GRASS AND WILDLAND FIRES

SUPPRESSION OF GROUND COVER FIRES/WILDLAND FIRE MANAGEMENT

A. INTRODUCTION

The method used to attack ground cover fires revolves around perimeter control. The control line may be established at the burning edge of the fire, next to it, or at a considerable distance away. The objective is to establish fire breaks that completely encircle the fire with all the fuel inside the breaks rendered harmless.

The direct and indirect approach are two basic attack methods for attacking ground cover fires. The direct method is action taken directly against the flames. The indirect method consists of control techniques applied at varying distances from the advancing fire to halt its progress, and its generally used against fires that are either “too hot”, “too fast”, or “too big”. Since a ground cover fire is constantly changing, it is quite possible to being with one attack method and end with another. Size up must be continued during the fire so these adjustments can be made when required. The essential rules that firefighters should follow are contained in U.S. Forest Service “Ten Standards of Firefighting Orders”:

1. Fight all fires aggressively, but first provide for safety.
2. Initiate all actions based on current and expected fire behavior.
3. Recognize current weather conditions and obtain forecasts.
4. Ensure that instructions are given and understood.
5. Obtain current information on fire status.
6. Remain in communication with crew members, your supervisor, and adjoining forces.
7. Determine safety zones and escape routes.
8. Establish lookouts in potentially hazardous situations.
9. Retain control of personnel at all times.
10. Stay alert, keep calm, think clearly, and act decisively.

Firefighting ground cover fires is very dangerous. Many firefighters have lost their lives or have been seriously injured while trying to control these fires. Four major common denominators of fire behavior have been noted in fires where a firefighters has been killed or from which firefighters narrowly escaped. Such situations often occur:

1. On relatively small or deceptively quiet sectors of large fires.

2. In relatively light fuels, such as grass, herbs, and light brush.

3. When there is an unexpected shift in the wind direction or wind speed.

4. When the fire responds to topographic conditions and runs uphill.

These factors should not be considered all-inclusive. For example, some change of wind may change the direction of fire speed, regardless of topography.

Each set of circumstances has a potential for creating a tragedy or near-miss fire. Often, human behavior is the determining factors. Firefighters who remain calm when the wind direction changes and move back into a burned area will survive. Those who panic and try to outrun a fire under similar conditions may die. The difference between a tragic fire and a near-miss fire may be due to luck, skill and/or advanced planning. In all cases, it is important to be alert and aware of conditions that may signal sudden change in fire behavior.

In a few words, be alert, watch out for light fuels, wind shifts, steep slopes and Achimneys@.

B. <u>SUPPRESSION OF SMALL FIRES</u>

While land fire management strategies are aimed at prompt, safe, aggressive suppression action of all wild fires, small fires pose the same kind of suppression problems and require the same kind of practices as larger fires. The effective suppression of small fires involves the following steps:

First attack, line location, line construction, burning out, mop up, patrol, and declaring the fire out.

Suppression strategies range from prompt control at the smallest acreage possible to containment using the combination of fire line and natural or constructed features, to merely ensuring that the fire remains confined to a defined geographical area.

1. <u>Initial Attack</u>

The principles of the initial attack include:

a. <u>Sizing up a fire</u>. Go around the fire as quickly and safely as possible, or inspect it from a vantage point. Do not go around the head of the fire it if is moving rapidly, since entrapment is likely. Size up a fire from a vantage point or from the flanks of the fire.

b. <u>Selecting a point of attack, and making an attack</u>. The universal rules are to take prompt action on an attack point; to stay with the fire, and take the most effective action possible with the available forces and equipment; to inform the dispatcher of the situation by radio; and to continue to work day or night, if night work can be done safely.

c. Mopping up. After primary line construction work is completed and the fire is called “controlled” many things remain to be done to make the fire line “safe” and put the fire out. This work is called “mop up”. The objective of mop up is to put out all embers or sparks to prevent them from crossing the fire line. A certain amount of mop-up work is done while building the control line. The mop up becomes an independent part of firefighting as soon as the spread of the fire has been stopped and all lines have been completed. Ordinarily, mop up is composed of two actions: Putting the fire out and disposing of fuel, either by burning it to eliminate it or by removing it so it cannot burn.

d. Patrolling. Patrol is that portion of the mop up job that consists of moving back and forth over the control line and the edges of burn areas to check for and put out any fire that may burn or blow across the line, and, at the same time, to check for and put out spot fires outside the line.

e. Declaring the fire out. Before abandoning a fire, and as a follow up, the Incident Commander will take steps to ensure that the fire has been extinguished and that any fire line that has been constructed is adequate should a flare-up incur within the fire line.

