

By C.A. Hungerford and others.

FOREWORD

There is a general lack of understanding of the bush-Fire Menace in Australia. This lack is, unfortunately sometimes apparent among those responsible for counter measurers against fire loss. People born and reared in bush know more about the matter than anybody else but rarely are such people entrusted with formulation of counter fire policies.

We cannot hope to achieve anything until every theory — no matter how seemingly logical — is subjected to factual test. An example of seemingly logical but entirely fallacious theory is that founded on the statement that 75% of bush fires are started by human neglect or carelessness. It APPEARS logical to assume that if human carelessness were wiped out, 75% of bush fire damage would automatically be wiped out with it. This apparently logical deduction proves to be nonsense in the light of experience. The remaining 25% started by uncontrollable agencies such as lightning may simply cover a bigger area. Instead of 100 fires we would have only 25, but maybe the same area would be burnt out. Instead of 100 little fires, we could have 25 big ones. As big fires are usually much hotter and more uncontrollable than little ones, the final damage could be far worse from the 25 fires than from the 100 fires.

For convenience and brevity, I classify fires and conditions as first, second and third degree:

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FIRST DEGREE. Little or no wind, material light or moist. Fire requires nursing to keep it alight.

SECOND DEGREE. Hot and dry. Little wind. Fire will get out of control if not checked.

THIRD DEGREE. Heavy dry undergrowth or grass. Temperature above 80° . Wind above 20 m.p.h. Fire uncontrollable.

FORWARD BURN. A "forward Burn" is a burn that runs with the wind and is used most of the time in early burning.

BACK BURN A "back burn" moves against the wind.

BASE BREAK. A "base break" is a break a few feet or yards wide used as a base for a wider burn.

FIRE and the Australian Bush

Many years ago in Burraborang Valley I noticed where a creek in flood had cut a new channel through ancient alluvial deposit to a depth of 22 ft. The whole of this deposit had clearly been laid down by successive floods many years before the arrival of the white man. A point of interest in the strata exposed was the clearness of this record of the past. I estimated it to cover a period of 400 years. Charcoal was present in the entire bank from top to bottom and I now know that if

this record had covered thousands of years, an unbroken succession of fires would have been revealed through the whole of that period. Observations spread over half a century have shown me that the Eucalypt, and other Australian flora, have been subjected throughout their evolution and over a period of thousands of years of periodic firing. The evolutionary reaction of Australian flora to this periodic firing has been extraordinary.

After years of study I begin to feel that I am in the presence of thinking beings, and that the trees in past ages have thought upon their problems and solved them with consummate ingenuity. The Burraborang deposit showed that fires have occurred on an average of every three years from time immemorial.

A well grown eucalypt sapling of three years will withstand, without damage, an ordinary fire, but the white man has interfered with and upset Nature's routine. The white man often succeeds in preventing fires for ten or more years. Fire MUST finally come, and when it does, accumulations of combustible material are so immense that all eucalypts, of any age, may be destroyed outright.

Fire adaptations in the Australian bush are innumerable. I shall quote a few of the more obvious.

SUCKERING. Ability to throw vigorous suckers immediately after a fire is common to all Eucalypts, Waratahs etc. The Waratah seedling, like the Eucalypts, produce a knobby swelling just under the ground surface. Each of these small knobs, or lignum tubers, is an emb-

ryo sucker bud. The top of the bush having been burnt off, the lignum tuber is there, ready to go into action, and immediately produces a vigorous sucker. In the case of the Waratah, burning off and resuckering lignum tubers goes on apparently for ever, and the plant seems to like it. The endless succession of suckers round and around the stump gradually produces the saucer like top common to the root of the Waratah. One of these saucer like tops found in the Blue Mountains measured 4 ft. in diameter and had in all, 32 suckers growing from it around the outside edge. Its estimated age could not have been less than 4000 years. These adaptations took ages to develop. They prove that fire has been part of Nature's routine for ages past.

