times that long. This is not an exceptional area but was the only area the author had an opportunity to survey. The boundaries of the forty acre tract were determined and a actual survey was made of the area. The author covered the area making an actual count which gave the figures used in this example.

The results are similar in the Zero margin type of cutting in this region. This type of cutting is practiced in 2nd growth stands where the submarginal trees are left on the area. The common practice is to cut to a 18" stump diameter and leave the smaller trees. But the present slash disposal laws do not allow for this type of cutting and state that the area must be broadcast burned. This results in the death of many of the smaller trees. If the smaller trees were allowed to live the areas could be logged again in forty to fifty years. But under the present methods of burning the area must start all over by reseedling.

Another area is cited at Mill City which is exemplary of the practice. North of Mill City is a fine stand of second growth timber which is being cut by the

Mill City manufacturing Company. A count was taken of an average 40 acre tract in this last years cutting. It was found that as an average, 18 trees per acre were removed. This left ten trees per acre which were too small for utilization. These trees left ranged from 12" to 18" inches in diameter. Had these trees been left to live the area could have been logged in 40 years and those cut at that time would have nearly equaled the present volume removed. But the area was burned over this last fall and the heat of the fire killed on an average 6 of the 10 remaining trees. The mortality will very probably become greater in another year or so as part of these remaining trees will die.<sup>2</sup>

In either type of logging the young seedlings in the open patches are killed. Throughout the Douglas Fir region there are many small openings which are usually filled with young seedlings. The only way these small trees could be saved would be by building fire guards around them. This is prevented by the cost of building such guards.

6. Kills seed in the Duff. The average slash fire which destroys the duff, kills the seeds that are embedded within.<sup>4</sup> This destroys the chances of reseed-  
ing except by the seed trees on the area and from surrounding timber sources. The present means of slash



disposal is seriously delaying reproduction.<sup>2</sup>

7. Increases the Immediate hazard. The first fire on the area consumes only a small percentage of the material.<sup>2</sup> The small limbs and needles are burned but the remainder is dried out and left on the area. The next season following the fire a type of vegetation springs up composed of bracken fern and other plants which form a serious danger when dry. The dried out debris along with this vegetative material is very dangerous to the area for some time to come. In the fall when the vegetative material along with the debris reaches its lowest stage it is as inflammable as a box of tinder. This condition prevails for several years and calls for added protection to insure proper control.

8. Results of Burning on Seeding. The fact that Douglas Fir seedlings prefer mineral soil for growth has been an argument for slash burning.<sup>4</sup> It is true that the seedlings will do better on mineral soil but burning changes the productive capacity of the soil and this in turn removes the advantage offered by mineral soil exposed as a result of burning.

Burning removes the duff from the forest floor. This duff acts as a regulator which tends to even the percolation of water. With the removal of the duff the rain water seeps through much faster and therefore lea-

ches many of the soil properties with it. This tends to lower the productive capacity of the soil.

The factor of shade arises in seedling growth. Although mineral soil is more favorable shade is required for seedlings. Burning removes the shade and this in turn defeats the above argument.

The following table will express the facts.<sup>4</sup>

Table Showing Germination

Bare Mineral Soil	-----	10.5%
No shade; Spring burn	-----	6.1%
20% shade;     "     "	-----	29.0%
50% shade;     "     "	-----	24.7%
75% shade;     "     "	-----	18.1%

#### TIME OF BURNING

The slash burning laws of Oregon require that the slash be burned in the fall under certain restrictions. In the fall of the year following the first rains this burning is done. The operator must have his snags fell and fire lines built around the area that is to be burned. Whoever is in charge of the burning then keeps in touch with the Federal Weather Bureau in Portland. When the Bureau forecasts a rain the association then notifies the operator to set his slashing afire. The operator does this knowing that he must do so or be penalized. The rain is supposed to come soon enough to prevent any

serious damage and keep the fire under control. This is the error of the system. In many cases the rain forecasted does not materialise and the operator has a fire on his hands which he finds a little hard to handle. It is this type of fire that does the serious damage to the forest.

In the past there is record of a number of serious fires resulting from the above conditions. These fires result in much damage to the land and surrounding stands of timber. This type of fire is very hot and has a very serious influence on the soil.

The reason for burning at this time fits hand in hand with the present practices and reasons for burning. The debris is dry and a good burn is secured at this time. The objective is accomplished in that the present hazard is removed.

