



Forest Research Branch

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PLANNING FOR FOREST FIRE CONTROL

**by
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Sommaire en français

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PLANNING FOR FOREST FIRE CONTROL¹

by

J. C. MACLEOD²

INTRODUCTION

Fire control in forest management—It is quite natural that the protection of forests against fire should have evolved as a part of forest management in those countries where fire poses a potentially serious threat to the forests. It is the managers of forests who are in the best position to make necessary arrangements for protection and, furthermore, management has a great self-interest in ensuring that harm does not befall this natural resource. Fire can strike with such suddenness and be so devastating that the operational forester must see to it that every attempt is made to exclude fire from his working domain.

The need for planning—Throughout much of recorded history man has been in the habit of setting fire to the forest whenever the mood suited him and for whatever reason, minor or major, he thought such practice desirable, though occasionally it was necessary for him to try to extinguish fires, if only to save his own life. It is only in comparatively recent years that many forests have been provided with what might be called organized protection. If available resources for forest protection are to be used effectively, plans for their employment must be developed. This may sound like an exceedingly obvious statement but it is surprising how little planning there has actually been in many otherwise sophisticated forest organizations.

Approaches to the problem—There are a great many ways in which forest protection forces can be organized and employed, and this paper will deal only with some of the primary factors that should be kept in mind. It is of importance to note that mere size of an organization is often of secondary importance. Just one dedicated man, given proper authority, and properly informed for the task, can set up a useful forest protection organization in an area encompassing several thousand square miles.

STARTING TO PLAN FOR FIRE CONTROL

Legislation

Acts, regulations and other forms of legal authority under which fire control agencies operate take a great many forms and often cover a wide variety of detail. A few of the major points that should be covered would include such items as: authority for fire control officers to conscript able-bodied men and equipment for forest fire suppression purposes without having to announce a state of emergency or having to refer to a higher office; authority to apply closure (that is, to restrict or prohibit travel in forested areas) during periods of severe hazard; and authority to detail the conditions under which fires may be used in forested areas by both industry and the traveling public.

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Maps

Maps are so important to the fire control officer that their provision should be given the earliest consideration. Although large, small and medium scale topographic maps are most useful, even simple planimetric maps will serve to meet many of the requirements referred to elsewhere in this paper.

Fire history and areas requiring protection

Much effort will be wasted if an attempt is made to provide an equal degree of protection against fire in all regions of one large administrative unit. The history of where fires most frequently occur, where the largest fires occur and the values destroyed by these fires provide the protection officer with the best guide for determining where his greatest effort should be placed. Protection of human life transcends all other considerations but as for the forest itself, it is not always the stands having the highest value at present that should be afforded the highest degree of protection. Sometimes, for instance, burned-over areas should be afforded a higher degree of protection because severe reburning might prevent the establishment of a tree crop there for hundreds of years—repeated fires have made deserts of some areas that once bore healthy stands of trees.

Fire behaviour

It would be difficult for anyone to plan for fire control without having some knowledge of how fires in a given area were liable to act. In some tropical forests that are subject to fire the maximum rate of fire spread is considerably less than one mile per day, whereas forest fires elsewhere often advance at a rate well in excess of five miles per hour. Difficulty of control varies just as much as rate of spread but there is not necessarily any relation between the two factors. Although the fire control officer may not have the opportunity to make detailed formal studies of the many factors involved, his personal knowledge of fire behaviour and the advice of others who might be familiar with it will greatly influence how he should start to plan a fire control organization.

FIRE CONTROL FACILITIES

Manpower

Forest protection staff—It was noted above that one man alone could do much to provide a fire control organization, but a full-time assistant plus a few rangers or fire wardens, even if employed only seasonally, would make a much more effective working force. A well qualified supervisor is often the key to success in a small forest fire control organization—enthusiasm and a willingness to learn will enable a resolute man to acquire quickly the essential basic knowledge.

Game wardens and forest workers—These personnel, next to the permanent protection staff itself, should provide the best source of manpower for forest fire suppression. Indeed, it is the first duty of game wardens in many areas to assist in the suppression of fires, and to better fulfil that duty they are given special instruction in fire fighting techniques at times when they can be most readily spared from their regular duties. There are several reasons why forest workers also make excellent fire fighters, some of the more important being their ready availability, their knowledge of the woods, the self-interest they have in protecting their source of livelihood, their familiarity with the use of hand tools in general and, highly important, the fact that they are already organized in groups under foremen or other supervisors.

Other personnel—Any severe forest fire calls for a great deal of manpower for its suppression. Bearing this in mind the fire control officer must maintain a record of not only where he can obtain on short notice fire fighters themselves, but also the many ancillary personnel such as cooks, scouts, vehicle operators and clerks necessary for the maintenance of a temporary, but usually complex, organization.

