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FOREST FIRE PROTECTION IN MINNESOTA

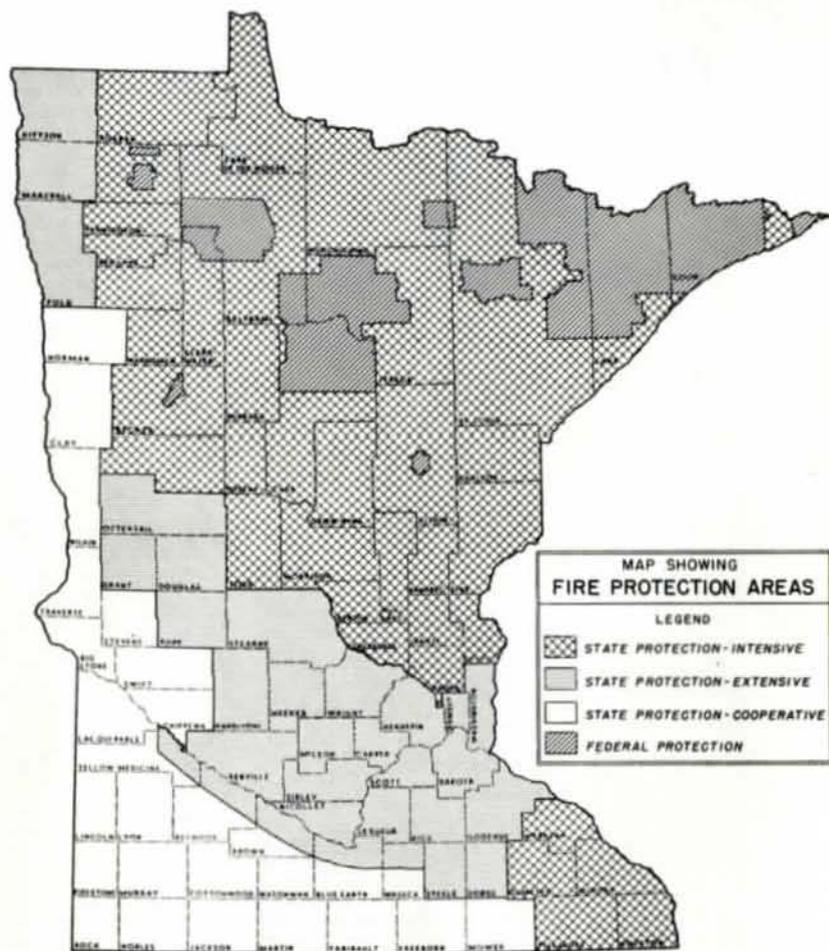


STATE OF MINNESOTA
DEPARTMENT OF CONSERVATION

Chester S. Wilson, Commissioner
DIVISION OF FORESTRY

E. L. Lawson, Director

1954



Map Showing Present and Proposed Fire Protection Areas

FOREWORD

The protection of the forests of Minnesota from fire is a matter of public concern regardless of the status of ownership. It is basic to the success of any forestry program and is perhaps the most important of the many activities connected with the conservation of our natural resources.

Fire protection, of course, first of all, is necessary for protecting the lives and property of those who live in the forest region. Not only forests, but game, soil and water control, as well as the industries dependent upon forest products, and the thousands of people who use the forests for recreation—all are vitally affected by fire.

Although the law imposes upon the Division of Forestry the duty of the protection of our forests from fire—and the suppression of those that start—the prevention of forest fires is the duty of everyone who uses the woods.

This booklet is written for the purpose of describing Minnesota's fire protection organization—and to point out the need for your cooperation in the protection of our forests from fire.

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FOREST FIRE PROTECTION IN MINNESOTA

Organization of Forest Fire Control

Minnesota took early steps toward organized forest fire protection. Following the disastrous Hinckley fire of 1894, in which 418 persons lost their lives, the legislature enacted a law establishing the office of forest commissioner and placed upon him the responsibility of setting up an organization for preserving the forests and for the prevention and suppression of forest and prairie fires. At this time a chief fire warden was appointed.

After the Baudette-Spooner fire of 1910, a law was enacted setting up a non-paid forestry board of nine members. The board was authorized to appoint a secretary and a trained forester, the latter being directed to appoint a deputy and such other employees as he deemed necessary. This was the origin of the present Division of Forestry.

Since 1911 few changes have been made affecting the protective organization. The first reorganization plan provided for abolishing the old forestry board and setting up in its place a Conservation Department, of which Forestry was one of the divisions. Under this plan a conservation commission exercised general control over the department. A few years later the commission was also abolished and the responsibility placed in the hands of a conservation commissioner, where it now rests.

