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29.

Using fire in farm forestry

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Introduction

Competently used, fire can be a safe, low cost management tool.

The majority of fires used in farm forestry will be low to moderate intensity. These can be safely practised by most rural landowners, provided that practical guidelines are followed.

The intensity of fire depends on the amount of fuel available, the weather and topography. The fuel and topography are usually pre-determined so effective fire management depends on the right weather conditions and the burning plan.

Cooler (less intense) fire is used for fuel reduction under an existing forest, including light or scattered logging debris left after selective harvesting.

More intense fire is needed to remove dense logging debris or windrowed and heaped fuels.

The use of high intensity fire for regeneration of large areas is a specialised task, which requires accredited training.

Detrimental effects of fire

Burning at appropriate intervals can maintain the health and diversity of many vegetation types. However, in some vegetation types (e.g. rainforest, alpine vegetation), fire can be disastrous, resulting in the elimination of fire-sensitive species. Fire in riparian vegetation may encourage erosion and reduce water quality. Frequent burning can also have adverse effects on young tree seedlings and in some forests and heathlands can cause weeds



snapshot - using fire in farm forestry

Conducting a low intensity burn - step by step

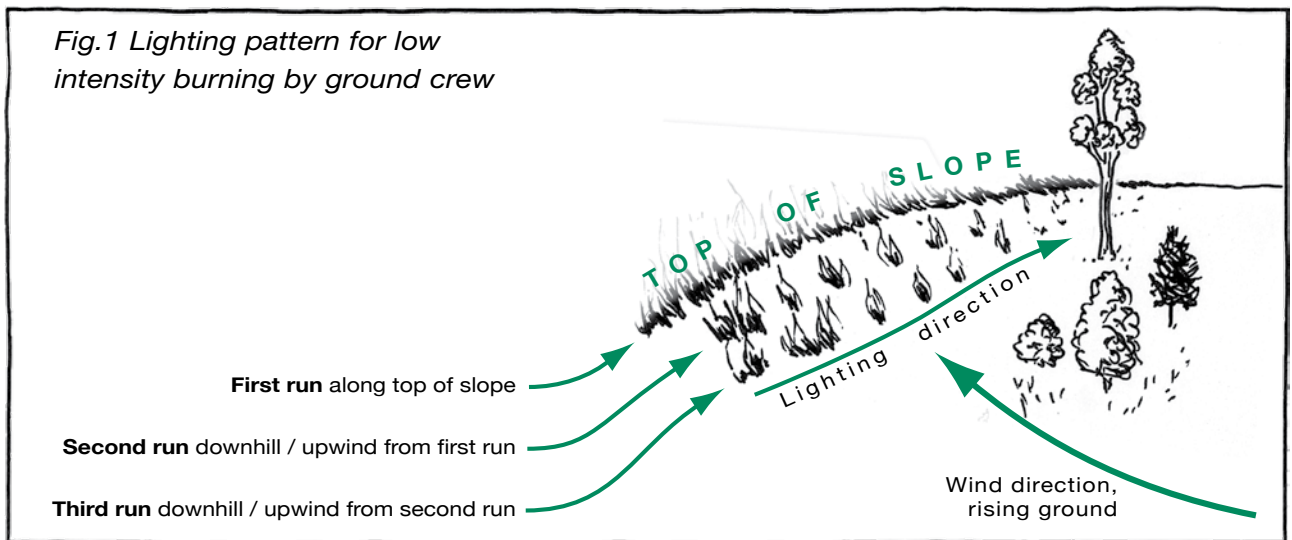
Timing

- Fire Danger 'LOW'
- Temp less than 20°C
- RH 40-60%
- Wind speed less than 20 km/hr
- Soil dryness 25-50 mm
- Have a permit if required
- Notify neighbours and permit officer

Lighting plan

- **Test fire:** For areas less than 1 ha use a test fire to determine (A) speed of fire, and (B) spacing of ignition points (location of spot fires).
- **Main fire:** FIRST, light down-wind on up-slope boundary first, THEN light spot-fires in parallel strips at right angles to wind direction.

Fig.1 Lighting pattern for low intensity burning by ground crew



Desired result

- A low intensity burn
- Spread of less than 100 metres/hour
- Flame height of less than 1.5 metres.
- 70% removal of fuel over 70% of area
- Less than 10% tree scorch



Undesirable result



to dominate. For example on sandy soils, frequent firing can cause bracken to dominate at the expense of healthy shrubs.

For information on maintaining or enhancing conservation values see Chapter 18, *Management issues for conservation*.

Fire management plans

The risk that fire might spread from property to property should be recognised in fire management plans. A fire management plan will usually cover an area with some distinct overall land management strategy, rather than compromise it. For example, if a hazardous fuel type lies to the northwest of vulnerable assets and covers more than one tenure, it is prudent to engage in cooperative burning between landowners. This will improve the outcome and reduce costs.

At its simplest, fire management planning involves the identification of hazards in relation to assets across large areas and the development of agreed strategies to reduce the risks.

