

Knowing When to Burn

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THERE IS A TIME and place for everything. The important thing is to know when the time is opportune and the place appropriate. For the time being, I would like for us to consider these statements from the standpoint of prescribed burning.

Knowing when to burn—safely, efficiently, and economically—is one of the primary objectives of anyone who uses fire as a prescription. At the Southern Forest Fire Laboratory, our scientists are attempting to identify those conditions that are associated with successful burns. To give you a brief story of their progress, I would like to break down the subject into three groups:

1. Weather
2. Fuel
3. Season and time.

I'm assuming, of course, that we have already satisfied the first requirement of fire use—that of being a prescription. With this in mind, let's talk about weather.

Our studies have indicated that relative humidity (and its interaction on fuel moisture) is undoubtedly one of the most important weather elements to consider in conducting a prescribed burn. Humidities between 30 and 60% are generally satisfactory; optimum conditions center around 40%. Corresponding fuel moisture (as measured by the fuel sticks at fire danger stations) may vary from a low of 3% to a high of 18, with an optimum about 8%.

Wind speed and temperature, although weather elements of some consideration, did not prove to be important factors in gauging the



Fig. 1. Some wind is necessary for hazard reduction fire prescriptions in the palmetto-gallberry fuel types. U. S. Forest Service Photo.

effectiveness of hazard-reduction fire prescriptions. A complete calm or lack of any wind, of course, is unfavorable. Winds in the forest, however, with speeds from 1 to 9 m.p.h. at the 5-foot level were equally effective if relative humidity and fuel moisture remained within the desirable zones. Wind direction persistency, on the other hand, was another story. Assured of a wind between 1 and 9 m.p.h. from any direction, guaranteed to stay from that same direction for an 8-hour period or longer, the prescribed burner has an easy task. Variable and shifting winds, particularly those that may shift 90 degrees or more within a matter of hours, make his job a most difficult one. In fact, if he knows the winds are expected to shift, he had best cancel his burning activities for that day or limit them to small areas.

Analyses of hourly weather observations for a 10-year period in the Southeast show that some winds are more persistent than others. During the winter months, northwesterly winds as a rule have been

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more reliable than winds from other directions; easterly winds were the least reliable. During the summer months, variable winds were the rule and no direction could be considered persistent from the standpoint of fire use.

High ambient temperatures are conducive to crown scorch. Nevertheless, effective prescribed burns can be made during extreme temperature spells as long as moisture conditions are favorable and the proper burning techniques are employed.

How about fuel? Size, arrangement, and condition influence decisions on when and how to burn more than fuel weights and volumes. At least a ton of available forest fuel distributed fairly evenly over an acre is necessary to support a prescribed fire. Successful burns can be made on forest land when fuel weights exceed this minimum—even to the extent of extremely dense fuel of more than 20 tons per acre. Burning techniques naturally must vary according to fuel. In very light fuel, strip heads, or flanks are almost a must; in very heavy fuels, the practitioner must resort almost entirely to backfires, at least for the initial treatment.

If high fire temperatures are sought, as in the case of controlling undesirables, summer or hot weather burning has been shown to be more effective than dormant season burning. Wind speed and direction, however, have been particularly difficult to predict accurately during the summer months. In addition, we're told that late spring burning is to be avoided whenever possible due to the fact that many of our game birds are nesting at this time. Winds are not only more subject to drastic changes in the summer than in the winter, but forecasts are generally less informative and reliable. Widely scattered showers and variable winds are the general rule. During the winter, on the other hand, many of the weather patterns consist of frontal passages that can be tracked in their progress across the country and consequently provide more reliable data for the prescribed burner.

Our studies indicate that daytime prescriptions are usually more effective and reliable than those made at night. Wind speed is generally greater and consequently less variable during the day while relative humidities are consistently lower. Both conditions are essential for successful fire treatments. There are instances, however, when nighttime burning may be appropriate. When cool fires are desired, as in the case of hazardous fuel accumulations under dense stands of

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Fig. 2. Prescribed fire is being used at the right time and in the right way to reduce fuel accumulations in the southern Coastal Plain. U. S. Forest Service Photo.

young pine, night treatments have been successful in consuming surface fuel with little or no damage to the overstory. The field man, however, must use discretion in selecting nights for this type of burning. Cloudy nights on the back side of a high pressure area when surface temperatures after dark do not drop drastically are indicative of good burning conditions. Winds remain at a favorable speed level, relative humidity does not rise rapidly, and dew seldom forms. In addition, favorable conditions often exist after the passage of a dry cold front. Uniform crown canopies also enhance the chances of success.

One final word. Very few perfect burning days occur in any season. It is important, therefore, that we make the most of our best conditions by utilizing them for our more demanding prescriptions. Second bests then can be used for the less exacting prescriptions.

There is a time and place for prescribed burning; there are also times and places when fire should not be used. The criteria that we have discussed should help the land manager to know when the time is right for a successful burn.