INFORMATION SHEET 11

REVISED JUNE, 1983

PRESCRIBED BURNING IN WESTERN AUSTRALIAN FORESTS

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During the hot, dry summer months, periods of extreme fire danger occur quite regularly in the south-west of Western Australia.

Extreme summer weather and strong winds have resulted in many disastrous, widespread fires. Damage has occurred over large areas of farmland and forest. Typical examples were fires accompanying Cyclone Alby on 4th April, 1978, when 90 fires in and near State forest burnt 51000 ha, including about 40000 ha of farmlands. There have been other notable fires, the Dwellingup fires of January, 1961, burnt over 100000 ha and other fire emergencies occurred as recently as December, 1974, and February, 1975.

With such risks it is important that adequate precautions are taken to minimise fire spread and damage. The Forests Department's long experience in fire fighting has clearly demonstrated that fires burning under extreme summer weather will reach uncontrollable proportions if fuels are allowed to accumulate unchecked over large areas of forest. These fuels build up as moribund leaves and twigs fall to the forest floor and the vegetation of understorey shrubs cures with age. After several years of such accumulation these fuels are highly flammable and will support very intense fires. Intense flames and rapid rate of spread, accompanied by the characteristic ability of such fires to project smouldering material more than 2 km ahead to start new fires, will defeat the efforts of even the best trained and equipped fire suppression forces.

Fire prevention campaigns are very necessary and valuable in reducing the number of man-caused fires, however records suggest many fires will occur each summer despite these efforts.

Over the past five years the department has fought between 183 and 382 fires each summer and between 1895 and 8575 ha of State forest has been burnt. Although most fires are caused by man's activities, lightning is a natural source and multiple strikes have caused difficult fire suppression problems. This happened in the Dwellingup fires in 1961.

Since fires are inevitable, it is important that fuels are regularly reduced to enable suppression forces to gain early control and minimise the area of damage. Prescribed burning is the only practical technique for reducing fuels over large areas of forest with the available manpower and equipment resources. The forests of the South-West have developed in a fire environment and are well adapted to withstand the mild fires used for most prescribed burning without damage.

Past fire history

Historical evidence suggests that fire has been common in Western Australian forests for centuries past, and Dutch explorers such as Pelsart and Vlaming saw fires along the west coast. Many of these fires were lit by aborigines for hunting and cooking as they moved continuously over the forest area in search of food.

After British colonisation the incidence of fire increased as exploitation of the forest for sawmilling and clearing for farming produced large quantities of debris. These heavy accumulations of fuel caused severe summer fires, damaging large areas of forest.

Some control over these fires followed the passing of the Forests Act by State Parliament in 1918 and the establishment of the Forests Department. Early foresters were alarmed by the extent of fire damage and adopted a policy which almost entirely excluded fire from the cut-over forest. These areas were protected from fire by surrounding them with a burnt fire-break about 100 m wide. Concurrently, fire-fighting units were established to deal with any outbreaks which occurred.

After 15 to 20 years of this policy of "total control" heavy accumulation of fuel had built up and it became impossible to contain fires burning on the worst summer days. It was realised that protection from fire was not a practical objective and a policy of prescribed burning over large areas of forest was introduced in 1952.

Planning and programme

Most of the 1·8 million ha of State forest is burnt on a cycle of four to eight years and either in spring or autumn depending on the forest type and rate of litter accumulation. For fuel reduction, burning is planned to maintain accumulation below 8 tonnes/ha in jarrah forest and below 17 tonnes/ha in karri forest (where litter is more compact, heavier and less flammable). This burning is carried out under cool prescribed weather conditions in spring and autumn, when mild fires are allowed to burn slowly through areas programmed for fuel reduction.

A prescription is prepared for each forest area to be burnt, and these prescriptions include:

(*a*) *Fire intensities* represented by rates of forward spread of the fire between 20 and 40 metres/hour. The rate of spread prescribed for an area depends on the fire resistance of the stand, i.e. tree size and type. Saplings are less fire resistant than pole-sized trees and jarrah is generally more fire resistant than karri

Areas of prescribed burning (ha) for the past five fire seasons are shown below:

TABLE 1

	Fire Season				
	1975-76	1976-77	1977-78	1978-79	1979-80
	ha	ha	ha	ha	ha
State forest:					
Hand burning	64 497	49 405	36 567	57 801	53 137
Aircraft burning	215 513	185 236	233 931	311 733	282 965
Total	280 010	234 641	270 498	369 534	336 102
Advance, Top Disposal and Regeneration Burns	4 532	3 563	3 674	3 861	3 051
Plantations:					
Clearing burns	2 872	2 752	2 530	2 008	987
Burning under pine canopy	1 958	2 284	1 779	1 932	1 938
Total	4 830	5 036	4 309	3 940	2 925

(*b*) *Several different lightings* may be prescribed, depending on range of fuel weights and types. Karri is less flammable than jarrah in early spring and where both types occur in one area, separate lightings spaced perhaps two weeks apart may be necessary to burn out the area.

