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Fire Management Branch

OTWAYS FIRE NO 22- 1982/83
A CASE STUDY OF PLANTATION PROTECTION

RESEARCH REPORT NO. 21

P BILLING

JULY 1983

Department of Conservation & Environment

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Originally printed as Fire Research Branch Report No. 21, Forests Commission, Victoria

INTRODUCTION

The Geelong District has a group of four relatively small plantations, of young radiata pine, located near Boonah (Map 1). Their areas total approximately 980 hectares, of which 789 hectares (81%) were burnt during the fire of 16/17 February 1983 (Table 1). Only Paddy's Swamp plantation remained unaffected, and the three remaining areas (Retreat, North and South Wormbete) were burnt when the fire entered on broad fronts from adjacent hardwood forest.

The largest plantation, Retreat, was burnt under a high FDI[1] (Table 1) and there was no possibility it could have been saved. The other two plantations were burnt many hours later, when the FDI was low, despite the efforts of a strong suppression force.

FIRE SUPPRESSION

1 First attack to 0330 hours on 17 February

The fire was first attacked at the plantation at about 2230 hours on 16 February and by 2400 hours the following resources were on site.

25-30 men
2 x 4WD (FCV) tankers (2700 litre)
4 x 4WD slip-on tankers (2 FCV) (400-500 litre)
2 x 2WD tankers (1350-1500 litre)
1 x D6 bulldozer (FCV)
2 x D2-D3 bulldozers

When the first crews arrived at the plantation, after being released from protecting nearby private property, almost all of Retreat plantation had been burnt but the fire had not reached the three smaller plantations to the north. They were relatively sheltered from the strong south-west wind and the cleared private property north of the Retreat plantation had been heavily grazed so the fire could only spread rapidly by long distance spotting. However, there was a long fire front in stringybark forest stretching from the Retreat plantation to the north-east.

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[1] The Forest Fire Danger Index.
(See A G McArthur (1967) Fire Behaviour in eucalypt forest Forestry and Timber Bureau Leaflet 107).

Private property near the Bambra-Airey's Inlet Road was still under threat, and during the first hour most of the work involved protecting two houses and some outbuildings just south of Paddy's Swamp plantation. At 2130 hours the wind was very strong (40-60 km/hr), the temperature about 19°C, the relative humidity close to 85% and the FDI moderate and falling as conditions gradually abated. A trail constructed in thick stringybark forest near one house controlled a flank fire and this sector was patrolled by a large FCV tanker and several CFA units. Other crews were working near a house to the east, where the fire was burning in grass, but the wind was so strong that burning cow pads were rolling across the paddocks and starting spot fires. Another large spot fire was burning in a steep scrubby gully and threatening the south-east corner of Paddy's Swamp plantation. Fortunately, just as it spread into the pines two small dozers, which were working around the plantation edge constructing a firebreak, arrived. They controlled the spot fire and began to widen a very narrow track along the eastern edge to provide access for the small slip-on tankers. This operation was slow mainly because of the heat from windrows, heavy fuels and dense undergrowth in the gully below the track, the need to slip-cut and the intense fire behaviour (Figure 1). Three small slip-on tankers defended this edge but access was so poor that the larger 2WD CFA tanker was limited to ferrying water. Once this firebreak reached a cleared area of private property the area was backburnt to ease pressure on this sector.

Near South Wormbete plantation the fire was burning in long-unburnt stringybark along the Old Telegraph Road next to the plantation. A small FCV crew, with the D6 bulldozer, a large 4WD tanker and a small slip-on tanker, put out numerous large spot fires in the pines and were attempting to hold the eastern edge on the Old Telegraph Road by a direct attack on the fire as it moved north. Despite many game attempts at holding the fire, intense short distance spotting across the line, and occasionally into the plantation, made this operation quite futile.

2 Fire situation 0330 hours - 0830 hours 17 February

By about 0330 hours 17 February there were two narrow fire fronts spreading north in forest between Paddy's Swamp and South Wormbete

plantations. Short distance spotting was very effective up to about 20 m. The FDI was 5 and the wind had eased to 30-40 km/hr. To the east the fire had burnt along the Wormbete Creek and north into private property, and it was threatening South Wormbete plantation on the eastern edge where the firebreak was untenable. By 0400 hours the wind had changed to the south and strengthened and, although Paddy's Swamp plantation was reasonably safe, South Wormbete plantation could no longer be defended. The D6 crew withdrew and joined other crews attempting to save North Wormbete plantation by outflanking the fire north from Paddy's Swamp plantation.

