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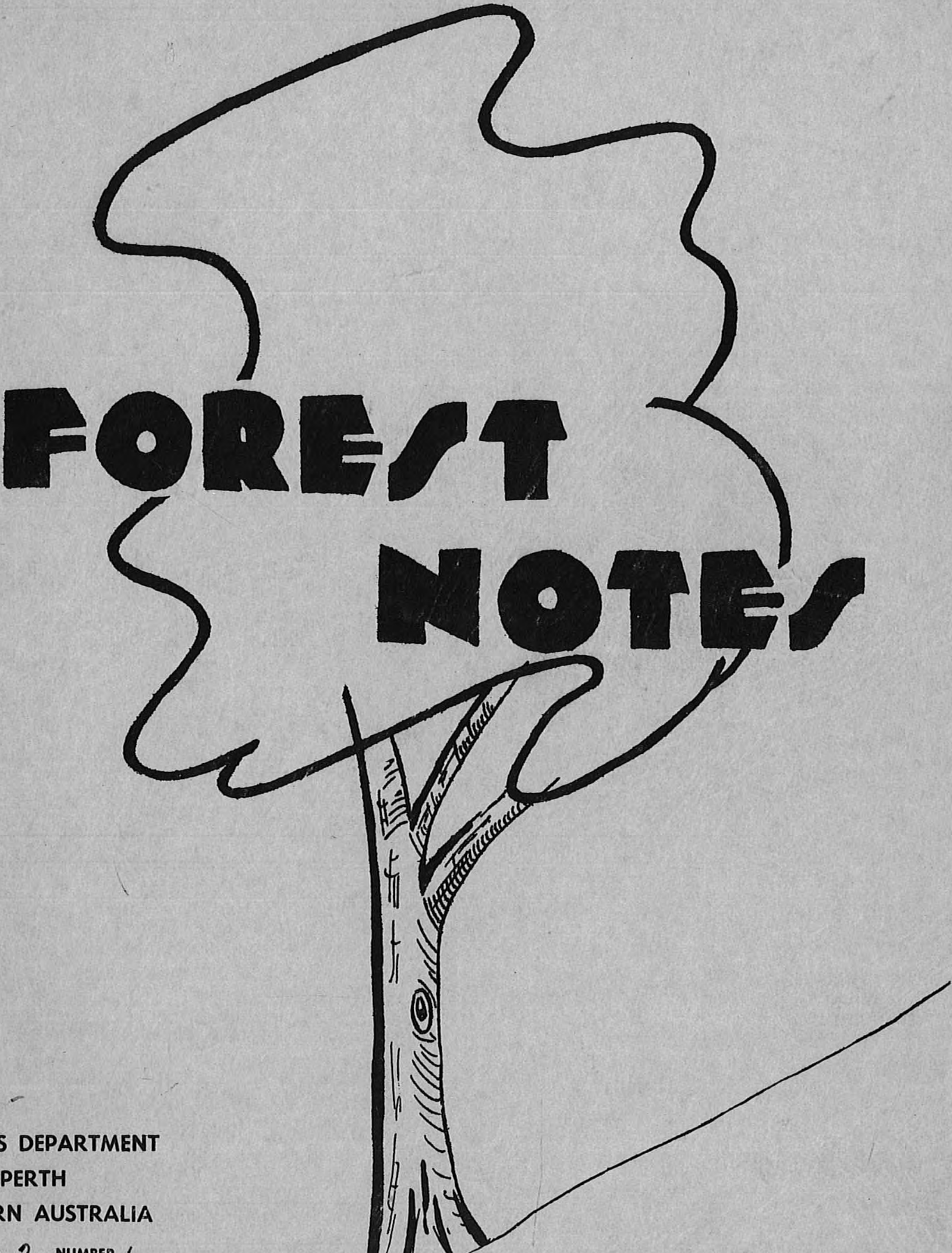
FOREST NOTES



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SOME ASPECTS OF CONTROLLED BURNING IN THE JARRAH FOREST

by G.B. Peet

It is reasonable to claim that over the past three years, considerable progress has been achieved in improving the fire protection system in the Jarrah forest. This increased protection is due largely to greater annual coverage in controlled burning and sound planning in the allocation of this burning. Increased area production in controlled burning is due to many factors, e.g. closer officer supervision, better weather information, improved burning techniques, and one of the most important contributions, the installation of V.H.F.radio.

