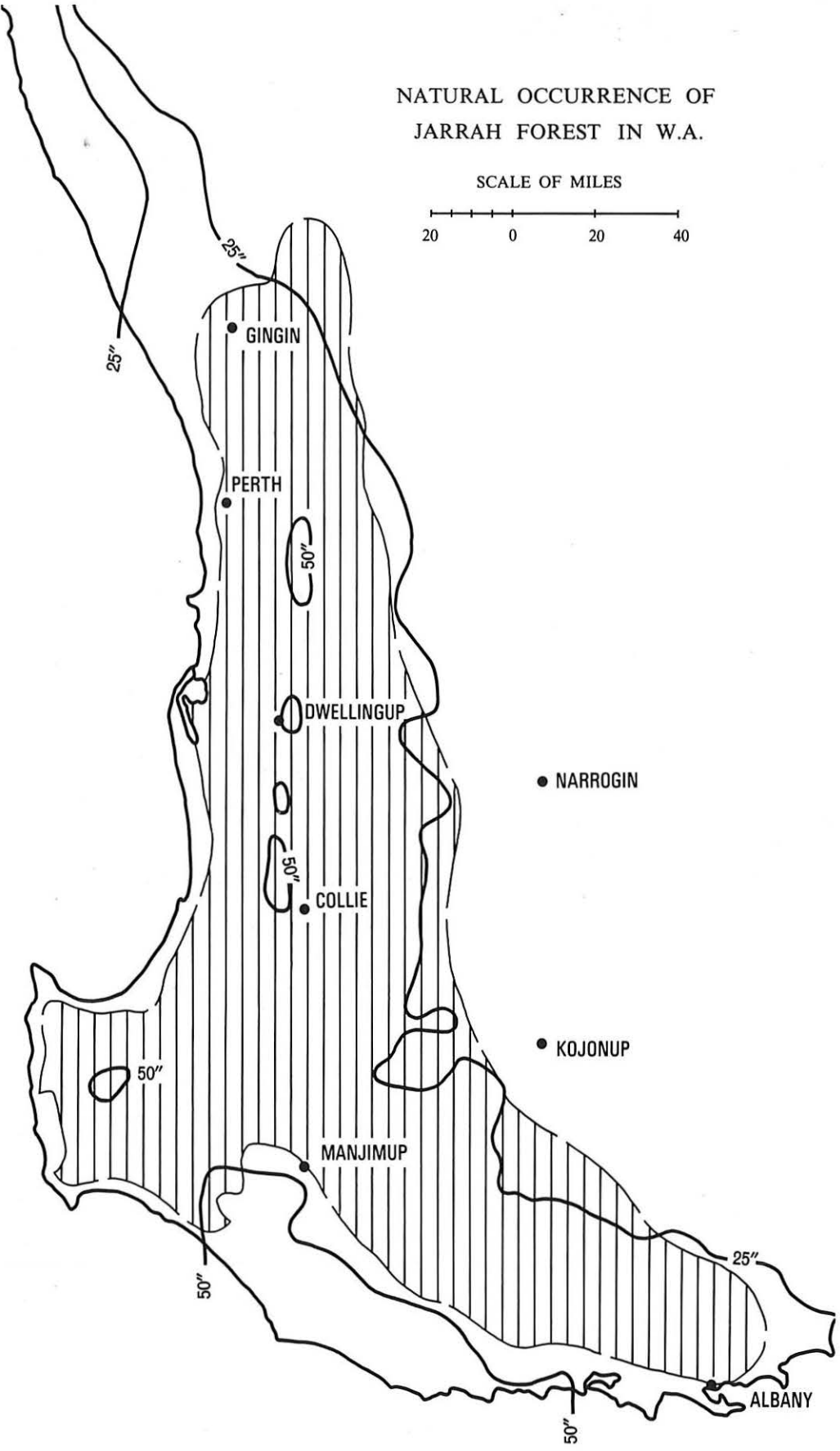
6

FOREST FOCUS

JARRAH FOREST — BUSHFIRE SURVIVAL



This map shows the extent of the natural jarrah forest area prior to clearing for agriculture.

Change of Portfolios

Following a recent re-allocation of portfolios, the Hon. H. D. Evans is now Minister for Forests, together with his other portfolios of Lands, Agriculture and Immigration.

Mr. Evans is no stranger to forestry. As a boy he lived at Pemberton, in the heart of the karri country. In later years he returned to teach at Pemberton for a period of 10 years—the last five as deputy headmaster. Subsequently Mr. Evans was senior master, teaching English at Manjimup Senior High School for five years.

He was elected Member of the Legislative Assembly for Warren in 1968 when the former Member, Mr. J. N. Rowberry, retired.

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Front Cover

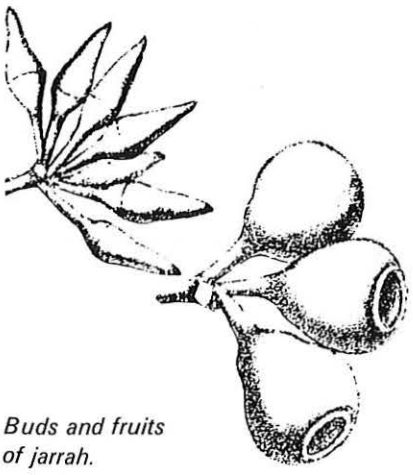
Virgin jarrah forest, in the Dwellingup Forest Division.

Back Cover

Karri (Eucalyptus diversicolor), *see Forestscapes, page* 15.