Backburning around North Wormbete plantation was considered but, because the external firebreak along the southern edge was very weak, it was little more than a rough 4WD track (Figures 2 and 3), there was insufficient time to widen it.

With the slight wind change the fire intensity increased, spotting was more effective and the fireline was very difficult to hold because the adjacent stringybark forest had never been fuel reduced. By 0630 hours South Wormbete plantation had been burnt, two tongues of fire were spreading north, and a wide front was threatening the northern plantation.

The wind gradually freshened so that by 0700 hours the fire was spreading north in a gully faster than the flanking attack by three dozers. At about 0745 hours the fire spread into the northern block of pines in several places, mainly by short distance spotting, and although the FDI was only about 6 or 7 this plantation was burnt by crown fire by 0830 hours (Figure 4).

3 Fire situation 0830 hours - 1800 hours 17 February

Even though the FDI increased during the day to 14 and the fire was uncontrollable in long-unburnt stringybark, fuel reduced areas north of Paddy's Swamp plantation were very effective in limiting the fire spread, particularly as the sea breeze late in the afternoon pushed the fire to the north-west and directly into this fuel reduced zone (Figure 5). Some spot fires developed in the older (1979/80) fuel reduced areas but these were controlled relatively easily.

FIRE PROTECTION

1 Location of Plantations

The various constraints which caused the plantation to be separated into four blocks included site factors, objections by local residents, pressure from conservation interests and lack of municipal support. The final LCC recommendations, published in September 1978, allow only minor extensions to each of North and South Wormbete plantations.

This group of small plantations is much more difficult and expensive to protect than a consolidated plantation of similar area. For example, Table 1 shows that the smaller areas require more than twice the length of external breaks compared with a larger plantation with regular boundaries. It is doubtful if these smaller areas would be viable if the firebreak standards used elsewhere in the State were applied, as a disproportionate area would need to be devoted to them.

Further penalties from irregular areas are involved in the costs and works required to fuel reduce buffer zones because of the far greater length of external firebreak. In a fire situation this means that it will probably be more costly and more difficult to control, patrol and mop-up a fire.

For these reasons, the protection of four smaller separated plantations could never be as efficient or as effective as the protection of a single block of regular shape. Although this may seem to be a hypothetical argument, the fact that so much of the plantation area was burnt, and will probably be replanted, opens up alternatives in plantation re-establishment to improve fire protection.

The mosaic of private and public land produces more problems. Much of the private land remained forested or covered in scrub (Map 1) and this creates problems both in establishing good protection, and during suppression operations.

2 Firebreak Standards

The width required for an external break depends on many factors, but where the adjoining hardwood forest has high fuel quantitities, and particularly where it contains stringybarks and has never been fuel reduced, the break should be wider than when the adjoining land is regularly fuel reduced or has been cleared. It is also important to have at least 4WD access along external breaks. Although there are no minimum standards for width and access, a clearing 20 metres wide with a 4WD track would probably suffice. Obviously where the hazards are greater a wider break with better access would be required.

The external firebreaks with these plantations were generally of a poor standard. Map 2 shows those breaks which, considering the hazard existing adjacent to the plantation, were judged to be inadequate from the point of view of access or width. Some sections were only 4 to 5 metres wide while others were too steep and rough or did not have a track suitable for a 4WD vehicle. Tighter guidelines for establishment of external firebreaks are required.

3 Fuel Reduction Burning

Fuel reduction had in recent years been carried out to the north and north-west of the plantations, with none to the south or east. However, only one of the fuel reduced areas was next to plantation, so the effectiveness was reduced by the hazard remaining in unburnt areas adjacent to plantation (Figure 6). Obviously there were problems with inliers of scrubby private property and access, but these reasons should demand a higher standard of fire protection.

It is alarming from a fire protection viewpoint to see large areas of long unburnt stringybark forest around young pine plantations. The problem is accentuated when it is considered that these areas, which contained high fuel quantities and large volumes of loose bark, were separated from plantation by inadequate firebreaks. Because the external breaks were virtually non-existent in some areas, fuel reduction could not be carried out around these plantations (Figure 6). It should be a fundamental of plantation protection that adjoining hardwood forest areas are fuel reduced on a regular basis, and provision for this should be incorporated in the protection plan.

