Managing Tasmania's Fire Environment

PART 1. The First Fire Managers

1. The Fire Environment They Inherited

Lightning had ignited world forests for at least 300 million years and temperate rainforests and eucalypts had fuelled and been regenerated by bushfires for more than 60 million and 12 million years respectively. The rot-resistant eucalypt fuels increased fire frequency and their stringy and candle barks increased fire spread. By 40,000 years ago wet and mixed forest eucalypts had evolved a complete dependence on fire at 20 to 400 year intervals for their natural regeneration.

With every ice age the sea level and most forests retreated downhill but still burnt often enough to regularly regenerate all of today's fire dependent species. Temperatures and sea level rose about 10,000 years ago and each vegetation type climbed back onto whatever sites it needed on today's island - in spite of First Tasmanian's fires.

2. 10,000 Years of Probable Fire Uses

The following sections are based on the writings and paintings by the early European explorers (who found the First Tasmanians were quick-witted and expert in fire use); on today's mainland aboriginal burning, and on modern research into the ecology, behaviour and effects of vegetation fires.

The European settlers noted the First Tasmanian's simple hunting tools consisted of heavy and slender types of very long spear, a killing stick and no other weapons. Unlike some of the mainland tribes they had no shields that suggests no need to defend themselves from other people and made serious disputes unlikely. For gathering they had woven baskets and a digging stick

Early paintings frequently included burning torches. To call them "fire-sticks" is probably a misnomer as, unlike the dead conifer branches of Europe, dead eucalypt branches are non-resinous and cannot keep flames or embers alight for long because of excessive loss of radiant heat. However tubes of candle bark when stuffed with crumpled stringy bark, can maintain glowing embers for long periods and be activated into flames when needed. These were vital for the use of every hunting and gathering tool in their kit.

Bark torches don't burn for ever but can be used in relay with unlit torches or by lighting clumps of cutting-giving to provide enough burning time to make new ones.

3. Carrying Versus Making Fire

The settlers reported that the First Tasmanians were unable to actually start a fire and could claim fire off another tribe if theirs went out. However, because they used fire so often it made sense to carry it wherever they went, rather than having to laboriously re-start it.

4. 'Green Pick' plus Cover

The First Tasmanian hunters would have seen that the new shoots of recent burns (='green pick') attracted their prey, and quickly found that un-burnt cover is needed to get within spearing distance. Their long, slender spears had to be hurled at short range below the tree canopies – often with non-fatal results. Speared prey usually heads for cover where the spear slows them down. The hunters could then catch up and wield their killing sticks. Green pick plus cover suggests hunting fires were small and many, probably on a five to ten year rotation, that developed into an intricate mosaic of burns of different ages in woodlands and dry forests plus rather larger burns in button grass areas.

5. Winter Campfires and Spring Burns

For most of winters it is likely that the First Tasmanians kept campfires permanently alight and mostly on the coast. Outdoor living would have made them well aware of the effects of altitude, aspect, season and recent rain on how fuels dried and of how fuel quantity, dryness, wind, time of day and pattern of lighting affected a fire and how much it burnt.

Limited only by tribal catchment boundaries, spring burning probably started by lighting a small northern aspect patch at the top of a nearby low hill, or a narrow northern aspect strip below a recent burn and between two gullies.

As drying progressed and access to campsites near water allowed, they probably moved to higher hills and other aspects. They may also have used sea and land breezes to burn narrow strips down from hilltops to give hunters cover uphill of their prey.

They seemed unequipped to suppress any fires so must have been expert at timing and lighting patterns to produce countless, tiny fires for hunting and other purposes in dry forest and non-forest.

6. Summer and Autumn Burns

It is likely that lightning and First Tasmanian dry season escapes continued to burn wet forests, mixed forests and rainforests (where few of their artifacts are to be found) whenever enough fuel had built up.

But most forest types have some hollow trees and many of these house possums that are easily brought down to earth by fire and captured in any season.

PART 2. The Last Two Hundred Years

7. European Settlers and Fire

Ten thousand years of flammable clothing, houses and crops made the new settlers fear fire but they soon found 'green-pick' was vital for their sheep. Their own big fires destroyed the likely previous fire mosaics and their ring-barking plus very hot fires killed the trees and grew good grass for their sheep. These in turn kept the forest at bay by eating the tree regeneration. The settler's bark huts in the forest soon gave way to fire-protected settlements amply cleared to the north and the west and downhill.

8. Selective Logging and Fire in Wet Forests

Selective logging for sawn boards started within days of European settlement. Those saw millers used to European timbers discovered the eucalypts were hard on their saws and that new skills were needed to cut boards that stayed flat. Eucalypt knots shrank more than the boards they were in and either fell out or twisted the board as they dried - so they left the knotty top half of every tree in the bush and burnt them along with all the debris that the broad eucalypt crowns smashed down.