Omission

The words "Half Size" should have appeared under the heading across pages 10 *and* 11 *of "Forest Focus" No.* 5.



Buds and fruits of jarrah.

FOCUS on the JARRAH FOREST

Jarrah (*Eucalyptus marginata*) is the principal timber tree of Western Australia, producing 33,300,153 cu. ft. of log timber, or 72 per cent of the total log production in the 1970/71 financial year.

Because of its resemblance to the well-known Honduras timber "mahogany" it was given the name of Swan River mahogany by early settlers. It was recognised, however, that as the timber had so many fine qualities peculiar to itself, it warranted a distinctive name of its own, and from about 1860 onwards it became universally known by its aboriginal name—*jarrah*.

Jarrah is a large tree attaining, under optimum conditions, a height of 100-130 ft. with a straight bole up to 50 or 60 ft. and a diameter of 6 ft.

The bark is persistent, reddish-grey, stringy, flat and flaky, with small fissures running vertically. This bark renders jarrah distinct from other south-west trees, except from Albany blackbutt (*E. staeri*) and red tingle (*E. jacksonii*) which also have fairly stringy bark, although less tough than that of jarrah.

The jarrah formation is a high forest with a small admixture of other species, which vary according to topography and quality of the site. Although it lacks the aesthetic qualities of karri forests, jarrah is noted for its remarkable purity as a forest, and the value and utility of the timber it produces. The prime jarrah belt contains a smaller proportion of other species than any other Eucalypt forest in Australia of equivalent area, and is considered to be one of the finest hardwood stands in the world.

Distribution

Jarrah was originally found scattered throughout the south-west of the State over some 13 million acres within the 25–50 in. rainfall belt. The prime forest of some four million acres, however, stretches from Chidlow's Well in the north, following the Darling Range to the extreme south of the State and finishing just north of Albany. Most of this is now State Forest.

The species is closely associated with soils of lateritic origin and the best existing forest areas occur on the lateritic gravels of the Darling Range where the rainfall exceeds 45 in. However, jarrah attains its greatest size in the red loam soils of the deeply dissected river valleys. Most of these areas have been cleared of jarrah forest for other land uses.

Distribution is limited to the east and to the north by low rainfall and the species becomes progressively smaller as the rainfall decreases. Eastwards it gives way to wandoo (*E. wandoo*), powder-bark wandoo (*E. accedens*) and York gum (*E. loxophleba*). On the coastal strip west of the Darling Range it occurs in rather open formation as a tree of low height and poor form. Here it is associated with tuart (*E. gomphocephala*) which replaces jarrah completely on the limestone ridges. In the extreme south of its range it is replaced by karri (*E. diversicolor*) on the better soils, and marri (*E. calophylla*) which also occurs in mixture with jarrah throughout its range. On the southern plains jarrah is a small crooked tree and takes on a mallee form in the harsher environments.

All-purpose timber

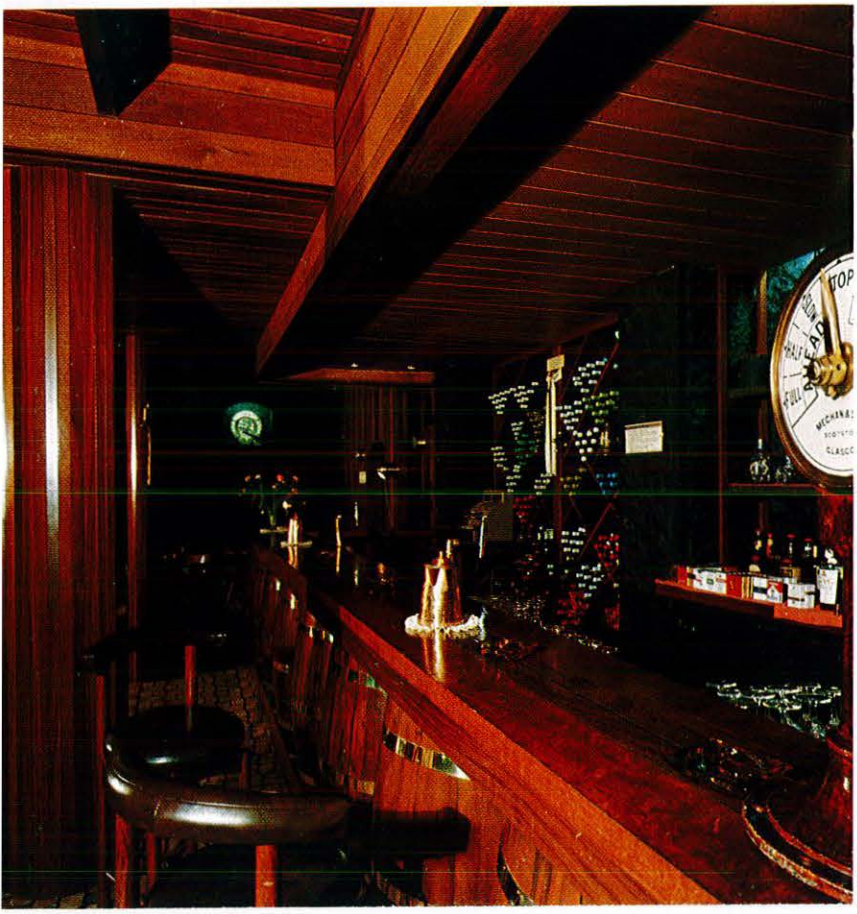
Jarrah timber is dense and hard but fairly easily worked. It is red in colour darkening with age to a rich brown with a beautiful grain, and takes a fine polish. It will be readily