Conducting a low intensity burn

Successful low intensity burns have the following characteristics:

- low flame height, less than 1.5 metres
- low rates of forward spread, less than 100 metres per hour
- more than 70% of the target fuels removed on more than 70% of the area
- area of tree crowns scorched less than 10% of total area burnt.

Scorching can be closely related to flame height and it varies between autumn and spring. As a general rule, in spring the scorch height can be expected to be 6 – 8 times the flame height while in autumn it can be up to 14 times the flame height.

Weather effects

The weather, including long-term rainfall, affects the dryness of fuels and the intensity of fires. The important short-term weather factors are wind, air dryness, (relative humidity) and temperature. These have to be measured on site using a simple wet and dry thermometer and a wind speed chart. A weather forecast from the Bureau of Meteorology is essential, particularly the outlook for the following days. Make use of the comprehensive 'Weather by Fax' service, particularly the 'Afternoon Fire Weather Package' – 1902 935 806 or contact the Fire Weather Forecaster directly by 'phoning 6221 2054. Alternatively, use the Bureau's web site at www.bom.gov.au

To minimise scorch and escapes, observe these limits:

- Wind - less than 20 km per hour. At 20 km per hour, treetop leaves and small twigs move.
- Air dryness - 40 to 60 per cent relative humidity.
- Soil dryness - topsoil moist early in the morning but dry in the afternoon. (Soil Dryness Index 25 to 50 mm - check the 'Weather by Fax' service 1902 935 783 for the latest Soil Dryness Index Map).
- Temperature - under 20 degrees C.
- The overall Forest Fire Danger Index should be in the 'LOW' range for most fuels or possibly in the 'MODERATE' range for light fuels. (Check the 'Weather by Fax' service 1902 935 801 for the latest Forest Fire Danger Index map).

Conducting high intensity burns

The type of high intensity burning most often done on farms is log heap or windrow burning. It is inadvisable to attempt large scale slash burning, following logging without either specialist advice or the necessary skills and experience, as the

opportunity for errors of judgement and subsequent escapes is significant.

Most windrow burning, if properly prepared and supervised will present few problems. The weather requirements are similar to that previously described but there are some important provisos.

The objective is generally to remove large volumes of wood so obviously, the dryer the material, the better the result. Also, dry, well-aerated stacks are less likely to cause a smoke nuisance and will be alight for less time, both of which are important considerations these days. The best time for windrow burning is in mid- to late-autumn, after the summer fire risk has passed and before the winter rains set in. The windrows are likely to be at their driest and there is less chance of bad fire weather occurring over subsequent days. Positively the worst time for windrow burning is the spring. The wood is saturated after a winter's rain and there is a very high risk of escapes as the weather warms and sudden hot windy days occur, particularly in October. This problem is so well pronounced that authorities will not issue permits for log heaps when the permit period begins in the late spring.

Lighting plan for low intensity burns

Every burning operation should have a documented plan (SEE SNAPSHOT). Apart

from the benefits which good planning brings to any task, a burning plan is evidence of intention, should the unforeseen occur.

A 'quiet' fire is needed to minimise damage but it must cover sufficient area to burn out to safe boundaries on the day it is lit. For areas over one hectare, a single ignition point cannot achieve this and a series of spaced spot fires is needed. Spacing is determined by the forward rate of spread of the head fire and the time available until 6:00 pm, Eastern Standard Time (EST) (see Table 1). The most reliable method of determining the rate of spread is to use a test fire.

Using a test fire

A test fire should be lit about an hour before the main burn. This is usually around 1:00 pm EST when the fine fuel is nearing its driest and there is confidence in the weather forecast for the remainder of the day.

- Select a site within the burn area with typical fuels and slope. It should be close to the downwind boundary so that it can be extinguished, if necessary.
- Record the air temperature, relative humidity and the tree top wind speed.
- Light a spot fire in fuels which give the

Table 1: Spacing spot fires: a calculation table

Time available until 1800 EST	RATE OF SPREAD OF HEAD OF TEST FIRE (metres per hour)				
	12	24	36	48	60
	SPACING NEEDED BETWEEN SPOT FIRES (metres)				
1 hour	10	20	30	40	50
2 hours	20	40	60	80	100
3 hours	30	60	100	130	160
4 hours	40	80	130	170	220
5 hours	50	100	160	220	270

- best chance of the fire spreading freely.
- ▶ Allow it to spread for 20 minutes by which time the headfire will have stabilised
 - ▶ After 20 minutes, mark the position of the headfire with a distinctive stone or steel peg.
 - ▶ Allow the fire to burn unchecked for a further 20 minutes and then mark its new position.
 - ▶ The distance, in metres, between the two marked points, multiplied by three gives the rate of spread in metres per hour.
 - ▶ Observe and record the flame height and spotting distance, if any.
 - ▶ Confirm that the onsite weather accords with the forecast and obtain an update or discuss with the Bureau of Meteorology's duty forecaster to confirm the outlook, based on local observations.
 - ▶ Decide whether to implement the burning plan or extinguish the test fire and wait for more suitable conditions.