The Protection Area

Of the 51,749,120 acres in Minnesota, more than 31,000,000 are in need of some phase of organized protection from fire. Various localities demand different degrees of consideration from a protection standpoint, depending upon the hazard, risk and value involved. In certain areas intensive protection is necessary the greater portion of the time while in other areas extensive protection is needed only during periods of unusually high fire hazards.

Intensive Protection Area. The bulk of the area now under intensive protection includes the counties between the Twin Cities and the Canadian border, except for a narrow fringe of prairie along the western boundary of the state. This is the area in which 907 human lives were lost in forest fires during the past 45 years and is at present the only part of the state where it is likely that such disasters could

occur again. It was the original coniferous timber belt and now contains the greater part of our remaining timber stands. It is also the region in which most of Minnesota's 10,000 lakes are situated, which make it an important recreational area. A large part of the hunting, trapping and fishing grounds are in this part of the state and it is estimated that 90 per cent of all out-of-state tourists and a great number of local people spend their vacations here.

Extensive or Cooperative Protection Area. This area which is mainly in the southern half of the state is the original hardwood belt and in general lies east of the western prairie region and between the highly developed farming section in the southern and south-central part of the state and the present intensive protection area.

Much more timber remains here than is generally known, and due to the greater local need, nearness to markets and the quality of the products it is an important asset to the local communities. While there is some scattered white pine and juniper in the region, the predominating type is hardwood, which fortunately is not as susceptible to damage from fire as the coniferous types. Although the killing of mature trees from the average grass fire is not an alarming factor, the young trees and brush in most cases are killed and because of the continuous burning which has been going on unquestioned for many years, there is at present little evidence of sufficient reproduction to replace the tree growth which is rapidly being cut. There are numerous portable sawmills, skidways of logs and piles of fuel-wood in evidence in this region which indicate that an enormous amount of woods products is being taken from this area every year.

The bluff country along the Mississippi River, because of the light soil, rocky formation and steepness of slope, can never be converted into cultivated fields or pastures. The bluffs are now almost denuded of tree and brush growth and are of little value in conserving moisture or retarding floods. As a direct result of this condition, soil erosion has become a major problem and many of the once beautiful hillsides are now becoming a series of deep ravines and gullies and are losing their attraction from a scenic standpoint.

Some very constructive work has been done in portions of the area by the Soil Conservation Service but this activity has barely scratched the surface when the territory as a whole is considered.

Before such a program can be entirely successful the fire problem must be solved.

Small game birds and animals have suffered seriously from the fires. Cover and food is rapidly disappearing. Many of the original fine trout streams have dried up and most of those remaining are becoming more and more unsuited to fish life because of soil erosion, floods and lack of a constant water supply, and require continual and expensive restocking.

Risk and Hazard

In the development of a fire protection program the risk of fires starting and the hazard conditions must be carefully studied. The risk must be ascertained from information obtained by keeping a complete fire occurrence record and from the knowledge of those working in the locality. The intensity of risk shifts from time to time due to changing conditions and men and equipment must be distributed accordingly.

Risk of Fires Starting. The risk of fires starting is an indication of the degree of effort required in prevention measures to assure reasonable protection. Most of the fires in Minnesota are man-caused, and broadly speaking, the degree of and the actual need for organized protection can be roughly measured by the number of people in the area during the fire season and their general attitude toward fire prevention. The type of fuel and the condition of the ground cover also have an important bearing on fires starting.

In the older and more highly developed farming territory the change in population is slow and few land clearing operations are engaged in, consequently the risk remains about the same from time to time. In the new settlements the population is gradually growing larger with the risk increasing proportionately. The numerous land clearing fires which invariably follow new farm development also add to the danger. The promiscuous and uncontrolled burning of meadows and open grass areas is increasing year by year. This, together with land clearing and other farm fires, has during the past ten years, caused 36 per cent of all forest and brush fires in the state, resulting in over 60 per cent of the total damage and area burned over.

It is estimated that approximately two and a half million people visit Minnesota's North Woods each year which more than doubles

the population of the protection areas during the months when the fire danger is at its peak, thus increasing the risk of fires starting.

Hazard. It is generally understood that the term hazard as applied to forest fire protection refers to fuel, timber and soil types and climatic and topographic conditions. Considering the protection area of the state as a whole it is conceded that the hazard is unusually high as compared to most of the other timbered states.

Fire Weather

Climatic factors which most affect forest fire protection are wind, precipitation, relative humidity and temperature. Due to the location of the state in relation to the Western Plains and the Great Lakes the weather conditions are exceedingly variable. Strong westerly winds accompanied by high temperatures are frequent and the relative humidity is generally quite low during much of the burning periods, all of which are unfavorable to fire control.

