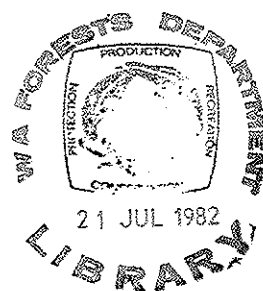


1961

WESTERN AUSTRALIA



# *Report*

OF THE

# ROYAL

# COMMISSION

*Appointed to Enquire into and  
Report upon the*

**Bush Fires of December, 1960 and  
January, February and March, 1961  
in Western Australia.**

**The Measures Necessary or Desirable to Prevent  
and Control Such Fires and to Protect Life and  
Property in the Future.**

AND

**The Basic Requirements for an Effective State  
Fire Emergency Organisation.**

By

G. J. RODGER, Esq., B.Sc.

Royal Commissioner

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PRESENTED TO BOTH HOUSES OF PARLIAMENT

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# REPORT OF ROYAL COMMISSION

Appointed to Enquire into and Report upon the Bush Fires of December, 1960 and January, February and March, 1961, in Western Australia, the Measures necessary or desirable to prevent and control such Fires and to protect Life and Property in the future and the Basic Requirements for an effective State Fire Emergency Organisation.

## TABLE OF CONTENT

SUBMISSION :	Page
Appointment of Commission .....	5
Terms of Reference .....	5
Hearings of the Commission .....	5
Parties and Persons Appearing .....	5
Travel of the Commission and Enquiries in the Field .....	5
Definitions .....	6

### Chapter

#### I. INTRODUCTION

The Divisions of the State according to Vegetation and Land use .....	6
Relationship between Forestry and Agriculture in the use of fire .....	7
History of the development of bush fire legislation .....	8
Provisions of the Bush Fires Act, 1954/1958 .....	9

#### II. THE BUSH FIRES OF DECEMBER, 1960 AND JANUARY, FEBRUARY AND MARCH, 1961 (TERMS OF REFERENCE 1 AND 2)

The weather of the 1960/61 fire season .....	9
Area burnt during the 1960/61 fire season .....	11
The bush fires of the 1960/61 fire season .....	11
(a) Chittering Bush Fire .....	12
(b) Gidgegannup Bush Fire .....	13
(c) Dwellingup Bush Fires .....	15
(d) Augusta-Margaret River Bush Fires (Karridale Fire) .....	23
(i) Forest Grove-Karridale Fire .....	24
(ii) Treeton Fire .....	26
(iii) McLoughlin's Fire .....	27
(iv) Marsh's Fire .....	27
(v) Cusack's Fire .....	27
(vi) Bell's Fire .....	28
(vii) Courtney Fire .....	28
(viii) Rosa Brook Fire .....	29
(ix) Flinders Bay-Augusta Fire .....	29
(x) Scott River Fire .....	29
(e) Pemberton Bush Fires .....	31
(i) Meerup River-Windy Harbour Fire .....	31
(ii) Maringup Lake Fire .....	32
(iii) Chesapeake Fire .....	32
(iv) Shannon River Fire .....	32
(v) Crowea-Dombakup Fire .....	32
(vi) Brockman Fire .....	33
(f) Denmark Bush Fires .....	33
(i) Albany-Denmark Fire .....	34
(ii) Kent River-Owingup Fire .....	34
(g) Gleneagle Bush Fire .....	35
(h) Kalamunda and Gooseberry Hill Bush Fire .....	35
(i) South Coogee Bush Fire .....	36
(j) Mandurah Bush Fire .....	37
(k) Lesmurdie-Kalamunda-Bickley Bush Fires .....	37
(l) Bush Fires on the Coastal Plains north of Perth .....	37
(m) Other large fires recorded by the Bush Fires Board, but not investigated by the Commission .....	38
(i) Within the South-West Land Division .....	38
(ii) Outside the South-West Land Division .....	38
(iii) Balladonia Fire .....	38

III. THE MEASURES NECESSARY OR DESIRABLE TO BE TAKEN IN WESTERN AUSTRALIA TO PREVENT THE OUTBREAK OR SPREAD OF BUSH FIRES AND TO PROTECT LIFE AND PROP- ERTY FROM SUCH FIRES (TERMS OF REFERENCE 3)	
Causes of Fires .....	38
The Bush Fires Act, 1954/1958 .....	41
(a) Bush Fires Board .....	41
(i) Bush Fires Board Members .....	41
(ii) Administration .....	42
(iii) Bush Fire Wardens .....	42
(iv) Responsibilities of Board .....	42
(b) Local Authorities .....	44
(i) Fire Control Officers .....	44
(ii) Bush Fire Brigades .....	45
(iii) Bush Fire Control Advisory Committees .....	45
(iv) Fire Weather Officers .....	46
(v) Firebreaks .....	46
Insurance .....	47
(a) National Insurance .....	47
(b) Approved Areas .....	47
(c) Bush Fire Funds .....	48
Communications .....	48
Fire Fighting .....	49
The Forests Department .....	50
Crown Lands .....	52
Protection of Life and Property .....	53
Research .....	55
IV. THE BASIC REQUIREMENTS FOR AN EFFECTIVE STATE FIRE EMERGENCY ORGANISATION (TERMS OF REFERENCE 4)	55
V. SUMMARY	
Findings .....	57
Recommendations .....	58
Conclusion .....	60
ATTACHMENTS :	
1. Map showing the location of the areas burnt in bush fires in the South-West Land Division of the State of Western Australia in the 1960/61 bush fire season .....	61
2. List of witnesses who appeared before the Commission .....	62

To His Excellency the Honourable Sir John Patrick Dwyer, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Lieutenant-Governor and Administrator in and over the State of Western Australia and its Dependencies in the Commonwealth of Australia.

May It Please Your Excellency—

I have the honour to submit my report in pursuance of the Commission dated the 27th day of April, 1961, appointing me to be a Royal Commissioner to enquire into and report upon matters associated with bush fires in the State of Western Australia.

#### TERMS OF REFERENCE.

The Terms of Reference of the Commission required me to enquire into and report upon—

- (1) the causes, origins and development of the bush fires (of the kind contemplated by the Bush Fires Act, 1954-1958) which commenced to burn within the said State at or near—

- (a) Dwellingup, on or about the 19th day of January, 1961;

- (b) Karridale, on or about the 27th day of February, 1961;

- (c) Gidgegannup, on or about the 25th day of February, 1961; and

- (d) Chittering, on or about the 15th day of December, 1960,

(each of which fires continued to burn for some days) and also of any other bush fire or bush fires (if any) which burned in the said State at any time during the first three months of 1961 and concerning which it is considered desirable to enquire into for the purposes of the Commission;

- (2) in regard to each such bush fire, the measures taken to prevent its outbreak and spread and to protect life and private and public property;

- (3) the measures which are necessary or desirable to be taken by any and what persons, corporations and bodies—

- (a) to prevent the outbreak of bush fires in the said State or to prevent the spreading of such fires; and

- (b) to protect life and private and public property in the said State from the consequences of such fires;

- (4) the basic requirements for an effective State Fire Emergency Organisation to handle major fire emergencies and to co-ordinate and ensure the taking of measures as aforesaid.

#### HEARINGS OF THE COMMISSION.

My enquiries commenced on 1st May, 1961, and continued until 19th August, 1961.

The taking of sworn evidence occupied 23 days. The remainder of the time was directed to visiting and inspecting the scenes of bush fires and pursuing enquiries within and without the State on informal lines and in the preparation of this Report.

Altogether 54 witnesses were examined on oath in Perth, 18 at Pinjarra, 29 at Margaret River, 8 at Manjimup and 7 at Denmark—a total of 116.

#### PARTIES AND PERSONS APPEARING.

The names of the parties and persons appearing before the Commission are given in Appendix 1. They include officers of the Bush Fires Board, the Forest Department, Police Department and other Government organisations such as the Department of Lands and Agriculture as well as members of Shire Councils, fire control officers and members of bush fire brigades.

In addition, a number of farmers, some retired from active work, voluntarily came forward to give the Commission the benefit of their advice based on long experience.

I believe that almost all witnesses were animated by a desire to be helpful, although some spoke with a conviction not always supported by facts. In some cases, childhood memories of restricted localities, and parents' recollections were unjustifiably given a general application. In a few cases, strong personal animosities were revealed, which tended to distort the picture of the true situation and reduce the value of the evidence. There were also instances where witnesses, due to a mistaken sense of loyalty to their neighbours or fear of civil action, were reluctant to tell all they knew.

Nevertheless, your Commissioner recognised few instances where witnesses failed to speak what they believed to be the truth.

#### TRAVEL OF THE COMMISSION AND ENQUIRIES IN THE FIELD.

All the evidence voluntarily presented referred only to that portion of the south-west corner of the State which is roughly west of a line from Geraldton to Northam to Albany.

Information gathered by the Commission was to the effect that in other parts of the State the local communities are reasonably satisfied with the provisions made for the prevention and suppression of bush fires, realising, of course, that complete prevention is not practicable.

In consequence, the Commission visited the districts of Northampton, Chittering, Gidgegannup, Wanneroo, Pinjar, Mundaring, Rockingham, Mandurah, Dwellingup, Margaret River, Pemberton, Denmark and places in between in the South-West Land Division, and investigated in considerable detail the



circumstances surrounding some of the fires in those districts, but the other Land Divisions of the State, the North-West, the Kimberley, the Eastern and the Eucla Divisions were not visited at all.

#### DEFINITIONS.

According to the Local Government Act, 1960, municipal councils are to be known as town councils and all road boards as shire councils in Western Australia as from 1st July, 1961. In this Report the terms "town council" and "Shire council" have therefore been used in lieu of "municipal council" or "road board" respectively, even though, in most cases, the last-mentioned titles were in use at the time of the Commission's investigations. The term "local authority," as used, means either town council or shire council. The term "bush fire" has been used as including forest, scrub and grass fires.

#### CHAPTER I.

##### INTRODUCTION.

Adequate understanding of the problems associated with bush fire control in Western Australia requires some knowledge of the country and its bush fire history, as well as of the respective activities in fire control of those two great divisions of rural industry—forestry and agriculture.

##### THE DIVISIONS OF THE STATE ACCORDING TO VEGETATION AND LAND USE.

The State of Western Australia can be divided, according to its natural vegetation and land use, into the following regions:—

- (1) The savannah forests and woodlands of the far north and the desert, savannah, mulga bush, mallee and southern woodland country lying generally north-west of a straight line from the mouth of the Murchison River through Southern Cross to the south coast a little east of Esperance. This line roughly follows the 12 in. isohyet. The main land use in this region is cattle and sheep grazing on an extensive basis. Wide-spread bush fires seldom occur here and, when they do, they generally follow a season of above average summer and autumn rainfall when a prolific growth of annual grasses will carry a fire through the scattered perennial vegetation.

- (2) The salmon gum forest country between the 10 in. and 20 in. isohyets. Most of the region between the 12 in. and 20 in. isohyets has been cleared for wheat production and sheep grazing and, eventually, will almost certainly be entirely devoted to such pursuits. As so much of this region is under annual cereal crop cultivation precautions against bush fires

are extremely strict until the harvest has been reaped and the stubble eaten and trodden down. After that time, owing to lack of fuel, there is very little chance of serious fires occurring.

- (3) The Wandoo and the mixed Wandoo and Jarrah forest country between the 20 in. and 30 in. rainfall isohyets. Much of this region has been cleared and converted to pasture and the cultivation of wheat, oats and barley. This conversion is still proceeding. The division is at times subject to severe grass and forest fires but organisation in fire control is improving rapidly and, in some parts, is of the highest standard.
- (4) The prime jarrah forest extending along the Darling Range from just north of Perth to the south coast, where it is intruded by the karri forest. The region has an average annual rainfall varying from 30 in. to 50 in. About four million acres have been reserved as State Forest, through which small patches of settlement occur on the better pockets of soil. The prime jarrah forest generally occupies poor lateritic soil which usually becomes very dry and hard in summer and on which the jarrah seedlings have great difficulty in becoming established. Once established, however, jarrah may be burnt to the ground time after time and recover very quickly. The jarrah forest carries a low, harsh undergrowth which is highly inflammable, and the bark of the jarrah itself is fibrous and, when unburnt for some time, readily carries a fire up the trunk. This division is particularly subject to lightning fires and to the incursion of fires from settlers' burning-off around the edges of the forest country.
- (5) The karri forest occurs in four or five patches around the coast between Albany and Busselton. It covers a total of about 350,000 acres and receives an average annual rainfall of 45 in. to 70 in. It is a very tall forest with dense undergrowth and is not easy to burn, except in the hottest time of the year when a very damaging fire can develop. The karri does not recover from bush fires as well as do most other eucalypts but, on the other hand, it frequently produces heavy crops of seed which germinate and develop rapidly after a fire. Some of the karri forest has been cleared for dairying. Considerable areas of such cleared country have since been abandoned, with the result that the giant ring-barked trees still standing in the midst of regrowth form a serious menace when a bush fire reaches them.

- (6) The south-western coastal woodlands occupy a narrow strip generally between the coast and the escarpment of the Darling Ranges, extending from Perth south to the Leeuwin. It has been largely cleared and is being gradually developed into an area of closer settlement which should not be subject to frequent bush fires. The poorer limestone and sandy areas included in this division, and of which the strip north of Perth largely consists are, however, generally undeveloped and very subject to bush fires. These areas often are of particular interest to the apiarist.

It is probable that at least Regions 3, 4 and 6 have been subjected to bush fires throughout the ages. This is indicated by the fact that much of the vegetation has such remarkable powers of recovery and regeneration following burning that its composition may well have been decided by fire. Even before the advent of the aboriginal, lightning must have been the cause of fires which, at times, burnt for long periods and over very large areas with varying intensity.

The navigators of the 17th century, who touched the west coast of Australia, occasionally reported seeing fires on the land. It is known from records of the 1830's and 1840's that the aboriginal used fire for driving game from thickets of scrub and to induce young growth which would attract the game to particular spots, but it is also recorded, that, in such operations, he usually lit against the wind and was careful to try to control the fire—a matter in which he was reputed to be astonishingly dexterous. The edges of the forest were probably kept fairly well burnt with his hunting fires where such edges abutted upon grasslands, and possibly such fires occasionally escaped and resulted in more extreme fires. It cannot be safely assumed, however, that the whole of the region or even any extensive area of the jarrah forest was regularly and systematically burnt over by the aboriginal before white settlement. In the wet karri region and the dry inland it is probable that extensive fires always were very infrequent.

#### RELATIONSHIP BETWEEN FORESTRY AND AGRICULTURE IN THE USE OF FIRE.

Both forestry and agriculture regard the uncontrolled bush fire as a dreaded menace, but fire under control can be a tool of great economic value to both and particularly to the settler. In the use of fire there is, however, a difference in basic outlook between forestry and agriculture which needs to be explained.

In forestry, the aim is to protect the forests from damage by fire. For this purpose, the Australian forester cannot rely entirely upon cleared or summer green fire breaks as does the European forester.

In Europe, the forests have been under intensive management for so long that they contain very few dead or dying trees, carry

very little, if any, inflammable undergrowth and have very little waste left lying on the forest floor owing to the comparatively close proximity, in most cases, of large centres of population, which provide a market for even the smallest produce of the forest.

The forests of Australia, on the other hand, are only emerging from the untended virgin state. They still contain many standing dead trees and trees with dead tops, which burn readily and fiercely once they catch alight. The bulk of our forests are Eucalypts in which the foliage of the undergrowth, as well as of the trees themselves, contains a relatively high volume of essential oils which makes it highly inflammable. In utilisation, about half of the wood in the tree, on account of poor form, defects or small size, is left behind on the forest floor. Once a fire starts in a eucalypt forest on a hot day, the intensive heat generated by the undergrowth and ground litter causes the fire to run up any dry, fibrous or ribbony bark into the tops. Many of these trees carry dead wood and ignite too high up to be readily reached by man. Under the influence of a strong wind they soon commence to throw burning material far beyond the width of any conventional type of European fire break.

Fortunately, eucalypts and their associated vegetation generally have remarkable powers of resistance to and recovery from the effects of fire, and the forester is able to use these attributes in their protection.

Soon after forest management commenced in Australia, it became the practice of the forester in the eucalypt forest to endeavour, by means of controlled fires, to remove the undergrowth and general debris in order to reduce the extent to which fires could spread.

At the present time, general opinion in Australian forestry favours destruction by fire, during the less dangerous times of the year, of all inflammable hazards such as result from logging and silvicultural operations. Light controlled burning is also practised, particularly in Western Australia, to provide wide strips as clear as practicable of undergrowth and litter to be used as wide breaks, from which any uncontrolled fire arising may be brought under control before it can develop sufficient intensity to damage the timber or fire the crowns of the trees. To avoid damaging the trees and re-growth, controlled burning needs to be carried out with great judgment on strategically located areas after a thorough study of such factors as the quantity of ground litter, its dryness, the nature of any forest re-growth present and the various weather elements both prevailing and likely in the near future. The extent to which fire is used in the forest in this way depends upon the species, the topography, the climate and the intensity with which the forest is organised and managed.

The need to progress from the virgin forest to managed forest conditions and to protect the re-growth from damage, makes wholesale and indiscriminate burning of the forest entirely unjustifiable. Whether it will ever

be practicable or advisable to keep fire entirely out of all eucalypt forests it is impossible to presage with any certainty at the moment. It will certainly need much more intensive management in some places than is practicable at present. There is also much research still to be done in Australian forestry to ascertain the effect of fires of different intensities upon the physical and chemical composition of the forest soils and the growth of the vegetation before the desirability or otherwise of complete protection from fire can be decided.

On the other hand, in agricultural settlements the aim is to destroy the native trees and other vegetation as quickly as possible, in order that the land may be cleared for cultivating or sowing to pasture. Fire is the cheapest tool that can be employed to dispose of the felled vegetation, and the hotter the conditions under which the burn can be carried out, the more effective and economic is the work.

As the crop and pasture land is extended, the still uncleared land is kept burnt as often as possible, in order that in its fire-swept state it may provide a barrier from which bush fires may be prevented from reaching pasture, crops and buildings. This so-called protective burning is carried out as frequently as possible, in order to prevent the accumulation on the ground of sufficient fuel to carry a fierce fire.

To the grazier, an added inducement to burn the Australian bush is that such fires destroy the old, harsh ground vegetation which is then replaced by a more edible and more palatable growth, thus increasing the grazing capacity of the land.

Fire is also used by the farmer to burn off stubble to facilitate ploughing and to burn off pasture to enable its renovation but, as the development of the land is extended, the need for the use of fire gradually becomes less and less and, by the time his land is largely under crop and pasture, the agriculturist no longer relishes the use of fire, except under the strictest control. There is still, however, much forest land which it is proposed to clear in Western Australia, and burning-off operations may be expected each year for many years to come.

#### HISTORY OF THE DEVELOPMENT OF BUSH FIRE LEGISLATION.

The first piece of legislation known to have been promulgated in Western Australia in connection with bush fires was an ordinance of 2nd September, 1847, just 18 years after the Swan settlement began, "to diminish the dangers resulting from bush fires". This enacted that any person wilfully or carelessly setting fire to any vegetation between 1st September and the first day of April following should forfeit a sum not exceeding £50, unless the offender were an aboriginal or a boy under the age of 16 years who could, in lieu of other punishment, be publicly flogged with any number of lashes not exceeding 50. It provided, however, that an occupier of

land could light fires at any time in summer, provided they did not extend beyond ten yards and at any time between the first day of February and the first day of April, provided such fires did not extend beyond the boundaries of his land.

In 1885 a Bush Fires Act was passed which provided that the Governor could declare prohibited burning times when no bush could be lit except by an occupier of land, who could do so on his own land under prescribed conditions. The penalty of flogging was not included.

In 1898, that Section of the Act which allowed occupiers of land to burn bush during the prohibited time, was withdrawn.

In 1902, another Bush Fires Act repealed previous Bush Fires Acts. It retained the prohibited burning time provision and introduced a restricted burning time which provided that, except during the prohibited time, an occupier of land could, under prescribed conditions, set fire to bush from October to April inclusive. It provided, inter alia, that four days' notice be given to neighbours of intention to burn, and that three men be in attendance to prevent the escape of the fire.

In 1925, an amending Act provided that the Minister could declare fire-protected areas in which it was unlawful to light a fire during the restricted time without the approval of the Minister or his authorised officer.

In 1937, another Bush Fires Act was passed, repealing all previous Acts. It retained practically all provisions of the previous Act but, to avoid the anomalies and dangers which arose from the prohibited burning times being declared by the Governor on the recommendation of each local governing authority, a Rural Fires Prevention Advisory Committee was appointed to advise the Governor in this matter. To place the responsibility for the prevention of fire in the hands of the individual, it required an occupier of land to extinguish any unlawful or accidental fire occurring on his property and, if he failed to do so, the local governing authority had power to do so at the land occupier's expense. To place the responsibility for fire control generally in the hands of local government authorities, it gave them power to appoint bush fire control officers, establish and maintain bush fire brigades and enforce the provision of fire breaks by the occupiers of land. In addition, it virtually gave a forest officer control over all fires occurring within two miles of a State forest. It also provided for the appointment of a Rural Fires Prevention Advisory Committee.

Under amending Acts provision was made, in 1940, for the restricted burning time to be extended to cover the period from 1st October to 31st May; in 1948 for the declaration of approved areas in which a 25% rebate of the premium for the insurance of crops could be claimed in districts attaining a suitable bush fire brigade standard and, in 1949, for the introduction of the system of issuing permits to burn bush.

In 1954, the present Bush Fires Act was passed. With amendments in 1957 and 1958 the Bush Fires Act, 1954-58 now provides that—

- (a) the Act shall be administered by a Bush Fires Board with power to appoint wardens and other officers necessary to carry out the provisions of the Act;
- (b) there shall be a restricted burning period from 1st October to 31st May during which the burning of bush shall be unlawful except under conditions laid down by the Act and the local governing authorities.
- (c) The Minister may declare a defined portion of the State to be a fire-protected area in which no person may, without the authority of the Minister or his authorised officer, set fire to bush between the months of October to May inclusive;
- (d) the Governor may declare prohibited burning times for defined districts, during which it shall be unlawful to set fire to bush;
- (e) the Minister may suspend the declaration for special purposes or if seasonal conditions warrant it he may postpone the opening date or terminate the prohibited burning times earlier and local governing authorities may, by two weeks, advance or delay the commencement of the prohibited burning times and delay the end of the season;
- (f) the Minister may declare a bush fire emergency period for a definite area during which no bush may be lit;
- (g) fires may be lit for certain purposes during the restricted and prohibited burning seasons, subject to specified conditions;
- (h) prescribed conditions shall govern the operation of machinery and vehicles during prohibited burning times;
- (i) local governing authorities may enforce the establishment of firebreaks and the Minister may direct them to do so;
- (j) occupiers of land shall make every effort to extinguish unlawful and accidental fires during restricted and prohibited burning times;
- (k) owners or occupiers of land may clear, plough or burn firebreaks on adjoining Crown land, except land under the control of the Forests Department;
- (l) local authorities may appoint fire control officers and establish and maintain bush fire brigades;
- (m) where a fire is burning in or near Crown lands, including State Forests, a forest officer shall have all the

powers and duties of a bush fire control officer and a captain of a bush fire brigade and shall take supreme control of all operations;

- (n) coronial inquiries into the cause and origin of bush fires shall be held when requested;
- (o) local authorities and fire control officers must render to the Bush Fires Board returns of fires occurring in their districts;
- (p) the Minister may declare as an approved area, districts in which a bush fire brigade has been established. In such cases insurers shall give a 25% rebate on premiums for insurance on crops;

As far as forest lands are concerned, the first legislation specifically providing for their protection from fire was an amending Lands Act of 1904, which provided that the Governor might make regulations for the prevention of fires and the spread of fires in forests. In 1920, regulations under the Forests Act, No. 8 of 1919, replaced the regulations under the Lands Act.