The Eucalypt seedling also produces, soon after germination, a similar bunch of lignum tubers. The young trees should be cut or burned off at least once when a year or two old. In the long course of evolution the little tree has learned to expect such treatment and has made full provision for it.

All Eucalypts (excepting those such as Mountain Ash which grow in damp gullies) have devised some sort of heat insulation in the bark. In the case of the smooth barks, the bark is laminated, i.e., layer upon layer. Upon being heated, the outer lamination shells outwards a quarter of an inch or so but is held from falling by diagonal fibres. This shelled off layer provides sufficient protection from heat to preserve the tree from destruction. Unlike the Waratah, lignum tubers do not persist in the maturing trees, because under ordinary circumstances the matured tree can withstand fire.

Behaviour of the Wattle family provides an example of the effort of each plant to reap a profit from the periodic firing to which it has been subjected through the ages. This plant produces a seed with a very hard shell, so hard it cannot germinate unless cracked by fire. Of the millions of seeds shed, some are wholly buried and some partially exposed. When fire comes, some seeds are entirely burned and some not even warmed. A proportion receive just the right amount of heat to crack the shell without killing the seed. These germinate in thousands and "beat the gun" in Nature's competition. For weeks the young seedlings have a freshly fertilised world all to themselves.

FIRE STARTERS

LIGHTNING: This is inevitable and rules out the possibility of total fire prevention. At this point it is necessary to dwell a little upon that fact.

If, by propaganda or other means, we stop all fires other than those started by lightning, all we will have accomplished will be a reduction in the NUMBER of fires. By reducing the number, we automatically increase the severity of those we cannot stop. By preventing SOME fires only, we can easily find ourselves worse off than ever. In short, we must realise the impossibility of entirely preventing bush fires. The practical aim is mitigation of the damage caused by them.

MAN: In point of numbers, man, black or white, has started most fires. The aborigine set alight to any scrub as soon as it got thick enough to harbour a wallaby. There is no doubt at all that before the arrival of the

white man, fires were far more numerous than since and less severe.

OTHER CAUSES: No doubt cross branches rubbing in the wind, broken bottles and various other agencies occasionally cause fire, but apart from the broken bottles, these causes are not frequent enough to justify more than passing notice. The extraordinary ability of fires (caused by lightning in particular) to "save themselves up" until the arrival of bad conditions must be noted.

I must describe a typical single instance of a lightning fire saving itself until arrival of third degree conditions. The tree struck was a very large smooth barked bush apple. It took fire about 50ft. from the ground. It burned slowly downwards and after six months apparently nothing remained but a large hot hole in the ground. After another month everything seemed cool with the fire apparently out. A large root broke surface 150 ft. from the stump hole. TWO YEARS afterwards during Third Degree conditions the fire surfaced from this root and started a long remembered and disasterous bush fire.

When we remember the entire timbered area of Australia is littered with "starters" of this type, we realise the absurdity of trying to abolish bush fires by any means now known. It is a fact that lightning fires rarely start a general conflagration there and then. They wait for Third Degree conditions and during the waiting period they generally cannot be seen. Until the white man interferred, they played an extraordinary but essential part in the balance of Nature.

I must detail at this point an example of a result of this interference

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The water shed of the Grose River contains no cultivated area. Until about 1948, it was a clean river, running comparatively clear even when in flood. An area in the watershed of about 100 square miles had by means of propaganda etc., been kept free from fires for fifteen years. The inevitable then happened. A lightning fire set it off. As one would expect, the fire was terrific. Nothing remained but blackened spikes.

Now after every heavy shower, and for a space of five years, the river has been like pea soup — silt from the burnt area. Bare rock now predominates with some patches of sand.

It will never recover.

If it had been lightly fired every third or fourth year no such damage would have occurred. Damage of this sort is like death, it is so permanent.

It is quite possible that a bush fire set up such as we now have in Australia contributed to the formation of the Sahara Desert — once a thickly populated forest land.