Because of the decidedly uneven distribution of the rainfall, the general weather records do not show the true value of the precipitation as it affects protection. Frequently rains reaching flood proportions cover only comparatively small areas while at the same time other parts of the state remain dry. Under normal conditions the rainfall is heaviest during mid-summer which confines the most hazardous burning periods to spring and fall. This does not mean that there is no fire danger during the so-called rainy season. It merely indicates that fires occur less frequently and are more easily controlled. The fire season usually starts shortly after the snow leaves the ground in the spring and continues until it again covers the ground in the fall. The length of the average fire season is about seven months.

The Division of Forestry has established 83 stations throughout the protection area for recording and computing weather observations. These are known as danger stations and are equipped with the proper instruments for making the various observations. Close cooperation is maintained with the U. S. Weather Bureau and the weather readings are submitted to the Chicago office of the bureau where a special daily fire weather forecast is made and sent to each of the protection headquarters.

Soil and Forest Types

Due to the fact that the timber types follow the soil types quite closely, the two factors are considered jointly in planning protection. Three general classifications are recognized, as follows:

1. **Light Sandy Soil with Jack and Norway Pine Timber.** The hazard in this type is extreme due to the high inflammability of the fuels, susceptibility to crown fires and the rapid absorption and evaporation of the surface moisture which materially shortens the safety period following each rain. About one-fourth of the northern half of the state falls within this classification.

2. **Swamp Areas.** These can be grouped into two distinct subclasses, the open lowland such as peat bogs and muskeg, and the timbered swamps. The open muskegs when drained or during extended periods of drouth create a most difficult problem, while the timbered portions are normally wet. The greater portion of Minnesota's open swamp land is north of the Red Lakes in the extreme north-central part of the state, with smaller scattered areas throughout the remainder of the northern half. (More will be said about the peat areas under the subject "Peat Fire Problem.")

3. **The Clay Belt.** This includes portions of the intensively protected area in the north and a large part of the extensively protected area in the south. It comes within two broad timber classifications, the northern section being mixed hardwoods and conifers, and that in the south mixed hardwoods. In the hardwood-conifer territory the hazard is high due to the excessive amount of litter and the inflammable nature of the fuels found on the floor of this type of forest. In the pure hardwood stands fires do not start as readily and the burning period is normally confined to early spring and late fall with comparatively low risk and hazard during mid-summer or when the vegetation is fully grown.

The Peat Fire Problem

Peat is found in nearly every county in the state but the most extensive deposits are in the muskeg swamps or open bogs of the northern part of the state, chiefly in Beltrami, Lake of the Woods, Koochiching, St. Louis, Itasca, Roseau, Aitkin, Crow Wing, Cass and Clearwater Counties.

Farm crops can be successfully raised on the properly drained bogs where the peat deposits are shallow, provided the top soil is of

such character that it does not require an excessive amount of fertilizer and the sub-soil is of a fertile nature. The length of time the soil will remain productive is questioned by some agriculturists, however. Because the land is level and easily broken it appears unusually attractive, and many new farms are being developed on this type of land.

It is generally considered necessary that the top layer of peat be burned off before it is suitable for cultivation, and because of the difficulty and expense involved in controlling a fire once it is started in peat soil, many of those engaged in this type of clearing are unwilling to assume the responsibility for the burning. As a result a large number of fires are set illegally, with no effort made to confine them to the tracts desired cleared. The extinguishing of such fires is a long, tedious job and because of this many of them reach dangerous proportions before they can be controlled.

When these burning conditions are considered favorable, fires seem to start simultaneously over the entire region, creating the condition most feared by the forest officer—that of numerous fires burning at the same time and scattered over a large area. The only requirement under these conditions to set the stage for a conflagration is a day of cyclonic wind accompanied by extremely low relative humidity. It was under such circumstances that nearly all of Minnesota's large disastrous fires occurred. Over 36 per cent of all fires which have burned in the state during the past decade were caused by land clearing and meadow burning, a large number of which were in this peat region.

ORGANIZATION

Administrative Organization

The general administration of the present fire control organization is conducted through the office of the Director of the Division of Forestry.

Field Organization

The area in the present extensive protection territory is divided into two regions with a coordinator in charge of each. These men have been given sufficiently broad authority to handle whatever fire problems may arise.



FIRE FIGHTING FOLLOW-UP UNIT

1½ ton L.W.B. truck—dual rear axle; power take-off and portable medium weight pumper (50 GPM-75 PSI); 300 gal. water tank; 8 pack tanks; first aid kit; small tools; iron rations for 25 men; 7½ ton trailer; tractor; middle-buster plow; and radio.