The Forests Act, 1918/54 now contains provisions prohibiting the lighting of fires in State Forests or Timber Reserves or within 20 yards thereof, empowering a forests officer to call for assistance, in extinguishing a fire, from any person working or residing within five miles of the outbreak and requiring adequate notice to be given to a forests officer by any person proposing to start a fire on land contiguous to a State Forest or Timber Reserve. Regulations under the Forests Act provide for locomotives working in forest areas to be fitted with efficient spark arresters and ash pans, for owners of locomotives to be liable for damage from fires resulting from their operations and for sawmill owners to take precautions against the outbreak and spread of fire from their operations.

## CHAPTER II.

### THE BUSH FIRES OF DECEMBER, 1960 AND JANUARY, FEBRUARY AND MARCH, 1961 (TERMS OF REFERENCE 1 AND 2).

All the bush fires of the 1960/61 fire season on which evidence was tendered and into which, in consequence, investigations were mainly directed, occurred in the South West Land Division of Western Australia.

It is not without significance that, within this Division, they were almost entirely confined to the area between the 20" and 60" isohyets which is the main forest region of the State.

### THE WEATHER OF THE 1960/61 FIRE SEASON.

The South West Land Division lies within a climatic zone with a defined winter rainfall and almost absolute summer drought, and

is one of the few true Mediterranean-type climates in Australia. Spring rainfall is usually fairly reliable but autumn rains are distinctly variable. In occasional years summer rains may be well above average.

The effect of heavy winter rains and moderate spring rainfall usually extends into the early summer months and during December fires in the higher rainfall zone of the South West are generally not common. By January, the jarrah belt is usually dry and inflammable and the severity of a particular fire season will then depend on the extent to which high temperatures, low humidities and strong winds combine to produce periods of high fire danger. Further south in the heavier rainfall zone embracing the karri forests, summer drying rates are much slower and a fire dangerous condition in these areas is not usually reached before mid-January or February.

During the summer and autumn of 1960, most areas in Western Australia received a rainfall above the average. This resulted in a very abundant growth of grass and no doubt increased the density of the foliage of the trees and shrubs.

By the middle of October the grass was fully cured in the eastern areas and along the Eyre Highway towards the border of South Australia a fire began which eventually covered an area approaching four million acres. This took place in a region with an average annual rainfall of from eight to ten inches, where the growth is usually insufficient to provide the fuel required to carry a fire. It may have been an indication of the possibility of a severe fire season in the south west of the State.

The 1960/61 season throughout the South West Land Division was marked by a distinct rainfall deficiency during the winter and spring months with a considerable build-up of fuel dryness over the spring period. This would particularly affect the larger fuel components on the forest floor and, also, may have had a considerable effect on the moisture content of the leaves of the trees and the shrubby vegetation.

The build-up of seasonal dryness was not only dependent on rainfall deficiency but was also hastened by the fact that temperatures were generally well above average during the spring and early summer months. These high temperatures were in evidence by October, and on the 24th October Perth recorded a temperature of 96.6 degrees F. which was the highest October maximum on record. Although conditions were generally cooler in November, December was a very hot month. These conditions resulted from the existence of a tropical low pressure area in the north-west with low pressure troughs extending down the west coast. This low pressure area and associated west coast troughs and the occasional formation of intense tropical cyclones controlled the weather pattern throughout the 1960/61 summer.

They were largely responsible for the persistent high temperatures, occasional strong cyclonic winds and unusually severe thunderstorm activity resulting from the inflow of relatively moist unstable air from the tropical regions. These thunderstorms produced an unprecedented number of lightning fires and it was these fires which resulted in the major fire damage of the 1960/61 season.

The hot, humid, rainless conditions culminated on 19th January when severe electrical storms produced a series of lightning fires extending from Mundaring in the north to Manjimup in the south, to be followed by further severe, dry thunderstorms and lightning fires the following evening. The fires thus started, burnt under continuing heatwave conditions for the next five days and a disastrous "blow up" occurred on the evening of 24th January, when cyclonic wind squalls associated with the southern movement of a tropical cyclone struck miles of partially controlled and uncontrolled fires. Heavy destruction of forest land and property resulted from this blow up and the townships of Dwellingup and the Mill settlements of Nanga Brook and Holyoake suffered severe damage.

Widespread rain over the south west followed this cyclonic passage and falls ranging from a few points to over one inch gave temporary relief. The effect of this rain was, however, quickly dissipated by continuing heatwave conditions resulting from the persistence of tropical low pressure systems in the north. Another intense cyclone developed about the middle of February and again produced intense thunderstorm activity in the south west, this time a little farther south. A heavy concentration of lightning fires resulted in the Manjimup-Pemberton-Shannon River area and numerous fires did moderate to heavy damage between the 11th-15th February. At the same time as these fires were burning in the south, Carnarvon was experiencing a severe flood in the north. Onslow received 1079 points in the 24 hours to 9 a.m. on 12th February which is nearly twice the previous maximum 24 hour total.

Light rain again fell in the south west following the eastwards movement of this cyclone, but again had little effect in alleviating the dry seasonal conditions. Tropical cyclone influences persisted and the fire season culminated during the 1st-3rd March with destructive fires over the whole of the south west area, and especially in the extreme south-west corner around Augusta-Margaret River.

Immediately the north-west cyclone and a second cyclonic centre which had persisted in the Indian Ocean linked up with the main low pressure belt to the south, the trough on the coast moved inland. From the 11th March onwards until the end of the month, southern anti-cyclones or southern low pressure systems predominated over the south west and on the 27th March brought drought-breaking rains which continued through April.

The information in the Table below illustrates the manner in which the rainfall deficit mounted in representative locations in the south-west prior to the fire season.

RAINFALL REGISTRATIONS AT DWELLINGUP, MARGARET RIVER AND DENMARK DURING THE WINTER AND SPRING MONTHS OF 1960

Station	Rainfall	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Dwellingup	Actual (pts.)	306	1041	372	324	126	54	32
	Average	1017	1049	886	552	292	170	86
	Deficit	211	219	733	961	1127	1243	1297
Margaret River	Actual (pts.)	757	994	495	293	110	59	78
	Average	1001	906	674	393	307	120	61
	Deficit	244	156	335	435	632	693	676
Denmark	Actual (pts.)	343	870	337	266	136	69	102
	Average	675	725	648	504	432	182	146
	Deficit	332	189	500	738	1034	1147	1191

The cumulative rainfall deficiencies at the end of the seven month period June to December inclusive in terms of percentages of average rainfall were:—

Dwellingup—32.0%.

Margaret River—19.5%.

Denmark—35.9%.

In the case of Margaret River and Denmark, the rainfall during January and February was near normal and the percentages remained similar up to the commencement of the March fire period.

Although yearly rainfalls were below average for the years 1958, 1959 and 1960, it is not considered that this factor had any significance as a long-term drying effect in forest areas. The general heavy winter rainfall although perhaps somewhat below average, would almost inevitably have thoroughly soaked larger fuel components. The short-term pre-seasonable dryness, combined with temperatures above the average would be the significant factor determining the severity of any particular summer.

#### AREA BURNT DURING THE 1960-61 FIRE SEASON.

Records available to the Commission, of the area burnt over by bush fires in Western Australia during the 1960-61 fire season were found to be far from complete.

Information submitted by the Bush Fires Board and the Forests Department indicates that in the South-West Land Division 721 fires occurred and that they burnt over a total of 774,450 acres.

The commission investigated 29 large fires in the Division and found that these alone had burnt over a total of approximately 964,000 acres. An additional 37,000 acres were reported to have been burnt over in a further four fires bringing the total area burnt to 1,001,000 acres.

The discrepancy between the actual and the recorded of area burnt arises from the failure of shire councils and bush fire controllers to report all the fires occurring in their districts and the total acreage they cover.

It is known for example that in the shires of Plantagenet, Albany, Manjimup and Augusta-Margaret River alone 246,000 acres

of Crown lands and timbered private property which were burnt over in fires investigated by the Commission were not reported to the Bush Fires Board by the shire councils concerned.

Your Commissioner conservatively estimates that the area of land burnt by bush fires this season in the South-West Land Division is 1,250,000 acres. Of this area, it is estimated that 519,000 acres were burnt on State forest and timber reserves, 330,000 acres on undeveloped Crown lands and 385,000 acres on private property. Of the 401,000 acres of private property, it is further estimated that 75,000 acres would be cleared pasture land and 326,000 acres low quality forest and scrublands of little or no economic value.

The main fire areas are shown on a plan attached (Appendix 1) and it can be seen that most large fires were confined to that part of the South-West Land Division lying within the 22 in. rainfall isohyet. The total area of land lying within this 22 inch isohyet is around 20,500,000 acres, so that approximately 6.1 per cent. of the land area was burnt by fires this season.

Three main fire periods were recognised during the 1960-61 season, namely: 17th-25th January; 8th-15th February and 1st-3rd March. It is estimated that the areas burnt during each of those periods was—

(a) 17th-25th January: 550,000 acres.

(b) 8th-15th February: 60,000 acres.

(c) 1st-3rd March: 250,000 acres.

Thus 860,000 acres or 70 per cent. of the total area burnt in the South-West Land Division this season was burnt within a 20 day period.

During the season 110 lightning fires were recorded and these burnt an area estimated at 525,000 acres or 42 per cent. of the total area burnt. The area burnt by escapes from settlers' burning-off operations is estimated at 530,000 acres or a little over 43 per cent. of the total area burnt.

In addition to the areas burnt within the South-West Land Division, it is recorded that an area of at least four million acres was burnt in pastoral country lying on or outside the ten inch rainfall isohyet. These fires occurred in regions which are largely pastoral holdings or in some cases relatively uninhabited. Due to low population density and the fact that it is probably only once every 15-20 years that enough grass carries over winter to support large-scale fires, there is little organisation of fire control measures in this low rainfall area. It is more than likely that a much larger area was burnt in this region.

#### THE BUSH FIRES OF THE 1960-61 FIRE SEASON.

The four fires specifically mentioned in the Terms of Reference together with two other fires which burnt during the first three



months of 1961 and into which it was considered desirable to inquire in some detail together with the acreage which each fire burnt over are as follows:—

	Acre.
Chittering .....	31,800
Gidgegannup .....	18,250
Dwellingup .....	361,000
Karridale .....	106,910
Pemberton .....	110,250
Denmark .....	187,650
<b>Total .....</b>	<b>815,860</b>

Evidence was also tendered in connection with the following six fires, all of which were investigated to some extent:—

	Acre.
Gleneagle .....	58,000
Kalamunda-Gooseberry Hill .....	9,980
South Coogee .....	3,300
Mandurah .....	33,000
Lesmurdie-Kalamunda-Bickley .....	6,000
Coastal plains north of Perth .....	37,500
<b>Total .....</b>	<b>147,780</b>

All the above fires occurred in the South-West Land Division and the area burnt by them amounts to practically one million acres.

In the following pages a description is given of the origin and development of each of these fires and the action taken to prevent their outbreak and spread and to protect life and property.

It was not possible to exhaustively examine all the factors associated with these fires, but many hundreds of working hours have gone into the analysis of the information available, and these detailed reports should form a most valuable record for Forest Departments, fire-fighting organisations and students of fire control.

#### THE CHITTERING BUSH FIRE.

The following findings with relation to a fire which commenced in the Chittering district on or about the 15th day of December, 1960, are based on the evidence of witnesses and a general examination of the scene of the fire.

#### 1. Cause and Origin and Measures Taken to Prevent the Outbreak.

The cause of the fire could not be definitely ascertained but the owner of Avon Location M2061 is believed to have had some stumps and logs burning on his property early in December and it appears likely that the fire escaped from this area sometime on *Tuesday, 13th December*, under the influence of a strong south-westerly wind. Inflammable material had been cleared from around the stumps and logs.

#### 2. Development of the Fire and Measures Taken to Prevent its Spread and to Protect Life and Property.

*Wednesday, 14th December.*—The wind changed to a strong wind from the south-east and the fire moved from the eastern side of location M2061 across Keating Road to the west. The owner of location M2061 and an employee endeavoured to bring the fire under control that night but about 5 p.m. on *Thursday, 15th December*, the property owner had to call on the local fire control officer for assistance.

The fire was inspected that evening. It had a front of approximately half a mile on the eastern side of Keating Road and a front of about three miles on the western side of the road. It was burning with moderate intensity and was travelling westward through timber land towards pasture country.

*Friday, 16th December.*—A party of bush fire brigade members brought the western face of the fire under control that night. Little or no attempt was made to control that part of the fire east of Keating Road which had by that time burnt into the Avon Military Training Centre. During the next few days the fire burnt slowly in a generally north-easterly direction.

*Wednesday, 21st December.*—Under the influence of a strong easterly wind the southern end of the fire on the military land moved westwards during the night and crossed Keating Road to re-enter location M2061.

*Thursday, 22nd December.*—Chittering Bush Fire Brigade members brought this portion of the fire under control by night-fall but again took no action against the fire on the east and now south sides of Keating Road.

*Saturday, 24th December.*—One sector of this fire reached the eastern and southern side of W. Bush's property and was close to Yossi's property. Bush fire brigade members worked on it during the nights of 24th and 25th December.

*Monday, 26th December.*—This sector was brought under control early in the morning when rain fell.

No attempt was made to bring the remainder of the fire under control though it was known to have crossed to the west of the road to "Moondyne" as early as *Thursday, 22nd December*.

*Tuesday, 27th December.*—Aerial reconnaissance revealed that all edges of the fire were dormant except for a headfire burning on a face of about 60 chains from one to one-and-a-half miles east of the properties of Beale and Bantock. Another headfire was burning towards the Avon River about three miles west of Bald Hill.

*Sunday, 1st January.*—About 9 a.m. the fire began to burn down the escarpment into the Chittering Valley. It was decided that as it was burning downhill and in sparse fuel there would be no danger before 6 p.m.

About 11 a.m. burning embers blew across the valley to the west and started a fire in the south-eastern corner of location 4 near the main road. This fire spread rapidly in a north-westerly direction through pasture. One man was at the fire within two or three minutes, but additional help did not arrive for 15-20 minutes, by which time the fire was burning rapidly uphill and out of control. Large numbers of bush fire brigade members attacked the fire and had it under control by late evening. It had burnt approximately one and three-quarter miles.

Meantime the fire on the east had continued to burn slowly and about 6 p.m. about 20 men began to try and control the north-western tongue of this fire, but on account of the rough terrain were not successful.

*Monday, 2nd January.*—About 9 a.m. a party of Army personnel arrived in the area. A fire headquarters was set up on the property of Beale. The local bush fire control officer and the officer-in-charge of the Army unit made a reconnaissance. It was found that a fire had been lit around "Moondyne" to protect it against the southern flank of the main fire which was burning gradually towards that property. About noon the fire which had been lit at "Moondyne" began to make rapid progress under the influence of a moderate to fresh east north-east to east south-east wind. The fire was very intense and was throwing embers and lighting up about half a mile ahead. A counterburn was commenced in a southerly direction from Plunkett's Road to contain the south-west flank of this fire. A second counterburn was commenced from near the main road in location 1382 southwards to Plunkett's Road and a third one northwards to contain the fire burning towards locations 9, 10 and 18. This operation was completed about midnight.

*Tuesday, 3rd January.*—A counterfire was burnt along the eastern and southern boundaries of locations 5, 6, 7, 8 and M895 to contain the north-western section of the main fire. This brought the entire western face of the Chittering fire under control.

The eastern and northern fronts were brought under control by various brigades from the Toodyay Shire.

### 3. Conclusions.

This fire would probably not have started if a fire had not been burning unlawfully on location M2061 during December. The fire could however, have been brought under control on the 16th December if the one mile of front to the east of Keating Road had been attacked after the western sector was brought under control that day. The equipment of the bush fire brigades in the district is designed for the control of fires in open grass paddocks rather than in hilly timbered country. In the circumstances, it was much easier for the bush fire brigades to wait until the fire came out to the edge of the forested area before attacking it. Had it been attacked and brought under control on 16th December,

which was feasible, damage to pasture land, the development of a highly dangerous situation and a great expenditure of manpower on fighting the fire at a later stage would have been avoided.

There are grounds for some suspicion that in the early stages it might have been considered good policy to allow the fire to burn on the military training area to provide a safeguard for the valley bottom properties over the next few years. In a normal summer there would have been a reasonable chance that such a fire would have burnt quietly for a period and then been extinguished by rain. Unfortunately the 1960-61 summer was not a normal one.

The Army had planned to protectively burn the area in the spring of 1960. Unfortunately again this did not prove practicable. The shire councils concerned should each year in future request the Army to establish and maintain a reasonable system of protection over this area. The timber cover on the area is light, numerous access tracks exist and little or no trouble should be experienced in protectively burning a large proportion of the area at least once every four or five years. In some years it might be necessary for the Toodyay Shire to delay the commencement of the prohibited period over this area, or it might even be necessary to ask the Minister to postpone the commencing date over it to as late as 1st December, to enable spring burning to be carried out on it.

The area burnt in the fire was 31,800 acres of which approximately 17,000 acres were in the Avon Military Training Centre and the remainder private property including leased land. The private land burnt included 2,000 acres of pasture. The total damage to fences, orchard trees, pasture and timber was about £7,000. The cost of suppression including value of man hours spent would also be about £7,000.

### THE GIDGEGANNUP BUSH FIRE.

The following findings with relation to the fire which commenced at Gidgegannup on or about the 25th day of February, 1961, are based upon an examination of the evidence collected by the Police Department and presented at a Coronial Inquiry, as well as upon evidence given to the Commission by witnesses and a general examination of the scene of the fire.

#### 1. Cause and Origin and Measures Taken to Prevent the Outbreak.

About 5 p.m. on Saturday, 25th February, 1961, lightning struck a dead ring-barked jarrah tree on Swan location 1317. The crown of the tree began to burn. The tree was felled the following day by direction of the landowner on the advice of the local bush fire control officer. The fire was not then extinguished by the landowner as required under the Bush Fires Act, but on the contrary was permitted to burn other logs and fallen tree-tops in the vicinity. These continued to burn for several days.



## 2. Development of the Fire and Measures Taken to Prevent its Spread and to Protect Life and Property.

*Wednesday, 1st March.*—About 12.35 p.m. under very strong easterly winds and dangerous weather conditions, a spark or burning ember from these smouldering fires ignited dry grass and a fire began to spread rapidly in a west south-westerly direction. The headfire passed Reserve Road about 2.45 p.m., Reen Road about 3.20 p.m. and O'Brien Road about 4.30 p.m.

As the fire was approaching O'Brien Road a bush fire control officer of the Swan-Guildford Shire and volunteers attempted to counter burn from the eastern side of the road. Shortly afterwards, however, the fire jumped to the western side of O'Brien Road a short distance south of the counter fire and continued to burn in a west south-westerly direction. It is not clear whether this new headfire came from the counter fire or from the main headfire, which at that stage was some 70 chains to the east. At 4.15 p.m., the new head-fire entered the property of Cousins and by 5 p.m. was nearing his western boundary. About 5 p.m. the rate of spread of the fire commenced to slacken. By 8 p.m. the fire had reached the property of Shannell and by 10 p.m. was through to the western side of that property and commencing to burn down the Darling Range escarpment.

About this time, bush fire brigades from the Herne Hill-Baskerville area commenced to counter burn along a line from Haddrill Road to the property of Bell Bros. About 11 p.m., this counter fire met the headfire and local bush fire brigades then fought the fire progressively southwards during the night as it came on to the edge of the plain country.

*Thursday, 2nd March.*—By 6 a.m. the fire had spread southwards across Susannah Brook. By 11 a.m. it had entered the property of Messrs. Burgess and Morris and by noon had reached Camperic Road. Local bush fire brigades held the fire along Camperic Road and protected improved pasture lands for some distance up Susannah Brook, except for a minor breakaway.

The general fire position around 2 p.m. on Thursday, 2nd March, was that the headfire was being safely held on the edge of the foothills bordering the Swan vineyard belt and the northern face was generally safe as it was burning very slowly in light two-year-old fuel.

The southern face was in a dangerous condition with two sections still burning southwards towards Toodyay Road. One of these was the area west of O'Brien Road and the other was a section east of Gidgegannup. If the wind had changed to a northerly, this whole face could have broken across Toodyay Road and threatened more populated areas to the south. Bush fire brigades brought the fire east of Gidgegannup under temporary control.

About 5.30 p.m. a counter burn from Camperic Road was commenced. The burn proceeded slowly as care had to be exercised in the severe weather conditions and in protecting holdings and unoccupied buildings.

*Friday, 3rd March.*—During the early hours of the morning, the fire continued in a very slow side spread. After midnight the wind commenced to back northerly and by 4 a.m. was blowing from the north-east causing trouble with the counter burn and carrying burning embers across the Toodyay Road on to unburnt ground on the south side. These outbreaks were quickly extinguished. By 5 a.m. the counter burning had reached a point one-half to three-quarters of a mile west of O'Brien Road and a further counter burn was run north from here to Burgess Road. This burn was mainly carried out by the Clackline Bush Fire Brigade who did excellent work in strange country. It was completed about 9 a.m., making the south-western sector reasonably safe.

The wind then commenced to rise and by 11 a.m. was blowing from the north north-east. About 9 a.m. a dangerous breakaway occurred in the weakly-held counter burn east of Gidgegannup. Thirty to forty additional men were diverted to this front and by midday, it was safely held on Toodyay Road. The entire perimeter was now held.