#### PRESENT PRACTICE

The present practice demands broadcast burning regardless of the conditions or type of logging. In a few instances the associations have made reservations to the common practice, but they haven't practiced this reservation enough. In a few instances in the fog belt they have allowed spot burning to preserve the young Hemlock growth which is so prevalent in that region. But these reservations have never been applied to the D. F. region



which is found in the greatest prevalence in the willamette and Columbia river basins. Mr. Scott of the State association believes that different methods would be applicable but the present laws and policies are not subject to any changes.

#### THE OREGON PROTECTION SYSTEM AND ITS FAULTS.

Federal financial ~~co~~operation in the protection of state and privately owned Forest lands came into existence at the time of the organization of the State Forestry Dept. in 1911.<sup>1</sup> This was promoted first by the Weeks law and later under the Clarke-McNary act. It was the passing of this law in 1925 that led to the ~~ad~~aption of the broad federal policy of administration which has ~~been~~ adhered to in its essential provisions since that time. This has done a lot of good in that it has promoted state-wide protection. This is a great improvement over the original practice where there was very little cooperation between those interested in ~~For~~est ~~Protection~~.<sup>1</sup>

No question can be raised as to the soundness of the policy as originally adopted. In order to accomplish the neccessary protection an estimate was made of the adequate protection costs for each state. The basis was to be an expenditure that could be justified from an economic and a legislative standpoint. The re-

gular allotment was based on these figures and at the present time about 70% of the total funds appropriated is distributed as regular allotments. The restriction being that the state must spend an equal sum of money. Recognition of performance comes out of the remaining 30%. This has resulted in a condition where some of the backward States have received as high as 50% of their total expenditures while Oregon with a high performance record, received 22% for the same year.<sup>1</sup>

There is a wide diversity of ideas throughout the states in the estimated cost of protection in spite of sincere efforts to standardize them as between States. Since public expenditures enter into the program under the old formula of 25% State, 25% Federal with the balance private, there are many intangibles involved; such as watershed protection, erosion control, recreation and similar matters that are strictly public responsibilities. These naturally would be a part of the cost of protection for these values represent some of the reasons for public participation in the works.<sup>1</sup>

The present protection of most of the private and State owned forest lands is vested in associations. These associations are organized as private companies to protect the lands on a money making basis. Although it falls into line that the better job of protection

they do the more money they make; it doesn't fit into modern Forestry and Silvicultural systems. Their idea of protection is to fire-proof the area immediately with little thought of the future or resultant conditions. They spend most of their efforts on the standing timber rather than logged off areas. These are conclusions drawn from interviews with Mr. Munger of the Experiment Station and Mr. Scott of the State Fire Association.

The State Forestry Service is merely advisory in its influence over the associations. It lacks the power to influence the methods of these associations. The State Department does a lot of research and studying but has no power to enforce its findings. The reasons for this being the political nature of the organization. These were the reasons given by the State Foresters office for the inefficiency of their organization.

The State or associations doesn't make any provisions to assure any responsibility for damage done by slashing fires. As long as these organization have the right to demand that this burning be done it seems as if some method of making the State assume responsibility should be initiated.<sup>2</sup>

The money made available for protection is inadequate for a complete fulfilment of the objective. The



money available makes it possible only to protect those areas that are bearing timber. Little time or money is expended in looking after those areas which have been logged off and burned over. Although law requires their protection the association pay little attention to these areas only during periods of worst hazard during the summer months. Very little time and money is expended for pre-suppression activities on these areas. These conclusions were drawn from observation of the protection job done by the associations in the Willamette valley. SS

#### COST OF PROTECTION

Figures were obtained from the State Foresters office which show the cost of burning for hazard removal. These costs are contributed by the various associations. The State office has statistically averaged these figures in order to get them into table form so that they can be deciphered by anyone who wishes to examine them. These figures show the cost of slash disposal pro-rated on a per thousand bd. ft. basis.

County	Acres Burned	Snag Falling Cost per acre	Burning Cost Per acre	Total Cost Hazard remov- al	Costt Per.M. Hazard remo- al
Lincoln Tilla- mook Benton	6,043	\$2.86	\$.61	\$3.47	.16

continued next page

Eastern Lane	1,576	\$1.49	\$.87	\$2.36	.06
Linn	3,538	\$1.35	\$.78	\$2.13	.08
Tilla-mook	2,358	\$1.52	\$.46	\$1.98	.06
Western Lane	4,256	\$1.25	\$.71	\$1.96	.06
Douglas	1,720	\$1.93	\$.91	\$2.84	.10

The sizes of the samples show that the figures are statistically sound. The figures are based on the expense of slash disposal for the year of 1938.