While conceding that this progress has been made, I feel there are certain aspects of the burning practice which require comment, and I hope these remarks will draw discussion from others faced with similar problems.

The two aspects on which I would like to comment are:

1. Preliminary planning, i.e. allocation of areas for burning, field inspection and prescribing of weather conditions for the actual burn.
2. The actual burning in spring and autumn.

Preliminary planning

My comment on the preliminary planning of controlled burning is that it is still far too rudimentary for the ambitious burning programmes which face most divisions. Obviously the prior inspection of the areas is extremely sound practice; the fuel quantity and type are defined as well as the topography and scrub type. Of course this information is vital if the burn is to be conducted on a calculated assessment of fire behaviour rather than a pure jag, into which the calculation degenerates if the areas are not inspected. One aspect of drawing up these prescriptions warrants further discussion.

There is little point in stating a method of burning which will have to be applied perhaps three or four months later than the inspection. This should exclude areas with special scrub or topographical problems which require a certain burning method to prevent risk to personal safety or to reduce forest damage. The actual weather conditions for the burn should be given in terms of fuel inflammability, of which a good measure can be obtained from the fire hazard rating. The fire hazard rating has the the advantage of allowing flexibility in weather conditions, while still reflecting degree of fuel inflammability.

For example, on non-rain affected fuel, after a dry night, a fire hazard of average summer may be obtained on a day with a maximum temperature of $80^{o}F$ and a minimum RH of 30%. The same rating may be obtained also on rain affected fuel, or after a moist overnight condition on a day of maximum temperature of 85^{o}F and minimum RH of 25%. In fact there are a considerable number of weather conditions which give the same fire hazard rating and hence much the same degree of fuel inflammability. Thus, prescribing the weather conditions from fire hazard will allow sufficient flexibility in the definition to prevent wastage of burning days.

It is suggested that the proposed burning be broken into daily burn areas for one gang, say 1,000 to 1,500 acres, depending on the position of roads. To each area is assigned a hazard rating under which the area is to be burnt, e.g. an area of 4-year old fuel low scrub has assigned to it a rating of Average S 6.3 to 6.5. The actual numerical rating within the hazard term must be given, as there is a range of both weather conditions and the state of fuel inflammability within a hazard class e.g. moderate average S etc.

The individual areas can then be grouped into hazard rating classes for quick sorting on each burning day. For example, if there are 100,000 acres to burn, the area has been sorted into Spring and Autumn burning in areas of 1,000 acres. This results in 100 individual areas for which a hazard rating for burning has been described. Assign a job number to each burn e.g. 1 to 100, and sort into groups based on the prescribed hazard for burning. For example:

Spring burning.

Moderate	4.5 to 5.0	Jobs 1, 15, 20, 35, 40 etc.
Moderate	5.0 to 5.5	Jobs 2, 10, 21 etc.
Moderate	5.5 to 6.0	Jobs 16, 18, 25 etc.
Av. S.	6.0 to 6.3	Jobs 48, 53, 94 etc.

The same procedure will be required for Autumn. If there is sufficient variability in fuel types, it may be advisable to sort Spring burning into early and late. Tables have been prepared to assist in determining the fire hazard on any day; hence the organizing officer can work out the hazard for the division or areas within the division, and go straight to the table and obtain the burns for the day.

The next point is the edging of late Spring and Autumn burning in early Spring. More attention can be given to this operation as a considerable volume of work is still involved in mop up and patrol, and in suppressing escapes from controlled burns. In terms of obtaining area production of well burnt acres these operations are a pure waste of time, if they can be overcome by prior planting which gives proper preparation to the area.

In early Spring the ground wood is moist. Hence it is a reasonable risk to expect the edge to be dead by summer if the area is proposed for Autumn burning. Edging can be done at a rate of 5-10 miles per hour on reasonable tracks with a flame thrower and utility truck. If the strips are progressing in yearly sequence, i.e. this year's strip backing on to last year's burn, the amount of edging required will be finished in 1 to

2 weeks with two of the above units. The edge need not be deep - 2 chains is sufficient - just enough to prevent the edge trees from catching alight. If edging was planned properly, there would be considerably less effort spent in containing late Spring and Autumn burning.

