Fire Management Branch
Department of Conservation & Environment

HAZARD REDUCTION BURNING IN THE BIG DESERT

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PREFACE

The attached report is based upon data collected during hazard reduction burning operations in the Big Desert. The data are limited and there is a requirement for additional information to be collected by staff involved in future operations of the type described.

Recording of basic meteorological information such as wind speed and direction, temperature and relative humidity, should be conducted at intervals of not more than 30 minutes throughout the burning period, or more frequently if conditions are obviously changing rapidly. These data can then be related to estimates of fire behaviour, including rate of forward spread and spotting distances, and descriptions of fuel type. Further analysis of fire behaviour may be possible using LANDSAT imagery taken following each operation.

Careful collection of the type of information described will make a positive contribution to our understanding of fire behaviour in this area.

S. F. Duncan

S F DUNCAN

Chief Division of Forest Protection

Introduction

Until recent years there were very few attempts to carry out hazard reduction by burning in the Big Desert. Much of the area was burnt by wildfire in 1959 and, because of the very slow recovery of the vegetation/fuel complex insufficient fuel had accumulated to warrant such action. However, fuel build-up has now reached a level that can sustain an intense wildfire under conditions of very high to extreme fire danger, and it is desirable to break the fuel continuity to limit fire spread.

Conventional approaches to hazard reduction burning have been ineffective. Under the mild conditions normally prescribed for fuel reduction burning in forest areas the still relatively discontinuous nature of the fuels meant that fires failed to spread satisfactorily. I Brilliant developed a technique of burning breaks by allowing fires to spread with the wind under high Fire Danger Indices (FDI)[1] and using gradually moderating conditions during the evening to stop fire spread. The technique results in relatively long narrow strips on which most of the fuel is removed. These strips are therefore excellent firebreaks and they have already proved valuable by assisting with the suppression of the wildfire of January 1981.

This report summarises the information available on hazard reduction burning in the Big Desert. It should provide a basis on which to conduct future operations.

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1 The FDI referred to is the Forest Fire Danger Index derived from the Mark 5 Forest Fire Danger Meter designed by A G McArthur.

Fire Behaviour

The relationships between FDI and forward rate of spread (FROS) of the headfire of hazard reduction burns conducted in the Big Desert are shown in Figure 1. The relatively discontinuous distribution means that fire spread in the post-1959 wildfire fuels is very dependent on wind speed. A minimum wind speed of 15-20 km/hr appears necessary before significant spread occurs.

The threshold value of sustained fire spread is approximately 1 km/hr, which is high compared with the range of spread rates experienced in tall eucalypt forest. This threshold occurs at an FDI of 10. Under milder conditions some spread may occur but the result is likely to be a very patchy burn, and at FDI's of 5 and below fires are unlikely to spread at all. At an FDI of 20 the FROS increases to 2.5-3 km/hr and at an FDI of 30 the FROS may be as high as 5-6 km/hr. There are no data from hazard reduction operations for higher FDI's. Some data obtained from analysis of wildfire behaviour indicate spread rates of 7-8 km/hr are possible at an FDI of 40.

Burning Guidelines

The objective is to produce a long narrow burnt strip by lighting on a line up to 50 m in length across the prevailing wind direction. Using this technique strips up to 30 k long and 2.5 k wide have been burnt.

The lower limit for effective hazard reduction burning appears to occur at an FDI of 20. Below this level fire spread is generally sustained, as discussed earlier, but the spread pattern is more readily interrupted by fuel discontinuities and the end result can be a very fragmented burn. In addition, burning conditions may not last long enough to allow a satisfactory burn length to be achieved.

The most satisfactory hazard reduction burning has been started under FDI's between 25 and 30, with wind speeds and temperatures of the order of 20 km/hr and 30^{o}C respectively.

The approximate linear relationship between the data shown in Figure 1 is :

$$\text{FROS} = \frac{2}{9}\,(\text{FDI} - 6)$$

and this equation should be used to indicate potential spread rates.

Comparisons with the spread rates predicted by both the Forest and Grassland Fire Danger Meters are also shown in Figure 1. The Grassland Meter predictions are reasonably close although conservative at higher FDI's. If the difference at FDI's above 15 is real, and not just a function of the limited data set for Desert fuels for which spread rates are of necessity estimated rather than accurately measured, it is possible the greater spotting potential of the Desert fuel types is responsible. As expected the Forest Fire Danger Meter is a very poor predictor of fire behaviour in this fuel type.

Other points which should be considered when planning a hazard reduction burn are :

1 Burning should be done in spring before the surrounding grasslands begin to cure.

2 October offers the best chance of good burning conditions. In September there are very few days where the FDI remains above 20 for a sufficient length of time and in November there are frequently consecutive days where the FDI reaches the high 30's and low 40's.

3 Burning should not be attempted when conditions are likely to allow overnight spread. A few hours at low FDI's are usually sufficient to extinguish the fire.

4 Burning should not be attempted unless the forecast wind direction is reasonably constant throughout the expected period of fire spread.

Figure 1 FDI vs FROS : POST 1959 WILDFIRE FUELS