By interpolation, the average cost of burning is 72 cents an acre for Western Oregon. This figure ought to be \$460.80 for the removal of the debris left from logging on the average section in the Douglas Fir region. These figures include the cost of trails and fire lines built around the areas before burning is performed.

#### NEW METHODS AND PRINCIPLES WHICH DEMAND A CHANGE

In the foregoing pages the bad effects of burning have been discussed. These points are very important to the Silvicultural condition of our Forests. These points can be classed together as damages to the Silvicultural

cultural conditions of the Forest. This factual demonstration calls to the attention of all that some other method must be devised to protect our Forests and lands for posterity.

Cut over lands can be fire proofed cheaper, in less time, with a greater degree of safety than is accomplished under the present set up. There is also a much better chance for reproduction without burning. These conclusions are a result of 25 years experience in handling cut over lands by Mr. Lamb of Wynocha Timber Company.<sup>2</sup> He believes that the year following logging the ground will be fairly well covered with ferns, blackberries and other annuals of high water content. These succulent plants provide fairly good cover during the main of the year. In the fall when the vegetation dries out a more rigid system of protection can be applied to the areas.

Mr. Lamb believes:

1. Safe broadcast burning of slashing is an impossibility.
2. There is no safe season for slash burning.
3. Our fire protection to safeguard standing timber must be extended to cut over lands.

These beliefs are based on years of experience and fall very much in line with the development of this thesis. In the past few years there have been a number of



changes in logging practices which have made the old system of slash disposal out of date.

### LOGGING METHODS

Probably the largest single factor contributing to the need for a change in policy is the change in logging methods. These changes have taken place since the State Protective System was devised and there has been no changes made to meet these new systems. These various methods of logging will be listed and discussed.

1. Selective Logging Till the last few years there has been a movement for sustained yield on the forest lands. There will have to be some revision in the slash disposal methods for this type of logging. It is impossible to broadcast burn in this type of forest as the resultant damage to the green trees left on the ground for the following rotations would be destroyed. The present burning practice on private and State owned lands prevents the practice of successful sustained yield.

2. Zero Margin Cutting This is the type of cutting practiced on many of our 2nd growth stands in Western Oregon. The workings of this system have been described previously in this paper.

With Gasoline logging on this type of area the smaller merchantable trees are left because of no profit

returned in logging. In all cases of green-timber operations there remains a heavy residual under-story growth of seedling and saplings.<sup>1</sup>

The question arises as to whether the existing hazard is worse than one created through burning the selective slash, killing the second story trees, and leaving an area covered with dead trees, snags, and debris. From the Silvicultural standpoint the answer is being frequently expressed from the protection standpoint.<sup>1</sup>

The State Forestry Department is inclined toward the no burning side of the question. Broadcast burns in selectively cut areas are usually only a temporary relief, a serious condition arising in a few years from the accumulation of debris and falling trees.

3. Leaving Seed Trees and Shelter Strips The damage done to these areas by broadcast burning has been described earlier. The purpose of these strips and seed trees is destroyed when the area is burned over and the seed source is destroyed. If anything is to be accomplished by these sources of seed, the system must be changed so as to protect them and the young seedlings on the area.

4. Clear Cutting The principal reasons for a change in the broadcast burning of these areas has been

discussed in previous areas. There are a few centralized places on these areas where the great accumulation of debris must be removed to protect the area. This can be handled as explained later. A different method must be adopted for slash disposal in order that the rotation may be shortened and the future timber famine may be prevented.

The modern method of logging is tending more to the high lead and away from the skidder and slackline. This method of logging makes it possible to leave all defective and cull trees on the area and these must be preserved for seeding purposes.

There is a type of vegetation that immediately follows burning which is very inflammable during the late summer. The vegetation at this time becomes very dry and will burn very readily. This adds to the future hazard for the area. With a study of these new methods of logging it seems as if there must be a change of policy. The rest of the report will be devoted to suggested changes which the author believes will give a solution to the problem. These opinions are original so no references will be given.

#### SUGGESTED CHANGES IN THE POLICIES AND PRACTICES

This part of the report is based intirely on original thought, with the exception of selectivily cut areas.



The reasons demanding these changes have been given in the previous pages. The changes suggested will be listed under two major headings: (1) Changes in policies: (2) Changes in Practices. These two large headings will be broken down into subheadings and a discussion of each will be given.