About 4.15 p.m. the wind changed suddenly from a north north-easterly direction to a westerly and a breakaway occurred on the northern edge of the fire between Reserve Road and Reen Road. Local bush fire brigades commenced a counter burn along Reserve Road to Wooroloo Brook, down the brook and back along Reen Road, a distance of some five miles.

*Saturday, 4th March.*—By 2 a.m. the counter burn was completed and the breakaway contained. By 2.30 a.m. all outside personnel had left the area and mopping up and patrol were left to local bush fire brigades. Between 5 a.m. and 8 a.m., bush fire wardens made an inspection of the area and planned future patrols by the local bush fire brigades. Control of the fire was then left with the Swan-Guildford Shire.

## 3. Conclusions.

On *Wednesday, 1st March*, from 12.40 p.m. until after noon on *Thursday, 2nd March*, the fire made its major advance and did most damage to property. The major work of suppressing the fire, which took place during this time, was handled by fire control officers and bush fire brigades of the Swan-Guildford Shire.

From about 3.30 a.m. on *Thursday, 2nd March* the State Emergency Service became involved and an emergency headquarters was set up at Midland Junction under Inspector Croker of the Police Department. At 10 a.m. that morning, a bush fire emergency period was declared and the Minister for Lands and Forests appointed the Chairman of the Bush Fires Board to take charge of bush-fire

fighting operations in the area. At the Chairman's request, the Forests Department made an officer available to assist with operational duties at Midland Junction and the Bush Fires Board made two wardens available. The State Emergency Service organised additional manpower from the Armed Services and petrol tankers from the petrol companies. The Bush Fires Board organised the assistance of bush fire brigades from other centres. The equipment and men from outside the fire area were used to advantage in counter burning operations and on patrol.

A remarkable feature of this fire was that the wind blew steadily from the east north-east for a period of 42 hours. This allowed little side spread of the fire and enabled the southern flank to be controlled fairly quickly. If the wind direction had changed to a northerly during early Thursday morning, the fire may have crossed Toodyay Road and threatened heavily populated areas along the Great Eastern Highway.

An area of 18,250 acres was burnt and damage to buildings, fencing, pasture, stock and timber was estimated to be in the order of £13,600. A conservative estimate of suppressing the fire is £6,000.

The fire could undoubtedly have been avoided if the burning tree on Swan location 1317 had been extinguished when it was felled on 26th February.

#### DWELLINGUP BUSH FIRES.

The findings regarding the Dwellingup bush fires which commenced in the Dwellingup district on or about the 19th day of January, 1961, are based upon evidence presented by witnesses and a detailed analysis and examination of all the circumstances associated with the fire.

The Commission was fortunate in that the Technical Assistant was at the scene of the fire very shortly after its occurrence, as Research Officer in Fire Control with the Commonwealth Forestry and Timber Bureau. He made a particularly close study of the weather and other factors associated with its origin and spread, and its hour by hour development as well as of the operations associated with its control and ultimate suppression. It is therefore possible to describe this fire in the considerable detail which it is believed its importance justifies.

#### 1. Cause and Origin and Measures Taken to Prevent the Outbreak.

The Dwellingup State forest area in which the Dwellingup fires occurred on or about the 19th day of January, 1961, is an area of prime jarrah forest in the Darling Ranges about 50 miles south of Perth, which has been under forest management since about 1918.

Portions of the forest in the Dwellingup district were heavily cut over between 30 and 40 years ago and carry fine stands of jarrah

regrowth. From about 1925 onwards, the major portion of this area was protected from fire by the provision of fire detection lookout towers, gangs of trained and well-equipped firefighters, telephonic and radio communication systems, regularly burnt firebreaks around areas of 500 acres or so and by protective burning each year in the lower quality forest area surrounding the prime forest area. Over recent years, the proportion of the area receiving complete protection has been progressively reduced and a system of compartment burning introduced. Nevertheless, when the 1960-61 fire season opened, there were still compartments which had not been burnt over for some 25 to 30 years. Some of these were reserved from fire for the protection of regeneration and others for purposes of scientific research. Except for these long-protected compartments, most of the forest in the Dwellingup division had been controlled burnt in recent years, and the litter on various parts of the forest represented accumulations generally speaking, of from 0 to 3 years.

On Thursday, 19th January, 1961, between 5.30 p.m. and 6 p.m., ten fires started from lightning strikes in the State forests along the Darling Ranges within 12-15 miles of Dwellingup. A further nine fires started from lightning strikes in the same vicinity the following day, Friday, 20th January, between 9 p.m. and 10 p.m. Rain which accompanied both thunderstorms probably extinguished a further number of other ignition points, but it also had an adverse effect in that some of the fires which were not extinguished remained dormant until the following day and then commenced to burn under severe conditions. In such circumstances they developed much more rapidly and were much more difficult to handle than if they had broken out at the time of the first ignition.

The following table lists the time each strike occurred and the time of its detection:—

Fire Name	Fire No.	Time and Date of Origin	Time and Date of Detection
Kennedy 10	1	6.00 p.m., 19th Jan.	6.30 p.m., 19th Jan.
Kennedy 6	2	6.00 p.m., 19th Jan.	6.30 p.m., 19th Jan.
Wells 7 (A)	3	6.00 p.m., 19th Jan.	6.30 p.m., 19th Jan.
Wells 7 (B)	4	6.00 p.m., 19th Jan.	6.30 p.m., 19th Jan.
Location 526	5	6.00 p.m., 19th Jan.	6.30 p.m., 19th Jan.
Duncan 6	6	6.00 p.m., 19th Jan.	6.30 p.m., 19th Jan.
Bristol Tank	7	6.00 p.m., 19th Jan.	5.15 a.m., 20th Jan.
Cameron West	8	6.00 p.m., 19th Jan.	8.00 a.m., 20th Jan.
Boonerring	9	6.00 p.m., 19th Jan.	12.40 p.m., 20th Jan.
Torrens	10	6.00 p.m., 19th Jan.	1.15 p.m., 20th Jan.
Cameron East	11	9.30 p.m., 20th Jan.	9.55 p.m., 20th Jan.
Urbae	12	9.30 p.m., 20th Jan.	10.15 p.m., 20th Jan.
Whittaker	13	9.30 p.m., 20th Jan.	11.00 p.m., 20th Jan.
Huntley	14	9.30 p.m., 20th Jan.	10.00 p.m., 20th Jan.
Marrinup	15	9.30 p.m., 20th Jan.	9.30 a.m., 21st Jan.
Scott	16	9.30 p.m., 20th Jan.	10.05 a.m., 21st Jan.
Oakley Brook	17	9.30 p.m., 20th Jan.	11.00 a.m., 21st Jan.
White	18	9.30 p.m., 20th Jan.	11.00 a.m., 21st Jan.
Windsor	19	9.30 p.m., 20th Jan.	5.30 a.m., 23rd Jan.

Fire 10, which became known as the Torrens fire, was detected at 1.15 p.m. the day following its origin. It began to burn and spread fiercely as soon as it became active and the whole Dwellingup fire can be said to have originated from this point.

## 2. Development of the Fires and Measures Taken to Prevent their Spread and to Protect Life and Property.

*Thursday, 19th January.*—Maximum temperature 104 degrees F., minimum relative humidity 15 per cent., wind 10 to 14 m.p.h.

At 6.30 p.m. Wells lookout tower reported six fires. Gangs which had been alerted as soon as the lightning storm developed were immediately despatched to deal with them. Fires 1, 2, 5 and 6 were located and brought under control that night. Fires 3 and 4 could not be located that night as they had been damped down by rain.

*Friday, 20th January.*—Maximum temperature 106 degrees F., minimum relative humidity 13 per cent., wind 15 m.p.h.

At 5.15 a.m. fire 7 was reported. At 6 a.m. a gang was despatched to it and had it under control by 11 a.m. At 8 a.m. fire 8 was reported and a gang immediately despatched to it. It was brought under control by 6.30 p.m.

At 12.30 p.m. fire 3 was found and brought under control. About the same time fire 4 became active and was located, but gained momentum so quickly that it could not be controlled by the initial attack force. It developed into the Wells fire to be discussed later.

At 12.40 p.m. fire 9 was reported and at 12.45 p.m. a gang was despatched to it. The gang arrived at the fire at 1.30 p.m. and found it burning strongly. Additional men and equipment were made available from other less threatening fires but it was not rendered safe until 6 p.m. on Saturday, 21st January.

At 1.15 p.m. fire 10—the Torrens fire—was reported. At that time all gangs in the Dwellingup area were committed to other fires and only one officer and one man were available for despatch to this fire. At 1.40 p.m. the fire was found in a swamp where it was reaching into the tops of the trees and throwing burning material so that there were actually a series of small fires covering about ten acres. At 1.50 p.m. a "D4" bulldozer and an aqua-truck unit was despatched to assist in the attack on this fire. At 2.30 p.m. Dwellingup divisional forest headquarters requested urgent assistance from adjoining forest divisions. At 2.40 p.m. the headfire was 40 chains from the point of origin and making rapid progress. At 3.30 p.m. men and equipment began to arrive and started attacking the tail and flanks of the fire. By 6 p.m. the headfire had travelled four miles and was spotting heavily.

At 7 p.m. a jumpover from this fire was reported in Myara 7, six miles from the point of origin of the main fire and two miles in front of the headfire. This fire advanced about a mile and then threw a spot fire three-quarters of a mile to the south-west around Marshall's locations 104 and 96.

Between 9 p.m. and 10 p.m. a massive thunderstorm developed and the wind changed to a north-easterly. Numerous jumpovers occurred and the southern face of the main fire spread rapidly in a south-westerly direction. This thunderstorm caused further lightning fires and three of them commenced to burn strongly in Whittaker 6, Urbrae 2 and Urbrae 3 near the junction of Wren Road and Seven Mile Road.

By 4.35 p.m. the separate Wells fire had spread about 60 chains in a north-easterly direction. At 5 p.m. a grader was made available. About 7 p.m., 16 additional men with heavy-duty equipment and a "TD6" bulldozer arrived at the fire. By midnight it had covered 310 acres.

Men were still working on fires 8 and 9.

*Saturday, 21st January.*—Maximum temperature 103 degrees F., minimum relative humidity 20%, wind 5 to 15 m.p.h.

In the early hours of the morning a reconnaissance was made of the edge of Torrens fire. As the position on the southern face was confused due to new lightning fires, it was decided to concentrate the suppression action on the northern face.

At 6 a.m. the general position was assessed as follows:—

- (i) The fire from Myara (7) had moved down the escarpment of the Darling Ranges and was threatening pasture lands just east of North Dandalup.
- (ii) The lightning fire from Whittaker 6 had also moved rapidly down the escarpment and at 4 a.m. a narrow tongue from it had reached the South Dandalup River at Fairbridge Farm School.
- (iii) The lightning fire from Urbrae 2 had crossed the Huntley Road and burnt into Turner 1.
- (iv) The lightning fire from Urbrae 3 had moved down Wren Road and crossed Observatory Road.
- (v) New fires were reported from Wilson, White, O'Neil and Cameron blocks. These had also ignited during the thunderstorm of the previous evening and it is probable that others were quickly engulfed in the main fire.

This fresh crop of lightning fires outflanked all the work done on the south face of the Torrens fire during the previous night. All gangs in this area were then recalled to Dwellingup for regrouping.

At 9 a.m. fire 15 was reported in Marrinup block. Gangs were immediately despatched to attack it but the fire could not be located until around 11 a.m. owing to poor visibility and slow burning conditions. While searching for it, however, another fire was found and suppressed between 10 a.m. and 11 a.m. on private property near Oakley Brook.

About 11 a.m. the wind changed to a strong west to south-westerly and the entire northern face of the Torrens fire broke away at various points and began a massive spread to the north and north-east. All gangs and equipment on this front were withdrawn and owing to access roads having been cut, had to return to Dwellingup via Jarrahdale, Serpentine and the Bunbury Road. They did not reach Dwellingup until 5.30 p.m.

The south-westerly change had also blown up fire 15 (Marrinup) which was only four miles north-west of Dwellingup. All available gangs were directed towards controlling the eastern and southern flanks of this fire as the western flank was being held by recently controlled burnt country and the northwards moving headfire was running towards country burnt by the Torrens fire.

By nightfall there was a very extensive area of running fire from Marrinup in the south-west to Boonerring in the north-east, a distance of some 19 miles and from Boonerring north through O'Neil, Clinton, and Myara blocks to North Dandalup in the north-west.

During the day bush fire brigades on the western side commenced counter fires to prevent the spread of the fire into highly-improved coastal country. At 8 a.m. a counter fire was commenced from the School Road southwards to Fairbridge Farm School to stop the two heads of fire coming down the escarpment. This counter fire generally covered the area between the North and South Dandalup Rivers.

Between 4 p.m. and midnight a second counter fire was lit from the South Dandalup River southwards to Woolheads Road about one mile north-east of Meelon Siding. The burn was carried out with a south-west wind which rapidly took the counter fire up the escarpment. The move to light this counter fire arose from the sight of large volumes of smoke from the Marrinup fire some four miles to the east. It is considered that the action was premature and that the counter fire was unnecessary as there was a large belt of recently control burnt country between the outer edge of the Marrinup fire and the escarpment which the Marrinup fire never burnt through. However, as the general fire position was obscure on all fronts, the action taken in this instance by the bush fire control officers concerned may have appeared reasonable and they did establish a sound line of defence.

The southern face of the fire was considered the most critical as north to north-easterly winds were expected and townships and large areas of managed forest areas lay to the south, whereas to the north the country had been extensively control burnt and the Serpentine dam clearing would act as a firebreak. It was envisaged that the fire might be held along the North East Road from Dwellingup to the Albany Highway by counter firing during the night.

By midnight some 70,500 acres had been burnt and the fire perimeter exceeded 85 miles.

The Wells fire had been brought under control in the morning after burning nearly 600 acres. At that time there were 22 men at the fire and four men engaged with chain power saws felling burning trees. A little after 10 a.m. a breakaway occurred on the eastern side and, at 10.30 a.m., another on the northern side. A strong westerly wind was blowing and the headfire was spotting 20 to 40 chains ahead.

After a quick reconnaissance, a gang of eight men commenced a counter fire along Telephone Road, on the southern face of the fire. At 8.30 a.m. another gang from the western side of the fire arrived to assist them. At 10 p.m. one gang left to rest and the burn was controlled with eight men from Nanga Brook. A little after 11 p.m., light showers prevented further counter burning for a couple of hours. The burn was then continued with two bulldozers clearing a trail. By midnight, 1,600 acres had been burnt and the perimeter of the fire was 800 chains.

*Sunday, 22nd January.*—Maximum temperature 100 degrees F., minimum relative humidity 20%, winds 5 to 15 m.p.h.

Weather conditions eased over night with some light showers of rain in the early morning and the establishment of a fire line along the south of the fire face began from Marrinup through to the north of Banksiadale and then south and east back on to the north-east road, a total distance of 21 miles. A reconnaissance of the northern face showed that in most sections the fire was burning slowly.

From midday, weather conditions worsened rapidly under the influence of a south to south-east wind and the north face of the fire became active in various sectors. One tongue moved north-west through private property blocks around Bell's location 496 and was burning strongly between 4 p.m. and 6 p.m. A second head travelled north across Karnet Road shortly after 6 p.m. and spotted across Snake Brook into Karnet 5. A third head crossed the Karnet Road into Karnet 2.

That evening a counter fire was begun from the junction of Spencers Road and Karnet Road along Spencers Road then south-west to Skinner's location 600 and around the southern boundary of that property. Early in the morning counter fire operations were begun from the Serpentine dam clearing on Big Brook south along O'Neil Brook Road. Before it could be completed, the fire crossed O'Neil Brook and another counter fire was commenced along tracks between O'Neil Brook Road and Windsor Road. By midnight the burn had been carried southwards to within one mile of the North East Road. During the afternoon the discovery of a large lightning fire in the Glen-eagle division resulted in men and equipment who had been working on the O'Neil sector being withdrawn.

On the western front along the Darling Range escarpment, a counter fire was being carried out by local fire control officers. The extreme southern end of the previous day's counter burn along the escarpment necessitated local bush fire brigades burning north-east along the road to Woolhead's location 446 in order to stop the south-easterly run of the first counter fire and protect buildings. This counter fire gave considerable trouble and the bush fire brigades were reinforced by some forestry personnel. The line was extended down to Oakley Brook on the following day.

Further north a counter fire was commenced along Palmers Road (40 mile), north of Olners' location 460 and extended down the road for a distance of about three miles. The purpose of this was to box in the head of the fire which had already burnt through Bell's location 496. This counter fire was still proceeding at midnight.

The total area burnt to that time was 113,200 acres and fire perimeter was in excess of 100 miles. Approximately 60 miles of fire edge were being held of which about 36 miles were held by Forests Department personnel and 24 miles along the western foothills of the escarpment by bush fire brigades.

At the Wells fire the counter fire had been continued around the northern edge of the fire and completed by 5 a.m. At this stage, approximately 2,500 acres had been burnt. About 1 p.m. the fire broke away again on the northern face under a south-westerly wind. Another counter fire was commenced to contain this fire. This work was completed by 8 p.m., but a spot fire had started from it about 7.50 p.m. and this was brought under control with trailing by bulldozer at 10.20 p.m. At 10 p.m. the fire had covered 3,200 acres and the perimeter of the fire was 900 chains.

*Monday, 23rd January.*—Maximum temperature 100 degrees F., minimum relative humidity 32%, wind 7 to 15 m.p.h.

With somewhat milder weather conditions good progress was made in mopping up operations and a considerable length of the perimeter was brought under control. The only parts giving trouble were the north-eastern sector in O'Neil block where the counter fire, established the previous evening, had broken away in various places.

By nightfall a reasonably stable line was held along the southern face of the main fire from the Darling Range escarpment through Marrinup and Banksiadale to O'Neil Brook on the North East Road, a distance of over 30 miles.

On the western front the wind was blowing from the east and causing the coastal plain farmers considerable concern. The headfire which had burnt through Bell's location 496 the previous evening continued to burn in timbered land. Local brigades had commenced a burn down Palmers Road the previous evening. About 8 a.m. another burn was commenced from the north-west corner of Skinner's location 60 down Gobbin Road

(38 mile) and by midday had been linked across to the Palmers Road burn. Early in the morning the burn down Palmers Road had broken away south of Balgobin Brook. Fire control officers in the area were not prepared to control the breakaway except by a massive counter fire along the edge of the cleared pasture land at the base of the escarpment. This was carried out on Monday morning.

About 2 p.m. a breakaway occurred in Kar-net 5 with a strong south-easterly wind. Volunteer fire-fighters under Forests Department control immediately began counter firing northwards along the 34 mile road. About 7 p.m. this counter fire had been carried as far as a swamp about one and one-quarter miles north of Spencers Road. Between 7 p.m. and 8 p.m. the east south-east wind drove a fast-moving tongue of fire up the swamp and the counter fire broke across the 34 mile road and moved westwards towards the edge of the escarpment. In view of this, the volunteer forces and Forests Department personnel were withdrawn to the Bunbury Road.

About this time a lot of confusion prevailed amongst fire control officers with regard to the location of the fire and the best course to pursue. Experienced fire-fighting personnel, after a reconnaissance considered that there should be no trouble in controlling the fire. About 9 p.m., however, fire control officers commenced a counter fire along the edge of pasture land from Palmers Road northwards. This action had serious implications as it could burn out several small farmers located on the escarpment. The operation was still proceeding at midnight.

At the Wells fire, mopping up continued during the early hours of the morning. By 10 a.m. there were 40 men at the fire, six chain saws, a "D4" bulldozer and two heavy duty pumpers. At 9.15 a.m. the western side of the fire broke away under a strong easterly wind. At 10.30 a.m. a breakaway occurred on the northern side. This was confined to a relatively small area and controlled by 8 p.m.

The breakaway on the western side crossed Pindalup Road and advanced two-and-a-half miles under an east-south-easterly wind. About midnight it was stopped in recently controlled burnt bush. It had spotted heavily ahead but the resulting numerous spot fires were in light country and not making much progress. By midnight, 5,120 acres had been burnt and the perimeter of the fire was 1,300 chains.

*Tuesday, 24th January.* Maximum temperature 106 degrees Fahrenheit, minimum relative humidity 14 per cent., winds 12 to 70 miles per hour.

About 11 a.m. the wind changed suddenly to the north-west at about 23 miles per hour and the day proved to be the culmination of an extended period of extreme fire danger. It resulted in a massive southerly spread of the fire and heavy damage in townships of Dwellingup, Holyoake and Nanga Brook. The happenings of the day will be clearer if the fire is treated in sections.



#### North-Western Section.

The counter fire commenced by local fire control officers on Palmers Road the previous night was carried along the edge of the foothills and up the 36 Mile Road. Extreme difficulty was experienced in establishing this line as the wind was blowing strongly from the east and setting up extremely turbulent conditions on the lee side of the escarpment. As a result whirlwinds were carrying rolling flames back down the hill.

About 5 a.m. a breakaway occurred about half a mile south of the 36 mile junction and carried the fire into pasture land on the western side of the Bunbury Highway. Fortunately a heavy concentration of men and pumper equipment were on the spot and the fire was stopped on the railway line some 30 chains to the west.

About 7 a.m. the wind started to back north-west and the burn was carried quickly up the 36-mile road to a little south of location 1166. Between 10 a.m. and 11 a.m. the wind direction changed to a strong north-westerly and the whole face of the backburn funnelled up Dirk Brook towards the farms of Skinner and Fawcett. It caused heavy pasture losses and seriously endangered homes, stock and lives. Up to this point most of the burning carried out along the edge of the escarpment had been sound in principle and reasonably well executed. The burn between the 34 and 36 mile road was ill-advised and executed without adequate examination and consideration of the position.

Later in the morning, suppression on the fire edge north of the 36 mile road was completed down to the Serpentine dam.

#### North Eastern Section.

Work was continued on the counter fire between O'Neil Brook Road and Windsor Road. About 2 a.m. a new fire was discovered east of Windsor Road. This made the 19th in the series of lightning fires. It probably originated during the storm on Friday, 20th January, and remained dormant until Monday, the 23rd. Heavy smoke prevented it being detected from the lookout towers.

At 5 a.m. it was decided to counter fire along the north-east road from O'Neil Brook to the Serpentine River to contain the new fire. By 11 a.m. the counter fire had nearly reached the Serpentine River when the winds changed to a fresh north-westerly and the counter fire broke away in several places and commenced to move southwards.

All forces in this sector were then withdrawn to Dwellingup but, owing to access being cut by fire in various places, they did not arrive until 4 p.m. The breakaway fires ran south and finally met the northern edge of the Wells fire sometime after midnight.