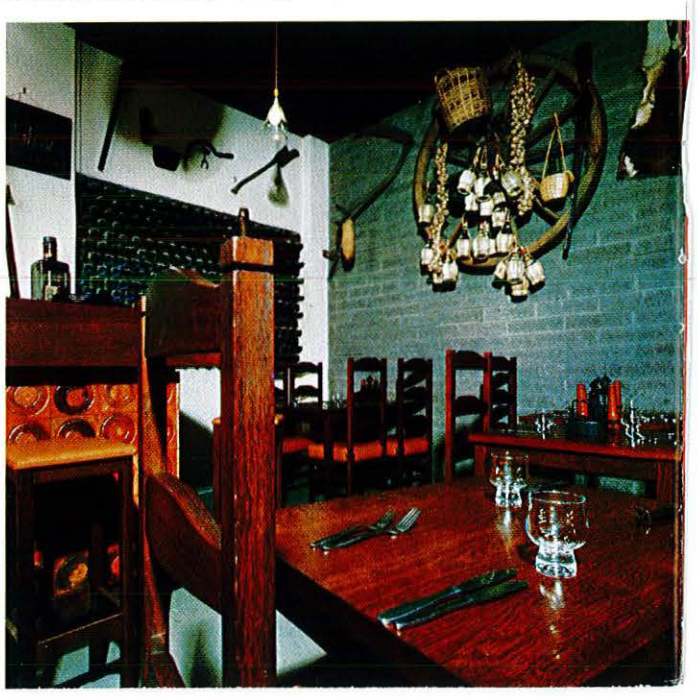
Above left: Lightly thinned regrowth jarrah pole stand, 48 years old. Further thinning will be necessary to achieve optimum production of quality timber.

Above right: The natural touch of jarrah timber lends hard-wearing strength and character to this riverside home's balcony. (Photo courtesy of Associated Sawmillers & Timber Merchants.)

Below left: Jarrah is a "natural" for the high quality interior elements at the Captain's Bar and Grill, Fremantle. (Photo courtesy of Bunning Bros.)

Below right: Solid jarrah tables and upholstered jarrah chairs give the necessary serviceability, character and warmth to Mama Maria's restaurant, Perth. (Photo courtesy of Bunning Bros.)





realised that there are few purposes for which jarrah cannot be used, when in addition to beauty of colour and grain, its strength, durability and an amazing resistance to fire are considered. Some trees possess a remarkable fiddleback figure referred to in the trade as "curly jarrah". For beauty of appearance as a furniture wood it has few rivals.

Despite its beauty as a furniture wood, it is used as a utility timber because of its strength, durability and availability.

In the form of piles, stringers and decking it has been employed to such an extent that there is scarcely a wharf, pier or jetty in Western Australia which does not contain a high percentage of jarrah.

It is eminently satisfactory as a building timber, being used in the sawn state for stumps, joists, weatherboards, plates, studs, rafters; while flooring, panelling, frames, doors, windows, interior trim mantelpieces and other furnishings testify to the beauty and suitability of the dressed timber for high grade purposes.

The pleasing figure of jarrah makes it eminently suitable for veneers and increasing quantities are now being used for this purpose for furniture and interior panelling.

Waste timber is universally used in the south-west as firewood, and jarrah forms the chief firewood supply for Perth.

The timber is quite durable and when used for posts or sleepers in contact with the ground it gives a long life of valuable service. The average life of jarrah sleepers in Australia is 20 to 35 years, depending on the locality in which they are used. Jarrah sleepers are readily accepted in many overseas countries and they contribute to a valuable export trade. In the London Underground they are still in use after 50 years of service.

Fifty-three-year-old jarrah regeneration east of Dwellingup. Height of the dominant trees is 80 ft.

A modern logging machine, the rubber-tyred tractor carries one jarrah log and snigs two behind (above), and doubles as a loading machine (below).

Flowering and seeding

New fruiting buds appear in the axils of the leaves of the new summer growth in the December to March period, and if retained, they flower in the following November and December. The fruits mature in time to shed their seed in the following summer, two years after first formation of the bud.

Seed years are not regular and heavy seeding occurs only once every four to six years. Scattered individuals can be found in seed every year, but in a general seeding, some 25 to 50 per cent of the stand will carry a heavy crop.

A marked crown degradation is noticeable during a heavy seeding. Copious flower bud formation is at the expense of the normal crop of leaf buds and when older leaves are shed, the trees are left with extremely thin crowns. These normally rejuvenate during the summer after seeding.

Seed fall is brought about by the opening of the capsules in hot dry weather of mid-summer. Disperal distance is usually taken as the ground distance equivalent to the height of the tree.

Regeneration

Germination occurs in the cool, moist conditions of late May and June. Although many thousands of seedlings may appear on each acre at this time of the year, losses due to insects, fungi, and drought reduce the numbers by up to 95 per cent in the first year after germination.

Mortality among the survivors continues for a number of years and a very small proportion of seedlings live to reach tree size.

A swelling forms at the stem base of the young seedlings. This swelling develops downwards as the seedling ages and forms a hard, woody subterranean lump called the lignotuber. The leafy shoots of this plant grow very slowly in length but rapidly multiply in number to form a small bush. At the same time a large, deeply penetrating tap root is formed.

This bushy form of jarrah becomes almost completely indestructible and is immune to fire. If the leafy shoots are burnt off, more arise from dormant buds on the lignotuber. If these shoots are *not* burnt off periodically they become moribund and the development of the plant is severely retarded.