A. Changes in Policies By the changing of policies it is meant the factors behind slash burning and its organization. These suggested changes are: (1) It must be realized that broadcast burning is against good silvicultural practice. The fertility of the soil is reduced and the rotation is lengthened by this practice. Education and instigation by Federal intervention must be introduced to cure this bad practice. The industry can't wait for the slow action of the public to take action. The public opinion is slowly being turned against the lumberman and he is bound hand and foot in many cases by the laws that are now in force.

(2) The Fire associations which are in prevalence in Western Oregon shouldn't have a place in the protection system. These concerns operate on a profit making basis. This is natural in any private enterprise as a profit has to be made in order to continue operation. The Federal or State Government can afford to carry on a non profit basis as their profit is figured on a long

time basis in the good that is done to the welfare of its citizens.

I would suggest that the State Forestry Department be taken out of politics and made a more permanent organization with its employees on a Civil Service basis. The department must be given more power so as to be able to carry through policies which are to the best good to the longest length of time to the most people.

If and when the State Forestry Department is given this power it can take over the protection of State and private owned lands. With such a system changes can be made which will better the present conditions. By search and study new ideas can be discovered and developed which will reduce the present problems.

(3) Build fireguards as is the present practice around the areas logged.

(4) There should be government or State aid for the protection of those already logged off areas. It is to the benefit of the public that these areas be protected so why shouldn't the public protect them? The present money allocated for protection of these lands within the State is not ample to give full protection to these areas.

Thus government or State aid is also fundamental for the protection of future logged off areas.

The present practice of ~~changing~~<sup>✓</sup> the operators for protection of their standing timber should be carried on but they should not be forced to protect the logged off areas. It is fundamental to good Americanism that we maintain private ownership. With Federal or State protection of these logged over areas it is believed that a part of the problem of repossession of land will be solved.

With these changes it is believed that the following changes in practice can be instigated. Some of them can probably be made under the present set up with the proper approach.

B. Changes in Practices In this section the actual problems are attacked and their solution given. From a previous table in this paper it is found that the actual cost of burning besides the cost of preparation is 72 cents per acre in Western Oregon. This is \$46.80 for a section. This amount would pay the salary of one man for two years to guard a section. It is only necessary to patrol the logged off areas for a matter of two to two and one-half months each summer. In many regions it would not take one man to this size of area. With this cost in mind the various types and the practice suggested for each will be given.

Mr. Munger and Mr. Mathews of the North ~~West~~ experi-



ment Station just recently compiled a report on slash disposal. This paper has not been published as a bulletin as yet so cannot be used as a reference. In their report they have found that the comparative hazard based on spread and control of the two types of areas burned and unburned, becomes the same after 16 years. This is based on areas of very heavy slash. It is believed by Professor Starker and myself-that in many areas this period is much shorter, probably 7 to 10 years. From a graph in the forgoing is 1.8 times greater during the 10 year period for the unburned areas. This means that the time, labor and expense for protection of unburned areas would be 1.8 times greater than that for burned areas. After this 16 year period it is found that hazard is equal on the two types of area.

It seems as if the only answer to the question is that the public must be made to bear the expense of paying for protection on logged over areas. This protection should be carried on by a revised State Forestry Department. The Federal Government must make up the deficiency between State funds and the amount necessary for full and proper protection. It is to the benefit of the public to stand this cost in order to do away with the destruction of the forest lands by unnecessary burning.

1. Zero Margin Cutting In this type of logging it

is quite important that the young growth be saved and also that the area have the opportunity to re-seed. With the practice of broadcast burning these two purposes are defeated. The steps to follow in such an area are:

A. Remove all snags in the area that are 20 feet high or higher. This is present practice that must be continued. This factor aids in controlling in case of accidental fires.

b. Strip burning along highway and roads. If any roads or routes of travel pass through the area a strip 100 feet wide should be cleared on each side of the route. This strip is for the protection of the area from any accidental causes of fire. This can be accomplished by bulldozing the debris into piles and burning later in the fall when the danger of spread is removed; or controlled broadcast burning at this period when there it is a sure thing to control spread.

c. Leave the remainder of the slash on the ground. In one or two years the main hazard will be reduced. The needles are dropped and a succulent growth covers the ground which lowers the hazard during the summer months. The hazard is returned to normal in 10 to 12 years.

d. The numerous cat and logging roads through the

area will provide ample fire breaks and means of control throughout the area.

e. Protection. With the 72 cents as the cost of burning by broadcast combined with Government aid rigid patrol over the area for five or six years is important. In most areas one man with proper transportation facilities should be provided to each two sections in the most hazardous areas and to each township in the isolated districts. There must be absolute closure except under permit to entrance. These areas subjected to penalty by law. SS

After this 5 to 6 years period of high hazard the area returns to normal. When this period is reached the protection necessary is much less. The protection needed at this time can be determined by the men in charge according to the local conditions.