Once a forward rate of spread has been determined, a simple table (see above) can be used to determine the spacing of individual spot fires within the burn area, based on the time left until 6:00 pm EST. This coincides with falling temperature and rising humidity, essential to counter the fire intensity as individual spot fires join and activity at their junction zones increases with higher flame heights.

Lighting should be done along the downwind or upslope boundary first. When this is burning satisfactorily against the wind or downslope, light further spots along parallel strips running at right angles to the prevailing wind direction, or along the contour, if the slope is significant. Spots which are lit too close together can quickly join up and become a line of fire. Flame

heights may double and fire whirlwinds occur as spots join. This will increase damage, scorch, and the risk of escapes.

For hand lighting operations the crew of lighters should move in a slanted formation throughout the area, with the lighter on the downwind or up slope line leading a staggered crew.

This ensures that each lighter is not endangered by fire from the next lighter upwind or down slope. (See fig.1, Snapshot)

While labour intensive, the method described is the safest and most reliable way of burning large areas. In very steep country, with a regular cover of surface fuels, a line of fire lit along a ridge will deliver a slow-burning backfire with virtually no scorching. Because of the uncertain time for this type of fire to cover the ground there is a risk that a wind change or the funnelling effects of gully updraughts could turn quiet backfires into damaging headfires. Generally, lines of fire are to be avoided and should never be used at the foot of a slope or on an upwind boundary.

The legal requirements

Tasmanian fire law requires owners and occupiers of any land, including the Crown, to be responsible for fires which occur on their land. Irrespective of the time of year and whether or not a permit period has been declared, it is the responsibility of land owners to prevent fires from escaping onto neighbouring properties.

People who want to burn vegetation during a Fire Permit Period must obtain a permit from a Fire Permit Officer. Apart from the fact that it is a legal requirement under the Fire Service Act 1979 (section 66), the Fire Permit Officer is likely to be able to offer some useful advice. Permit holders who comply with the conditions set out in the

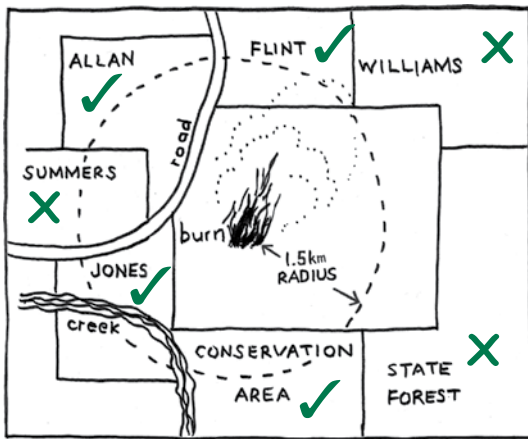


Fig 2. In the example above, neighbours Flint, Allen, Jones and the Conservation Area must be notified during a Fire Permit Period because their properties are adjoining the property on which the fire will be lit and they fall within a radius of 1.5 kilometres from the fire's origin. Summers is within the distance, but the property is not adjoining.

permit are indemnified against liability for any loss, injury or damage that occurs as a result of their fire provided that they did not act recklessly or negligently.

A good burning plan can be offered to the Fire Permit Officer as evidence of planning and risk management and will probably be incorporated into the conditions of the permit.

A fire permit must be registered prior to its use, by phoning the freecall number shown on the permit.

Irrespective of whether or not fire permits are required, at any time of the year a land owner or occupier who becomes aware that there is a fire on their land is required to take reasonable measures to prevent the fire from escaping onto other properties.

When the State Fire Commission imposes a Total Fire Ban all permits are void. If a fire is already burning, it must be reported to the Tasmania Fire Service or the Police and all reasonable measures taken to extinguish it or prevent it from spreading.

The law requires that particular people and

organisations are notified of intention to light a fire during a Fire Permit Period. It is also a good idea to notify relevant people at any time of the year, if they are likely to be affected by the fire. During a Fire Permit Period notify:

- ▶ Adjoining neighbours within 1.5 km of the fire. Neighbours can be notified in writing or verbally, up to 14 days before the fire is lit. (See fig. 2)
- ▶ Tasmania Fire Service Control Room - A 'phone call advising the permit number and the time the fire will be lit. (This is to avoid unnecessary call outs of brigades).

Further reading

'Guidelines for Fuel Reduction Burning Under Dry Forests' Forestry Commission & Tasmania Fire Service, August 1984. While dated, this remains a relevant and useful guide.

'Prescribed Burning – Low Intensity', Forestry Tasmania, January 2005. Comprehensive manual used by Forestry Tasmania and the Parks & Wildlife Service.

'Bush fires in Australia' R.H. Luke & A.G. McArthur, Australian Government Publishing Service 1978. This is the standard text for Australian fire management.

'The Wonders of the Weather' Bob Crowder, Bureau of Meteorology Australian Government Publishing Service. An easy to read explanation of many aspects weather and climate.

Contacts

'Afternoon fire weather package' ph 1902 935 806

'Fire weather forecasts' ph (03) 6221 2054

Bureau of Meteorology web site; www.bom.gov.au

Further information can be found from the 'State Fire Management Council' web site; www.sfmc.tas.gov.au