At the mill both the 'boxed out' 'brittle heart' in the middle of the log and the borer-prone sapwood off-cuts had to be burnt, and every board radially sawn so they didn't cup when drying.

This meant that all eucalypt sawlogs had to be 500+ cm small-end diameter and some 90+ years old (cf pine logs only 200+ cm and 20-30 years old). Eucalypt standard board recovery averaged 30% and selling smaller bits was very difficult. It was quickly found that on average only 10% of eucalypts were big enough, straight enough and sound enough to cut enough boards to make felling worthwhile.

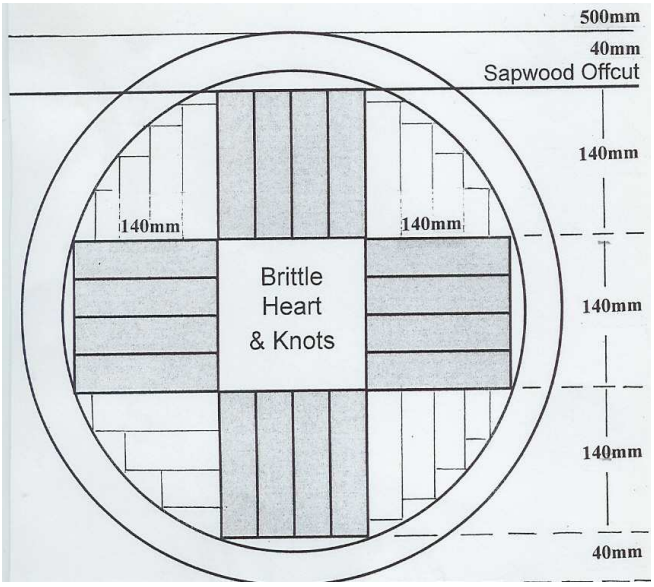
It was soon noticed that the hot bushfires generated by the logging debris produced excellent regeneration, so, once the useful logs were removed, the forest was routinely burnt to start again.

The best saw logs grew in the thin-barked wet eucalypt and mixed forests that were more or less even-aged. Here 150 years of burning after 10% selective logging, started huge fires that wasted the other 90% of the trees which, when they eventually fell damaged the excellent regeneration produced by the fire. Any salvage of fire-killed trees fuelled a second fire leading to extensive areas of tall bracken with few trees and to an increased fire frequency.

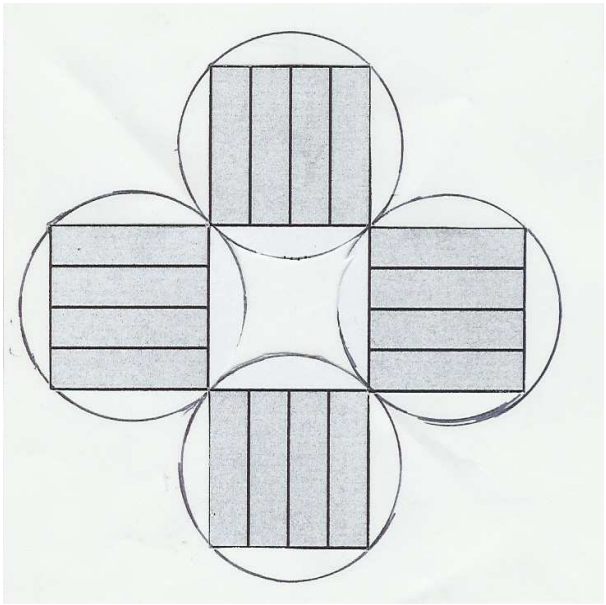
9. Selective logging and Fire in Dry Forests

In dry forests, burning of the logging debris over moist soils in safe fire weather (called 'top-disposal burning') damaged few of the thick-barked, fire-resistant, multi-aged trees and produced ample regeneration. This practice continues today.

Minimum Eucalypt Sawlog – 500+ cm (90+ yrs)
To radially saw standard green boards



Four Pine Sawlogs - 200+ cm (20-30 yrs)
To back saw same number of standard green boards



10. Pulp and Paper Research

The short Eucalypt fibres were originally seen as useless for papermaking but 1930's Tasmanian research showed they were also thin and so gave enough crossings to make strong newsprint and fine quality paper.

11. Clear Felling and Fire

Clear felling in wet and mixed forests for both pulpwood and saw logs started in parts of Tasmania in 1939. Twice the previous sawlogs were found and all solid stem parts that were wasted by selective logging could be used. All logging debris is now kept within the good firebreaks needed to control the hot burns vital for the regeneration of wet eucalypt forests. More than fifty years of research have improved the control of these fires and of their smoke.