DISCUSSION

The efforts of crews in trying to save these plantations were commendable and there was very little more that could have been done under the circumstances. There is no doubt that there was sufficient manpower and equipment attacking the fire to have made a much bigger impact had not the suppression operation been hampered by poor access, poor firebreaks and high fuel quantities.

Young plantations are particularly vulnerable once fire enters a plantation because the restricted access and poor visibility make attack difficult, and the almost continuous arrangement of fuel promotes crown fire at quite low FDI's. If a fire enters a young plantation on a wide front substantial losses are inevitable, even at relatively low FDI's. Fire protection works should be carried out to prevent this from occurring.

Regular fuel reduction burning, which reduces the intensity, rate of spread and spotting activity of a fire, will give crews a far better chance of controlling fire before it reaches plantation. For example, fuel reduced areas north of Paddy's Swamp plantation were effective in limiting fire spread even though the FDI was quite high (14). The fire could not be controlled in long-unburnt stringybark forest.

Adequate external breaks are essential, particularly to enable back-burning to be carried out if other conditions are suitable.

CONCLUSION

This case study illustrates that very little can be achieved during a fire suppression operation, even at low FDI's, if fire protection works are inadequate. It suggests that more attention should be given to external firebreak standards, perimeter access and fuel management near plantations. Guidelines covering these matters are necessary so that a satisfactory standard can be achieved.

TABLE 1 PLANTATION AREAS AND FIREBREAKS

Plantation	Area (ha)	Area Burnt (ha)	FDI	Perimeter Firebreak Length (km)	Inadequate Firebreak Length (ha)	Plantation Area/ Firebreak Length Radio (ha/km) *
South Wormbete	80	90	5	4.3	4.3	19
North Wormbete	85	85	6 - 7	4.5	4.5	19
Paddy's Swamp	191	0	N/A	7.6	7.3	25
Retreat	624	624	80 - 10	12.7	9.7	49
	980	789		29.1	25.8	

* This ratio is higher than 60 for large regular shape plantations.

FIGURE 1 : Fire behaviour adjacent to Paddy's Swamp Plantation.

FIGURE 2 : Perimeter firebreak on the southern edge of the North Wormbete Plantation.