At the Wells fire, strenuous efforts had been made during the early hours of the day to make the western breakaway safe. Approximately 35 men were on this work from midnight to noon with two "TD6", one "D4" and one "D6" bulldozers and two heavy-duty pumpers. About 10 a.m. the overnight gangs

were relieved by about 60 fresh men many of whom, however, were not experienced fire-fighters. About 11 a.m. the southern front broke away and, from this time onwards, control of the Wells fire was lost.

Some of the men on the south side of the fire withdrew to Boddington and that afternoon the others returned to Dwellingup. The breakaway advanced down Pindalup Road under a north-west west wind until the wind backed to a west north-westerly and drove the fire eastwards. At about 8 p.m. the wind veered back to north north-easterly and the fire made rapid progress southwards on a face of over five miles.

Later that night the northern side of the Wells fire was joined by the head of the fire which had broken away from the main Dwellingup fire on the North East Road. This cut off the 35 men on the northern face, but they sheltered on burnt ground during the early hours of Wednesday and, after daybreak, cut their way down Pindalup Road to Dwellingup.

Southern Section.

The section from Marrinup to the North-east road had been under control for two days except for a minor breakaway the previous afternoon. The edge of the fire had been well mopped up and patrolled.

About noon the eastern edge of the Marrinup fire broke away into some one-year-old litter in Holmes 6, but was brought under control by 5 p.m. About 1.15 p.m. another breakaway occurred on the Back Huntley Road in Nowra 7 and commenced rapid high intensity spread in a south-easterly direction. By 2.15 p.m. it had crossed the South Dandalup River and spotted into Nowra 4 on the east side of the Banksiadale Road.

About 11 a.m. another breakaway had occurred near White Road further to the north-east. This head was being held, however, and when all forces were ordered to withdraw to Dwellingup. This fire probably broke away again between 1 p.m. and 2 p.m. and advanced through Cameron and Kennedy blocks.

At 1.30 p.m. the position was that breakaways had occurred at three widely separated points, Holmes 6, Nowra 7 and Scott 6. The first-named was being controlled in light litter but the two others were out of control and moving with high intensity. In view of his lack of precise knowledge of the various fire positions, the dangerous fire conditions existing and a forecast of strong north-westerly winds, the forest officer in charge of operations recalled all the personnel to Dwellingup, except those protecting Banksiadale, some 50 men on the Wells fire and the men attending the Marrinup breakaway on Holmes 6. It was intended to regroup the men at Dwellingup and prepare for a further attack during the night when conditions were expected to ease.

About 2 p.m. the Pinjarra police were advised of the situation and asked to notify all farmers west of Dwellingup of the dangerous situation existing. At 2.45 p.m. the

Boddington police were notified that fires in the Mt. Wells and north-east road areas were out of control and could threaten Boddington and the surrounding districts. They were urged to advise all persons in the path of the fire to evacuate.

The strong north-westerly wind continued until about 3 p.m. when it started to moderate but its direction was variable. At 4.50 p.m. a strong northerly gust occurred, then the wind backed to the west for a short period and then veered again to the north. This caused the various fires to spot ahead fairly long distances in many places and confused the situation even more.

By 6 p.m. all the gangs that had been recalled had returned to Dwellingup. At this stage there was a semi-circle of uncontrolled fire to the north of Dwellingup, while a tongue of headfire had crossed the Banksiadale Road and was threatening Holyoake. A considerable number of spot fires were burning independent of the main heads. All fires were moving southwards towards Dwellingup and Holyoake.

At 6.30 p.m. the forests officer in charge notified all residents of Holyoake of the danger and advised them to evacuate to Dwellingup. The patients from the Dwellingup Hospital were evacuated to Pinjarra some time after 6.30 p.m.

Between 8 p.m. and 8.30 p.m., the wind rose to gale force and the whole front of the fire to the north of Dwellingup began to spread rapidly and spot heavily ahead. Sheets of iron were blown from the roofs and verandahs in Dwellingup and burning debris began to shower over the town. Buildings were commencing to catch alight long before the advancing fire reached the outskirts. About 8.30 p.m., the Waroona police were in contact with the Dwellingup Telephone Exchange and were told that the Police Station had been burnt down, that many other buildings were alight and that all exits from the town were blocked. The line went out of action during the conversation. Despite valiant efforts by firefighters, all attempts to save the old divisional forestry buildings, sawmills, store, sheds and office were unsuccessful and these, together with some of the adjacent older houses were alight by 8.35 p.m. The hospital caught alight at 8.50 p.m.

The initial gust velocity of the wind which caused the damage was only 30 to 35 miles per hour and outside the fire area lasted only about 15 minutes. In the town of Dwellingup the force of the wind was estimated to reach in the vicinity of 60 and 70 miles per hour and it lasted for one-and-a-half to two hours. The wind which Dwellingup experienced was probably largely fire induced, due to large areas to the South of the town being mass ignited by spot fires and then burning very fiercely. A second strong burst of wind occurred a little after midnight and this coincided more or less with the burning of the Nanga Brook settlement some six-and-a-half miles to the south-east.

Once the fire reached Dwellingup, overall control of firefighting forces became virtually impossible and each unit or group undertook independent action to safeguard life and property in its own small sector. Families were taken to open ground at the oval, the school and the hotel parking area. Doors and windows were shut and inflammable material was moved from house gutters and from the area immediately surrounding the houses.

*Wednesday, 25th January.*—Maximum temperature 98 degrees F., Minimum relative humidity 26%.

The main headfire which had passed through Holyoake and Dwellingup continued to burn southwards during the early hours of the morning. About 12.30 a.m. the Nanga Brook settlement was destroyed. By 9 a.m. the headfire had reached some two-and-a-half to three miles south of Nanga Brook up the valley of the Murray River.

About this time a change to a strong westerly wind took this eastern side of the main fire due east with high intensity through the Swamp Oak and Yarragil Brook areas for a distance of four to five miles before it was extinguished by rain shortly after 4 p.m. Apparently this western change did not extend to the easterly edge of the fire around Wuraming and Tullis, where winds remained generally easterly and heavy rain commenced to fall between 1.30 p.m. and 2.30 p.m.

On the western side the main fire was held by recent controlled burnings along the top of the escarpment. Nevertheless, bush fire brigades in the Murray and Waroona Shires were extremely apprehensive and had commenced counter fires in various areas. The Murray Shire Brigade had proposed a massive counter fire along the edge of the cleared country below the escarpment but at the request of the police and forestry officers, delayed its commencement while the evacuation of families of firefighters from Dwellingup was proceeding. To assist in keeping the Dwellingup-Pinjarra Road open, the brigades burnt up both sides of that road to a point three miles west of Dwellingup and then proceeded to carry a counter fire north to Woolheads Road and south to the Murray River, a distance of seven miles.

This counter fire was not necessary as a distinct westerly change in wind direction took place about 9 a.m. and also because, as a result of recent protective burns at the top of the escarpment, the main fire would not have passed the escarpment over such distances and with such intensity that it could not have been brought under control. However, in view of the confusion which prevailed early in the morning, the action of the brigades can be justified.

It does appear, however, that insufficient thought was given to the location of the counter fire and that some unnecessary property losses occurred.

South of the Murray River, brigades in the Waroona Shire commenced to fight the southern face of the fire about 3 a.m. in the

morning, handling the section from a point near location 507 to the Murray River, a distance of some six miles. Forests Department gangs from the Harvey division handled the southern section eastwards across to near the Hotham River.

The south-eastern and eastern portions of the perimeters were handled very efficiently by brigades from the Boddington Shire. By the evening of Wednesday, 25th January, all running fire was stopped by heavy rain ranging from 50 points to 120 points.

### 3. Subsequent Suppression Action.

Rain which fell on the 25th and 26th January, 1961, temporarily extinguished all running fire, and a commencement was made on the huge task of constructing a firebreak around the southern and eastern edges. The entire southern face was consolidated by Forests Department gangs. The eastern side was handled by the Boddington Bush Fire Brigades until the Dwellingup Forestry Division organisation was sufficiently recovered to take over the eastern face on Tuesday, 1st February.

When hot, dry conditions returned on the weekend of 28th January, many dormant spot fires which had been thrown ahead by the main fire late on Tuesday, 24th January and early on Wednesday, 25th January, started up and had to be promptly suppressed. In the period to the 8th February, over 200 of these fires were dealt with.

Breakaways from the eastern front occurred on Saturday, 28th January, Sunday, 29th January and on Monday 30th January. These were controlled by the Boddington Bush Fire Brigades. Further outbreaks on Friday, 10th February and Saturday, 11th February were controlled by men of the Forests Department.

The rain which fell throughout Wednesday afternoon prevented the fire which passed through Dwellingup, from joining up with the Wells Fire. This resulted in a deep salient of unburnt country and a very long, ragged fire edge which was constantly breaking out away during the heat wave periods up to the 15th February. The area had eventually to be burnt in blocks whenever mild conditions obtained.

The huge perimeter of the fire could not be said to be under complete control until heavy rains fell in late March, as there was always the possibility of a new fire starting from the burning logs and stumps.

Owing to the excellent mopping up and patrol work done by the Forests Department men, no breakaways occurred during the very severe fire period which occurred in early March, 1961.

### 4. Conclusions.

The meteorological conditions which accompanied this fire were most severe but they were not necessarily more severe than have been experienced in the Dwellingup

district in the past. There have been drier pre-seasonable conditions and periods when temperatures were higher and humidities lower and periods when winds were as strong, if not stronger. Whether any past combination of these factors was as severe as in 1961 is not known. Early recognition of a meteorological situation conducive to dry thunderstorms and a suppression plan strong and flexible enough to deal effectively with at least 25 fires from one such storm are essential needs for the protection of the jarrah forests from fire.

Statements that the Forests Department does not carry out controlled burning in the Dwellingup forests are entirely without justification. The Department has control burnt extensive areas each year for the last 40 years and more than ever at the present day. At the present time about 10 per cent. of the forest in the district is being controlled burnt annually.

The efficiency of all forest officers, overseers and workmen engaged in this fire was of the highest order. This is no doubt due to the large amount of practical training and experience they receive in the annual controlled burning operations. The control which must be exercised in these operations ensures that the men develop safe and efficient practices.

The fact that no lives were lost in the critical situation which developed is in no small part due to their efficiency and to the qualities of leadership displayed by the officers in charge.

The courage, determination, tenacity and loyalty to the organisation displayed by all forests personnel is something which they and their Department has every reason to be very proud.

It was unavoidable that errors would be made and some weaknesses exposed under a strain so severe and of such duration. With this in mind, attention is drawn to the following points:—

(a) Insufficient provision had been made for reserve gangs and equipment to be available quickly enough. It is considered that arrangements should be made before the fire season commences for such reserves to be available from the local sawmills and bush fire brigades.

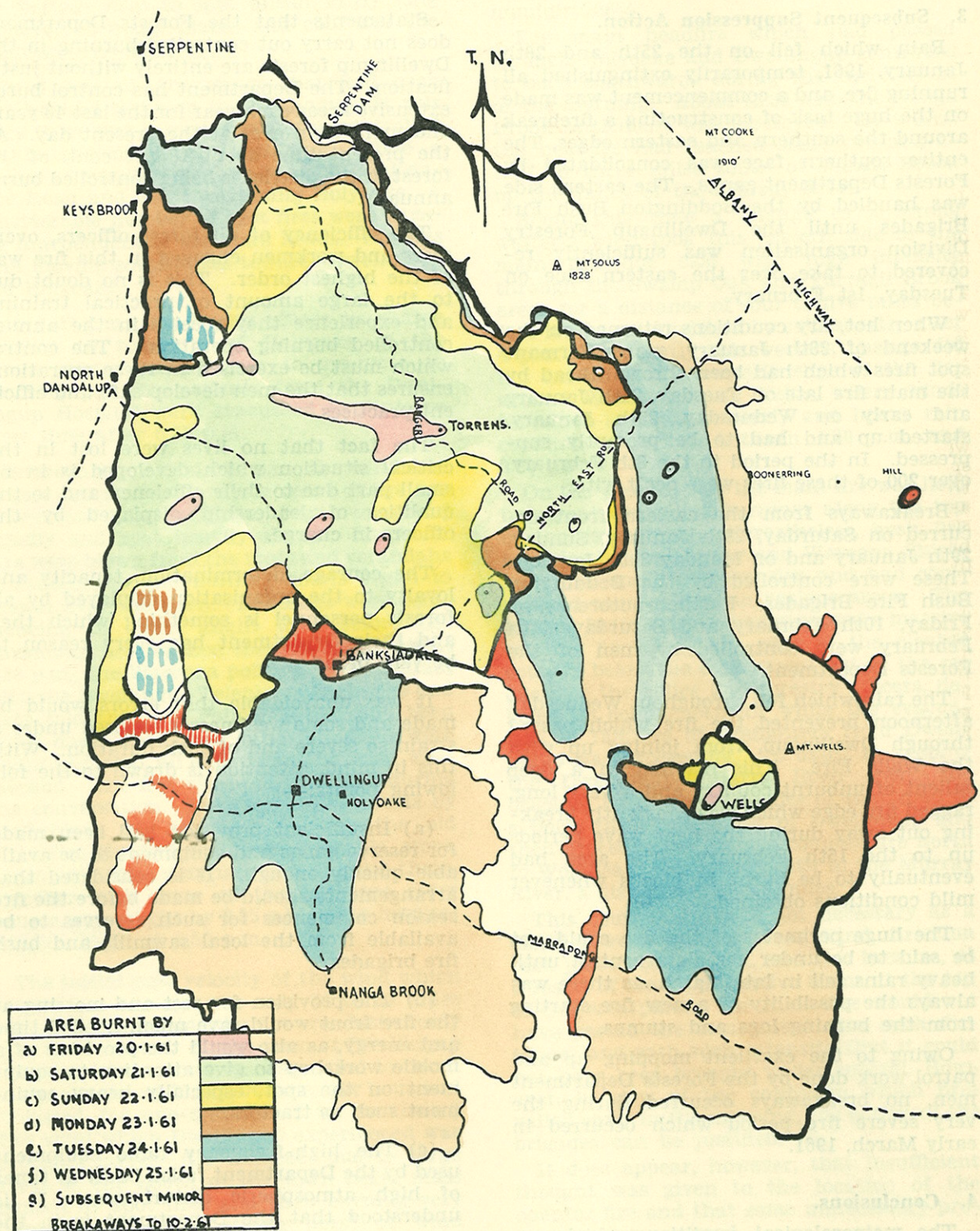
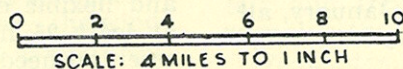
(b) The provision for rest and messing at the fire front would save much-needed time and energy, as also would the provision of a mobile workshop to give attention to equipment on the spot, especially heavy equipment such as tractors.

(c) The high-frequency radio equipment used by the Department failed badly at times of high atmospheric disturbances. It is understood that the Department is in the process of installing V.H.F. equipment with a view to adopting it generally for bush fire work if the initial installation proves successful.



# THE DWELLINGUP FIRES - JAN. 19-25 1961.

PLAN SHOWING  
FIRE PERIMETERS  
AT  
MIDNIGHT ON EACH DAY





(d) An auxiliary system of lookout towers is needed to cope with the reduced visibility resulting from the smoke when large fires occur. Special training for the tower men would also be advantageous.

(e) The construction of fire lines was carried out most effectively but unfortunately there was not always sufficient manpower present to hold the lines.

(f) Counter firing, one of the most difficult operations in fire control and particularly in forest country, was generally carried out efficiently, but occasionally counter fires were lit with insufficient time to enable the lines to be consolidated before burning conditions worsened. Sometimes the area between the counter fire line and the main fire was not completely burnt out and with worsening conditions the main fire again became active and advanced to a position where it could then throw burning material over the fire line.

Fire control operations by bush fire brigades on the western and eastern sides of the fire reflected the experience of the individual brigades in forest fire fighting. The bush fire brigades from Boddington Shire on the east were very efficient as their leaders and some of the members possessed previous forest experience and a knowledge of the country. On the western side of the fire, fire control officers and bush fire brigades as a whole had comparatively little knowledge of the country outside the cleared pasture land. Their main defence was to set a counter fire in the grasslands along the bottom of the escarpment and let the fire run up into the forest. This undoubtedly resulted in a much larger area of land being burnt at times than was warranted by the position of the main fire and the nature of the intervening country. It is desired to make it clear, however, that this does not apply to all the brigades and is not intended to reflect either upon the calibre of any of the men concerned or their devotion to their task. They had a most unwelcome job to do in a country to which many of them were unused and they did it to the best of their ability. Had conditions developed differently, everything that was done might have been fully justified. Some of the work of the western brigades was very well done. It is essential that bush fire brigades be formed by people living along the escarpment and who are naturally familiar with the forest country and forest firefighting.

Lack of co-operation and co-ordination between the Forest Department and the bush fire brigades was evident, as well as between the individual fire control officers and bush fire brigades. Action taken by one brigade at times forced an adjoining brigade into action which it did not consider necessary. Fire control officers from the pasture land at times lit fires against the advice of both the Forest Department and local residents who had a much better knowledge of the country. There is obviously a need for an amalgamation of all these interests including the Forests Department and the appointment

of group directors of fire control in the different districts to ensure co-ordinated action when a fire arises which would be beyond the capacity or field of an individual brigade.

The Dwellingup fire covered 361,000 acres. Damage to property, including the destruction of 132 dwellings, a district hospital, two sawmills, two service stations, three general stores, offices and other out-buildings and 74 motor vehicles, is estimated at about £500,000. Damage to pasture and forest probably brought the total to about one million pounds.

#### AUGUSTA-MARGARET RIVER BUSH FIRES.

The Augusta-Margaret River fires included the Karridale fire which commenced on or about 27th February, 1961. The findings given below are based upon evidence presented by witnesses, including a comprehensive report compiled by an officer of the Police Department, and a general examination by the Commission of the scenes of the fires.

Ten fires were involved, but in the case of two which occurred in the Augusta district during February, 1961, special investigations were not considered to be warranted. The spread and development of the Forest Grove-Karridale fire were examined in detail as this fire caused the heaviest property losses of the ten, as well as the near destruction of the village of Karridale. Other fires which occurred about the same time were investigated, but not in such detail. The fires investigated and the acreage burnt by each were:—

Forest Grove-Karridale — 1st-6th		Acres.
March, 1961	.....	60,400
Treeton—1st-6th March, 1961	.....	1,025
McLoughlin's—1st-6th March, 1961	.....	2,950
Marsh's—1st-6th March, 1961	.....	1,660
Cusack's—1st-6th March, 1961	.....	2,750
Bell's—1st-6th March, 1961	.....	13,200
Courtney—1st-6th March, 1961	.....	8,850
Rosa Brook—1st-6th March, 1961	.....	450
Flinders Bay-Augusta — February, 1961	.....	5,325
Scott River—February, 1961	.....	10,300
		<hr/> 106,910

In the case of two bush fires which occurred along the coast in the Augusta district in February, 1961, there is good reason to believe that they were lit by graziers seeking to encourage fresh growth for cattle grazing.

The bush fires which occurred in March, 1961, all escaped from burning-off operations by settlers. The fact that these burning-off fires were lit in the first instance is due to the failure of the authorities concerned to extend the prohibited burning time beyond the 26th February, despite the fact that there had been an unusually dry summer and that the forecast of fire danger for the south coastal meteorological division on the morning of the 26th was "average to severe" and in the afternoon "average to high" and also despite the presence of an intense tropical cyclone on the north and north-west coast

which was liable to bring strong, dry, northerly winds with resultant very severe bush fire weather throughout the west and south coastal areas.

Secondly, despite the indications of a possible worsening in fire danger conditions, those settlers wishing to make clearing burns lit their fires on the morning of Monday, 27th February, because the early morning forecast for that day mentioned the possibility of thunderstorms. They probably considered that if rain occurred it would reduce the severity and effectiveness of their fires. The worst happened and on Monday, the 1st March, the bush fire danger for the morning was broadcast as "severe to dangerous" with winds up to 40 miles per hour and in the afternoon, as well as for two days thereafter, the fire danger was forecast as "dangerous". The Minister declared a bush fire emergency period over the whole State at 11 a.m.

Thirdly, in several cases the settlers failed to maintain an adequate patrol over their fires until they were safe, with the result that on 1st March, when fire conditions suddenly worsened, the clearing fires became active and burning embers were blown into the surrounding country and the fires quickly became out of control.

Serious bush fires are not common in the far south-west of Western Australia. The previous serious bush fire season was in 1933, when almost identical meteorological conditions prevailed, although the fire weather conditions were much more severe than in 1961. Other disastrous fires have occurred in the district in the past.

#### FOREST GROVE-KARRIDALE FIRE

##### 1. Cause and Origin and Measures Taken to Prevent the Outbreak.

This fire undoubtedly arose from burning-off operations in Sussex location 2760 which had commenced about 9.30 a.m. on Monday, 27th February. At the time of lighting, three men were present at the fire and a firebreak had been made around the area to be burnt. However, the person lighting the fire did not have a permit to burn on that day and did not notify the Forests Officer of his intention to burn. On the day it was lit, only about the eastern third of the proposed area was burnt and all the men left the fire.

##### 2. Development of the Fire and Measures Taken to Prevent its Spread and Protect Life and Property.

*Wednesday, 1st March.*—With a rising wind and general worsening conditions, the fire commenced to extend. The owner of location 2760 attempted to light the western side of the area as a safeguard against the escape of the fire coming from the east. He stated in evidence that a tree caught alight, that burning material from this tree jumped his firebreak and that he was unable to extinguish the resultant spot fire or bring it under control. The brands may possibly have come from the backburn and not from the burning

tree. He then notified other property owners in the path of the fire and the Forests Department, of the escape.

The fire was driven in a general westerly direction through timber reserve 72/25 which had been burnt some four or five years previously. By midnight it had travelled 60 chains. During the evening an attempt was made to control the northern edge of the fire but no attempt was made to control the Southern edge.

*Thursday, 2nd March.*—Between 2 a.m. and 4 a.m., firebreaks were ploughed around various properties to the west as a protective measure. At 4 a.m. the forestry officer at Margaret River and the local bush fire brigade captain made a reconnaissance of the fire. It was found to have travelled 80 chains from the point of origin in a general south-westerly direction and to have a face of one-half to three-quarters of a mile. The rate of progress was about four chains per hour. The local landholders and Forests Department organised suppression forces and about 8 a.m. a counter fire was commenced from a forest track north of Mullins location 2713.

About 9 a.m. the main fire spotted over the counter fire and continued spreading in a south-westerly direction. The fire was advancing at a rate of about 15 chains per hour and spotting up to 20 chains ahead. Another counter fire was attempted from Bull Ant Drive but the fire was now advancing at about 35 chains per hour and about 11 a.m. it jumped that counter fire and burnt into semi-cleared and cleared private property to the south. The bulldozing of a break through pasture land on Vigas' location 1564 was then commenced, but the fire went around the break to the east before it could be cut off. About 11.30 a.m. reinforcements of local bush fire brigades arrived and portion of the fire was temporarily stopped in pasture land. It continued to spread south, however, in uncleared locations 3183 and 2714. Bush fire brigades and Forests Department personnel then gave their attention to saving private property east of the Bussell Highway.