The regions are divided into sixteen supervisory areas, with a supervisor and assistant supervisor assigned to each. The areas are divided into districts under the jurisdiction of the rangers. Temporary men such as forest guards, towermen, smoke chasers, standby crews, keymen and township fire wardens work under the direct supervision of the rangers.

The men holding key positions are called upon at times to assume considerable responsibility. They constitute a skeleton or supervisory force designed to organize and direct the work of fire protection within the area assigned to them. Most of the labor used in fire fighting comes from the local communities. The law provides that any able-bodied citizen must assist in fire fighting when called upon to do so by an authorized forest officer. Automobiles, teams and other property may be commandeered if needed in fire protection work. Compensation must be paid by the state in all cases, however.

Auxiliary Organization

The auxiliary fire protection organization consists of various volunteer or cooperative agencies or individuals pledged to assist in controlling fires. One of the most important of these is the township

fire warden or keyman unit. The men constituting this force are unpaid, except when they are actually engaged in fire work. In some cases they are members of the township board or members of city or village councils. Any citizen of the state, however, may be appointed to this position.

The state law provides that one of the regular duties of the township board is to take all necessary steps to prevent the start and spread of forest or prairie fires within their respective townships. After the board members have been appointed as special wardens they act as both township officials and as state forest officers with limited authority.

The state law further provides that a burning permit must be secured before any burning may be done within the protection area of the state unless an adequate firebreak has first been constructed around the area to be burned or unless the ground is snow-covered. Another important duty of the township fire warden is to issue these permits. There is at least one warden strategically located in each geographical township within the protection area so that burning permits may be conveniently procured by those requiring them, as well as to increase the protection facilities in territories of extremely high hazard.

General Organization

It is not considered practical to maintain as a state organization a large enough group of men to actually extinguish all forest fires. The objective is to build up a permanent, moderately sized force of well trained experts who can devote their entire time to the fire problem.

Fire prevention is usually considered as three separate activities—prevention, pre-suppression and suppression. There would be little need for the other two if prevention could be made wholly efficient. Due to the element of carelessness this is not possible and plans must be made and funds provided for carrying out the entire fire program. The extent and effectiveness of prevention governs more or less the amount of funds required for pre-suppression and suppression.

After the fire actually starts, the most important requisites are quick, hard-hitting action by the suppression organization if the damage and area are to be held to a reasonable minimum. This means that the detection or lookout tower system must first be made adequate in size and effectiveness, communication facilities must be developed to a satisfactory degree, a sufficient number of trained men must be available to organize, coordinate and supervise the combat forces, and sufficient fire fighting equipment must be on hand.

FIRE PROTECTION

The Detection System

When the present tower system is completed in Minnesota, there will be approximately 150 steel lookout towers in the protection area, each of which will overlook an area of about 100,000 acres. These structures, which are from 60 to 120 feet in height, have a glassed-in "crow's nest" on top. They are strategically located on the highest convenient point in each protection area.

The equipment in each crow's nest consists of a fire finder or a glass-covered mapboard, with a map of the area which is under observation on which is placed a graduated circle directly over the location of the tower, an alidade or sight instrument to determine the exact angle or direction of the fire, a telephone or radio which is connected with headquarters, a scale or ruler which is used for measuring distances on the map, and a pair of specially tinted goggles which are used to assist in spotting smokes. Binoculars are used in certain cases, particularly in the hilly areas.

The duties of the towerman are to determine by means of instruments the exact direction of any fire which may occur, estimate the distance and size and make a report to his superior officer, either by telephone or by radio. After the report reaches the area headquarters and the exact location of the fire is determined, the dispatcher contacts the forest officer nearest to the fire, provides him with the details and directs him to take the necessary action. If there is a township fire warden or keyman living near enough to the location of the fire to enable him to take quicker action than the forest officer he is also dispatched to the scene and instructed to organize a crew and start work immediately. Due to prearranged plans the entire procedure usually requires only a few minutes.

Classes of Fires

Fires are classified into three general types, namely surface fires, ground fires and crown fires.

Surface Fires. As the name implies, these fires burn the inflammable material on the surface of the ground. Nearly all fires are at their inception surface fires, but may develop into either ground or crown fires. Under normal conditions the surface fire is perhaps the easiest to control but in cases of extreme drouth, high winds and dense cover, they travel very rapidly and are often very difficult to extinguish. This type of fire burning in grass or in the litter found on the forest floor can usually be extinguished by direct attack, by means of throwing sand or water on the edge of the fire, either by hand or with mechanical equipment, or by actually beating out the flames with wet sacks, brooms or green boughs. It is sometimes

advisable to plow one or more furrows as close as possible to the edge of the fire and either allowing it to burn to the line thus formed, or by clearing off the unburned area by means of a back fire.