(*c*) *Persons and property* to be protected. Precautions must be taken to avoid fire escapes during or after the burn, or damage to facilities such as S.E.C. powerlines in the area. Warnings are broadcast over the radio and areas are signposted to warn the public of burning operations.

Most prescribed burning for fuel reduction is carried out in spring, but fire is used for a variety of other purposes, for example, advance burning prior to logging, for regeneration of karri seedlings after logging, clearing for plantation establishment and more recently, hotter burns to promote regeneration of legumes and resistance of jarrah forest to dieback disease.

The area of prescribed burning over the past five years is shown in Table 1.

Most prescribed burning for fuel reduction is carried out by aircraft dropping small incendiaries on a grid pattern, with ground crews patrolling the burn perimeter to prevent escapes. Smaller, more difficult burns and special treatments, such as regeneration burns, are undertaken by ground crews.

Method

For successful prescribed burning it is essential that forecasts for weather and fire behaviour are accurate and reliable. This is a pre-requisite if fires are to burn at prescribed intensities, damage is to be minimised and perimeter control ensured. Reliable weather forecasts are necessary to minimise environmental problems such as smoke accumulation over major population centres.

Over the past 20 years considerable research has been undertaken into methods of predicting fire intensity in jarrah and karri forests. Forest Fire Behaviour Tables have been compiled from this research, which integrate weather factors such as air temperature, relative humidity, rainfall and wind with fuel amount and type to predict rate for forward spread of head-fire. The tables specify range of weather and fuel conditions suitable for prescribed burning and the spacing of spot fires for lighting.

The method of lighting most commonly employed by ground crews or aircraft is a grid pattern of spot fires. The spacing between spot fires is worked out from the fire behaviour tables and designed so that fires burn separately during the day and join in the late afternoon or night under cool conditions, when adverse effects from flares at the junction zone between fires is minimised.

Spot fires are lit in parallel lines across the direction of the prevailing wind and against a secured downwind perimeter. The method most commonly employed by ground crews is shown below:

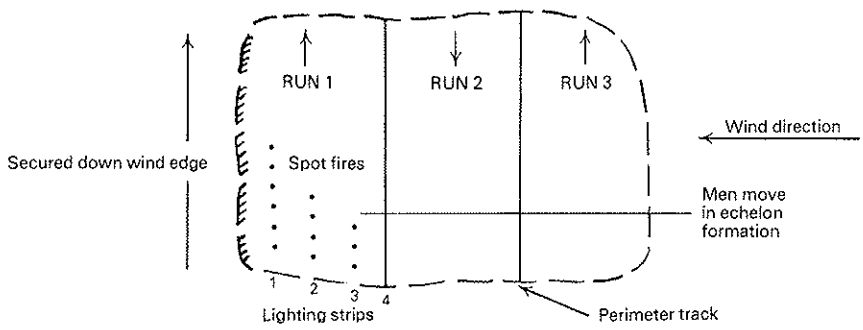

Figure 1. "Across wind" lighting method for ground crews.

Spring and Autumn

Spring and autumn burning have specific characteristics which must be considered in planning when to burn an area.

In autumn, heavy fuels such as logs and understorey shrubs are very dry after the summer drought and ignite readily. Most of the fuel is burnt and flaming is more prolonged. In spring these fuels are damp after the winter rains, less fuel is burnt and the result is patchy. General characteristics for autumn and spring burns in these forests are described below, however it must be recognised that site characteristics will often over-ride a generalised effect of fire and therefore results are not consistent through the whole forest. The effect of topography, fuel type, and amount is far more enhanced in summer than in spring when winter moisture is still providing a buffering effect.

Autumn

Preferred for eastern wandoo forest where grassy fuels create excessively patchy spring burns and chance of summer escapes.

Promotes regeneration of legumes by necessary heating of seed pods and conditioning of seed, followed by winter rains for germination.

Promotes regeneration of eucalypts by burning heavy groundwood and creating ashbeds favourable for regeneration.

Clear burns provide greater degree of fuel reduction and therefore fire protection.

Growth of shrub regeneration is slow until following spring and forest floor is relatively bare in winter.

Costly. Burning of heavy fuels such as logs increases costs for perimeter control and mopping up and increases chances of fire escapes.

Spring

Patchy burns favouring fauna refuge and diversity of forest understorey.

Reserves heavy logs and ground wood for fauna refuge and food supply.

Promotes abundance of species in the understorey shrubs for wildflower display.

Rapid regrowth of shrubs from lignotubers and corms ensures replacement of vegetation cover.

Fire behaviour is more predictable because only flash fuels are burnt.

Less butt and scorch damage to trees.

Cheaper and safer burns as mop up and edge control requirements are much less than in autumn.

Further Reading

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28216/8/83—5M—O/SOL.