Meantime the northern head of the fire was burning slowly through timbered country which had been protectively burnt in the spring of 1960. About 4 p.m. the wind changed to an easterly and the fire broke across Bussell Highway westwards into locations 1564 and 2710. About this time an aerial reconnaissance of the fire was undertaken by the Forests Department and the position of a number of fires burning in the district was plotted.

A north-westerly sea breeze then came in which slowed down the fire generally, but west of Bussell Highway the fire had a face of about a mile and with the possibility of the wind changing back to the east, constituted a threat to the State Forest land lying further west. The forest officer therefore decided to counter fire from a track some 30 chains south of McLeod Creek on the Bussell Highway and to carry the backburn in a north-westerly direction to cut across the head of

the fire. The burn was commenced about 6 p.m. and after about 100 chains, the track for the counter fire was continued by bulldozing. About 10 p.m., the sea breeze was replaced by a north-easterly land wind, causing the head of the fire to increase its rate of advance to about 15 chains per hour. This necessitated the swinging of the bulldozed track a little farther south.

*Friday, 3rd March.*—The counter fire was completed across to the W.A.G.R. line about 5 a.m. and was wholly successful.

A reserve gang of Forests Department employees had meanwhile been sent from Margaret River down the Caves Road to endeavour to contain the fire either along the railway line or along the road. Before they could do so, the fire had moved about three-quarters of a mile to the west of the railway line and was commencing to swing southwards as the wind began backing to the north.

The counter fire line from Bussell Highway to the railway line was successfully held but was already outflanked. A further attempt was made about 9 a.m. to stop the headfire by counter firing from an east-west track through the old pine plantation near Cass' mill, but the headfire was now advancing south at about 50 chains per hour and spotting far ahead and did not give sufficient time for the counter fire to be established. While this was going on, the Forests Department men on the Caves Road, together with farmers from the Forest Grove area, were controlling the fire back on to the Bussell Highway. About 10 a.m. the fire reached Antonovich's mill on the railway line at location 2704. Tracks had been bulldozed around the mill for its protection. The Forests Department men and equipment were then withdrawn to the north-east corner of Buller's location 1353 on Bussell Highway.

Another attempt was made to control the headfire with a counter fire along the north edge of this property. However the headfire was found to be already south of this line, some 40 chains west of the railway line and advancing at a rate of about one mile per hour.

East of Bussell Highway little or no attempt appears to have been made to control the southern face of the fire during the night and the fire had spread southwards through private property, and timbered country and had crossed McLeod Creek. About 7 a.m. the fire burnt into an extensive area of felled and windrowed timber. The windrows ran in a north-south direction along which the fire burnt fiercely and about 10 a.m. escaped southwards and formed a separate strongly burning headfire which travelled in a south-easterly direction down McLeod Creek.

The forest officer, following an appreciation of the situation, now decided that no attack on the headfires could be successful until weather conditions changed. A similar assessment was made about the same time by the Karridale fire control officer and he

instructed all members of the bush fire brigades to return to their homes in an endeavour to save stock and buildings. At about 11.30 a.m., Forests Department men and equipment were withdrawn from the fire to attend a fire at Treeton and which was now threatening Keenan plantation north of Margaret River.

By noon, a gusty wind was blowing from the north north-west to north-west and the eastern flank of the western headfire broke away in a south-easterly direction and was throwing brands over Bussell Highway into the McLeod Creek area. By 1 p.m. the southern headfire of the western fire had reached Ironmonger's location 1944 and was jumping ahead 80 to 120 chains. A central head from the eastern flank had crossed the highway to the east and was entering Espinos' location 1957 and spotting heavily. The eastern head from along McLeod Creek was also advancing strongly and spotting heavily.

Between 1.30 p.m. and 1.45 p.m. the main headfire from west of the Bussell Highway burnt through Karridale and was some 60 chains south of the Brockman Highway and heading towards Kudardup. At this stage the fire was travelling at about 105 chains per hour and still spotting heavily ahead. The McLeod Creek area at this time was being burnt by the two separate headfires which joined a little after 2 p.m.

About 2 p.m. conditions began to improve. By 4 p.m., a distinct south-west-change came in and by 6 p.m. the wind was blowing from the south. Suppression action on the head and flanks of the fire just north of Kudardup became effective from 7 p.m. onwards. During the early hours of the evening, local bush fire brigades held the south-west sector of the fire from a little over half a mile north of Kudardup to a mile north of Brockman Highway. The western flank of the fire was burning mainly in coastal scrub and sand-dune country and was allowed to spread out to the coast. Forest Grove bush fire brigade members were controlling the north-west sector of the fire and the northern sector from the Bussell Highway to the point of origin was brought under control by 11 p.m.

A head of fire driven across the Warner Glen Road by the southerly change was brought under control fairly quickly. The north-east and east edges of the fire were burning on private property bush land and suppression action was being taken in this sector.

*Saturday, 4th March.*—A distinct weather change had now taken place and conditions generally were comparatively moist and cool. The north-west sector was brought under control by local bush fire brigades and Forests Department personnel by 6 p.m. Some trouble was experienced in the southern sector west of Kudardup in the early morning, but it was brought under control by local brigades. By midnight on 4th March, the fire had generally burnt out to the coast.

The extreme north-east corner of the fire crossed Chapman Brook about noon but Forests Department personnel and local bush fire brigades brought it under control by 6 p.m. on Monday, 6th March.

Extensive patrol and mopping up operations were maintained on the north-east and south sections for many days.

### 3. Conclusions.

Had the owner of location 2760 given notice to the Forests Department of his intention to light the fire as he was required to do by statute, and had he not left the burn unpatrolled, this fire would probably not have escaped or if it had, would have been controlled quickly.

The forest officer, when informed of the escape, did not adequately appreciate the situation. Together with some of the local landholders, he did not consider that the fire would spread as it did during the night of 1st March and it was believed that in any case the area recently control burnt would stop the fire. The delay of the forest officer in reaching the fire has been criticised by some of the farmers, but in my opinion it was an error of judgment which is understandable. Once the real threat of the fire was recognised, the Forests Department and some local brigades took very effective and determined action to control the headfire.

These efforts were, however, hampered by lack of prepared firebreaks, by lack of any planned protective burning in the privately-owned timber country, by lack of equipment, failure to effectively use volunteer labour and in some instances, by opposition from landholders to firebreaks being cut across their properties. Much valuable energy and time was spent on Thursday, 2nd March, endeavouring to save unprotected buildings and pasture areas.

The action of the forest officer in lighting a counter fire from just south of Slabby Ford on the Bussell Highway in an endeavour to stop the fire west of the highway on the night of 2nd and 3rd March has been criticised by some witnesses who have stated that it only aggravated the position. Reliable evidence was given that the main fire had not crossed the counter fire line by 11 a.m. on 3rd March. In fact, there is no evidence to be seen on the ground to suggest that the main fire ever crossed the counter fire line. It is considered that this counter fire probably delayed the head of the fire to such an extent that it did not burn anything like as far south-east of the Brockman Highway as it otherwise would have done.

Criticism was also expressed of the failure by the Forests Department to protectively burn forest land. It was obvious that a number of witnesses expressing such criticism did not know what land was under the control of the Forests Department, which was Crown land and which was timbered private property nor when and where the Forests Department had done any control burning. Although the forest land was not protectively burnt to the extent considered desirable, it appeared to have been attempted to the

extent of the Department's resources in manpower and time, and it was obvious that the Forests Department had made a much greater and more systematic effort to carry out such burning than had the owners of timbered private property.

### TREETON FIRE.

#### 1. Cause and Origin and Measures taken to Prevent the Outbreak.

This fire resulted from burning-off operations on Sussex location 3057 which were commenced about 6 p.m. on Monday, 27th February. A permit had not been obtained for the burn, but the verbal permission of the fire control officer had been given. No firebreaks had been constructed but on the north side of the area the bush had been burnt the previous spring. On the western side there was a reserved road carrying timber and west of that, a ploughed firebreak of about one chain constructed by the adjoining landowner. No guard was maintained on the fire, but it was inspected on the mornings of 28th February and 1st and 2nd March and considered safe on each occasion.

On 2nd March about 11 a.m. the fire escaped probably as the result of burning brands being thrown from standing trees burning on the reserved road across the neighbouring firebreak into location 2229, where felled and windrowed timber caught alight. The captain of the Treeton bush fire brigade was notified.

#### 2. The Development of the Fire and Measures Taken to Prevent its Spread and Protect Life and Property.

*Thursday, 2nd March.*—By 1.30 p.m. the fire was spreading rapidly under a strong north-east wind and had jumped the North Treeton Road into pasture land. Counter firing by local brigades had stopped the running fire during mid-afternoon. A further breakaway on the eastern flank was again quickly controlled by ploughed breaks and counter firing. Around 7.30 p.m. that night, a breakaway occurred on the western counter firing line established during the afternoon and this was held along the Caribunup River.

*Friday, 3rd March.*—Between 7 a.m. and 8 a.m., the fire broke westwards from the Caribunup River and was then controlled along roads to the west and south. By 10 a.m. the wind had changed to a north-westerly and a minor breakaway occurred across a creek but was quickly controlled along a road to the south. Around 11 a.m. a further breakaway occurred in timbered land on the eastern flank. This was allowed to burn south-eastwards for a period whilst trails were constructed through the timbered land and the fire was controlled along the creek on the south and by counter firing from prepared trails on the eastern side.

By 5 p.m. that evening all running fire had been stopped. Intensive mopping up and patrol along the fire perimeter was then

organised. The Forests Department assisted with this work from 6 p.m. until 7 p.m. the following day, Saturday, 4th March.

### 3. Conclusions.

The efficient suppression work of the local bush fire brigades resulted in keeping the area burnt in this fire to around 1,000 acres during very serious fire weather. Counter firing operations were well-planned and executed. The brigades fought equally well in pasture land and in timbered country. The heavy-duty pumping equipment of the Forests Department proved very valuable in mopping up counter firing lines in the timbered areas.

This fire presented a very good example of well-co-ordinated action by an efficient group of rural bush fire brigades and an instance of the good co-operation which can be achieved between bush fire brigade and forestry firefighting units.

#### McLOUGHLIN'S FIRE.

##### 1. Cause and Origin and Measures Taken to Prevent the Outbreak.

This fire resulted from an escape from burning-off operations which commenced at 11 a.m. on Monday, 27th February, in Sussex Location 2408. A permit to burn had been obtained but little attention had been given to the establishment of firebreaks around the area. The fire escaped almost immediately after being lit. By 2 p.m. it was burning in timbered country on the east bank of the Blackwood River.

##### 2. The Development of the Fire and Measures Taken to Prevent its Spread and Protect Life and Property.

*Monday, 27th February.*—The fire burnt slowly in timbered land along the Blackwood River during Monday, 27th February, through to Thursday, 2nd March. An aerial reconnaissance undertaken by the Forests Department around 4 p.m. on this day showed that the fire had also jumped the Blackwood River and was burning quietly along the west bank. The owner from whose burn the fire escaped had ploughed some firebreaks during this period and had prevented the fire spreading in an easterly direction.

*Friday, 1st March.*—The fire commenced to break away from the temporary control lines late in the morning and by 1 p.m. it was spreading rapidly through Sandy's location 3980. About this time the local fire control officer was notified of the position and assistance was requested.

By 2 p.m. it had crossed the Warner Glen Road and was seriously threatening Campbell's and Marsh's in location 2412. Suppression efforts by local brigade members were concentrated along the Warner Glen Road on the eastern flank. The western and southern flanks had been controlled by a local property owner.

All these flanks were reasonably well under control by midnight. The headfire had run into recently burnt country in Marsh's locations and was burning very slowly. A bulldozed line was constructed around this

tongue on Sunday, 5th March, and the block was burnt out. The fire perimeter was patrolled until 8th March and no breakaways occurred.

#### MARSH'S FIRE.

##### 1. Cause and Origin and Measures Taken to Prevent the Outbreak.

This fire resulted from burning-off operations on Sussex location 2448 which were commenced on Wednesday, 1st March. The property owner had been granted a permit to burn on 8th March but without notifying the fire control officer he decided that conditions were favourable on 1st March and commenced his burn around 4 p.m. on that day. This action was taken despite the fact that a dangerous fire hazard forecast had been issued and a Bush Fire Emergency Period had been declared covering the whole of the State at 11 a.m. that morning.

A firebreak had been ploughed half-way across the area to be burnt. By midnight the fire had escaped around the eastern edge of this break and was then burning in timbered country.

##### 2. The Development of the Fire and Measures Taken to Prevent its Spread and Protect Life and Property.

*Thursday, 2nd March.*—The fire spread in a south-westerly direction towards Alexandra Bridge and joined with the north-east side of Bell's fire. The eastern side had meantime continued to burn through timbered land and was approaching the Brockman Highway.

*Friday, 3rd March.*—The eastern side of the fire was controlled by counter firing from firebreaks, but at 10 a.m. the southern face jumped the highway under a strong north to north-west wind and spread rapidly southwards until the head ran into some spring-burnt country where it was halted. The fire was under control by 2 p.m. after having burnt 1,660 acres.

### 3. Conclusions.

There appears to have been little organised brigade action on this fire as members were largely engaged on other fires already burning in the district. A large proportion of the suppression work consisted of running the fire into other recently burnt areas. The action of this property owner in burning-off under such dangerous conditions is inexcusable.

#### CUSACK'S FIRE.

##### 1. Cause and Origin and Measures Taken to Prevent the Outbreak.

This fire resulted from burning-off operations on Sussex Location 2466 which were commenced about 1 p.m. on Tuesday, 28th February. A permit had been obtained for the burn and a six-chain firebreak had been burnt around the permit area on the previous day. The burn was successful and was patrolled during the two following days. At about 11.30 a.m. on *Friday, 3rd March*, a burning tree fell across the firebreak and



the fire escaped. No-one was on patrol at the time as the owner was helping with the suppression of other fires burning in the area.

## **2. The Development of the Fire and Measures Taken to Prevent its Spread and Protect Life and Property.**

*Friday, 3rd March.*—The fire burnt rapidly in a south-east direction and by 1 p.m. the headfire had entered Mass' location 4410. It burnt through this property and, crossing the Brockman Highway, penetrated about 40 chains into timbered country where the spread was slowed down in areas which had been recently protectively burnt.

On *Saturday, 4th March*, weather conditions had moderated. The eastern and southern edges of the fire were burning very slowly and the western edge was under the control of local brigades. Some burning was done around a sawmill on State forest about two miles from the nearest fire edge and without any notice to the Forests Department. This fire was allowed to run unchecked into the surrounding forest.

On *Sunday, 5th March*, this fire was brought under control by Forests Department gangs in the morning and these gangs then proceeded to control the eastern edge of the fire along the Great North Road.

On *Monday, 6th March*, the perimeter of the fire on the north side was brought under control and mopped up and the southern edge was controlled with heavy bulldozer equipment.

## **3. Conclusions.**

The area burnt was 2,750 acres.

Local bush fire brigades worked well in controlling the fire in pasture land but were not so efficient in timbered areas where in the main, control was left to the Forests Department.

The backburn undertaken around the sawmill in the State forests was quite unnecessary and indicates the limited understanding of fire behaviour in forests lands held by some settlers. The damage to fencing, pasture and timber was estimated to amount to £1,870.

### **BELL'S FIRE.**

#### **1. Cause and Origin and Measures taken to Prevent the Outbreak.**

This fire resulted from an escape from burning-off operations on the southern portion of Sussex location 4055. The burn commenced about 2 p.m. on Monday, 27th February under mild conditions. Three men were present at the fire that day and the following day. On Wednesday the fire escaped into Crown lands on the southern boundary. The property owner held a permit to burn on the day in question, but apparently did not have any firebreaks along the sector from which this fire escaped and which lies just north of the Brockman Highway. He remained in attendance at the fire but without other assistance.

## **2. The Development of the Fire and Measures taken to Prevent its Spread and Protect Life and Property.**

*Wednesday, 1st March.*—About 12.30 p.m. the fire jumped the western boundary of location 4055. The assistance of local brigade members was sought and an attempt was made to counter fire along the Warner Glen Road. This counter fire escaped westwards and continued to Alexandra Bridge where the headfire was halted by the Blackwood River. The original escape jumped the Brockman Highway and burnt in a south-west direction.

*Thursday, 2nd March.*—During the early hours of the morning, the main fire jumped the Blackwood River east of Alexandra Bridge and continued to burn in Crown land towards Glenarty Creek. The western side of this fire was handled by the Karridale and Kudardup brigades. The Warner Glen brigade handled the eastern edge of the fire and controlled it around locations 2482 and 2483. The western headfire burnt strongly through the timbered Crown land and was controlled along the edge of pasture country east of Kudardup Road. By midnight it had reached the vicinity of Glenarty Creek.

*Friday, 3rd March.*—The fire spread rapidly south through timbered Crown land and private property and burnt through to Hardy Inlet at the mouth of the Blackwood River.

## **3. Conclusions.**

The area burnt was 13,200 acres.

Under the weather conditions prevailing, the counter fire lit along the Warner Glen Road by the local brigade had little hope of success. Subsequent brigade action on the eastern face in an effort to save small areas of improved pasture was mainly successful. The work of the Karridale and Kudardup Brigades in controlling the western face was efficient.

At no time did local brigades attempt to hold the headfire burning in timbered Crown land. This fire engaged the main resources of the Karridale bush fire brigade during Thursday and Friday morning and seriously weakened any attempt they might have been able to make in halting the spread of the Forest Grove-Karridale fire coming down from the north. On Friday morning, however, the Karridale Brigade was split into two sections, one remaining on Bell's fire and one returning to Karridale, but by this time the Forest Grove-Karridale fire was completely out of control.

### **COURTNEY FIRE.**

#### **1. Cause and Origin and Measures taken to Prevent the Outbreak.**

This fire resulted from a control burning operation on Sussex location 2751, which was lit about 5 p.m. on Monday, 27th February. This burn was not successful owing to damp conditions. A further attempt to burn was commenced at 5 p.m. on Tuesday, 28th February. During the evening the fire escaped and burnt into a swamp in location 2752. The burn was carried out under permit but satisfactory firebreaks were not provided.

## 2. The Development of the Fire and Measures taken to Prevent its Spread and Protect Life and Property.

*Wednesday, 1st March.*—During the night and early morning the fire burnt in a south-westerly direction and the eastern edge was controlled by the owner of the property from which the fire escaped. He notified the local fire control officer of the position at 7 a.m. By 8 a.m. the fire was moving fairly rapidly but was controlled on the western edge of location 2755. The southern front was burning uncontrolled in unoccupied Crown land.

On *Thursday, 2nd March*, the western side of the fire had almost reached the Courtney Road by midday, whilst the southern face was still burning in unoccupied Crown land. During the afternoon the fire continued to move southwards on a broad face and attempts were made to stop it crossing Courtney Road to the westwards. Around 5 p.m. it jumped the road but was confined to a small area by counter firing from firebreaks. Later in the evening it broke away from this line and swept across Sunshine Avenue. This section south of Sunshine Avenue was brought under control that night.

*Friday, 3rd March.*—Further breakaways commenced from 8 a.m. onwards, but were quickly controlled. Later in the morning the wind changed to a north-westerly and the fire on that section of the perimeter east of Courtney Road broke away on a broad front and made rapid process into timbered Crown land. This main head continued to burn in a southerly direction through to the Scott River sand plains where it burnt itself out late in the afternoon. The western edge burnt out to the Blackwood River and joined with the area burnt by Bell's fire. Once this major breakaway had occurred around 11 a.m. in the morning, brigade efforts were mostly directed towards saving pasture land in the vicinity of Sunshine Avenue.

## 3. Conclusions.

The area burnt over by the fire was 8,850 acres.

The escape of the fire was due to the owner not providing adequate measures to prevent the fire escaping. Suppression action by brigades in the Courtney area appear to have been well-organised and efficient. Well-directed efforts were made to control the fire.

### ROSA BROOK FIRE.

On Monday, 27th February, burning-off was commenced on Sussex location 1924. This fire escaped about 1 a.m. on 2nd March as the result of burning brands being blown into adjoining properties from a standing dead tree which had caught alight. The person who lit the fire had a permit to do so. The fire was brought under control by local bush fire brigades and landholders and by men of the Forests Department who controlled the western and northern edges of the fire when it had burnt into timber reserve 60/25 on ground which had been protectively burnt in the spring. The fire was entirely under control by 5 p.m.

## Conclusions.

The area burnt was 450 acres.

This fire proved that fires in the area can be controlled and the burnt area kept small during severe fire weather, if determined suppression action is taken early. The fire was brought under control while, as a result of slow initial attack, the Forest Grove fire was resisting all efforts to control it.

### FLINDERS BAY-AUGUSTA FIRE.

Neither the cause nor the point of origin of this fire could be ascertained, nor was there any evidence that any measures had been taken to prevent the outbreak. On the other hand, there is reason to believe that the fire may have been deliberately started. It appears to have been lit some time in February in the coastal sand-dunes near Deepdene.

On 15th and 16th February, it burnt freely and seriously threatened the townships of Augusta and Flinders Bay.

It is estimated that 5,325 acres largely carrying coastal scrub were burnt, but little or no damage was done to private property.

### SCOTT RIVER FIRE.

Neither the cause nor the origin of this fire was ascertained, but there is some reason to believe that it may have been deliberately lit with a view to improving the grazing capacity of the land. It was apparently lit in the coastal sandhills during February and burnt slowly to the north and west. No action was taken to control the fire and on the afternoon of Thursday, 2nd March it jumped the Blackwood River to the north and into location 1505. This sector of the fire was attacked by the Kudardup Bush Fire Brigade. An unsuccessful attempt was made to counter fire during the evening. Other and more serious fires were, at that time, also engaging the attention of the brigade.

On the morning of Friday, 3rd March, breaks were bulldozed around the western edge of the fire and it was brought under control. At 2 p.m. the brigade withdrew and proceeded to the Forest Grove-Karridale fire. Some time that afternoon Bell's fire ran into the northern edge of the Scott River fire and died out.

The area burnt was about 10,300 acres but the damage done was practically nil.

### GENERAL.

The total area burnt by this series of fires in the Augusta-Margaret River Shire during 1960/61 was 106,250 acres distributed as follows:—

	Acres.
State forest	8,400
Timber reserves under the Forests Act	4,500
Reserves under the Lands Act including caves reserves, recreation reserves, etc.	19,500
Private property including leasehold, conditional purchases, etc.	73,850

The estimated losses in pasture, hay, fencing, stock, farm implements, buildings, personal effects and timber was £106,330.