Ground Fires. These are the fires which burn in peat beds or in the humus or top layer of decayed or partially decayed vegetable matter on the forest floor. The ordinary ground fire in the woods is not as difficult to extinguish as that in peat, since the humus is usually quite shallow, thus making it possible to check the fire by means of a plowed furrow, hand trench or with water used either by hand or mechanical pumpers. Power equipment, such as bulldozers, tractors and graders, is used wherever possible in this type of control. In either case, it is an expensive procedure as the fire line must usually be patrolled until all live embers near the edges are burned out. In heavy timber and dense underbrush it is necessary to clear a strip before trenching can be done which also adds to the cost of fighting this type of fire.

The fires in peat bogs, while handled in a manner similar to the shallow duff fires, are more difficult to combat because of the need for deeper trenching, more water and longer patrol. Where an adequate water supply is available the use of large mechanical pumpers is the most practical method of extinguishing fires in deep peat bogs. Sand is sometimes used in the bottom of the trench to retard the fire where water is not available. In cases where neither can be obtained it is necessary to patrol the trenches and edges of the burning area and to continually throw back the smouldering embers until such time as all of the inflammable material is consumed.

Crown Fires. These fires burn and travel through the tops of trees. They usually occur during periods of high winds, in dense timber, on steep slopes where the branches of the trees are near the ground or where there is a large amount of debris on the forest floor. During the time high winds prevail, crown fires are usually attacked on the flank. Work is started on the front line of the fire as soon as the wind drops, by trenching, back-firing or by some other practical combat method. The setting of back fires is a dangerous practice unless done by experienced fire fighters. It should be employed only after all other methods fail.

It is difficult to definitely outline the actual methods of fire fighting since almost every fire presents a different problem and the procedure employed depends upon the topography, cover, weather and various other conditions and for this reason experience is the prime requisite in supervising this kind of work.

Forest Fire Fighting Equipment

The greatest advancement in the field of fire protection has been made in mechanical equipment, mainly in the redesigning of available



REVERSIBLE FIRE PREVENTION SIGN

The side in upper cut is displayed during high hazard periods and reversed when hazard is low.

standard implements and of finding new ways to use them, rather than in the development of entirely new types.

Most mechanical units require comparatively few men to operate and will on the average fire line do a faster and more satisfactory job than a large crew of men working with hand tools. In areas where labor is scarce or widely scattered considerable delay ensues in organizing crews and transporting them to the fire. If standby mechanical equipment is available for immediate dispatching, this handicap is largely overcome, and quick action and excellent results are obtained. There are many localities in the state where there is an urgent need of this kind of protection, but it cannot be provided with the present funds and facilities.

The extent to which the limited supply of mechanical equipment was used during the past two years is illustrated by the fact that in the control of 500 fires, 692 miles of fire line were constructed by the use of power units, as compared to 28 miles of hand constructed trench involving 228 fires.

There are many other details affecting either directly or indirectly the technique of modern fire control, and the advancement of new ideas from time to time necessitates continuous changes in administration and operating procedures. The progress now being made in educational facilities, aircraft, radio, meteorology and various mechanical devices give at least some assurance that the forest fire control problem will be largely solved in the not too distant future, providing that adequate sound financial backing is forthcoming.

During recent years the use of mechanical equipment has become more and more popular in fighting forest fires and all types of machinery are now used in Minnesota, from the light 37-lb. gasoline-driven pumper which pumps 15 to 20 gallons per minute, to the heavy duty type which must be transported on trailers or trucks and will pump as much as 550 gallons per minute. Bulldozers, tractors, heavy duty plows, graders, etc., are also used when they can be transported in to the fire areas. In addition to this, aircraft, radio, weather instruments and various other scientific implements are a part of the fire fighting setup.

Communications

The effectiveness of the protection organization has been greatly improved by the use of the radio. Continuous service is now possible between the area headquarters and the outlying ranger stations, administrative motor vehicles, fire trucks, lookout towers and even with crews on the fire lines. Fire weather forecasts are relayed from station to station and to the men on field duty, and fires are reported direct to the field administrators from the towers. By the use of the pack type units (walkie-talkie) communication can be maintained between the men working on various other field projects. The tele-

phone is still an important means of communication but is quite rapidly being replaced by radio for certain functions.

Fire Damage

Minnesota history indicates that great forest fires were recorded by the explorers, fur traders and voyageurs as early as 1803. The areas covered by these fires were very large but of course no estimate was made of the damage done.