The jarrah bush appears to be quite incapable of developing into a sapling with a single upright stem until the lignotuber attains a diameter of about 4 in., or until the shoots of the bush reach about $2\frac{1}{2}$ ft. in length and exceed six or seven in number.

The period the plant takes to reach this stage varies considerably. Jarrah seedlings planted into ploughed soil where there is no competition will form a sapling shoot at from three to six years. Under normal forest conditions the period may extend to 15 years or more and on harsh, low quality forest sites this consolidation period may exceed half a century.

Once a single leading shoot appears, it grows rapidly for the first few years, after which height growth gradually declines. A five-year-old sapling is likely to attain a height of 20 ft. or more, and at 10 years will reach 30 ft. on a good site.

For the first few years the sapling shoot is green and fleshy, but by the time it is five to eight years old, thick bark is forming and it can withstand mild fires.

The impetus for the bushy plant to produce a dynamic sapling shoot arises from a reduction in competition. In the virgin forest this comes from the death of a large tree. Bushy plants, previously shaded by the tree, respond to the increased growing space so provided, by forming sapling shoots. In managed forest similar conditions are created by the cutting of large trees for timber production.

Fire in the forest

No account of the jarrah forest would be complete without some mention of fire. The whole forest community, including animals, plants and jarrah itself has developed in an environment which is subject to frequent burning.

Ecologically, the jarrah forest community would be classed as a *fire climax*, meaning that the plant species represented have reached a stable equilibrium with site conditions, and *particularly with fire.*

Research workers have found sound evidence that the forest has been associated with fire for at least 7,000 years. The vast majority of plants in the forest, including wildflowers and jarrah itself, have certain adaptations that enable them to survive fire. In some cases fire is essential for their continued existence: the seed pods of some hakeas and grevilleas can only be opened and the seed released by the high temperatures of a fire. Nearly all the wattles (*Acacia* spp.) need treatment with temperatures around that of boiling water before they will germinate. A very high proportion of the plants in the jarrah forest have woody subterranean rootstocks (or sheathed shoots in the case of plants of the lily family) from which new shoots are formed after a fire.

The Forests Department has learnt by bitter experience the consequences of excluding fire from the forest, and the resultant build-up of leaf litter and dead plants. A succession of severe and uncontrollable wildfires in the period 1948-50 followed 15 years of protection from fire.

We have, then, a situation where the forest community needs fire for its continued health and existence. This is achieved by rotational burning over the forest floor every three to five years with carefully controlled fires in mild weather conditions. Rotational controlled burning replaces the lightning fires and aboriginal hunting fires of the pre-settlement era of the State.

Silvicultural cutting for regeneration

When sawmilling operations are about to commence on any specific area, an advance controlled burn is run through the area in cool weather

Track-laying for the 179-mile Hamersley Iron railway line. The sleepers, mostly jarrah with some wandoo and blackbutt, are 8 ft. long and 9 x 6 in. cross section. Heavy rails (119 lb./yd.) are welded into 1,020 ft. lengths before laying. Train loads of up to 18,000 tons travel at 45 m.p.h. along the track. At 3,520 to the mile (18 in. centres) some 630,000 sleepers were required.

Bushy jarrah regeneration.

to reduce the accumulated inflammable debris.

Next comes the operation of tree marking. Trees which are to be felled for sawmilling are marked by a forest officer who blazes the tree to be felled with an axe, and in a nick cut at the base, identifies the tree with his treemarker's brand. Care is taken to mark all trees so that when felled they cause the least damage to those remaining.

This system allows for the removal of mature or less vigorous elements of the old crop; and in the openings left, regrowth becomes established.

The young vigorously growing trees of the crop are retained in the forest to provide future mill logs.

Following the logging operation, tops (crowns) of felled trees are lopped flat and debris cleared away from the butts of remaining good trees. This debris is burnt in spring or autumn when minimum damage will occur to the remaining stand.

Full protection from fire must be afforded for a period of years until the openings have been satisfactorily stocked with young regrowth of sufficient height to permit the reduction of the fire hazard by prescribed light burning without incurring damage to the crowns. This period of complete fire protection may be from 8-10 years, by which time a total height well in excess of 20 ft. should have been attained.

Jarrah seedling showing lignotuber and strong tap root.

Growth rates

Although the growth rate of jarrah cannot compare with that of karri, it is impressive when the harsh and impoverished conditions under which it grows are taken into account.

The average yield of sawlogs from the whole jarrah forest is in the region of 15 cu. ft. an acre each year. There is a large difference in the rate of growth of the species between the relatively poor northern and eastern sectors of the forest and the prime forest area on the western edge of the Darling Range.

In the former, the trees may grow well under $\frac{1}{2}$ in. in girth each year and annual timber yield an acre may be as low as 5 cu. ft. The prime forests of the high rainfall area produce more than 10 times this timber yield and individual tree growth may exceed $\frac{3}{4}$ in. in girth a year.

The productivity of the jarrah forest is rapidly improving under the careful management regimes now practised. Protection from severe fires alone has resulted in a marked increase in production, and further gains can be expected from the large-scale thinning operations of the last few years.

BUSHFIRE SURVIVAL

Each year in Australia many people find themselves in peril due to bushfires. Some of these people meet a tragic death—because they had not exercised simple safety precautions that could have averted danger. There are many cases where death in a bushfire can be traced to a lack of knowledge of a survival drill and the principles behind it.

Research workers, by drawing on their own findings, and the experience of practical fire control officers and their leaders in other departments, have been able to sift out the best and most essential advice so far available on survival and safety.