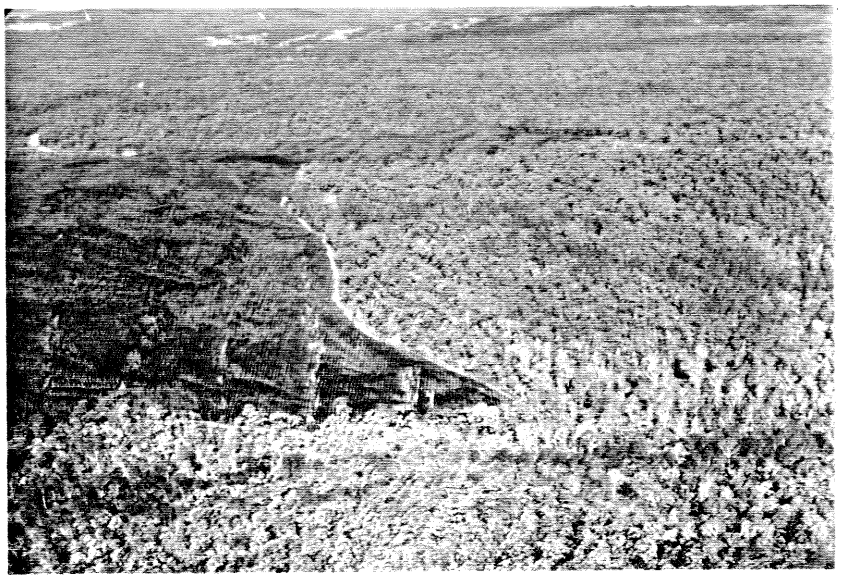
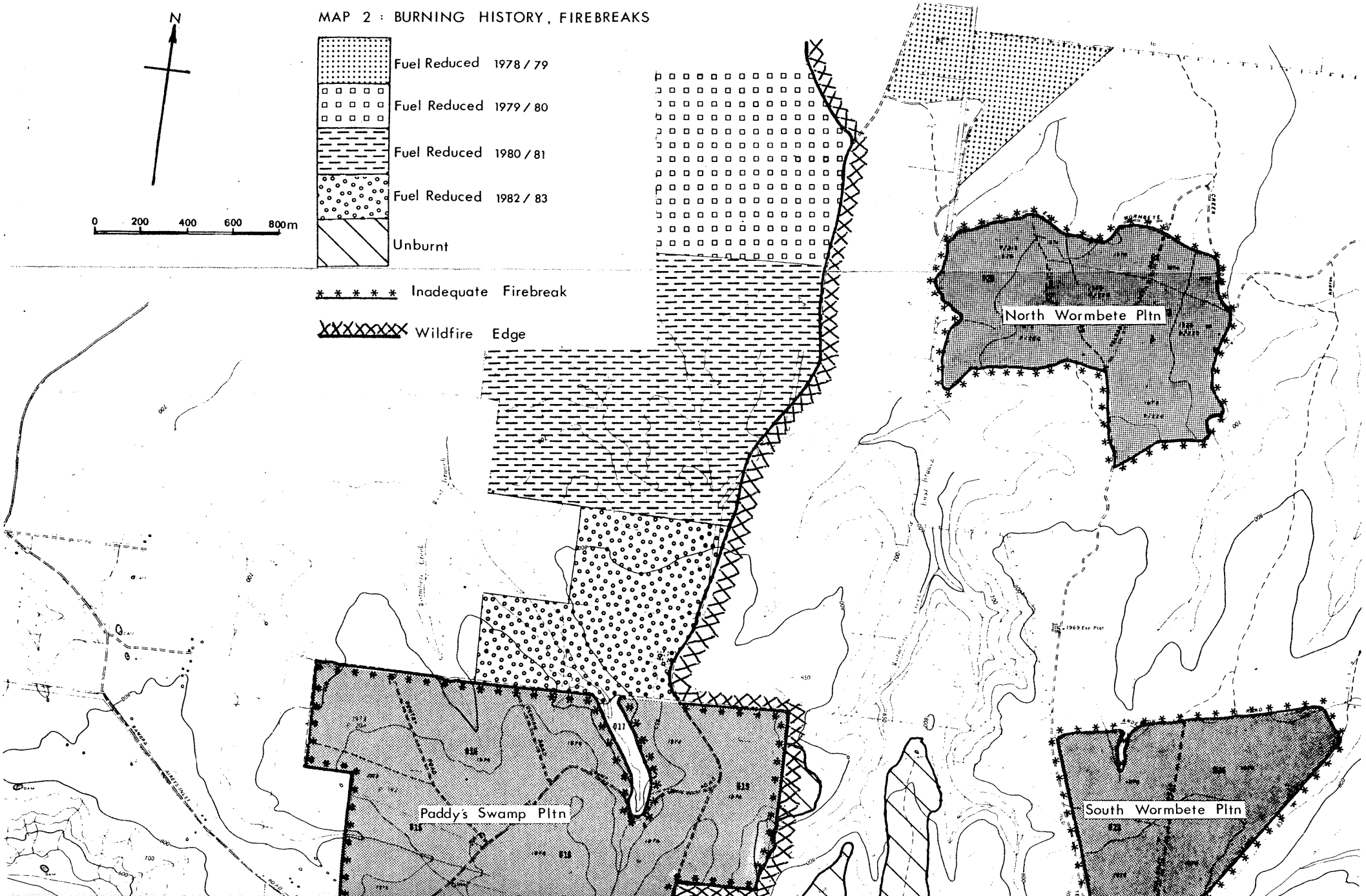


FIGURE 3 : Firebreaks - North Wormbete Plantation.

FIGURE 4 : Crown fire in North Wormbete Plantation at 0830 hours on 17 February 1983.

FIGURE 5 : Paddy's Swamp Road - Fuel reduced area on the right, wildfire on the left.

FIGURE 6 : Paddy's Swamp Plantation. Heavy fuels (18-20 t/ha) next to plantation.


MAP 2 : BURNING HISTORY, FIREBREAKS
N
0 200 400 600 800m
Fuel Reduced 1978 / 79
Fuel Reduced 1979 / 80
Fuel Reduced 1980 / 81
Fuel Reduced 1982 / 83
Unburnt
Inadequate Firebreak
Wildfire Edge
North Wormbete Pltn
Paddy's Swamp Pltn
South Wormbete Pltn

Retreat Pltn
BOONAH ROAD
ROAD