THE THIRD DEGREE.

A third degree fire ranks with tornados and earthquakes as the most dangerous and terrifying of natural phenomena. Heat produces drought and drought produces more heat. The cumulative build up of heat releases enormous volumes of inflammable gases in advance of fire. Because of oxygen shortage, much of this gas may not immediately ignite. Vast volumes of reddish-brown bases are driven skyward where coming into contact with unburned oxygen they explode in a series of rumbling detonations like artillery fire. Updraft is terrific and burning sheets of bark weighing a hundred

weight have been seen driven 300 ft. above ground level. Burning debris is carried skyward wholesale and is then broadcast far ahead of the fire, starting innumerable new fires. Homes, animals and people are likely to be hemmed in. Fire breaks, unless very wide, are likely to be leap-frogged. It is like a paratroop invasion. Instances are on record of such fires "leap-frogging" three, five or even eight miles.

MITIGATION

The foregoing is a brief but, we hope, sufficient statement of the problem.

We now proceed to the solution.

We must take our cue from the ancient routines of Nature, endeavour to apply them and improve upon them. We are all familiar with notices attached to many of the gum trees on the highways of New South Wales.

PREVENT BUSH FIRES

It is possible that the general public in its efforts to obey this injunction, has actually done more harm than good. These notices should be made to read:

PREVENT MIDSUMMER FIRES

BURN EARLY

The city dweller is liable to imagine that such a policy would result in the devastation of our forests. This is the reverse of the truth. A light burn every second or third year is very beneficial.

Matted down humus is not burned. The loose dry surface only is skimmed off. Mistletoe and many bacterial fungoid and insect pests are also exterminated. Erosion is not encouraged and third degree fires are entirely prevented. The early burn should not be hot enough normally to brown off the foliage on tall trees, but if the forest is infested with mistletoe or fungoid disease, a hotter burn should be arranged.

A forest in the Windsor District, apparently dying, was so treated about fifteen years ago. It was heavily infested with both Mistletoe and Phoma. The Phoma is now back again but only an occasional Mistletoe. The speed at which this half dead forest rejuvenated immediately after the fire had to be seen to be believed.

ORGANISATION

The idea of directing anti-fire measures for the whole State from a central office in a capital city is quite impossible. Conditions of temperature, wind, moisture content, etc. etc., and are never the same anywhere at a given time. Appropriate action has usually to be determined hours or even minutes before execution and such decisions can only be made on the spot. The idea of some central authority presenting the inhabitants of Wombat Gully in the Monaroes with such decisions or orders is too absurd for discussion.

The only possible basis for an effective fire organisation is the local bush fire brigade.

For this to be successful, the leaders and deputy leaders

must know their jobs. Their hands must not be tied.

The proper work of the central office should be the collection and distribution of accurate and general knowledge on fire mitigation, the supply and allocation of equipment and broadcasting of meteorological forecasts.

Every effort must be made to ensure that brigade leaders are the best available and they should be given the opportunity to meet and discuss fire problems. The present set up of the local brigades is good, but it should be made clear that leaders are not bound by blanket instructions from any central office.

The only weak spot is the capacity and general fire knowledge of the brigade leaders. This must be improved.

The present local set up in which every able bodied citizen is a member of the brigade and ready for service at an instant's notice is the only one. Equipment other than rakes, axes, wet bags; which they all have; is limited to knapsack sprays, mobile power sprays and water carts, in order of preference and importance. Water carts and power sprays should be kept in a central depot and knapsack sprays, issued one to each member should be kept in working order by that member and an acknowledgement of custody signed by him.

TECHNIQUES

The fire captain must be continually conscious of wind direction. He must make the study of LOCAL wind a life hobby and must also pay close attention to meteorological forecasts. These are good enough to be useful.