12. Changed Bushfire Behaviour and Effects

Settlers created extra fuels with logging slash and land clearing that increased fire intensity and damage to retained trees. They also introduced fire-adapted plants like gorse that increased both fire intensity and fire frequency. The introduction of rabbits and sheep minimised grass fires and reduced some dry forest fires. Unlike native browsers these animals nip off tree seedlings below the lowest bud and so kill them. Fire suppression started and was continually improved for two hundred years. This is easier away from the hottest front so bushfires now have bigger proportions of intensely burnt area when put out than when they were allowed to run.

Many King Billy and Pencil Pine stands that had survived hundreds of years of bushfires were severely damaged by European settler's fires. The 1979 February Plains fire over waterlogged soils with little wind, suggested too long an absence of fire had allowed the accumulations of fuels in Scoparia thickets that caused most damage. Pines growing over grass were undamaged.

13. Decrease in Bushfire Hectares Burnt

1898 - 2 million hectares = *one third of Tasmania*
1934 - 1 million hectares = *one sixth of Tasmania*

Peak Year per Recent Decade -Hectares Burnt

1967 - about 250,000 - *one twenty forth*
1972 - about 150,000 - *one fortieth*
1981 - about 100,000 - *one sixtieth*
1995 - under 50,000 - *one hundred and twentieth*
2007 - about 144,000 - *one forty third*

14. The Current Fire Situation

Most of Tasmania's original grassy woodland and some dry forest have now been cleared but less wet forest and very little of its mixed forest, rainforest, or buttongrass. Bushfire suppression is improving but hazard-reduction burning is decreasing.

Regeneration burning in logged wet forest, and top-disposal burning in logged dry forests probably account for about half the job of hazard-reduction there. But any planned burning in wet forest reserves is very difficult.

15. Managing Tasmania's 6.8 Million Hectares

Red - National Parks & FT Reserves 49%
Forest = 22%
Non-F = 27%
Yellow - Private Land 39%
Forest = 15%
Non-F = 24%
Green - Loggable State Forest 12%

16. What Happens If We Do Nothing New?

Fire suppression will keep improving and hazard-reduction burning will keep decreasing so fuels in fire-protected forests and moorlands will keep increasing. Bushfire intensity and damage to humans, to property and wood values will increase. This may be considered acceptable for dry forest reserves and the same may apply *some* wet forests, but in wet forests reserves elsewhere 'dieback' may increase (**see paragraph 21.**).

17. Fire Responsibilities of Land Occupiers

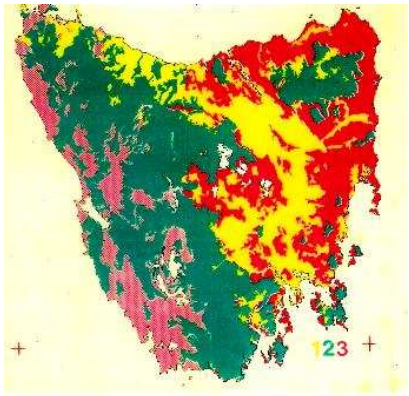
Vegetation and fuels accumulating on any land are the responsibility of the occupier of that land. Any fire that occurs on or invades that land becomes the responsibility of the occupier who must try to prevent it escaping that land.

The longer not burnt - the more the fuel, higher the flames, more the damage, faster the spread and less the chance of controlling the next fire.

18. Suggested Future Fire Management

A. Change planned burning's *"notify neighbours"* requirement to *"seek neighbour's permission"*. This would minimise blame and encourage co-operation. It would change secretive one-man, line of fire at the foot of the hill (=100% head fire), in "High" fire danger days, to many hands lighting large areas in "Low" fire dangers with lighting patterns that minimise head fires.

Pink& Green = moorlands, rainforest, mixed and wet eucalypt forest that all need more than 1000 mm per year.
Yellow = grassy woodland. (Plus much now cleared)
Red = dry forest.



B. *Buttongrass Moorlands* - burn a mosaic of strategic areas with a five to fifteen year rotation over wet soil two days after rain, using natural wet scrub fire lines and "Low" fire danger.

C. *Dry Forest* - burn strategic and selectively logged areas with an eight to twenty year rotation, when dry daytime soils wet up overnight, fire danger "Low", within made, or natural fire-lines.

D. *Wet Forest, Mixed Forest & Rainforest*. These mostly burn when soils are so dry that fires stay alight over night. Small wild fires may be put out by helitack or other methods. Larger wild fires may have to be brought out to safe edges (if they exist),

by ground or aerial ignition, in "Low" fire danger times.