C. FACTORS INFLUENCING WILDFIRE BEHAVIOR AND FIREFIGHTING.

In attempting to control the wildland fire, firefighters must remember that topography, aspect, position of fire on slopes, steepness of slope, and shape of country will have an affect on the fire’s speed and the firefighters’ ability to control it.

1. Topography.

Fires often have distinctive behavior characteristics according to aspect, position on slope, steepness of slope, and shape of the surrounding countryside. These topographic features usually are easy to identify in the field and are thus important factors in the evaluation of fire behavior.

Differences in topography may cause local variations in climate and day to day weather conditions. These variations, in turn, influence the character of forest growth and the flammability of fuels.

a. Aspect.

Aspect, sometimes referred to as exposure, describes the direction a slope faces. The fire conditions vary greatly according to aspect because different aspects receive various amounts of sunshine and wind.

In general, southern and southwestern slopes provide favorable conditions for ignition and spread of fires. Because these slopes receive direct sunshine, the air and fuel temperatures are somewhat higher. This causes the snow to melt earlier on southern slopes. For these reasons, vegetation on south-facing slopes is not only sparser, but also dryer and more flammable than vegetation on north facing slopes.

Fire behavior at various positions on a slope may be influenced by the magnitude of the fuel body, and by topographic barriers. When a fire starts at the bottom of a slope, an entire hillside of fuels may lie in its path. Once a fire starting at the base of a slope gains headway, the availability of a continuous fuel body makes a large burn possible.

Other conditions being equal, fires burn more rapidly on steep slopes. In general, as the steepness of the slope increases, the rate of fire spread increases. Combustion is accelerated on steep slopes primarily due to increased heat transfer through radiation and convection.

The shape of the country may also have a significant effect on the firefighter who must evaluate the fire behavior. Narrow canyons, side drainages, sharp ridges, and massive, regular slopes all have a bearing on the direction of travel, rate of speed and general behavior of fires. Experience is shown that wind direction will normally follow the direction of a narrow canyon. However, where the canyon is wide, prevailing wind direction will not be altered to any great extent by the direction of the canyon. Cross canyon spot fires are not as common except in high winds. Fires burning along lateral ridges may change direction when they reach a point where the ridge drops off into an area below. This change of direction is caused by the flow of air in a canyon. In some cases, a swirling motion by a fire may result from a strong flow of air through the point of a ridge.

2. <u>Ground Fuels</u>

Keen observation of variations in forest fuels is essential in reliably estimating fire behavior. Fuel is the material of primary concern in controlling fires. A good firefighter must be able to evaluate flammability and difficulty of control in the various fuel situations encountered in forest or woodland areas.

In a forest, great differences exist in the character of flammable materials. Deep duff, newly fallen dead leaves, clumps of grass, litters or dry twigs and branches, downed logs, low shrubs, green tree branches, hanging moss, snags, and other type of material are present. Each of these materials has distinctive burning characteristics. The flammability of a particular fuel body is governed by the burning characteristics of individual materials by the combined effects of the various types of materials present.

3. <u>Aerial Fires</u>

Aerial fuels include all green and dead materials located in the upper forest canopy. The main aerial fuel components are tree branches, crowns, snags, moss, and high brush.

a. <u>Tree Crowns</u>

Fires in the upper crowns of trees are extremely difficult to control. The main control method must be aimed at suppressing the fire and ground fuels and preventing the fire from entering the tree crowns. Removal of limbs on the lower trunks of trees is one method of preventing crown fires. Limbs should be removed whenever a concentration of ground fuels makes a crown fire likely.

b. Snags

Snags or tree stumps are one of the most important aerial fuels that influence fire behavior. Fire and burning snags must be controlled promptly. Whenever possible, the main control effort of the fire must be designed to prevent the blaze from getting into the snags. When fire becomes established in snags, the control method usually requires the snags be felled. Snag-felling is especially important if shaggy bark is carried from the burning trunk by wind or strong convection currents.

c. Moss

Moss hanging on trees is a lightest and flashiest of all aerial fuels. Moss is important principally because it provides a means of spreading fire from ground fuels to other aerial fuels or from one aerial component to another. Moss reacts quickly to changes in relative humidity. Methods of controlling moss fires are aimed primarily at breaking up ground fuels to prevent fire from entering the trees crowns from hanging moss. In addition, lower limbs containing tree moss should be removed at all danger spots.

4. Fuel Conditions

Fuel continuity describes the distribution of fuels in a given area. Fuel continuity is an important factor in fire behavior because the distribution of fuels influences the potential area where a fire may spread, as well as the rate of speed. If a dangerous fuel is uniformly distributed over an entire area, a high potential exists for a complete burn to occur at a rapid rate of spread. If the fuel body is broken up by patches of bare ground or much less flammable material, both the potential area of the burn and the rate of spread is reduced.