A back burn is slow and safe. Some sort of break should be found or made along the lee side of the area to be burnt and this should be made wider by back burning. When this break is wide enough to be safe and the wind not too strong, the burners can proceed much faster with a forward burn. The fire should be hot enough to clean up all dry rubbish likely to be a menace later in the year. If the main fire threat is from the West, it is obvious that rubbish to the immediate West of houses, fences, wheat fields, must be removed or singed off. The captain may elect to clean up his entire neighbourhood or to confine himself to the most dangerous patches, or by means of strip burning to break up his area into fire tight compartments.

Remember every patch of rubbish burnt is transformed from a menace to a safe area.

A base break is of course, quite useless except as a base. A third degree fire will cross it as though it were not there. Standing dead trees are always a menace. They should not be allowed to get alight, but if they do, and there is immediate danger from them, they should be felled. In stopping a fire from running up a tree with a knapsack spray, start at the TOP OF THE FIRE and lose no time as it may get out of reach in seconds. It is generally very bad practice to try to extinguish a smouldering log or stump with water. The only way to be sure it is out is to make it burn to the last chip. See that there are no such logs or stumps anywhere near the burn margin—especially on the lee side. The practice of making base breaks with a bulldozer is quick and easy but treacherous. The bulldozer leaves a ridge of loose earth on each side, usually covering or partly covering inflammable matter.

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This material, once alight, may smoulder for days or even weeks unseen and come to life in third degree conditions. The same thing has been done with a shovel.

BE CAREFUL. It pays. Early burning should usually be done between 4 p.m. and 6 p.m. Fires that will burn merrily enough at 4 p.m. will often go out after sundown. Fires that apparently go out from any cause should always be inspected. Smouldering logs etc., will always be found that require attention. Move them well away from the Margin and encourage them to burn right out as soon as possible.

WHEN TO EARLY BURN

This may be done anytime between May and the following December and must be decided upon by the captains. The period between when the fire won't run at all and when it burns too hotly is often very short — possibly a single day. Don't miss your chance. Too soon will spoil the job and too late will spoil the timber and cause other damage.

When doing preliminary protection burns, such as around house foundations, paling fences etc., start as close as possible and stand by with the knapsack. It is least dangerous when first lit. The further it goes, the hotter it gets.

WIND CHANGES

In every locality certain wind changes can be used. For instance, day after day in hot weather you may have a westerly which at 6 p.m. drops and is replaced with a southeaster. This is more or less a rule within 50 miles of

the East Coast of New South Wales. The southeaster heralds its approach by a brown haze on the eastern horizon. Start your fire with one wind and put it out with the other. With proper timing you will do a good job with little effort.

BUILDING PROTECTION

With efficient early burning, very little protection will be necessary. While your early burning is in progress, it is well to keep continuous watch on any houses or out-buildings in the vicinity. It is easy to extinguish an unwanted fire if caught young but it may be impossible if left for five or ten minutes. See that gutters are not full of dead leaves. All ventilators near danger spots should be covered with fly gauze, WINDOWS AND DOORS CLOSED.

THIRD DEGREE COUNTERS

Let it be clearly understood that the only time to fight a "third degree" fire is before it happens. Burning breaks in third degree conditions is a desperate, dangerous and often futile business.

Among the many possible lines of action, it has been suggested that the best is to travel as far and as fast as possible in a direction oblique to the wind.

If on the way to a water hole, get into it but don't stay too long. It may boil!!! The writer once got out of immediate trouble by setting fire to a grass paddock and tak-

ing refuge on the burnt ground. Incidentally, this grass fire burnt back to the main blaze, and in doing so saved a building from what appeared to be certain destruction. This building was saved with no other equipment than a box of matches, a green bush used as a beater and a little luck.