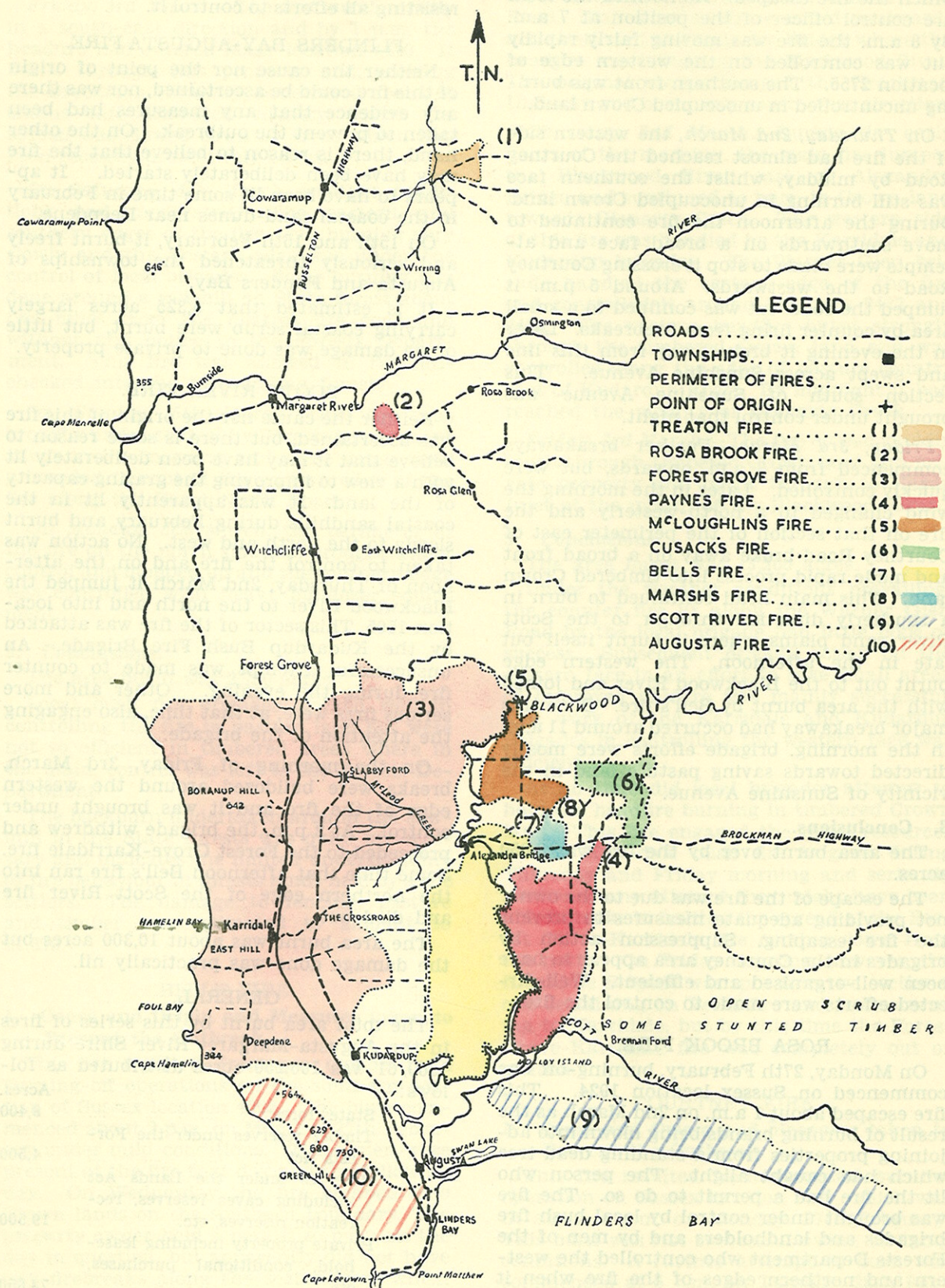


# LOCALITY PLAN

SHOWING

AUGUSTA-MARGARET RIVER FIRES - 27 FEB.-5 MARCH 1961

SCALE: 1 INCH TO 4 MILES





## THE ORGANISATION OF FIRE CONTROL IN THE AUGUSTA-MARGARET-RIVER SHIRE GENERALLY.

The infrequency of serious fires in this shire leads to an apathetic attitude towards fire prevention and control generally. Fire brigades throughout most of the district are ill-equipped, especially with heavy pumper equipment and there is a lack of co-operation and organisation, not only between the Forests Department and some of the local brigades, but also between individual brigades, particularly in the district south of Margaret River.

Each brigade appears to be indifferent to the organisation and happenings in adjoining brigade areas. This attitude may not be significant where only small fires are concerned, but becomes very significant when large-scale fires occur. It results in divided control and lack of the co-operation and co-ordination needed for a full-scale fire control effort.

There is a need for a chief fire control officer for the shire, who would take an active interest in the overall district organisation. He would need the assistance of an active bush fire control advisory committee, particularly to assist in the direction of burning-off activities.

The Forests Department could render valuable assistance by advising on seasonal trends and fire weather forecasts, assisting in the supervision and control of burning-off operations near State forests and by keeping the local brigades informed of the Department's own protective burning plans and activities. The Forests Department fire detection system and advice to the chief fire control officer on any suspected fire outbreaks would also improve co-ordination of firefighting activities.

A control burning plan should be drawn up for the district showing the dangerous areas and the areas burnt each year. This is a direction in which co-operation between the Forests Department and the local brigades would be most valuable.

### PEMBERTON BUSH FIRES.

These fires occurred in the area between Pemberton, Shannon and the south coast. They cover two main areas—

- (a) The coastal sand-plain.
- (b) The karri forests to the north.

The coastal sand-plain is mostly unalienated Crown land used for cattle grazing during summer months. It is generally accepted that fires in this strip are lit by graziers, although campers and fishing parties may sometimes be responsible. The fires are generally lit in December, and summer and autumn rains are relied upon to extinguish them. As no significant rain fell last summer from December to March, the fires extended until they eventually threatened the State forest and areas of developed private property. As this coastal country is largely undeveloped, no organised form of fire control exists there.

The fires which occurred in the karri forest on 10th February were mainly caused by lightning. Those which broke out during the first week in March were due to a variety of causes in a period of very high to extreme fire danger. A further outbreak of lightning fires occurred during the second week of March.

Descriptions of the fires which occurred in the Pemberton district in early 1961 are confined to six major fires. Many other fires occurred but by fast, energetic attack, they were kept to small areas.

During the 1960/61 season over 50 fires occurred in the Pemberton forest district alone but only one assumed large proportions. The local bush fire brigades and the men of the Forests Department did excellent work in confining these fires to small areas. The six major fires described and the areas burnt are as follows:—

	Acres.
(i) Meerup River-Windy Harbour.— December-March	56,300
(ii) Maringup Lake.—January	7,200
(iii) Chesapeake.—29th December- 4th January	11,300
(iv) Shannon River.—11th February- 16th February	14,750
(v) Crowea - Dombakup.—13th - 16th February	16,900
(vi) Brockman.—3rd-4th March	3,800
	<hr/> 110,250 <hr/>

Of the total area of 110,250 acres burnt by these fires, approximately 37,000 acres were State forest and the remaining 73,250 acres were either private property or Crown land under lease.

### MEERUP RIVER-WINDY HARBOUR FIRE

This area on the coastal strip was burnt by a series of fires commencing in mid-December and probably largely originated from graziers' fires. It is possible that a jumpover from these fires may have caused the fire which started in State forest to the north and north-west of them on 1st March, 1961, and burnt through 1,500 acres.

The two lots of fires were united by a break constructed by local farmers and men of the Forests Department in order to eliminate any possible threat to the township of Northcliffe and the forest areas to the north.

In all, 23 separate fires were reported on the coastal strip between the Warren and Gardner Rivers from December to March and the total area burnt was approximately 56,300 acres. No damage to property or stock was reported. One of the fires seriously threatened a holiday camp site at Windy Harbour on 16th March but it was controlled by voluntary firefighters.

### MARINGUP LAKE FIRE.

On 11th January, 1961, about 12.30 p.m. this fire escaped from a control burn being carried out on leasehold country in locations 10807 to 10810 on the coastal sandplain. The person who lit the fire gave notice to the Pemberton Forest Office of his intention to burn on 21st December. It would appear that he disregarded the fact that burning was prohibited in the area from 1st January to 12th March. Under normal seasonal conditions the area may have been safe to burn in January as the Gardner River lay on the eastern edge and a one-year-old protective burn lay to the north. Due, however, to the unusually dry season and near heatwave conditions, the fire escaped across the Gardner River and burnt eastwards. It was controlled on a two-year-old burn south of the State forest.

The area burnt was 7,200 acres but no damage to property or stock was recorded.

### CHESAPEAKE FIRE

On 29th December, 1960, about 12.45 a.m. a control burn was commenced on locations 5602, 5600, 5273, 5605, and 5604 held under various ownerships and on reserves 9540 and 21712 held under lease by the same persons. These areas are on the coastal sand-plain. The fire escaped northwards under prevailing southerly and easterly winds as the area had not been securely surrounded by firebreaks. The fire was attended by men of the Forests Department from Shannon River and Northcliffe when it seriously commenced to threaten State forest areas. It was stopped on 4th January.

The area burnt was 11,300 acres, but no damage to stock, property or timber was reported.

### SHANNON RIVER FIRE

#### 1. Cause and Origin of the Fire and Measures taken to Prevent the Outbreak.

*Saturday, 11th February, 1961.*—Three separate lightning fires resulted from a thunderstorm which passed over this karri forest area about 3.30 p.m. Some patchy rain accompanied the storm. By the evening of Sunday, 12th December, the first two fires had been brought under control by forestry men from Shannon River.

#### 2. Development of the Fire and Measures taken to Prevent its Spread and to Protect Life and Property.

*Monday, 13th February.*—About 9 a.m. weather conditions worsened and several spot fires which had remained dormant the previous day, started to spread. These fires were brought under control with the aid of bulldozer equipment.

At the same time another lightning fire which had remained dormant was reported. This fire was in heavy undergrowth, over 60 chains from the nearest road and could not be controlled with hand tools. By 1 p.m. the

fire was spreading rapidly and out of control. Early in the evening, the headfire crossed the Nornalup Road and penetrated some 120 chains to the west. The rate of spread during the afternoon was 25 to 30 chains per hour and the fire was spotting heavily. Despite heavy reinforcements of manpower and equipment the headfire could not be controlled during the night although the southern flank was brought under control by counter firing. Further manpower was drawn from Kirrup and Quinninup, and additional bulldozers were hired.

*Tuesday, 14th February.*—The headfire advanced another three miles and could not be controlled that night again due largely to a number of spot fires which had been thrown some distance ahead.

*Wednesday, 15th February.*—About noon, the headfire began another advance and by evening had travelled a further 190 chains.

*Thursday, 16th February.*—By 11 a.m. a bulldozed break had been completed around the western and southern flanks of the fire and full control was achieved by 6 p.m. Weather conditions had eased and a south-west change brought some light showers to the area. This materially aided suppression efforts.

### 3. Conclusions.

The area burnt by this fire was 14,750 acres and the estimated damage to forest growth would be in the vicinity of £15,000.

### CROWEA-DOMBAKUP FIRE

#### 1. Cause and Origin of the Fire and Measures taken to Prevent the Outbreak.

*Saturday, 11th February, 1961.*—About 3.30 p.m. a lightning strike started a fire in State forest. This was one of a series of 11 fires started by lightning in the area between Pemberton and Shannon River.

*Monday, 13th February.*—The fire became active and was detected about 4 p.m. At the time, all forestry gangs were engaged on mopping up two other fires which had originated from lightning strikes on 11th February and which had been controlled by Sunday, 12th February.

The Crowea-Dombakup fire was in heavily timbered country on steep slopes carrying heavy undergrowth. The fire was controlled by an initial attack force with hand tools by Monday evening with a burnt area of two acres.

#### 2. Development of the Fire and Measures taken to Prevent its Spread and to Protect Life and Property.

*Tuesday, 14th February.*—About 10 a.m. spot fires were being thrown and control was lost. By 2 p.m. it was advancing rapidly and spotting up to 40 chains ahead. By 6 p.m. spot fires were reported up to two-and-a-half miles from the point of origin. In the

evening the headfire was stopped on the Northcliffe W.A.G.R. line and a number of spot fires on the western side of the Northcliffe Road were contained.

Late in the evening a large spot fire was located in Dombakup block some four-and-a-half miles south and west of the point of origin. This fire was also in broken country with heavy fuel.

*Wednesday, 15th February.*—Attempts to contain this fire were unsuccessful during the early morning hours and by 10 a.m. it was moving rapidly before a fresh northerly wind. All other sections of the fire were under control. The fire was stopped that night.

*Thursday, 16th February.*—All sections of the fire were stabilised. A trafficable trail was constructed around the entire perimeter and intensive mopping up undertaken.

### 3. Conclusions.

The area burnt was 15,800 acres. Damage to forest growth is estimated at £16,000.

### BROCKMAN FIRE

#### 1. Cause and Origin of the Fire and Measures taken to Prevent the Outbreak.

This fire was detected on Friday, 3rd March at 10.55 a.m. It originated on a firebreak south of the State Building Supplies mill railway line on State forest. The cause of the fire appears to have been a spark thrown from the railway locomotive which ignited a small patch of scrub. This scrub fire in turn ignited a dry karri tree south of the break and this tree spotted freely into dense undergrowth. The initial attack crew arrived at the fire at 11.15 a.m. The fire was probably set at 9.50 a.m. or a little later but was in a deep gully and the smoke was not readily seen.

#### 2. Development of the Fire and Measures taken to Prevent its Spread and to Protect Life and Property.

Once across the firebreak the fire developed rapidly and by 2 p.m. had entered some tobacco plantations lying to the south. The rate of forward progress of the headfire between 11.30 a.m. and 2 p.m. was between 40 to 50 chains per hour. At 4 p.m. the headfire crossed the Warren River to the south and ran into country burnt by the Crowea fire two weeks previously.

The total distance travelled by the headfire was three miles, giving an average rate of advance of 53 chains per hour.

By about 5 p.m. the wind had backed to the southwest then south, and gangs were engaged on containing numerous spot fires along the eastern edge of the fire.

A big weight of manpower and heavy bulldozer equipment was brought into action during the night and all sectors were controlled.

### 3. Conclusions.

The area burnt by this fire was 3,800 acres and the damage to forest growth and property is estimated at £10,000.

### GENERAL

Two main points arise in connection with the fires in the karri forest:—

- (1) When a number of fires occur at the same time as is not unusual following lightning storms, initial attack on the fires reported later is likely to be somewhat delayed and diminished in manpower and material owing to commitments to fires reported earlier. It is important that at such times arrangements should be made for reserves to be drawn from such sources as the sawmilling industry, as well as from bush fire brigades in the districts adjoining the forest.
- (2) It is questionable if bush locomotives should be permitted to continue running on a day when a number of bush fires are burning in the vicinity and the fire danger is rated as dangerous or severe.

### DENMARK BUSH FIRES

Fires in the Denmark district during the 1960/61 fire season occurred during two separate fire periods.

The first and major fire started in the Albany Shire in mid-December and burnt westwards into the Denmark and Plantagenet Shires during January. The total area burnt in this fire was 160,000 acres of which 49,150 acres were burnt in the Albany Shire, 36,100 acres in the Plantagenet Shire and 74,750 acres in the Denmark Shire.

The second series of fires commenced in the first week of March, and were the result of escapes from settlers' burning-off. The two main fires during this period joined after several days and it is not now possible to distinguish between the two areas. The total area burnt in these two major fires was 27,650 acres.

The area through which the fires burnt is largely undeveloped Crown land and there appears to be little organised fire protection in the district. Local bush fire brigades practically disregarded the fires while they were burning on Crown land and made a determined effort to control them only when they threatened developed private property. Owing to a markedly reduced rainfall in the spring and summer, the timber areas in the district were much drier in the 1960-61 summer than usual. In a year of more normal rainfall, fires in this district would probably have been extinguished by summer rains.

The Denmark, western Albany and south Plantagenet areas have a bad fire record extending over many years, due largely to the fact that practically no fire control is practised over large areas of undeveloped Crown land in the region. Even in the settled areas the fire control organisation shows a marked lack of efficiency and drive.

It is probable that all these fires could have been easily controlled by a very small force if they had been attacked within one day of their outbreak.

## ALBANY-DENMARK FIRE

### 1. Cause and Origin and Measures taken to Prevent the Outbreak.

This fire started on Hay River locations 6630 and 6631 near the head of the Sleeman River some eight miles north north-east of Youngs Siding and approximately five miles south-west of Redmond. No direct cause of the fire can be ascertained nor can any reason be seen why anybody should wish to start the fire. It is believed it was lit on the 18th December, 1960.

### 2. The Development of the Fire and Measures taken to Prevent its Spread and Protect Life and Property.

The fire was inspected by the local fire control officer at the request of the Albany Shire Council on 19th December, 1960, but no action was taken to suppress it.

Early in January, local brigades in the Youngs Siding area controlled the southern face when the fire showed signs of threatening settled areas. About this time, strong easterly winds drove the fire westward and it jumped Hay River and advanced through Crown land as far as the Mt. Barker-Denmark Road. Efforts were made to halt the fire on this road but it crossed the road on 15th and 16th January and spread towards Mt. Lindsay. The Denmark Shire then attempted to halt the fire along a forest track known as Stans Road. A counter fire operation was planned in co-operation with the Plantagenet Shire Brigades. A southerly to south-easterly wind, however, drove the fire on a three mile front into the settled areas in the north and the Plantagenet Brigades were then fully committed to controlling the northern edge of the fire. The Denmark Shire attempted to counter fire from Stans Road but the fire crossed the road before the counter fire could be completed. The fire was prevented from reaching settled areas to the south, but under heatwave conditions continued to burn westwards until rain fell on the evening of 25th January. It was finally brought under control in the vicinity of Clear Hills a day or so later.

### 3. Conclusions

Apart from the loss of 2,000 to 3,000 acres of pasture, the damage in this case was confined to forest growth. An assessment of the total damage done is £22,100, with a further £2,000 or so incurred in the cost of suppression.

## KENT RIVER-OWINGUP FIRES

### 1. Cause and Origin and Measures taken to Prevent the Outbreak.

On Tuesday, 28th February, 1961, the first of these fires escaped from a fire from Plantagenet location 2176 where bulldozed heaps were being burnt. During subsequent days at least one other burning-off fire escaped from the vicinity of Owingup Siding and it is probable that there were other fires towards the coast, all of which eventually united in one fire.

### 2. Development of the Fire and Measures taken to Prevent its Spread and Protect Life and Property.

*Wednesday, 1st March.*—The fire moved slowly to the south-west. No suppression action appears to have been taken.

*Thursday, 2nd March.*—About 9 a.m. a reconnaissance of the fire showed it to be still burning in location 2176 and moving slowly towards the Kent River. By 5 p.m. fire lookout tower bearings indicated that the fire had crossed the Kent River and was moving westwards. A reconnaissance showed the fire burning in three to four-year-old-fuel in timbered country. No-one appeared to be engaged in control activities.

As the fire was moving westwards towards State forest areas, the Forests Department requested the assistance of the Denmark Shire in controlling the fire. About 40 men responded. That evening a counter fire was lit from the point of origin to Quarram Inlet and the western spread of the fire was halted.

*Friday, 3rd March.*—The western section of the counter fire was patrolled and held by Forests Department gangs but in the late afternoon the fire escaped from the sector east of the Kent River when the wind changed to a south-westerly. Meantime settlers and shire council employees had concentrated on controlling the eastern edge of the fire which had escaped from burning-off operations in the vicinity of Owingup Siding and had spread rapidly in a south south-easterly direction towards William Bay.

*Saturday, 4th March.*—The fire east of Kent River and north of Owingup Siding continued to burn slowly northwards and was uncontrolled.

From *Sunday, 5th March*, to *Tuesday, 7th March*, attempts were made to control the northern edge of the fire with bulldozer equipment.

*Wednesday, 8th March.*—At 8 a.m. rain commenced to fall and the fire was brought under control. For several days mopping up and patrol of the northern portion of the fire was carried out by personnel of the Forests Department and local bush fire brigades.

### 3. Conclusions.

The damage done by this fire was estimated at £5,000.

It appears that brigades and farmers in the district are only prepared to fight fires when cleared pasture land is endangered. Officers of the Forests Department and the Shire are left to organise the main firefighting efforts on timbered and partly developed private holdings. There is an urgent need for co-ordination of effort by local landholders so that with the assistance of the shire council and Forests Department, bush fires occurring in the district can be quickly attacked and suppressed in their early stages. The present system of waiting until the fires reach the cleared country is a most uneconomic and dangerous method of firefighting.

## GLENEAGLE BUSH FIRE.

### 1. Cause and origin and measures taken to prevent the outbreak.

This fire arose on forest land in the Gleneagle Forestry Division east of the Albany Road. The area is normally under observation from fire lookout towers and much of the country burnt had been heavily control burnt in recent years. The suspected cause of the fire is lightning resulting from one of the thunderstorms which occurred on the 19th and 20th January. Visibility from the fire lookout towers was very much reduced around this time by smoke from the Dwellingup fires to the west. This fire probably remained dormant until late on Saturday, 21st January, and was not detected until 4.45 p.m. on Sunday, 22nd January.

### 2. Development of the fire and measures taken to prevent its spread and to protect life and property.

*Sunday, 22nd January.*—At the time of the detection of this fire, all officers and employees in the Gleneagle Forestry Division were engaged in fire suppression in the adjoining Dwellingup Forestry Division. An initial attack gang was therefore obtained from the Jarrahdale Forests Division and arrived at the fire about 6 p.m. A reconnaissance showed that the fire had then burnt about 2,500 acres.

*Monday, 23rd January.*—Gangs from Carinyah, Jarrahdale and Mundaring Weir, as well as some men and equipment from Dwellingup, worked on the fire and, although unsuccessful during the day, had stopped it by 11 p.m. and cleared a bulldozed trail around it, except for about one and one-half miles on the western side.

*Tuesday, 24th January.*—By 5 a.m. the bulldozed trail was completed but at 6 a.m. over 20 miles of perimeter still required intensive mopping up and patrol. At this stage there were three Forests Department gangs, 30 sawmill workers, one "D6" and two "D4" bulldozers and two heavy-duty tankers available. These forces were allocated as evenly as possible to the northern and southern sectors of the perimeter.