Equipment

Designed for fire suppression—Much specialized equipment is available to the fire fighter today, and includes items ranging from inexpensive hand tools (there is little doubt that almost every fire control force extinguishes more forest fires with hand tools than by any other method) to specialized pumps, tankers, ploughs, bulldozers and aircraft. Because speed of attack is one of the most important factors in fire suppression it is essential that the fire control officer have at his immediate disposal sufficient tools to equip at least a first-attack force. In many regions the simple fire shovel is the most effective single tool available to the fire fighter. Also of prime importance is the back-pack pump, or water knapsack fitted with a hand pump, so useful in extinguishing small fires or for working directly on the front of any fire within a few feet of which a man can stand the heat and smoke. Many of the specialized tools such as fire hoes, rakes and beaters may be exceptionally useful in one area and yet have little applicability in a different type of forest stand or terrain nearby. It is up to the fire control officer to decide which tools would be most effective and what proportions of each applicable type should be acquired. Various types of power pumps, slip-on trailers, tanker trailers and tankers, often specially made up to meet a given condition or situation, are particularly effective where water supplies and availability of access roads warrant their use.

Adaptable for fire suppression—Many implements prepared for other purposes can be adapted as first-class tools for fire fighting; such adaptations are limited only by the ingenuity of the fire fighter. The common hoe and garden rake, to say nothing of such heavier hand tools as the hazel hoe and mattock, may be used to excellent advantage in building fire lines, and are frequently available in considerable numbers in communities near the site of a fire. Many types of beaters or swatters for suppressing fires in grass and other light fuels have been manufactured but, in some areas, certain species of shrubs or small trees are even more suitable for the purpose. Various items of farm and industrial machinery can be used to good advantage in fire line building. Included in this category would be ploughs, bulldozers, road graders, tank trucks and commercial vehicles and aircraft. Fire control officers should ever be on the lookout for possibly available items that might be required in an emergency, and records should be made of their location and how best they can be obtained when needed.

Access and transportation

It has already been noted that speedy attack is essential if forest fires are to be kept small. Therefore, means of ready access to potentially hazardous areas is also essential. If roads, trails, or water routes are lacking it may be possible, through careful scouting of the land, to find adequate routes that could be travelled on foot and used by pack animals. Such investigations should, of course, be made in advance of the fire season whenever possible and careful notes should be made on the findings. Although it is highly desirable for the fire control unit to have vehicles or pack animals in sufficient quantity to transport one or two

first-attack crews, facilities maintained on stand-by duty cannot always be afforded. However, where such transportation facilities are on hand they should be maintained in top-class condition and not be allowed for use on routine activities. The fire control officer who counts on using certain trucks, but finds that they are not in working order or are not available when fire strikes, may be worse off than if he had not had the vehicles assigned to him. If the fire control officer does not have vehicles at his disposal he should keep an up-to-date record of those in his community that might be borrowed, rented or commandeered. These notes should state the suitability of these vehicles for transporting personnel or equipment only; the type of terrain over which they could be used, i.e. if equipped with all-wheel-drive; and the general conditions of the vehicles.

Fire detection and communications

An alert, co-operative public can provide one of the best fire detection means known but in many instances there are no people in some of the more remote parts of the forest, thus making lookout or air patrol coverage almost mandatory if fires are to be detected in time for adequate action to be taken on them. Lookout men often fill a dual role by being assigned the task of taking initial action for suppressing fires that they detect within their reach. It is usual to provide the lookout man with some form of alidade or fire finder so that he can advise the officer to whom he reports of the bearing on the fire. Where such instruments are not provided, only those men with an excellent knowledge of the country should be employed in the position. Furthermore, at least a minimum check should be made to ensure that the lookout man can readily see a small smoke—colour blindness or some other sight deficiency might render some bright-eyed individuals quite unsuitable for the position. Lookout men must be able to report the smokes they see immediately upon discovery. Availability, or rather the lack of availability, of communication systems for this purpose may well be the limiting factor in the establishment or growth of a detection system. For many years telephones provided the principal source of communications for fire control organizations in most countries. Many of these systems have now been supplanted by radios which not only provide much greater versatility and dependability but often cost less to maintain.

FIRE WEATHER

Weather is such an important factor in determining when fires may be started, and once started if they will continue to spread, that some countries have devoted a large portion of their fire research effort to developing means for gauging its effects on the fire potential in their forested areas. Fire danger and fire hazard rating methods developed for specific forest types in one country are often found to have almost full applicability elsewhere. Any fire control organization that does not have a danger rating system of its own would be well advised to adopt one that is used successfully elsewhere.

FIRE CONTROL PLAN

A fire control plan may be defined as a written statement of fire control policy and prescribed action which may include maps, charts, tables and statistical data, and which applies to a specific area. The fire control plan should contain many, if not most, of the items already discussed, and present them in a simple

form that succeeding fire control officers would understand and, when necessary, amend. Much of the information contained in the plan may best be recorded on maps or diagrams. For instance, maps may well be used to record such items as fire occurrence (all fires spotted for several years give the operator a good indication of fire risk in his territory); areas burned, either by single years or decades; fuel types (possibly for various periods during the fire season); transport routes and, when worked out, travel times from fire control headquarters; and fire fighting facilities. Because a good fire control plan contains a wealth of information in orderly fashion it enables the fire control officer to make effective use of his time in advance of fire occurrence and greatly assists him in taking effective action without panic or confusion when fire does break out. A first consideration of the fire control officer should be the preparation of a fire control plan.