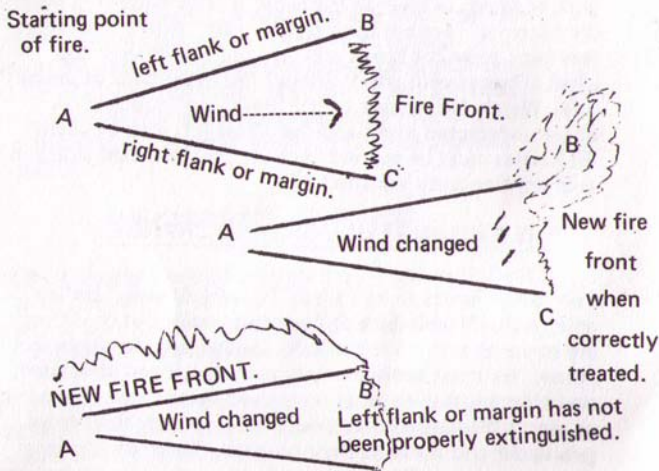
However, third degree fires do happen, and will continue to happen while our preventative measurers remain as they are. In bad conditions, the only counter is the burnt break. Find a road, a stream or other base and start a back burn at once; as soon as the break is wide enough, a modified form of forward burn can be used. Run a line twenty feet back from the break and let your fire go with the wind. Repeat with other lines of fire as far back as seems safe. Watch the lee side of the break continuously. A single undetected jump and the whole job may be spoilt. All houses must be burned back on the windward side and then continuously watched.

THE EVENING LULL OR WIND CHANGE

The foregoing could be called "Frontal Attack." Before going onto "Flank Attack," we must point out that fires are so variable that we can bind ourselves to no single technique. We must apply every known dodge and stratagem, one after another or all at once; and invent new ones as we go along. Fires always fan out; that is to say their front gets wider and wider as they advance. There should be a fire gang on each flank, attempting to reduce or reverse this fanning out. Short lulls in the wind or gaps in the undergrowth or grass make the opportunity to shorten front.

FIRE CHANGES DIRECTION

Depending upon the efficiency of the fire gang, a wind change can be a Godsend or a calamity. If all margins have been thoroughly extinguished, the change may give the opportunity to kill the fire. If this marginal work has been carelessly done, it may mean instead, an enormous extension of the width of the fire front.



On change of wind, A TO B becomes the new fire front. If these smouldering spots had been extinguished before the wind changed, a small point at B only would constitute the front.

RAIN AND EVENING LULL

It is doubtful if it wise to wear the fire fighters out trying to kill a fire until such an opportunity as the evening or early morning lull, a thunder storm or shower develop. When one of these occurs, a supreme effort should be made to kill the fire outright. Afterwards, a continuous patrol must be maintained, until it is certain there are no smoulder points anywhere near the margin. Never make the mistake of thinking a thunderstorm will kill a fire. It merely stuns it. The fire gang must finish the job. It is sometimes effective tactics for two fire gangs, one on each flank to follow in the wake of the fire ready to pounce when such opportunities arrive. In their progress, they must extinguish every marginal smoulder point.

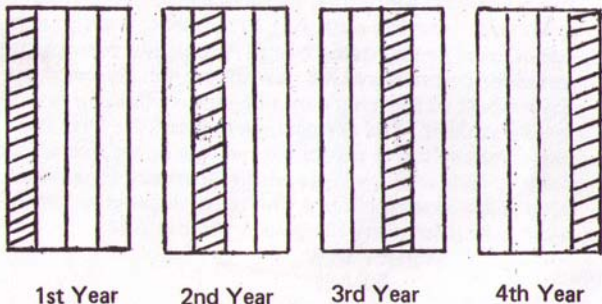
GRASS

Early burning in grass is not so good. Apart from destruction of valuable fodder, it cannot be skimmed so well. A burn tends to be all or nothing. Every road in New South Wales should be a clean fire break from November onwards. If there is an additional chain wide strip along one or both sides, so much the better.

OVERSEAS EXPERIENCE

This is something of only remote interest. Australian conditions are unlike those of any other country. Don't waste time on what is done elsewhere.

STRIP BURNING



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of

Brigades and Government Officials.

ALL SUGGESTIONS WELCOME.