When the stand becomes of age so that the owner can realize some income he must then take over the cost of protection. This will be an acreage cost and will be payed to the State in conjunction with his taxes.

On this basis the cost would be very little to the public and would be worth many times the expenditure in the benefits to society.

2. Selective Cutting This is a new type of logging rather foreign to this region. If and when the



practice comes into use these controls are believed to fit the need.

A. Leave slash as is on the ground.

B. Keep uncut blocks of timber between areas of selectively logged land just as advocated in clear cutting. The difference in value between various sides probably will more than make up for the additional rail road or truck road cost necessary for this type of operation.<sup>3</sup>

C. Leave uncut strips of timber next to routes of travel. If this is not possible pile and burn the slash for a 100 foot interval on each side of the of the roadway.

D. Fall all snags which stick up above the general height of the remaining green trees.<sup>3</sup>

E. Restrict any further cutting in these stands for ten years or until the slash hazard has been abated.

F. Build fire guards which may be cat roads if they are in the right place. These guards should be along the ridges or natural barriers. A fire break 10 feet wide must be constructed around the area.<sup>3</sup>

G. The area must be protected on the same basis as the Zero Margin cutting practice. The private operator paying the same assessment every year as he is now required to pay for his protection. The public must

stand the balance of the cost of ample protection for the areas because it is to the benefit of the public that sustained yield be practiced. This method is a little different from the others in that the operator must pay every year his acreage protection cost. In order to promote this type of cutting and make it successful the public must help bear the cost of protection.

3. Cut Out and Get Out Logging In this type of cutting, which is quite common in the mature and over mature stands in Western Oregon, something must be done to protect the culls and seed trees on the area which will provide the seed for the restocking of the area. Erosion and the other bad effects of broadcast burning, which have been mentioned before, must be stopped if the timber lands are to be saved. The methods of handling slash disposal on these areas are:

A. Remove all the snags over 20 feet in height on the area. This is the common practice and must be carried out for successful fire prevention.

B. Burn the accumulations of debris left at the landings and rollways in October or November. There is a period during these months when the general slash is too damp to burn but these piles have not yet become too wet. Top, this removes the source of greatest hazard.

Much care must be used in picking the right time but study of the conditions will indicate this time.

C. Leave the remaining slash on the area.

D. Protect the area by very rigid means for 5 to 6 years following the operation in the average area. In the worst areas this rigid protection may be necessary for from 10 to 12 years. The operator must pay for the year of logging the regular assessment figure for protection but the government must provide the funds necessary to carry out the proper protection until the conditions return to normal. When this time arrives the same conditions will be in force as for the zero margin type. The 72 cents an acre which is the cost of burning will provide all the protection necessary for two years. It is to the benefit of the public that the area be protected so it seems very proper that the Government should protect the area for the remaining time. The same degree of closure and number of guards are required here as in the Zero Margin type.

E. Fire lines must be built along the natural barriers and around the areas with the same specifications as given for the forgoing policies.

### RESULTS

With the following out of this system our forest lands can be preserved at a minimum cost to all.



Private ownership will be encouraged by the use of this system.

All the results of broadcast burning can be remedied.

The rotation of saw timber will be shortened very much through the preservation of seed supply and normal conditions of the site. The forest lands are left in a condition for restocking and will not have to go through the building up process which is many times necessary when extensive broadcast burning is practiced.

#### CONCLUSION

By following the present slash disposal practices through their present practices and its effects the author has demonstrated how by changing the policies and practices now in use these bad effects can be cured. Very few figures were used because there is very little material on the question. It is a new problem and offers large opportunities to those who will experiment and study the question. The present practice is unsatisfactory is the opinion of all except the Associations and the handwriting is on the wall as far as they are concerned.

The material in this paper is used to demonstrate the suggested possibilities. There is very little factual material on this subject and the field is too

broad to go into the details. The purpose of this paper is to show the reason demanding a new type of slash disposal. It is hoped that the solution here may offer some suggestions to the solution of the problem.

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