About noon the southern edge of the fire, under a strong north to north-westerly wind, started to break away in numerous places. At 1.30 p.m., owing to the extreme burning conditions prevailing, the Dwellingup Divisional Headquarters advised that all gangs and equipment on the southern and eastern faces of the fire should be withdrawn. They were withdrawn to Gleneagle and bush fire control officers and settlers to the east were informed that the fire was out of control and moving towards their properties and advised to take any action necessary for their protection.

On the northern edge of the fire, mopping up and patrol was continued. The break-aways in the southern sector of the fire made rapid progress through forest country towards the south-east. During the afternoon

and evening, local bush fire brigades burnt along forest tracks on the eastern side of the fire and prevented it entering developed land.

*Wednesday, 25th January.*—Early in the morning, control of the western edge of the fire along the Canning River Road was commenced. Further gangs were allocated to the northern section where several small breakaways were giving trouble. Extra crews were obtained from Jarrahdale and a number of volunteers were also engaged. At approximately 4 p.m. rain commenced to fall and continued throughout the night, extinguishing the entire perimeter. Sixty-one points of rain were recorded. Mopping up operations were continued for the following 13 days.

### 3. Conclusions.

This fire could probably have been brought under control when first reported if most of the forests employees had not been away at the Dwellingup fires. On the Monday and Tuesday the manpower and equipment available were not sufficient to prevent the fire breaking away under the extreme weather conditions experienced.

The work of the local bush fire brigades on the eastern flank of the fire was very efficiently and thoroughly carried out.

The advice received from Dwellingup on Tuesday, 24th January, to withdraw all men and equipment on the southern and eastern flanks of the fire was sound and probably saved much equipment.

This fire burnt 58,000 acres of forest land and the damage to standing timber is estimated at £30,000. The suppression cost is estimated to have been about £7,500, of which the Forests Department's share was approximately £5,000.

## KALAMUNDA AND GOOSEBERRY HILL BUSH FIRE.

### 1. Cause and origin and measures taken to prevent the outbreak.

The suspected cause of this fire is lightning from a thunderstorm which occurred about 6 p.m. on Thursday, 19th January. The fire commenced in Canning Location 711. Fires frequently occur in this locality and ground fuel is usually light. In addition, the Forests Department maintains a fire control system of gangs and lookout towers with controlled burning of the forest land in the vicinity.

### 2. Development of the fire and measures taken to prevent its spread and protect life and property.

*Friday, 20th January.*—The fire was brought under control by the Darling Range Bush Fire Brigade during the afternoon and evening.

*Saturday, 21st January.*—The fire broke away in the morning and spread steadily north and east towards the valleys of Piesse Brook and Helena River. The south-western head of the fire was threatening Kalamunda township.



The fire control officer of the Darling Range Shire requested assistance from the Forests Department and, at 2 p.m., a gang was despatched to his assistance. During the afternoon the north-east head moved rapidly through Park Reserve No. 21314. By 2 a.m. on Sunday, 22nd January, the headfire was stopped approximately three and one-half miles from the point of origin by a counter fire line extending northwards into the Helena River. Light showers during Saturday night dampened the bush and prevented an effective depth of burn along this line.

*Sunday, 22nd January.*—Attempts to burn out various pockets of unburnt bush were not effective, due to damp conditions and high humidity.

*Monday, 23rd January.*—All sections of the perimeter were controlled and mopping up proceeded.

*Tuesday, 24th January.*—The eastern section of the fire broke away in the north-eastern corner and on the southern flank and moved rapidly in a south-easterly direction.

The fire was now burning in State forest. It was of high intensity and spotting severely. The headfire could not be held along Kalamunda Road and gangs were forced to withdraw southwards for some distance to a line along Reservoir Road, South Road and Boundary Road. Counter firing was commenced that evening.

*Wednesday, 25th January.*—Counter-firing continued. By 5 a.m. all running fire had been stopped and efforts were concentrated on mopping up the perimeter. Rain commenced to fall in the late afternoon and assisted the consolidation of the fire edge. No further outbreaks occurred.

### 3. Conclusions.

This fire was not made sufficiently safe by the bush fire brigade before it was left on the evening of Friday, 20th January.

A large proportion of the manpower and equipment of the Mundaring Forestry Division had been transferred to assist with the extensive fires at Dwellingup and Gleneagle. The Mundaring Division consequently had to call for assistance from Wundowie, the Goldfields Water Supply, Mundaring township and Mundaring Shire. Assistance was refused by the Mundaring Shire but the other organisations responded ably.

It is a credit to all those concerned with the firefighting that the area burnt on Tuesday afternoon was less than 5,000 acres, as fires in adjacent divisions were, that afternoon, burning much more extensive areas.

The total area burnt was 9,980 acres and the damage to both State forest and private property would be in the vicinity of £15,000.

## SOUTH COOGEE BUSH FIRE

### 1. Cause and Origin and Measures taken to Prevent the Outbreak.

This fire was investigated by the Police Department but insufficient evidence was found to enable the cause to be determined. It probably commenced about 6.45 p.m. on Monday, 27th February, 1961 in the vicinity of Thompson Lake.

### 2. Development of the Fire and Measures taken to Prevent its Spread and Protect Life and Property.

*Monday, 27th February.*—At 6.35 p.m. three small columns of smoke were noticed on the eastern side of Thompson Lake. Apparently the fire started about this time.

*Tuesday, 28th February.*—At 7 a.m. the fire had burnt about an acre of land on the eastern edge of the lake. By 4 p.m. it was spreading slowly and there was a considerable amount of smoke. The fire was not considered dangerous by local residents and no suppression action was taken. A light, easterly wind was blowing.

*Wednesday, 1st March.*—At 8 a.m. a large column of smoke was seen on the eastern side of the lake and the fire commenced to make rapid progress. A strong north-easterly wind was blowing and by 10 a.m. the fire had entered properties in South Coogee and had burnt some buildings. The headfire made further rapid progress in a south-westerly direction, until it ran into recently-burnt country.

The western flank of the fire continued a slow side movement and at 5.30 p.m. it jumped across Rockingham Road and continued to burn towards the coast in Crown land. Around this time the wind moderated and, during the night the fire burnt quietly through the coastal plain area.

*Thursday, 2nd March.*—About 1.45 a.m. the fire was threatening the Naval Base camping area and was being fought by the Medina Bush Fire Brigade. By 8 a.m. it was considered safe in this area. In the meantime, it had burnt back in a northerly direction. It was controlled in the area west of Rockingham Road by 4 p.m. The eastern edge of the fire continued to burn against the wind until 3rd March, and eventually burnt itself out in swampy ground near Hammond Road. The fire was patrolled by local bush fire brigades until 5th March.

### 3. Conclusions.

This is another example of a fire which was allowed to burn unchecked for several days under mild conditions because local inhabitants and bush fire brigades considered it was not dangerous. When extreme fire danger developed early on the morning of Wednesday, 1st March, the fire very quickly reached dangerous proportions and little effective fire suppression action was possible. It was fortunate that heavier property damage was not

experienced in the South Coogee township and by camping areas and dwellings on the Naval Base Road

Once conditions eased on Wednesday evening, local brigades and volunteers carried out effective work in bringing the fire under control.

The area burnt by the fire was approximately 3,300 acres. Damage to property has been estimated by the Police to be £2,943.

#### MANDURAH BUSH FIRE

##### 1. Cause and Origin and Measures taken to Prevent the Outbreak.

This fire was caused either by sparks from a tractor-driven scrubslasher or resulted from burning material dropped from a tractor manifold. It commenced on Wednesday, 1st March, on or about Cockburn location 1087.

##### 2. Development of the Fire and Measures Taken to Prevent its Spread and Protect Life and Property.

*Wednesday, 1st March.*—The fire crossed the Serpentine River and swept down both sides in a south-westerly direction towards Mandurah and the coast highway.

*Thursday, 2nd March.*—The fire jumped the coast highway around 4 p.m. and threatened Madora Beach settlement.

*Friday, 3rd March.*—The fire was still burning out of control and threatening Mandurah. Breaks were established and the southern face held north of Stake Hill Bridge about three miles north-east of the township. Conditions eased during the afternoon with a westerly change. About 5 p.m. the fire was considered safe on the southern and western sides. However, a wind change drove the eastern face, in the vicinity of Yangedi Swamp, towards Dirk Brook. In the evening, this face was controlled by bush fire brigades from Serpentine Shire.

##### 3. Conclusions.

The northern flank of the fire was attacked very efficiently by the Rockingham Shire Bush Fire Brigade. Action on the southern face seemed somewhat disorganised and considerable apprehension was felt by the residents of Mandurah. Outside volunteers responded readily to calls for assistance. During Wednesday afternoon the State Emergency Service sent a mobile first-aid station from Perth. The unit was not required and returned to Perth.

This fire is an example of a very decided lack, or even absence, of co-ordination of firefighting effort. Each front was being handled by separate bush fire brigades or groups of volunteers who had little or no appreciation of the extent of the fire and the State Emergency Service could obtain no reliable information on the position.

The area burnt by this fire was approximately 33,000 acres, the great majority of which is of low quality. It is estimated that the damage would not exceed £15,000.

#### LESMURDIE-KALAMUNDA-BICKLEY BUSH FIRES

The cause and origin of these fires is not known and little evidence was received with reference to them.

Three separate outbreaks apparently commenced on Wednesday, 1st March. One outbreak was at Gooseberry Hill, one in the Kalamunda town site and the other at Lesmurdie. It is thought that what some witnesses have termed the "Lesmurdie" fire was referred to by other witnesses as the "Bickley" fire.

The fires made rapid progress during the day and seriously endangered many homes and properties in the Hills district. Local bush fire brigades and Forests Department units assisted in controlling the fires which were generally safe by 2 a.m. on Thursday, 2nd March.

It is estimated that around 6,000 acres were burnt in the area, but no estimate can be made of the damage resulting from the fires. It is known that at least two houses were destroyed.

Considerable trouble was experienced with sightseers who flocked into the area during Wednesday afternoon and continually hampered firefighting operations. Lack of adequate communications also hampered the suppression operations. Many houses and properties in the district were seriously threatened by the lack of protective burning around them and much valuable time was wasted by suppression forces in protecting these houses, the owners of which were frequently not in attendance to assist.

#### BUSH FIRES IN THE COASTAL PLAINS NORTH OF PERTH

These fires occurred on the coastal sand-plain country at various times during the 1960/61 fire season and several times threatened pine plantation areas established by the Forests Department, around Wanneroo and Gnangara.

*South Wanneroo Fire.*—This fire commenced on or about the 23rd December, 1960, and burnt approximately 5,000 acres of private property and land held by the State Housing Commission.

*North Wanneroo Fires.*—These fire occurred mainly on the 17th and 18th January and were considered to have been deliberately lit in several places. The fires burnt almost entirely on private property land held by absentee owners. There were virtually no fire-breaks and little or no provision for access. The eastern and northern flanks threatened the Pinjar pine plantation but were controlled by the Forests Department. Approximately 7,500 acres were burnt in this series of fires.

*Pinjar Fire.*—This fire burnt mainly between the 10th and 13th February, 1961, and was the largest in the district. The cause cannot be firmly established, but the fire



originated on the R.A.A.F. bombing range and was possibly due to the explosion of a practice bomb. The fire burnt a very large area, mainly on Reserve C.425 held under Commonwealth ownership. It seriously endangered private property on the western side along the boundary of Lake Pinjar. This western flank was controlled by forestry personnel and several properties and houses were saved by their efforts. Private property owners showed small interest in the progress of the fire and gave little assistance to the Forests Department. Owners, for the most part, were not even present when their properties were threatened. Approximately 25,000 acres were burnt.

#### OTHER LARGE FIRES RECORDED BY THE BUSH FIRES BOARD BUT NOT INVESTIGATED UNDER THE COMMISSION.

The following details of other large fires in the South West Land Division have been extracted from the records of the Bush Fires Board. They were reported to that Board by Shire Councils and fire control officers but were not investigated by your Commission—

Shire.	Date Fire Commenced.	Area Burnt. Acres.	Cause.
(i) Irwin	31/1/61	14,000	Unknown.
(ii) Dandaragan	25/2/61	12,000	Escape from burning off.
(iii) Kojonup	1/3/61	6,500	Escape from burning off.
(iv) Upper Blackwood	1/3/61	4,500	Escape from burning off.
Total area burnt by these fires		37,000	

Added to the 963,640 acres burnt in the fires investigated, the above fires bring the total known acreage burnt in the South-West Land Division to 1,000,640 acres. Your Commissioner has good reason to believe that the total acreage burnt in that division was well in excess of one million acres.

Large bush fires were also reported in other Land Divisions of the State. They include the following:—

	Acres.
(i) Balladonia.—October, 1961	3,750,000
(ii) Meekatharra.—23rd - 26th November, 1960	15,000
(iii) Black Range.—15th January, 1961	10,000
(iv) Yilgarn.—23rd January, 1961	30,000
(v) Meekatharra.—15th March, 1961	41,000
	3,846,000

The Balladonia bush fire, which burnt in the Eucla Division during October, November and early December of 1960, is considered to be so noteworthy that the following description has been prepared from information received mainly from the Bush Fires Board.

#### BALLADONIA FIRE.

The largest fire of the 1960/61 fire season was the Balladonia fire which burnt in the Eucla Land Division. It was probably one of the largest single fires that has occurred in the history of fire control in Australia.

This region generally carries a sparse stand of low shrubs and scattered patches of light timber which will not carry a fire any distance. During the summer and autumn of 1960, however, it received good rains and the growth of grass which followed was apparently sufficient to carry a fire during the following summer.

The cause of this fire was not ascertained, but it was possibly lit by travellers along the Eyre Highway.

It commenced in the vicinity of the 300 mile peg on the Highway about the middle of October.

It burnt slowly westward during October and November on an ever-widening face and, by the first week in December, was approaching pastoral country some 150 miles east of Norseman. In the 50 day period the fire had travelled 150 miles and had developed a front of approximately 50 miles.

On 6th December the owners of Noondoonia Station requested that action be taken to arrest the western spread of the fire as it was threatening their own and other pastoral holdings. Firebreaks were cut in front of the fire with earth-moving machinery from the Dundas Shire Council and, by December 11th, the western front was brought under control from about the 146 mile peg east of Norseman on the Eyre Highway.

No accurate estimate of the area burnt has been made, but it is possibly in the vicinity of 3,750,000 acres. The country over which the fire burnt is mainly uninhabited Crown land owing to lack of fresh water and no damage to stock or property was reported.

### CHAPTER III.

#### THE MEASURES NECESSARY OR DESIRABLE TO BE TAKEN IN WESTERN AUSTRALIA TO PREVENT THE OUTBREAK OR SPREAD OF BUSH FIRES AND TO PROTECT LIFE AND PROPERTY FROM SUCH FIRES (TERMS OF REFERENCE 3).

Some knowledge of the circumstances usually associated with the outbreak of bush fires and their development is a necessary prelude to any serious consideration of bush fire prevention and suppression. For the purpose of practical consideration, the causes of bush fires can be grouped under the following broad headings:—

- (1) Burning-off fires used in such operations as burning-off to permit cultivation of pasture or grazing or the burning of bush to reduce the fire hazard.
- (2) Accidental fires lit by mechanical defects in machinery such as in the operations of locomotives, tractors, vehicles, power saws, etc.
- (3) Domestic fires, i.e., fires lit for such purposes as cooking, smoking or destruction of rubbish.

- (4) Malicious fires, including fires lit mischievously by children.
- (5) Lightning fires, including fires arising from spontaneous combustion.
- (6) Fires from unknown causes.

It is often impossible to determine the cause of a fire with complete assurance and, therefore, the cause sought and given is generally accepted as the "suspected cause."

Table 1 gives the suspected causes of bush fires under these headings for the five years since the Bush Fires Act, 1954-1958, came into operation according to the records of the Bush Fires Board. These records are compiled from returns furnished by local government authorities as a statutory requirement under the Bush Fires Act.

Table 1

FIRES RECORDED BY THE BUSH FIRES BOARD OVER THE FIVE YEARS FROM 1956/57 TO 1960/61 INCLUSIVE

Suspected Fire Cause	No. of Fires	Per-cent-age	Total Acres Burnt	Per-cent-age	Average Acres Burnt per Fire
Burning-off .....	325	31	245,508	27	755
Accidental .....	276	26	67,741	7	245
Domestic .....	205	20	55,222	6	269
Malicious .....	53	5	1,020	1	19
Lightning .....	108	10	96,163	11	890
Unknown .....	82	8	448,209	48	5,441
Total .....	1,049	100	911,863	100	869

As already stated, these records are very incomplete. Not only are all fires arising on State Forests and, in most cases, for two miles outside State Forests omitted, but many fires in other parts of the State are not included because either the local fire control officer or the local government authority has not reported them to the Bush Fires Board, as required under the Bush Fires Act and Regulations.

The Forests Department has been keeping similar records of fires attended by officers and men of the Department, whether on State Forests, Timber Reserves, Crown lands or private property, for the last 20 years. For comparison purposes, the records of the Forests Department for the last five years are given in Table 2.

Table 2

FIRES RECORDED BY THE FORESTS DEPARTMENT AS ATTENDED BY DEPARTMENTAL GANGS OVER THE FIVE YEARS FROM 1956/57 TO 1960/61 INCLUSIVE

Suspected Fire Cause	No. of Fires	Per-cent-age	Total Acres Burnt	Per-cent-age	Average Acres Burnt per Fire
Burning-off .....	599	32	690,553	50	1,153
Accidental .....	399	21	63,498	5	159
Domestic .....	364	19	43,260	3	119
Malicious .....	213	11	30,207	2	142
Lightning .....	164	9	476,828	34	2,908
Unknown .....	148	8	89,161	6	602
Total .....	1,887	100	1,393,507	100	738

It is interesting to note that these two Tables reveal that, over the last five years, employees of the Forests Department have attended nearly twice as many fires as the Bush Fires Board's records show as having occurred over the whole of the remainder of the State.

It is also of interest to note that the percentage of the total number of fires under each cause is very similar in both Tables. It is somewhat surprising, therefore, that the acreage burnt by fires of unknown cause, as recorded by the Bush Fires Board, is nearly 50 per cent. of the total area recorded as burnt whereas, in the case of the Forests Department, their records show fires from unknown causes less than 7 per cent. of the total acreage burnt.

It is unlikely that the number of fires and the acreage burnt, as given by the Forests Department, would duplicate to any extent the figures in the records of the Bush Fires Board as the Forests Department only records those fires occurring in the forested portion of the State. These are not usually attended by bush fire brigades. The necessary corrections have been made to allow for the few cases where duplication is thought to have occurred.

If the numbers and acreages of the fires recorded over the last five years by both the Bush Fires Board and the Forests Department as of unknown causes are distributed proportionately amongst the known causes, the result is as shown in Table 3. This Table also shows the numbers of fires occurring and acreages burnt in each month of the year.

Table 3

FIRES ARISING IN EACH MONTH OF THE YEAR OVER THE FIVE YEARS FROM 1956/57 TO 1960/61 INCLUSIVE AS SHOWN BY A CONSOLIDATION OF THE RECORDS OF THE BUSH FIRES BOARD AND THE FORESTS DEPARTMENT AFTER DISTRIBUTING FIRES ATTRIBUTED TO UNKNOWN CAUSES PROPORTIONATELY OVER THE KNOWN CAUSES

Month	Burning-off Fires			Accidental, Domestic and Malicious Fires			Lightning Fires			No. of Fires	Total Acres Burnt	Average Acres Burnt per Fire
	No. of Fires	Total Acres Burnt	Average Acres Burnt per Fire	No. of Fires	Total Acres Burnt	Average Acres Burnt per Fire	No. of Fires	Total Acres Burnt	Average Acres Burnt per Fire			
September .....	4	92	23	9	9	1	.....	.....	.....	13	101	8
October .....	17	2,570	151	54	958	18	1	36	36	72	3,564	49
November .....	119	8,719	73	222	17,300	78	21	404	19	362	26,423	73
December .....	199	71,005	357	319	23,638	74	41	19,779	482	559	114,422	205
January .....	108	65,895	610	385	131,473	342	106	491,064	4,633	599	688,432	1,149
February .....	135	539,863	3,999	350	34,840	99	59	49,903	846	544	624,606	1,148
March .....	297	555,436	1,870	241	126,761	526	65	120,188	1,848	603	802,385	1,331
April .....	129	37,123	288	44	7,366	167	1	21	21	174	44,510	256
May .....	6	826	134	4	101	25	.....	.....	.....	10	927	92
Total .....	1,014	1,281,529	1,263	1,628	342,446	210	294	681,395	2,319	2,936	2,305,370	785
Percentage of Total	35	55	.....	55	16	.....	10	29	.....	.....	.....	.....

From these Tables it will be seen that the bush fires do the most damage in January, February and March, the latter being the month when the greatest area is burnt and that the most serious and extensive fires arise as escapes from burning-off fires, with fires from natural causes—namely lightning—coming next.

Fires classed as burning-off fires consist of the following:—

- (1) Developmental burns used for the purpose of disposing of the solid and heavy material felled in the course of clearing forest or scrub. The hotter and drier the time when this operation is carried out, the more effectively and economically the area is cleared.
- (2) Grazing burns used for the purpose of destroying rank herbage and scrub growth and causing the development of fresh foliage more edible and palatable to stock. On the south coast sand plains these burns are carried out in summer as soon as a fire will run. In the drier parts burning is more commonly carried out in the autumn, when the cattle are returning from the coast. The spinifex country of the north-west is usually burnt at the end of summer.
- (3) Pasture burns used for the purpose of destroying old rank pasture growth to facilitate renovation of a pasture. They are generally most satisfactorily carried out after the end of summer and as close as practicable to the first rains.
- (4) Agricultural burns for the purpose of destroying stubble and straw to facilitate ploughing. They are most effective when carried out after the stubble and straw has been grazed and just before the first rains.
- (5) Protective burns for the purpose of destroying material which may assist the spread of bush fires. They are generally most effectively carried out in spring, but may also be satisfactorily carried out in autumn and, at times, even during the winter.

A closer analysis of the figures indicate very clearly that the great majority of the burning-off fires from which bush fires escape are developmental burns.

These fires are mostly lit in January, February or March, as soon as the prohibited burning time ends when the vegetation and litter are driest. It is unlawful to light the bush on a day for which the Perth Weather Bureau has forecast the fire hazard as "dangerous", and most fires are lit on a day of "moderate" to "average" fire danger. Some fires, are, however, lit when the fire hazard forecast is "severe". The actual hazard in such cases sometimes proves to be "dangerous".

The reason for the large number of escapes from burning-off fires lies basically in the settler's desire to get as good and as

cheap a burn as possible and his failure to appreciate adequately the changing weather patterns which frequently occur early in the burning season.