During the past 40 years records show that 48,166 fires have occurred in Minnesota on which control action was required. The area burned over is more than eight million acres, with an estimated damage of over 45 million dollars.

Since the beginning of the present state fire control organization the amount of money expended for suppressing forest fires exceeds three million dollars, and almost two and one-half million dollars has been spent for the relief of fire sufferers. The total loss to the state during this period in property damage, relief of fire sufferers, and money expended for fire prevention and control was over 60½ million dollars.

Since 1894 forest fires in Minnesota have claimed the lives of more than 900 human beings. The following is a list of the most disastrous fires occurring in the state:

Date	Name of Fire	Total Area Burned for the Year	Lives Lost
1894—Sept.	Hinckley	160,000 A.	418
1908—Sept.	Chisholm	20,000	
1910—Oct.	Baudette	300,000	42
1918—Oct.	Cloquet-Moose Lake	250,000	438
1929—May	Mud Lake	380,599	1
1931—Oct.	Red Lake	992,931	4
1933—Sept.	Roseau County	354,728	1
1934—Oct.	Warroad	364,409	1
1936—Aug.	Palo-Markham	276,400	1
1938—Sept.	Badoura	190,207	1

Slash Disposal

The term "slash," or "slashing," is generally applied to the branches of trees or debris left in the woods after logging operations. The presence of this slash may create a fire menace in which case the operator or owner of the land on which it is located must, under the law, take the necessary steps to remove the hazard. The method employed in doing so and the time and extent of the disposal is one of the responsibilities of the forest officer.

The slash disposal policy now in effect in Minnesota is as follows:

"The state law provides that the state forester shall direct the disposal of slashings, debris and refuse from timber operations wherever there is or may be danger of starting and spreading of fires. The law further directs certain measures to be followed when no specific directions are given by the state forester or district ranger.



MECHANICAL PUMPER USED IN FIRE FIGHTING

"Experience in the administration of this law indicates the desirability of a definite statewide policy as a means of obtaining reasonable uniformity where similar conditions exist in different parts of the state, and to provide the timber operator with definite advance information as to slash disposal requirements.

"Experience has also indicated that while the general practice of burning slash removes the hazard inherent in the slash itself, it is not always a good protective measure from the standpoint of perpetuating the forest. If not properly done, it often damages the soil, kills young trees and destroys the tree seeds that remain in the forest following logging.

"In general, studies of the subject have shown that at least where partial or selective cutting is practiced, the removal or disposal of slash from protective strips along roads, next to adjoining timber land and lake-shores, combined with good logging and scattering of the remaining slash, is a more satisfactory practice than complete removal or disposal. In heavy slash (as in clear cutting operations), partial removal of the slash appears more satisfactory, from the standpoint of natural regrowth of the forest, than complete disposal. Only in certain cases where all or nearly all of the timber is cut, and extreme hazards exist or where artificial reforestation is planned, does complete disposal appear necessary. If well lopped and scattered so that it lies flat most types of slashing decay rapidly. With good fire protection and disposal of slashing on protective strips, the practice of lopping and scattering creates little if any greater hazard to adjoining property than does piling and burning.

"In general, the slash policy for the State of Minnesota will be to remove or dispose of slash on protective strips and to lop and scatter the remaining slashings so that they will lie flat, and thus decay rapidly. Protection strips will be of specified width and location, as directed by law and by administrative policy and by such specific directions as may be issued by the forester or his designated representative. Where excessive amounts of slash (as from clear cutting of heavy stands) or excessive hazards exist, partial or complete disposal will be directed.

"Unless specific directions are given, calling for a different procedure in individual cases, slash will be removed or piled into separate and compact piles ready for disposal or removal along protection strips as follows:

Within 200 feet of any adjoining timber land, public highway, railroad, portage or lakeshore (required by law), and is applicable where no specific or legal notice is provided.

All lopping, scattering or piling of slash may be done currently as cutting proceeds, and must be completed within 15 days after the timber is cut.