A wide range of fuel continuity conditions is found in most forest areas. For the sake of simplicity and making fire behavior estimates, two broad fuel continuity classes are recognized:

- Uniform fuels, which include all fuels distributed continuously over the area being evaluated. Areas containing a network of stringers, or blocks, which connect with each other provide a continuous path for the spread of fire, are included in this classification.

- Patchy fuels, which include all fuels distributed unevenly over the area being evaluated. Definite breaks should be present, such as patches of rocky outcropping or plots where the dominant vegetation is of much lower flammability than the main fuel body.

As the amount of flammable materials in a given area increases, the amount of heat a fire produces also increases. The hottest fires, as well as those most difficult to control, occur in areas containing the greatest quantity of fuel.

In evaluating fuel volume, the quantity of both small and large size fuel components should be observed. A great volume of small materials, such as fine dead wood indicates ample kindling for the ignition of other fuels. A great volume of either small or large size material indicates a high potential for a hot fire. Where fires develop in areas containing a great volume of large-sized material, there is intense radiation of heat to fuel lying in and the path of the fire.

Fuel compactness - that is, the number of individual fuel particles per unit of volume - varies greatly in all kinds of fuel, but it is significant principally in duff and dead leaves lying on the ground. Fires burn rapidly in loosely compacted fuels because more of the individual fuel particles are freely exposed to air.

Two conditions of fuel moisture have major influence on the rating of fuel types. One concerns the greenness, or curing stage, of vegetation. The other relates to the shade and protection furnished by green timber.

In grass fuels, moisture content is a critical factor in determining flammability. Fires spread only at a low rate, or not at all, in grasses that are rank green, but when the same grass becomes cured and dry, fires will race through them at an extremely rapid rate. The degree of curing of grass is difficult to evaluate and requires keen observation of the grass stand. For purposes of considering fire behavior, the moisture content of grass can be judged according to the state of curing, as follows:

Green - the condition can be recognized by the green color in the cool, moist feel when crushed in the hand.

Curing - as hot dry weather prevails, grasses ordinarily progress through a period of gradual curing. This stage is detected by close observation of the individual grass clumps or stems. For most grasses, the curing stage begins when the tips of grass blades become tan or brown, or when individual grass blades take on a cured appearance.

Cured - in the cured stage, grasses are dried completely to a tan or brownish hue, and the stems feel dry or crackly when crushed or rubbed in the hand.

Soils influence curing primarily because of soil and moisture relationships. In the deep, most soils bordering creeks curing is much slower than the thin soils on slopes.

Some grasses seldom reach a dangerous cured condition. The shade and protection afforded by timber stands influence fuel type ratings due to the favorable fuel moisture conditions that are created. In dense forest, ground fuels are protected from the sun and wind. Temperatures and wind velocities are lower so that the moisture does not evaporate as rapidly from the dead fuels on the ground. Lower ratings are assigned to fuels situated beneath dead dense timber canopies.

The moisture content of fuels is influenced also by aspect, altitude, time of the year, time of day and other factors. For the purpose of fuel type classification, these factors are disregarded, and fuel types are classified on the basis of physical characteristics of the fuels themselves.

D. SPECIAL FIRE BEHAVIOR FACTORS - SPOT FIRES

The development of spot fires depends not only upon topography and weather factors, but also upon the character of fuels, in the main fire and fuels beyond the main fire. In the main fire, rotten, shaggy-bark barks snags such as broken topped hemlock snags and large quantities of ground fuels such as heavy logging slash, are the fuels most likely to cause spot fires. Spot fires frequently are started by crown fires. Wide spread crown fires, with their intends heat and strong convection currents, can throw burning embers far out ahead.

Fuels that are ignited most readily by embers thrown out ahead of the main fire, listed in the order of susceptibility include:

1. Rotten wood on the ground, on logs, and in snags.

2. Moss and lichens in tree tops.

3. Slash, particularly when compacted in tight piles.

4. Duff.

5. Cured grass.

Spot fires become more frequent and severe with lower fuel moisture and increased wind. On an average dry, a late summer afternoon, the small sparks quickly ignite rotten wood or tree moss. In compacted slash, duff and in cured grass, larger burning embers are required to start spot fires unless sufficient winds exist to fan smoldering material into flames.

E. A REMINDER - NOT A SIMPLE OPERATION

Firefighting ground covered wild land fires is a very dangerous work. Many firefighters have lost their lives or have been seriously injured while trying to control these fires. Thoroughly think out the situation, then do what will most likely be correct for that situation. Remember, the safety of personnel equipment always comes first.