Objectives and standards

It is unlikely that any fire control organization would aim at the total exclusion of fire from its forested areas. Nevertheless, some defined objective or standard of achievement that the organization would have a reasonable hope of attaining should be defined. This section of the plan should also contain a brief outline of how the objectives are to be achieved, as well as a statement about the priorities of protection to be given various areas.

Organization

Here should be listed the fire control personnel, channels of responsibility for the supervisors, and in addition, the duties of key personnel (truck drivers, pump operators, crew bosses, etc.) both in the presence and absence of fires. This section could also include notes relating to state of preparedness, detection, communications, transport and reports.

Fire prevention

This is such an important activity that it could not be overstressed. Probably the three most important ways that forest fires can be prevented are through education, law enforcement and reduction of hazard, but by far the most important of these is education. No opportunity should be lost to impress upon woods operators, tourists, local residents and school children the need for care with fire in the woods. Personal messages to groups and individuals are very effective in waging a fire prevention campaign and it is an undertaking that must be kept up year in and year out regardless of the current forest fire situation.

Suppression

The initial action each member of the crew is to take upon receipt of a fire call should be carefully detailed. Arrangements made for co-operation by local or outside organizations should be set forth and notes should be included about the availability of all types of fire suppression equipment.

Training

One trained fire fighter may be of more value to a fire boss than a group of inexperienced and untrained men. A trained crew can work as a coordinated unit that drives home quickly to its objective rather than as a number of individuals working at cross purposes. Training schemes for all members of the force, as well as for potential fire fighters, should be described.

Safety

Because forest fire fighting is often dangerous, all supervisory personnel should ever be on the alert for the safety of the crews and for the individuals. There is a very definite need for the plan to contain reminders that the safety factor is to be borne in mind when training exercises and actual operations are undertaken. It is up to the fire boss, for instance, to ensure that everyone on the fire line stands no chance of being cut off from escape routes.

RECORDS AND REPORTS

Traditionally, fire control officers and fire bosses are men of action rather than men of letters and they consider the preparation of reports and maintenance of records a most irksome task. Nevertheless, it is of prime importance that at least a minimum of reporting is kept up to date, especially the reports on individual fires. It is only through a study of the records that the fire control officer can make an assessment of changes or improvements made in his organization. In addition, records provide the basis on which demands for fire control funds are made. The wise officer supports his requests for funds with submissions that are well documented with accurate information.

SOMMAIRE

Il faut tenir compte de plusieurs facteurs fondamentaux dans l'organisation de la protection contre les feux de forêt. Un service de protection forestière aux cadres restreints et même un seul homme peuvent accomplir beaucoup s'ils sont nantis d'une autorité suffisante. Au début, il faudra dresser des cartes des régions à protéger et effectuer une étude des feux des années passées et du comportement des incendies dans les diverses régions et les divers types de couvert à protéger.

L'agent de lutte contre le feu sera peut-être le seul fonctionnaire du service de protection qui travaillera à plein temps, mais la main-d'œuvre pour l'extinction des incendies peut provenir de diverses sources. Les ouvriers forestiers sont ordinairement les meilleurs pompiers en forêt, notamment s'ils sont formés et employés à la ligne de feu sous la direction de leurs contremaîtres réguliers.

Il faut avoir, au minimum, un matériel suffisant de lutte contre le feu pour outiller au moins un premier contingent de pompiers. Des outils manuels et mécaniques propres à la lutte contre le feu sont souhaitables, mais ne sont pas indispensables. De nombreux articles d'outillage qui servent à d'autres fins, tels que certains outils de jardinage, des charrues, des bulldozers, peuvent servir à enrayer un incendie et peuvent se trouver à une distance raisonnable des incendies.

Il faudrait prendre note des meilleurs moyens de se procurer, dans un bref délai, toutes les commodités nécessaires pour combattre un incendie. En outre, il faudra effectuer des études sur les moyens de transport, les grandes routes et autres routes d'accès, et sur les possibilités d'obtenir ou d'amplifier les moyens de communication et de détection des incendies.

La préparation des plans de lutte contre le feu est d'importance capitale. Ces plans devront porter sur les sujets suivants: les objectifs et les normes, l'organisation, les mesures préventives, l'extinction, la formation de personnel et sa sécurité.

En somme, il est nécessaire de rédiger des rapports et de tenir des archives convenables particulièrement en ce qui concerne chaque feu de forêt. Une bonne documentation est nécessaire à l'appui de tout programme efficace de lutte contre le feu.