The Actual Burning.

It is thought that having up to the minute weather information at the scene of the burn has amply demonstrated its value. This information has given the following advantages:

1. Fire behaviour, i.e. the rate of spread and flame height, is directly related to weather, particularly wind speed, temperature and relative humidity. If the actual weather readings are known, there is a reasonable chance of estimating probable fire behaviour. If not known, it becomes a personal estimate based on the feel of the air, degree of rustle in the leaves and other signs which range from reasonable to useless.

2. Experience in gauging fire behaviour will be gained more quickly and be of greater value is fire behaviour characteristics can be assessed against definite measures of weather, e.g. wind speed in miles per hour. A wind speed of 10 mph is much easier to remember than how the leaves rustled on that day.

Therefore it is considered that each division should have at least two towers equipped with wind speed meters and direction indicators. Most divisional headquarters have Stevenson screens with wet and dry bulb thermometers. On a burning day, readings of temperature and humidity should be taken every two hours and this information transmitted to the field crews carrying out the burning. Wind readings are most important and should be checked with the nearest tower as often as possible. The cost of equipping each division with robust wind meters and vanes will approximate £100. If a quarter increase in area production is experienced, with three gangs this equipment will be paid for in a week of burning. It is hard to assess how much increased area production will be achieved by providing weather information, but 100% increase in the burnt area has been obtained at Dwellingup, of which it is felt that at least $\frac{1}{4}$ can be allocated to having reliable up to the minute weather information at the scene of the burn. The installation of V.H.F. radio, strict officer supervision, and the alteration of techniques would account for the remaining 75%.

The use of wind speed and direction warrants further comment. Local wind direction in the forest is not an important factor except on steep slopes. The local wind direction will affect the direction of the spot fires in their initial development stage, but once the convection column gets into the upper wind stream, it is that win which controls the direction of movement of the fires. The towers are usually well placed to measure this wind stream and the burn plan should be based on the nearest tower wind readings, and not on local wind except on the steep slopes.

The method of lighting is all important and requires greater precision. Many hot burns under mild burning conditions are due simply to the method which was used for lighting. Too much fire is one of the greatest faults in controlled burning today. When fires join they flare at the junction zone, and this causes scorch. The amount of fire placed in any area is in direct proportion to the amount of junction zone. When lighting a burn I feel each single fire should be treated as a unit, and given sufficient room to burn so that it joins with the next fire at the end of the day when conditions are mild. It is common to see areas lit by 2 to 3 chain strips and lines of fire burning through the area quickly in one or two hours joining in the heat of the day. This causes unnecessary scorch because instead of minimising the junction zone, the opposite has occurred. Naturally there is a limit to how far a fire will run while burning at the the intensity required for controlled burning. On the average it appears that good controlled burning is experienced with fires of an average forward progress of from 1 chain per hour to 3 chains per hour. Therefore in a five hour burning period the strips will range from 5 chains to 15 chains apart with spots from $2\frac{1}{2}$ to $7\frac{1}{2}$ chains apart. The point I wish to make is: if the fire will run 15 chains, it should be allowed to do so and not given only 5 chains so that it joins with the next fire in the heat of the day. Bad lighting is largely due to the lighting tool which has been used. The pipe drip torch is a valuable lighting tool in early Spring when a lot of fire is required on damp fuel beds to get a burn. However I contend that they are a dangerous instrument in late Spring and Autumn when trying to keep correct spot distances. The fusee match is the answer to this problem and the torches should be stored as soon as the fuel beds dry sufficiently for spot fire burning.

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The first attempt to restrict indiscriminate cutting of timber in the Swan River colony was made in 1840 when local governing bodies known as Town Trustees were to protect the forest resources of their neighbourhood as part of their duties. Two years later Governor Hutt made another attempt by declaring that no colonist was to be permitted to fall trees without a licence from the nearest Collector of Revenue, and the licensee could have no more than three fallen trees on the ground at one time. Following the first attempt to reduce waste, the colonial authorities' treatment of the problem scarcely contemplated anything beyond the mere registration of those engaged in the timber falling industry. Registration fees provided a useful addition to the colonial treasury.