The following article is based substantially on results of research and articles by Dr. A. R. King, C.S.I.R.O. (*Rural Research Bulletin No.* 38, 1961), and Mr. Phil Cheney, Forestry and Timber Bureau, Department of National Development (*Bush Fire Bulletin*—N.S.W. Bush Fire Committee, 1970).

Most experienced firefighters are well aware of the principles of bushfire survival, but because of experience or a good knowledge of fire behaviour, they rarely place themselves in a hazardous situation where they would be trapped by flames.

It is generally on days of extreme fire danger that rural communities are burnt-out and that members of the general public may be trapped and killed on the roads.

It is most important that under these conditions people know the basic principles of survival and that they instruct their families what to do in the event of an emergency. Panic and confusion can only be avoided if the community as a whole has a planned course of action and the firefighters and brigades can concentrate on fire suppression.

Main fundamentals for survival:

1. *Remain calm and don't panic.*
2. *Place yourself in an area where there is the least amount of combustible fuel.*
3. *Use every means to protect yourself from radiation from the flames.*

How people are killed

There are five possible ways in which people can be killed by fire:

1. The body's heat regulation mechanism fails.
2. The body is burnt.
3. The lungs are seared by superheated gases.
4. People are overcome by smoke and suffer anoxia (lack of oxygen).
5. People are poisoned by carbon monoxide or other toxic gases.

The first factor is the most serious problem, in that people suffer apoplexy or heatstroke in an extreme form as a result of excessive *radiation.*

The other factors are rarely important by themselves, although they may predispose the victim to act irrationally and expose himself to excessive radiation. Even bad burning is not an immediate cause of death unless the body's heat regulating mechanism fails as well.

It is often thought that people may be overcome by smoke and suffer from lack of oxygen or have their lungs seared by hot gases. However, this is most improbable. While smoke causes irritation of the lungs, it does not appear to cause pulmonary oedema, which is common with fire victims. Pulmonary oedema is a condition in which the lungs contain excessive fluid and it may be shown by a frothing at the mouth of the victim.

Most of the heat felt at a fire is radiant heat and in fact the air temperatures around a severe fire are not exceptionally high, as the hot gases are quickly carried away by convection. Measurements have shown that air temperatures within 10 ft. of the ground and within a few feet of flames up to 35 ft. high are less than 30 deg. F. above surrounding temperature. While it is not pleasant to breathe hot air, the body has remarkably high tolerances. Air at 200 deg. F. can be breathed for half an hour and air at 500 deg. F. for three minutes.

Air at this temperature would never be encountered at ground level unless it was directly in the path of a convection column.

Anoxia is practically impossible in any open fire situation. Even in mass fire experiments where the combustible fuel was 140 tons an acre and the fire ignited instantaneously, the oxygen level dropped only to 19 per cent for a few minutes. Flaming combustion can only continue when the oxygen content exceeds 12 per cent and life can be supported at this concentration.

Similarly, the concentration of carbon dioxide in mass fire does not exceed the limits for survival. Poisoning by carbon monoxide is extremely unlikely in an open fire situation.

However, carbon monoxide is produced by fires in smashed fuels, such as clearing burns. Mass fire experiments have shown that carbon monoxide levels can be produced which cause headaches after 30 minutes' exposure, collapse after 90 minutes, and death after four hours' exposure. It is worth noting that bushfire survivors have never complained of splitting headaches associated with carbon monoxide poisoning, and it is apparent that if you can survive the flaming period of a bushfire, which rarely lasts over one spot for more than five minutes, there is no risk of succumbing at a later date.

Building fires are a completely different proposition. Anoxia is possible when there is a combustion in a confined space and various toxic gases can be produced. Recent

experiments have shown that traces of these toxic gases of less than 4 per cent of the generally accepted threshold level can produce death when in combination with heat, anoxia and high carbon dioxide levels.

In most bushfire tragedies the people are usually dead or nearly dead before the flames actually touch them. By laboratory and field measurement and from the study of case histories, it is now abundantly clear that the radiated heat is the main peril leading to exhaustion and collapse.

Radiation causes heat stroke, which is essentially a state of utter exhaustion. Shielding yourself from radiation and avoiding behaviour or activity such as fear, panic or flight that saps your strength are therefore vital. Many of the rules for safety and survival are based on these considerations.

What to do—what not to do

Experience and experimental evidence both point to the fact that if you can protect yourself from radiation during the peak of the fire, you will survive. The following points deal largely with protection from radiation, and should be borne in mind when approaching any fire, even when no hazard to life exists.

1. *Protective clothing.* The value of clothing as a shield against radiation should not be overlooked. Woollen material is best. Besides giving somewhat better protection than cotton, it does not catch fire readily and will save many a nasty small burn caused by falling sparks. Some artificial fibre cloths are not good shields and the melted remains can seriously contaminate burns. Clothes which cover arms and legs, and button up to the neck, should be worn. For firefighters there are good quality flame-proofed overalls on the market which, when worn with the minimum amount of underclothing for comfort, are cool and allow more efficient work in safe situations.

2. *When approaching any fire* make a practice of noting safe areas which could be used as a refuge in the event of emergency. In grasslands note areas of fallow, dams or native pasture carrying light fuel. In the forest note positions of creeks, moist soaks, dugouts, etc., and try to avoid areas of dense vegetation or roads lined with windrows. Experienced firefighters do this automatically, and because they know exactly where to go in an emergency they avoid panic.