E. *Regeneration burns* over dry soils of clear-felled wet forests reduce fuels for twenty to eighty years.

19. Smoke Management

Tasmania has a fire environment so smoke events are inevitable. Most bushfire and fuel-reduction burning smoke stays relatively low but in good regeneration burns most of the smoke is lifted 1500m plus by a convection column to the layer where water vapour condensation helps pull the column upwards to where safe smoke dispersion is maximized.

Fire managers already aim to give warnings that communicate and minimise the impact of smoke. Any increase in planned burning means more smoke and warning systems could well become part of normal weather forecasts. These could warn where *low smoke* is likely to occur so those affected can take precautions *as soon as low smoke is seen*.

Smoke management rules should not severely compromise planned burning objectives. But when existing smoke won't disperse all new planned ignitions should cease.

20. Wet Forest Reserves Fire Dilemma

Wet and mixed forest regeneration needs *controlled fires* that need *fire-lines*. Most of these need *bulldozers & chainsaws* that reserves do not want. But no fire means *no regeneration* and, in many places may lead to *dieback*.

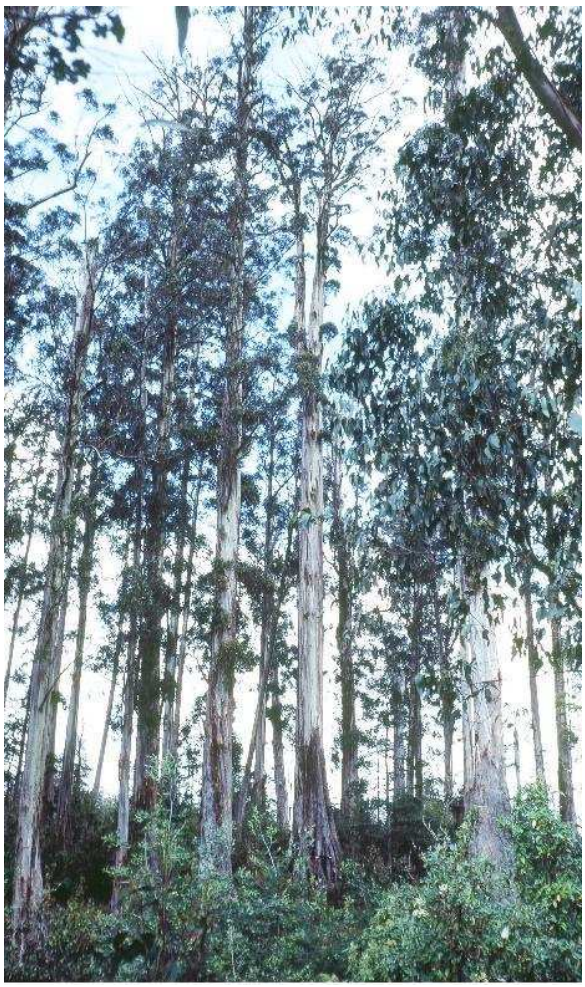
21. Dying Eucalypts over Sick Rainforest

Some high altitude wet eucalypt and mixed forest stands die prematurely – often from the top down, *if not burnt*. This is not caused by cinnamon root rot or by any other known fungi.

Prolonged protection of most fire-adapted plants is likely to have adverse effects and may contribute to other diebacks, especially when droughts occur.

22. Overall Summary

Tasmania's ancient bushfire heritage is currently threatened by better fire suppression and less planned burning. Few Tasmanians know that fire is vital for the regeneration and health of most of our forests and some insist that all fire is bad. Permanent public displays with suitable handouts about our ancient bushfire heritage, in museums, national parks, forest parks and elsewhere, should be created to counter such misinformation.



Fire created and maintained the tallest hardwoods in the world here in Tasmania like this Andromeda stand in the Styx Valley. Fire belongs in Tasmania and the current increases in bushfire suppression must be matched by more planned burning.

Tony Mount, Oct 2009

Author's Experience and *Publications (abbreviated titles)*

1957 Found and measured first Tall Trees in Andromeda stand
1961 *Regeneration Surveys for Cutover Eucalypt Forests*
1964 *The Interdependence of Eucalypts and Forest Fires*
1966 *MSc (Tas) -Three Studies in Forest Ecology.*
1967 Invited to lecture at all four UK Forestry Schools
Visited winter rainfall forests in Spain and California,
1969 *Eucalypt Ecology as Related to Fire* (Tallahassee, USA)
Impression of North American Attitudes to Fire
1972 *The Derivation and Testing of a Soil Dryness Index*
1972,3,4 Taught Forest Conservation at Melbourne Uni.
Found charcoal layers in Victorian brown coals.
1979 *Natural Regeneration Processes in Tasmanian Forests.*
1984 *Guidelines for Fuel Reduction Burning Dry Forests*
1987 *Australian Bushfire Research* (for Forestry Council)
2009 *Tasmania's Ancient Bushfire Heritage*
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