NUMBER OF FIRES BY CAUSES

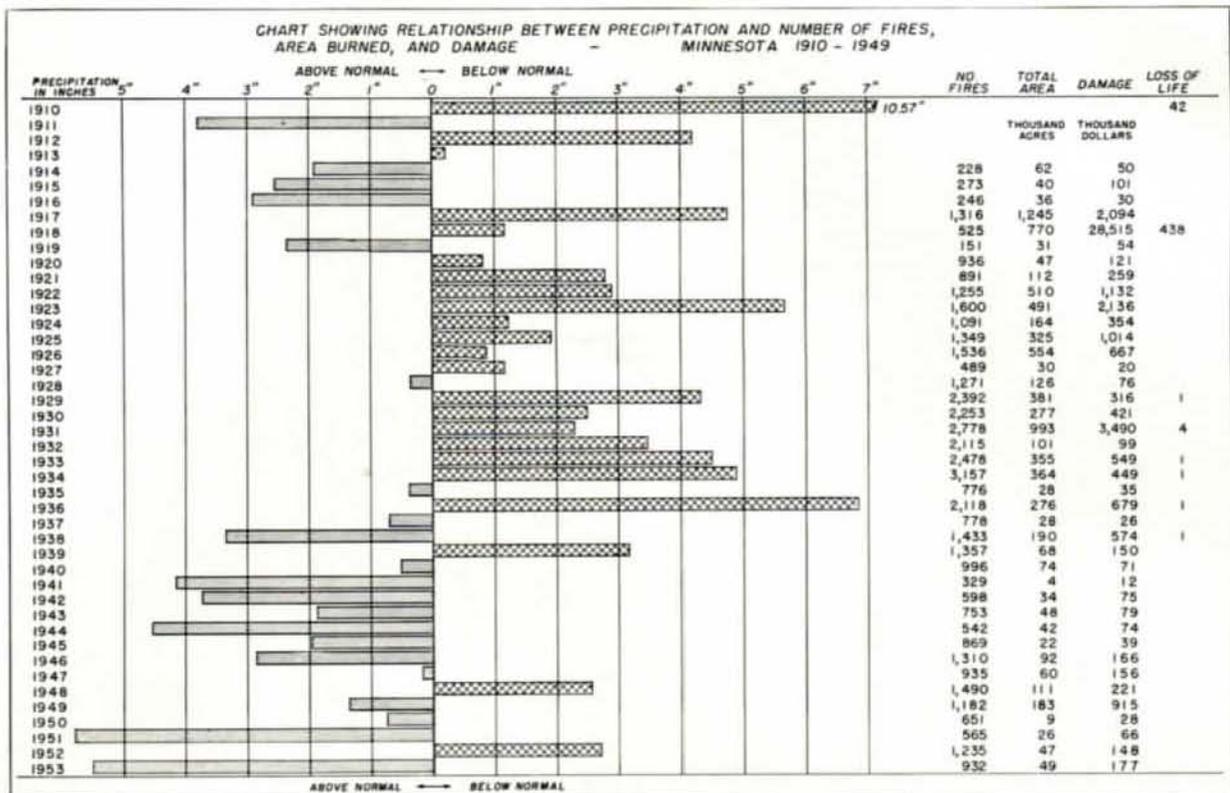
Cause	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	Per Cent
Lightning	1	1	4	13	12	11	5	6	4	5	0.6
Railroads	68	397	212	232	462	171	222	181	253	194	24.7
Campfires	12	22	44	30	57	29	22	16	73	30	3.5
Smokers	109	141	388	273	305	198	144	103	297	185	22.0
Land Clearing	63	76	146	93	228	179	70	77	146	102	12.2
Incendiary	34	19	36	16	28	84	15	11	50	60	3.6
Lumbering	8	6	21	12	13	7	8	6	12	6	1.0
Meadow Burning	192	141	315	149	245	367	39	108	173	160	19.5
Miscellaneous	55	66	144	117	140	136	126	57	227	190	12.9
Total	542	869	1310	935	1490	1182	651	565	1235	932	

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NUMBER OF FIRES BY RESPONSIBILITY CLASSES

Class	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	Per Cent
Farmers	238	202	465	262	464	81	92	7	212	125	22.1
Hunters	52	39	80	83	133	51	13	29	43	31	5.7
Fishermen	10	30	86	56	86	102	46	32	112	65	6.4
Berry Pickers	8	3	25	36	2	521	140	174	354	293	16.1
Work Crews	16	14	52	35	42	2	21	40	1	2	2.3
Travelers	46	87	197	126	137	49	37	30	46	25	8.1
Locomotives	62	388	201	208	441	160	205	157	210	166	22.6
Miscellaneous	110	106	204	129	185	216	97	96	257	225	16.7
Total	542	869	1310	935	1490	1182	651	565	1235	932	

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Burning of slash may be done in the winter season, currently as cutting proceeds, provided the ground is snow-covered and burning conditions are safe. Burning at other seasons will be done only at the direction of the forester or his designated representative, at a time specifically authorized by a burning permit issued in accordance with the state burning permit law.

Specific directions for slash disposal, varying from those of the general policy, will be incorporated in slash disposal notices furnished to the individual operator concerned."