3. *When flames have already cut off your escape route.* If caught on continuous fuel try to move on to bare or burnt ground. Enlarge the area by burning the fuel around you. As a last resort it may be necessary to light a fire and step on to the burnt ground. Light a line of fire, of say 30 ft. or longer across the slope, or at right angles to the wind direction, to achieve a faster rate of spread. Always carry matches for this purpose.

4. *Do not attempt to run through flames* unless you can see clearly behind them. This generally means that flames are less than 5 ft. high and less than 5-10 ft. deep. Few people, if any, have run through high flames and survived. The practice cannot be recommended.

5. *Resist the temptation to run from a fire* unless your chance of survival is obviously high. Conserve your energy and consider alternative courses of action.

If you run, choose a downhill route if equally safe-looking, since fire moves uphill fast. Try to walk to the edge of the fire front.

6. *When circumstances become most severe* remember to use every possible means to shield yourself from radiation. Cover exposed skin as well as possible. Take refuge in running streams, ponds, or culverts. On bare ground, bury yourself if possible, or use depressions, wheel ruts, large rocks or logs to protect yourself from radiation.

If caught in the open in a forest fire under extreme conditions, you can expect to be showered with burning embers and charcoal for up to 15 minutes after the fire passes. It is most important to have flame-proof clothing which will not catch alight under these conditions.

7. *Avoid elevated tanks.* A body immersed in lukewarm water cannot sweat and at a temperature of 115 deg. F. a state of collapse will be reached after about three minutes.

8. *Limit your breathing rate when smoke is dense* and wait for the arrival of cool pockets of fresh air before filling your lungs. The air near the ground is the freshest and coolest.

9. *Do not delay in front of flames* when it is necessary to enter them to escape, but after having covered exposed skin as best you can in the circumstances, take some quick deep breaths and move briskly through on to the burnt area. Choose the path that is least obstructed by dense growth, logs, or uneven ground. Avoid flames that are tending to "crown out" (enter the tree tops).

10. *Don't panic*—it seriously drains nervous and physical energy and clouds your judgement.

MOTOR VEHICLES

A hard-topped vehicle, with windows which can be tightly closed, can afford good protection in an emergency. If it is in good condition, there is little chance of it catching alight if parked on bare ground. Even on heavy grass fuels the vehicle will provide protection from radiation until the flame front has passed and it is possible to step on to the burnt ground.

Avoid touching the outside of the vehicle immediately after the fire—it could be extremely hot.

There appears to be little evidence that the petrol tank will explode, even while a car is burning out. None of the burnt-out cars inspected after the Hobart fires had exploded tanks. However, there are probably well-authenticated examples of in-

Dwellingup Hospital, burnt out during the 1961 fire. Note the nurses' quarters, undamaged, in the background.

stances when tanks have exploded, and certainly there are cases where a damaged tank has rapidly engulfed the car in burning petrol.

BUILDINGS

Most buildings which are well maintained, and do not have accumulations of rubbish close to them, should be easy to protect by carrying out such measures as closing the windows and doors, and maintaining a vigilant patrol to put out spot fires as they start. Houses with enclosed eaves and foundations are safest as they prevent entry of flying embers.

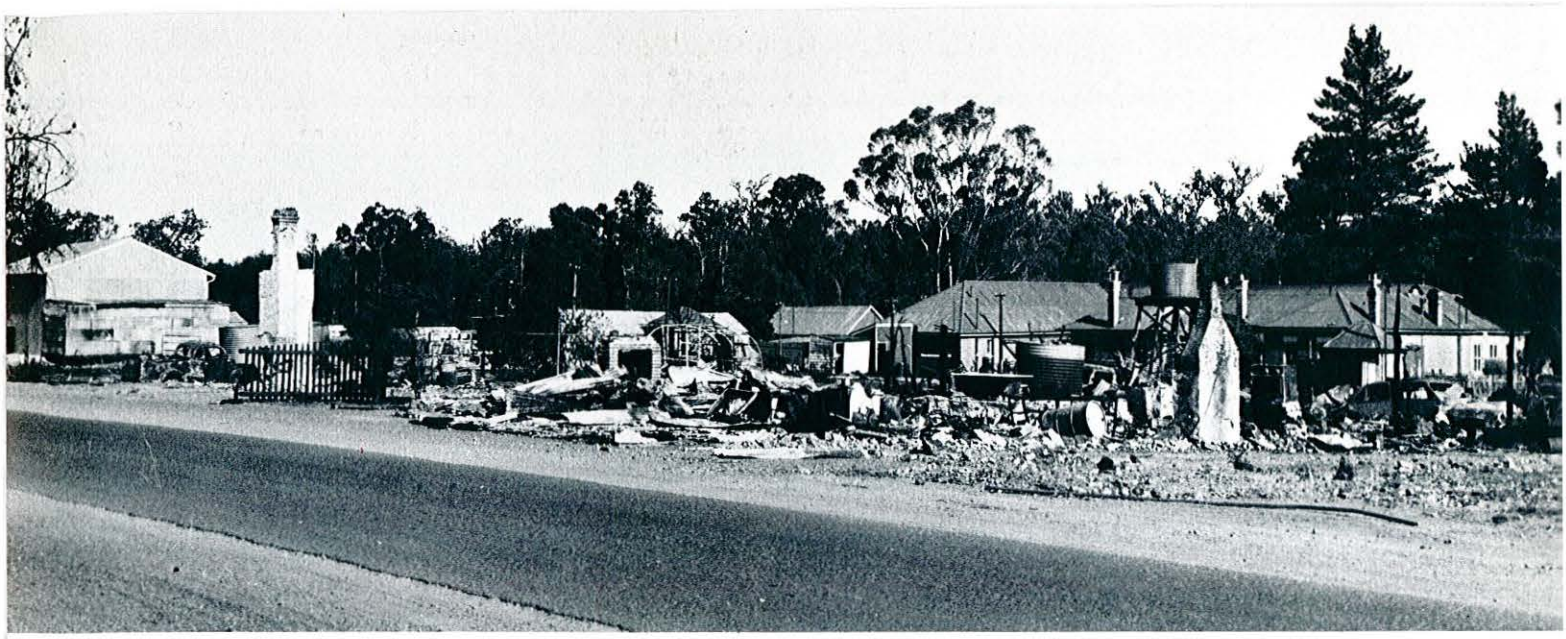
In the worst situations a house will provide refuge from the peak of the fire, even if it burns down later.

It is most important that rural householders keep their houses in such a condition that they can be protected by the women and children. A well protected home not only provides the family with a safe refuge, but also prevents diversion of fire-fighting equipment from the fire line to building protection.

Case histories

Tasmanian fires, February 1967

The disastrous fires which burnt on the 7th February claimed the lives of 62 people. This is probably the largest loss of life in fires in a single day in Australia, and although



View of Dwellingup after the fire, looking towards Community Hotel from R.S.L. Hall.

71 people died as a result of the January 1939 fires in Victoria, this total accumulated over several days.

Of the Tasmanian deaths, nine were certified as being due to natural causes, such as heart failure and heat exhaustion, but considering health prior to the fire, these deaths can be attributed to the fire. The ages of these people is not known, but the ages of the remainder ranged from 23 to 88. The age distribution is given in the table below, prepared by Messrs. A. McArthur and P. Cheney, Forestry and Timber Bureau, in a preliminary report on the tragedy.

Age Class (years)	*No.*	*Average Age*
1–25	1	23
26–50	13	38
51–75	26	64
76+	13	82
Total	53	61

This age class distribution is almost the exact reverse of the normal Australian population curve and indicates the susceptibility of older people to prolonged heat and smoke.

(*Continued on page* 14)

NEW PUBLICATION

The Forests Department's latest publication, *Selected Flowering Eucalypts of Western Australia*, a 48-page (including cover) booklet is now on sale at the department's head office, 54 Barrack Street, Perth, and all branches.

The $9\frac{3}{4}$ in. by $7\frac{1}{2}$ in. booklet includes 69 colour illustrations—including one map showing State rainfall and place names—and 62 line illustrations of buds and fruits to assist identification.

The 29 species and five varieties selected for publication are represented in 67 of the colour plates, and there is one full page picture of the karri forest after bark-shed in late summer (see page 15 and back cover of this edition of *Forest Focus*).

The price of the publication is $1. Bulk lots of 50 will be available for retail purchasers at $37.50 (75 cents each).

One hundred and sixty-five species and a number of varieties of the genus *Eucalyptus* have been recorded in Western Australia. Included in this are two new members, *Eucalyptus laeliae* and *E. roycei*, which were named in the last five years, while another four are currently being described. It is quite possible that the number will further increase in future years.

Most of the species are endemic to Western Australia and a number of them have unique characteristics of colour or shape of the buds, flowers or fruits. Foresters operating through the southern part of the State have built up an interesting collection of photographs of the 29 species selected for reproduction in *Selected Flowering Eucalypts of Western Australia.*

It is hoped that this booklet will add further to the prestige of the world renowned flora of the "Wildflower State".

A table of distribution in the book shows that more than half of the species listed occur in the 11–20 in. rainfall belt, the area where the greater part of the State's agricultural development has taken place. This means that their occurrence throughout their natural range is becoming increasingly fragmentary and many are now extremely rare and vulnerable.

The remnants must be rigorously conserved otherwise most of them will, within the not-too-distant future, cease to exist in the wild state, and posterity could well be forced to rely on cultivated specimens to ensure the perpetuation of the species.

Reproduced on the opposite page is page 31 of the new publication, indicating style and content.

TREES OF THE ARID ZONE

Goldfields sand mallee

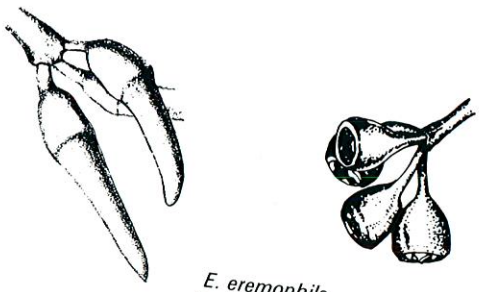
Eucalyptus eremophila

Although the specific name *eremophila* meaning "lover of the desert", might suggest its restriction to the more arid areas, the species in fact has quite a wide distribution extending through the wheatbelt to Kalgoorlie and to the mallee areas south and east of Norseman.

Nearly always a mallee, the species is seldom more than 7 to 10 ft. in height and the stems have a characteristic cinnamon-brown bark which is quite smooth except during the late summer months when it sheds the outer bark in rather thick strips. The typical form is seen between Merredin and Coolgardie, but southwards from Widgiemooltha the plant may reach a height of 20 ft. or more.

The blossoms are quite attractive, ranging in colour from deep blood red to yellow, although the reflexed peduncles do not permit them to be displayed to the best advantage.

It has not been extensively cultivated to date but could make a useful ornamental shrub. In its natural habitat it grows in sandy loams and sands.



E. eremophila
buds and fruits

E. eremophila –showing three variations of flower colour

Remains of the small township of Holyoake.