THE NEED FOR FOREST FIRE PREVENTION COOPERATION

During a recent 10-year period, control action was taken on approximately 19,000 fires in Minnesota. Of this number 1.4% were caused by lightning and most of the remaining 98.6% were the result of human carelessness and could have been prevented. The whole-hearted cooperation of the public is necessary and the assistance of everyone is therefore solicited in order to reduce losses from forest fires to the minimum.

In the practical application of forest fire prevention there are some standard rules, which, if carefully followed, would be of immeasurable assistance in stamping out this tremendous destruction. The following are the most important ones and it is urged that they be carefully studied and those applicable to your case put into practice.

General Precautions

1. Be careful with fire at all times.
2. Continually preach fire prevention to your neighbor.
3. Extinguish all small, unattended fires, and report others to the nearest forest ranger.
4. Acquaint yourself with the fire laws.
5. Instruct children in fire prevention.

Smokers

1. Break your match and be sure the fire is out before throwing it away.
2. Make sure your cigar or cigarette butts and pipe ashes are dead out. Never throw them onto the forest floor or in the grass along the road. Use the ash tray in your car.
3. Warn careless smokers with whom you come in contact.
4. During dry periods, refrain from smoking while traveling in the woods. If you must smoke, stop and sit down to do so.

Land Clearing

1. Pile or windrow the debris and burn when weather conditions are favorable.
2. Procure a burning permit.
3. Construct a firebreak around the area to be burned.
4. Burn in late afternoon or evening or when there is no wind.
5. Have plenty of help and water at hand.
6. Inspect the edges of the burned area the next day for smouldering embers.
7. When convenient notify the forest ranger or fire warden of your intentions. He may be of assistance to you.
8. Instruct the children in safe burning practices.
9. Trade work with your neighbor in burning.
10. Immediately notify the forest ranger if the fire should get out of control.

Meadow Burning

1. Burn in early spring or late fall when there is snow in the woods.
2. Procure a burning permit.
3. Construct a fire guard around the area.
4. Have plenty of help at hand. Arrange "burning bees" with your neighbors.
5. Burn only when the wind is not high, preferably late afternoon or evening.
6. Inspect the area several times for burning embers or smouldering peat.

Campers

1. Before building your fire, clear a space not less than five feet in diameter of all combustible material (required by law).
2. Build a small fire. It cooks and heats better and is not as likely to throw sparks as a large one.
3. Build a fire well away from living trees, old stumps, logs or brush.
4. Cut the wood in short lengths.
5. Have a pail of water handy when fire is burning.
6. Extinguish every ember with water before leaving. Feel the ashes with your hand to make sure.
7. If the ashes are buried, make sure they are well covered with eight or ten inches of pure mineral soil free from roots and duff.

Berry Pickers

The berry picking season usually comes during the driest time of the year and the berry patches are in the most hazardous areas. Great care should therefore be exercised in building camp fires and in smoking.

Flourishing woodlands mean more than timber crops, permanent industries and an adequate supply of wood.

They minister to our need for outdoor recreation; they preserve animal and bird life; they protect and beautify our hillsides and feed our streams; they preserve the inspiring natural environment which has contributed so much to American character.

— Calvin Coolidge

LOCATIONS OF FOREST OFFICERS

Report all unattended fires to the nearest forest officer or local telephone operator. Following is a list of stations where rangers are located:

Aitkin	Itasca State Park
Alborn	Jacobson
Backus	Kabetogama Lake R. S.
Badoura Nursery	Kelliher
Bagley	Link Lake R. S.
Baudette	Litchfield
Bemidji	Littlefork
Big Falls	Loman
Birchdale	Longville
Black Bay	McGrath
Blackduck	Moose Lake
Brainerd	Nevis
Cambridge	Nickerson R. S.
Carlos Avery Refuge	Norris
Cass Lake	Nimrod
Clear River R. S.	Northome
Cloquet	Onamia
Cloquet Valley R. S.	Orr
Cook	Park Rapids
Cotton	Pequot Lakes
Crane Lake	Pillager
Cromwell	Pine Island R. S.
Crosby	Pinewood
Deer River	Plum Creek R. S.
Duluth	Preston
Eaglehead R. S.	Ray
Effie	River R. S.
Elbow Lake R. S.	Roy Lake R. S.
Eveleth	Sandy Lake R. S.
Faribault	St. Croix State Park
Faunce	Side Lake R. S.
Finland	Smoky Hills R. S.
Floodwood	Thistledew R. S.
Garrison R. S.	Toivola R. S.
Grand Rapids	Tower
Gull Lake R. S.	Two Harbors
Guthrie R. S.	Warroad
Grygla	Washburn Lake R. S.
Hibbing	Waskish
Hill City	Williams
Hovland	Willow River Nursery
International Falls	Zimmerman