(*Continued from page* 12)

The locations where the deaths occurred are of importance:

Situation	*No.*
1. Mustering stock	2
2. Firefighting	11
3. Travelling	2
4. Escaping from house (i.e. some distance from house)	11
5. Within yards of house	10
6. Found in house	17
	53

Most of the people in categories 5 and 6, who were found in the home or within yards of the house, were either old and infirm or suffered from a physical disability. These people probably had little idea that the fire was threatening them until they were surrounded by flames and were then unable to take any action to save their lives or homes.

In category 4, over 60 per cent of the houses from which the people fled were not burnt and it is highly probable that these people would have survived if they had stayed in their houses.

Most of the 1,300 houses, cottages and shacks destroyed by the fire were vacant or had been abandoned by the occupants in the face of the fire. There were numerous instances where one or two householders had stayed behind and managed to save their own home—and often those abandoned by their adjacent neighbour.

There were also several instances of elderly pensioners with dilapidated homes which most fire controllers would rate as a "death trap" classification, who not only survived, but also saved their homes because they followed the basic fire survival rules.

The two people who died while travelling were experienced bushmen, but they were caught on a narrow road in a canvas-topped vehicle which did not give any protection from radiation.

The 15 people killed in categories 1, 2 and 3 would have survived if they had obeyed the basic rules for survival in fires.

However, the classification shown as firefighting is misleading, as few of these people were trained firefighters and they probably had little fire experience.

It must be remembered that these fires were spreading at speeds beyond the experience of most people in Tasmania and considering the number of fires burning at the one time (110 separate origins) it would not be surprising if even experienced people made errors in judgement as to where the fire had come from and the speed at which it was travelling.

Considering the fire behaviour there were many places around Hobart and the seaside towns where people survived (relatively easily) in a fire situation which few other people in the world have ever experienced.

Lara fires, 8th January 1969

Seventeen people were killed when they left their cars after being trapped in a fast-moving grass fire alongside Princes Highway, connecting Melbourne with Geelong, Victoria. Several others in the same situation remained in their cars and survived. The cars were trapped on the major four-lane expressway and there is little doubt that all occupants would have survived if panic and confusion had not taken place.

"Miraculous" escapes

Heat rays, like light rays, travel in straight lines, and are greatly impeded by opaque materials such as clothing, wood, earth, stones and metal. Knowing this, certain "miraculous" escapes are explicable. On one occasion an old man, finding himself surrounded by a raging fire, draped a blanket over himself and stood where he was till the flames had died down. His several comrades who took other measures all perished.

On another occasion, a party with a bulldozer was trapped in a small clearing in a pine forest. The driver of the machine dug a shallow trench and pushed the earth back on top of the others. Then he also slid into the trench and covered himself with loose earth. All survived.

Two people in another fire wound up the windows of their truck and hid under the dashboard. Although the cabin became intensely hot—its glass melted—they left the vehicle only when the upholstery caught fire. By this time the flames outside had abated and they were able to walk through them to safety on the burnt ground.

In all these situations people lived chiefly because, whether intentionally or otherwise, they succeeded in shielding themselves effectively from radiation and avoided further stress by panicking or running wildly. Had there been too many people to crowd into the cabin of the truck the others could have crawled underneath, where they would have been fairly well shielded and where the air would have been relatively cool.

Similarly, if trapped in a house, one should close all windows and doors and stay inside—abandoning the retreat only when it is burning fiercely and conditions inside are becoming unbearable. By this time, with any luck, the surrounding vegetation will be almost consumed and the flames dying down.

When the choice must be made, it is better to choose the oven than the griller!

Dwellingup fire

In dangerous fire weather, it is often impossible to predict sudden wind changes which could immediately change the whole fire situation. Such a wind change caused extensive damage in the town of Dwellingup on 24th January 1961.

At 8 o'clock a cyclone struck the area and gale-force winds changed the fire direction and brought it down on the town in four heads.

Burning debris showered over the town long before the actual fire reached the area, starting numerous spot fires throughout the settlement and igniting buildings at widely separated points.

Two heads of fire engulfed the town and much heroic work was done in saving what remained. Women and children were concentrated in safe positions and fire-fighting gangs were deployed on threatening flanks as well as throughout the town with pack sprays and power pumpers. It is to the credit of all involved that throughout the terrifying experience of the night, there was no panic and not a single human casualty.

Back Cover

FORESTSCAPES

Karri, *Eucalyptus diversicolor*. Although not noted for beautiful flowers, karri, particularly after bark-shed in late summer, forms one of the world's most magnificent and scenically beautiful hardwood forests. (This photograph appears in the Forests Department's latest publication *Selected Flowering Eucalypts of Western Australia* to illustrate the point that forests, too, may be beautiful—although the trees lack spectacular flowers. However, it is noteworthy that karri blossom is a prolific yielder of nectar and so highly valuable to beekeepers.)

The bark is smooth and greyish white when old. However, in late summer this old bark splits and sheds in irregular patches exposing the new, fresh salmon-yellow bark beneath, so giving the stems a mottled appearance. Following severe fires, bark-shed may be greater than normal, resulting in stands of trees having uniform salmon-yellow bark. As the months pass, however, the colour gradually reverts to the original greyish-white.

Seen in the slanting rays of the morning sun, which illuminates the long smooth straight boles against the bright green mass of dew-spangled undergrowth, the karri forest presents a beautiful sight not readily forgotten.

Care has been taken to reserve extensive areas in the virgin state, not only for reasons of conservation and recreation, but also to provide reference points for scientific ecological studies.

See FORESTSCAPES, page 15.