As a result of the movement of the air masses across the Continent, the direction from which the wind blows gradually changes in an anti-clockwise manner. The change is, however, not at all regular. The times and rates may vary considerably. Depending on the particular locality, sea-breeze influence from the south-east to the north-west may considerably reduce or accelerate the land wind and quickly change temperature and humidity conditions.

If a fire is lit in the south-west of the State while the wind is blowing from the south-east quarter, it can be expected that in the near future—it may be a matter of hours or days—dry winds originating from the interior of the Continent are likely to be experienced and the direction from which they blow will gradually change from south-east through east, north-east, north and north-west. These winds are normally hot and dry and can rapidly fan a dormant fire to one of uncontrollable proportions. The position is made worse by the fact that the heat of the fire also tends to increase the force of the wind.

If, on the other hand, the fire is lit while the wind is blowing from the west, cooler and moister winds from the south are likely to be experienced before further dry winds are received. It is during this period that a fire can be more easily kept under control.

Severe burning conditions this season have been frequently associated with one or more tropical cyclones lying off the north-west coast. Special attention should be given to such situations, which can result in a rapidly rising fire hazard and widespread escapes of burning-off fires.

Another and even more common cause of the escape of burning-off fires is the failure of the settler to keep adequate labour in attendance. In order to keep fires under control and prevent them from spreading beyond the land on which a permit has been given for burning, the Bush Fires Act requires that at least three men shall be constantly in attendance at a fire from the time it is lit until, in the opinion of a bush fire control officer or a bush fire brigade officer, the fire is safe. The settler seldom seeks the opinion of a bush fire control officer or a bush fire brigade officer as to the safety of his fire before dispensing with his additional labour and, in fact, he often goes away himself and leaves it unattended long before it is safe. Then, with a rising wind, embers are blown over the firebreak and, before the escape is seen and the outbreak can be extinguished, it is out of hand. It is almost invariably found that the fire does not escape on the day it is lit, but some day or days later when it is practically, if not absolutely, unattended. In some cases the fire escapes even though all requirements of the Bush

Fires Act have been met in full. Fires generally escape under the influence of a moderate to strong wind following a period of hot, dry weather.

One obvious way of reducing the numbers of these escapes is to prohibit the lighting of clearing fires until so late in the season that there is very little, if any, risk of dangerous fire conditions developing. Over most of the south-west it has been found that seldom, if ever, does a serious fire occur after the 12th March, and never do they occur once 50 points of rain have fallen following the 1st March. This delay in burning would probably mean an increase in the average cost of clearing operations and would be strongly opposed on that ground by the settler who, despite all evidence to the contrary, still stoutly maintains that he can be trusted not to take an unreasonable risk. Most of them can, of course, be so trusted, but there are still too many who cannot.

#### BUSH FIRES ACT, 1954-1958.

The Bush Fires Act, 1954-1958, is sound in principle and it is not considered that any major changes need to be made in it. It places the responsibility for the prevention of bush fires upon the individual and for the suppression of bush fires upon the local community through the local authority. Any apparent weakness in the operation of the Act is due to the apathy of the local community which does not take sufficient interest in the public welfare to ensure, firstly, that the prohibited burning time for the district adequately covers the dangerous season and, secondly, that settlers proposing to burn off have taken adequate steps to provide the assistance and manpower required to keep the fire under control. Finally, there is the perhaps understandable disinclination of local government authorities and their officers to direct and sometimes prosecute their neighbours and friends who commit breaches of the Act. The statement was made by some witnesses that the restrictions on the actions of the individual provided in the Bush Fires Act only encouraged the unlawful lighting of fires, as they interfered unduly with his opportunities for gain. Such statements only emphasise the disrespect into which a law for the protection of the public can fall if deliberate violations are not immediately and adequately penalised.

The Act has only been on the statute book for five years, and perhaps more time must be allowed to enable it to become properly understood and operative in all centres and in all directions.

#### (a) The Bush Fires Board.

The Act provides that it shall be administered by a Bush Fire Board. The duties of the Board are mainly of an advisory, educational and supervisory nature. They include advising the Minister with regard to the administration of the Act, reporting to the Minister on the means of preventing and

suppressing bush fires, co-ordinating fire prevention measures, carrying out research, conducting publicity campaigns, advising the Governor on the commencing and terminating dates of the prohibited burning times to be declared for each district and advising the Minister whether and to what extent such declarations should be suspended or varied.

The Board has power to prosecute persons for offences against the Act and to recover expenses in which it may become involved in the suppression of unlawful fires or the establishment of firebreaks. It is also empowered to appoint such officers and servants as it considers necessary and, through the bush fire wardens so appointed, it may assist a local government authority in the establishment of bush fire brigades, inspect fire precaution measures and investigate the cause and origin of bush fires.

Although the Act places the responsibility for bush fire control directly upon the local community, the responsibility for ensuring that the local community accepts this responsibility should rest with the Bush Fires Board. Up to the present time the Board has not been able to deal adequately with the apathy of a local community in this matter.

The Bush Fires Board needs strengthening.

#### (i) Board Members.

It is important that the members of such a Board should each be capable, by reason of his knowledge and experience, of contributing effectively to the work of the Board and that no member should be nominated simply as representing an interest.

To this end, it is your Commissioner's opinion that the Board should consist of five persons of wide knowledge and experience in the work of bush fire prevention and suppression who would be nominated as at present by the Country Shires Association, at least three of whom shall be actively engaged in the business of farming; two foresters nominated by the Conservator of Forests; a police officer nominated by the Commissioner of Police; an officer of the Lands Department nominated by the Under Secretary for Lands; a member of the timber industry nominated by the Minister for Forests; a person nominated by the Minister for Agriculture; a person nominated by the Western Australian Government Railways Commission and a person nominated by the Fire & Accident Underwriters' Association.

The Board should, if possible, also include a meteorologist nominated by the Commonwealth Deputy Director of Meteorology or, if this is not practicable, another person such as an officer of the Forests Department who has a knowledge of weather and fire danger forecasts.

Your Commissioner further suggests that the Chairman of the Board should be appointed by the Governor from amongst its members.

It should be lawful for the Committee to form sub-committees and co-opt other persons with suitable knowledge to such sub-committees to deal with particular regions or subjects. The timber industry, for instance, although vitally interested in fire protection in the south-west and with a valuable potential source of manpower for fire-fighting, is unlikely to be directly concerned with other regions of the State beyond the co-ordination of burning periods on the boundaries of its own region.

(ii) *Administrative Staff.*

The senior executive staff needs a sound knowledge of fire control operations as well as administrative ability. The necessary knowledge is not obtained by visiting meetings of bush fire brigades or even by attending fires in a supervisory capacity. It can only be obtained by actually taking part in firefighting operations and in their direction. If it is impracticable to obtain persons with the necessary all-round ability then such an administrative staff needs to be strongly supported by technical staff. As far as could be ascertained, the present staff is comprised of earnest, hard-working and conscientious officers, but the senior executive staff needs strengthening in order that the Board may be adequately advised and that the field staff may be adequately trained and encouraged to carry out their duties with greater effect.

(iii) *Wardens.*

The present number of bush fire wardens—five—is inadequate to carry out the work needing to be done by wardens. Subject to the direction of the Board, the wardens are required inter alia to investigate the cause and origin of bush fires in their districts and report on them to the Board and the local government authority, as well as to report to the Board and the local authority particulars of all offences against the Act. The duties of the wardens, as set out in written instructions to them do not, however, include the investigation of the causes of fires and they are forbidden to investigate any matter concerning breaches of the Bush Fires Act without seeking and obtaining the permission of head office. They are also required to forward to the Secretary, any correspondence they receive direct on official matters.

The value of a warden should lie in the exercise of his supervisory powers in the interests of the Board and of his advisory and educational powers in the interests of the local government authorities and their officers. They should be capable of acting as arbitrators in disputes between or within the firefighting organisations of the Shires. If wardens cannot be obtained who can completely exercise these powers or be trained to do so then it would seem that action should be taken to have the salary ratings for such positions more highly classified, in order that men with the necessary qualifications may be attracted to apply for them. The present salary range of £1,217 to £1,361 per annum for a warden seems low by comparison with

other Government officers carrying similar responsibilities cf. a forester £1,467 to £1,575 per annum, plus £52 per annum in consideration of fire control duties. The senior warden's salary of £1,415 to £1,577 should also be reconsidered, cf. senior forester £1,748 to £1,756 per annum, plus £52 per annum in consideration of fire control duties. The Senior Warden should also be relieved of his ward duties and given the opportunity to taking more direct responsibility for the executive work of the Board in the field and of assisting, encouraging and training the field wardens. He should be present at all regular meetings of the Board.

It was stated in evidence that the Board proposed an amendment to the Act to enable investigations into the cause and origin of fire to be carried out by police officers. While the value of police officers in obtaining statements from witnesses is recognised, and it is believed that advantage should be taken of it, the examination of the scene of the fire and investigations on the ground as to its cause should, as far as practicable, be carried out by persons specifically trained for this purpose and as early as possible after the fire originates. This is a duty which the bush fire warden should be able to fulfil.

(iv) *Responsibilities of the Board.*

In the matter of the dates of burning times and of fire weather, the Board has considerable responsibilities. Although it is not expressly provided in the Act, the Board should, in addition to its duties of advising the Governor and the Minister in the matters of burning times, be able to also advise local government authorities when the termination of the prohibited burning times should be delayed and to advise the Minister when, where and to what extent emergency fire periods should be declared.

On the whole, the Board has done good work in these directions although there appear to be some cases where the prohibited periods could be amended with advantage and anomalies avoided. In this connection, the following 1960-1961 season times are quoted:—

- (a) The declaration of the dates in the Carnamah Shire coastal strip was from 15th January to 26th February when, in the district to the north it was from 15th October to 29th January, to the east from 1st October to 29th January and to the south from 22nd October to 29th January and to 12th February.
- (b) In the Augusta-Margaret River Shire, where the season ended on 26th February, it would seem that the 5th March should have been the earliest date for this termination. If seasonal conditions warrant the Minister may, on the recommendation of the Bush Fires Board, terminate the prohibited burning times up to 14 days before the declared date.



- (c) On the south of Manjimup Shire and in the Denmark Shire, where the prohibited burning times started on 1st January, it would appear that, to avoid fires being alight over the holiday period, the commencing date should have been 22nd December.

Insufficient attention has perhaps been given by the Board to the matter of its power to recommend delaying the termination of the prohibited burning period. The Board, through its officers, needs each year to follow carefully weather trends and consider likely developments. In a year so unusually dry as was 1960-61, it would have been expected that the Board would have been prepared to recommend an extension of the prohibited times until the position became safe. At least the Board might have warned shire councils and suggested that the Councils themselves would be wise to consider extending the period of prohibited burning times for that year in certain cases. Such action would perhaps have brought the Board into odium with some people in some districts, since it is probable that no fires of any consequence would then have resulted from burning-off operations and the wisdom of the Board's recommendation would not have been obvious. That is, however, a possibility which must be appreciated by those who accept positions as members of the Board, if the Board is to fulfil satisfactorily its functions.

In the matter of the declaration of bush fire emergency periods, a number of witnesses complained that such bans against setting fire to the bush were often applied to districts where they were entirely unwarranted. It would seem that, although it is not specifically a statutory function of the Board, this matter requires more attention from the Board in its capacity of adviser to the Minister than it has been given in the past.

An officer of the Board, in evidence, stated that it has been the custom to wait until there has been a build-up of dangerous conditions before recommending to the Minister that a bush fire emergency period should be declared. He further stated that the Forests Department was not consulted in assessing the position and emphasised the need for rapid action when a ban against the lighting of fires had to be applied. While the need for rapid action is recognised, it also needs to be appreciated that the present system of forecasting fire danger in Australia was largely developed by an officer of the Western Australian Forests Department, and that the Department still carries out such forecasting for its own service from stations at Dwellingup, Dryandra and Pemberton. This service is available to any country residents in the districts if they seek it. Many witnesses expressed appreciation of the accuracy of the service.

While recognising that "it is better to be sure than sorry", if due regard is given to advice available from the Commonwealth Deputy Director of Meteorology, the Forests Department and the wardens of the Board in the various districts, there should be little

room for recommendations being made that the ban be applied to any district where it is definitely unnecessary or, if it does have to be applied in blanket form in the first instance as a matter of urgency, no reason is seen why it should not be lifted quickly from districts where it is unnecessary.

Consideration should be given to using broad features such as the Albany Highway, the Southern Highway or the Great Northern Highway, rather than shire boundaries, in determining the limits of the declarations to particular districts.

Complaints were also made that the bush fire emergency periods were not always declared sufficiently early in the morning. This of course could, in some instances, be unavoidable.

It is essential that prosecutions be lodged in the case of deliberate breaches of the Bush Fires Act or Regulations. If the local government authorities or the police will not prosecute in such cases, the Bush Fires Board should do so.

The Bush Fires Board is the only body carrying out bush fire control publicity in Western Australia. It arranges schools and lectures on fire control and demonstrations in the use of firefighting equipment. There should be no need to hold more than one school a year. It is important that the curriculum should, as far as possible, be practical in nature and that such schools should be held when burning exercises can be carried out. Exercises of this nature are essential to maintain the interest and efficiency of a brigade.

The Board supplies notices on bush fire prevention for erection by local government authorities. In this matter, it is suggested that roadside publicity would be improved by the use of slogans which can be changed during the summer season and removed for the winter months, so that they will not become too familiar and boring to the traveller.

The Board publishes a very good quarterly booklet entitled "The Fire Fighter". It is suggested that it would be well worthwhile, at least once a year, to include in this booklet notes on the protection of buildings as well as the protection of human beings and the treatment of injured. The fear of repetition from year to year should not be a deterrent.

The Board has published a very good summary of the Bush Fires Act entitled "Fire Law". In this connection it is suggested that this publication is very suitable for enthusiasts but is rather comprehensive for the ordinary person, busy with other matters. Unless it is very carefully studied, some confusion of thought may result. Some fire control officers and other witnesses had no idea that an emergency fire period declaration had to be revoked by a further declaration, but thought that it was renewed day by day, as necessary.

The Board also distributes small card calendars with fire warnings and advice regarding fire control printed on them. The Board should also consider printing on some

of these card calendars, in simple language, the provisions of the Bush Fires Act as they apply to particular matters—for example, the duties and powers of a fire control officer, of a fire brigade member or of a land owner. The present certificate of appointment or registration of a bush fire control officer or officer of a bush fire brigade, as the case may be, informs them only of their powers.

Some thought should be given to the publication of advice regarding the control of fires in the foreign languages which are more commonly used by new arrivals to these shores. The erection in towns of fire danger signs which show, by daily adjustment, the fire danger rating for the day, always stimulate interest. It is also desirable that some material be prepared which can be used by school children in the projects which the modern child is often asked to prepare on topical subjects. The difficulty everywhere is to maintain interest and enthusiasm in fire control when some time has passed without any serious outbreaks occurring. The maintenance of such interest is one of the most important duties of the Board and its officers.

#### **(b) Local Authorities.**

About 126 shire councils, 14 municipalities and five cities constitute the local authorities in the State of Western Australia.

The Bush Fires Act places the responsibility for the control of bush fires upon the local community, through the local authority.

In too many cases district inhabitants are inclined to blame the local authorities for their own shortcomings. They fail to realise that the members of the local authorities are elected on account of their general ability to conduct effectively the local government matters in which the electors are interested. They cannot be expected always to give first priority to matters of bush fire control.

Several witnesses suggested that local authorities should be removed from any association with bush fire control, but none of such suggestions was considered practicable or desirable.

Local authorities may appoint bush fire control officers and may appoint a senior bush fire control officer as a weather officer, and also a deputy and an advisory committee to assist the weather officer. They may also establish and maintain bush fire brigades and they are responsible for insuring all such bush fire control officers and members of bush fire brigades as they may appoint, and any persons voluntarily assisting any of them, as well as all the firefighting equipment of all such persons.

##### *(i) Fire Control Officers.*

There is no limit to the number of bush fire control officers that a local authority may appoint. At the end of April, 1961, there were 1,548 bush fire control officers registered with the Bush Fires Board.

At one time, it was common practice for a local authority to appoint its own members or other prominent members of the community as bush fire control officers without sufficient regard as to whether they had a sound knowledge and experience of bush fire control. More recently, much more discretion has been shown in most cases and, in many instances, the opinions of bush fire advisory committees or bush fire brigades is now sought with regard to such appointments.

Fire control officers need to be very keen, agile men holding the respect of their neighbours and familiar with the district and the duties they are called upon to perform. Their duties require them to take action to prevent the outbreak of bush fires, to protect life and property in the case of a bush fire arising and to control and extinguish such fires. They are given very wide powers to do these things. They are also responsible for the issuing of a permit to burn and the conditions attached to such burning. They should have a reasonable knowledge of weather behaviour and its likely effect upon fire danger. They are not required to inspect areas for which they are asked to issue a permit, nor to carry any responsibility for fires lit under the authority of the permits they issue. The responsibility for the actual lighting of the fire rests solely upon the person lighting. Nevertheless, inspection of the areas proposed for burning, advice to the permittee with regard to the burning and supervision during and after the burn are public duties which all fire control officers should be encouraged to perform and commended for performing.

In general, they are a very capable and respected body of citizens, voluntarily carrying out a very unpleasant though a very important and essential duty.

There are, however, a few points to which attention needs to be drawn in connection with fire control officers:—

- (a) The local authority should exercise its powers to determine the seniority of fire control officers, the most senior officer being called "Chief Bush Fire Control Officer" or some such title to indicate his status.
- (b) The local authority Clerk should not necessarily be the Chief Fire Control Officer. This title suggests that a person holding it is senior to all other fire control officers. The Clerk's training is usually a clerical one and he is generally much more liable to move from district to district than a member of a local farming community. It appears that he has generally been given the title because he has a better knowledge of the Bush Fires Act than the ordinary man of the district and because he is generally centrally situated in the district and usually readily available. It is suggested that his title should be

liaison officer, or something indicating that his duties in fire control are of that nature.

- (c) Generally, it would be an advantage if the bush fire control officer were the captain of a bush fire brigade, but this does not mean that all bush fire brigade captains should necessarily be fire control officers.
- (d) Provision needs to be made for local authorities to have power to appoint a deputy to a bush fire control officer for a limited period should the fire control officer fall ill or have to leave the district at a critical time. Generally, the senior officer of the local bush fire brigade would be the most suitable person to act as a deputy.
- (e) Although a bush fire control officer is not required to inspect an area before he issues a permit to burn the area it is most advisable that he do so in the case of clearing burns, to ensure that the conditions he imposes are adequate for the case.
- (f) The number of fires to be lit at any one time for which permits are given should be strictly limited to those with which the local bush fire brigade could cope should an emergency arise.
- (g) It would be a great assistance to the fire control officer if the local authority would request all those desiring to carry out developmental burns in the autumn, to give notice to the authority before the prohibited season started.

#### (ii) *Bush Fire Brigades.*

The real basis of the protection afforded under the Bush Fires Act is that it gives every opportunity for the local people to protect themselves and their property by the formation and operation of bush fire brigades. No Government action or legislation, however strictly enforced, can prevent bush fires occurring. The first essential is, therefore, to have a force which can take immediate action to suppress, as quickly as possible, any bush fires which do arise. Brigades are the basis of any defence against bush fires.

Local authorities are responsible for many important matters affecting their districts and cannot be expected to conduct the business of bush fire brigades, but they have a duty to encourage the establishment of such brigades, their co-ordination and their maintenance, not only by moral support but also with financial aid such as providing the basic fire headquarters for the district and a central pool of equipment, such as a fire tender.

Several factors are essential to the successful operation of a bush fire brigade. There must be at least one individual, a driving force, who is dedicated to bush fire control and who will be prepared to direct the organisation of the local community to this end. Authority and finance may be made available to the local government bodies but,

without the enthusiasm and support of the local community, no worthwhile effort will result. Once a bush fire brigade is formed, it deserves to receive every encouragement and assistance. The local authorities have been given power to render such assistance.

Once formed, brigades need to develop plans of operation. They have to decide their boundaries, marshal their resources, prepare maps to show the location of the fire control officers, bush fire brigade members, land-owners' boundaries, roads, trails, gates, water supplies, buildings, areas of protected burnings and firebreaks. They need to prepare lists to show the availability and location of such firefighting equipment as trucks, bulldozers, water tanks, power pumps and power saws. (Maps on a scale of 80 chains to 1 inch should suffice.)

They should plan and organise protective burns along district roads and in bush country in the spring, and particularly in proximity to areas where clearing fires are proposed for the autumn. To this end they should endeavour to ascertain before the prohibited season commences the location of any clearing fires proposed. They need to arrange for these areas to be inspected and the hazards assessed. They should be prepared to assist with any burns where any risk of escape exists.

Arrangements should be made for the local fire control officer to be the captain of the brigade if possible or, if not, then at least a member of the brigade, or for him to work in close association with the brigade.

If the bush fire brigades of a district can work as an association, so much the better, as this increases the public interest, strengthens their status and morale and enables co-ordination and the application of their efforts over the maximum area. A very good example of this type of organisation in the Kojonup Fire Control Association was brought under the notice of the Commission.

In those shires where the local community was sufficiently interested to form bush fire brigades and bush fire brigade associations, it was difficult to see any direction in which the position could have been improved by legislation.

#### (iii) *Bush Fire Control Advisory Committees.*

In the south-west corner of the State, where many of the inhabitants are not satisfied with the operation of the Bush Fires Act and arrangements for bush fire control generally, one of the greatest faults is lack of co-operation. This lack of co-operation exists not only between the forestry interests and the agricultural interests, but also between various sections of the agricultural community, while co-operation even between the saw-milling and the forestry communities leaves something to be desired.

Police and military reports on the 1960-61 fires both commented on confusion and lack of organisation and co-operation in bush fire control operations in some shires. This appeared generally to apply to the efforts of

fire control officers, who were endeavouring to direct the general strategy rather than to the local bush fire brigades which were getting on with the job of carrying out the actual firefighting.

It is important that every local authority take steps to ensure co-operation between the firefighting elements in its district. This can probably best be done by the appointment in each shire of bush fire advisory committees, or committees of whatever name may be considered most indicative in their purpose. The name in itself is not important, but their purpose is important. Uniformity in naming should be assured, if possible.

On these committees, representatives of the firefighting organisations—fire control officers, bush fire brigades and the Forests Department, when appropriate—should be adequately represented. Such committees have already been established in many shires. The purpose of the committee is to assist the local authority by recommendations with regard to such matters as the dates to be recommended for the prohibited burning periods, the appointment of fire control officers, the registration of bush fire brigades and prosecutions. These committees should meet two or three times before the fire season commences in order to organise their resources and plan the action they will take to prevent the outbreak of bush fires and to suppress such bush fires as may arise. They should appoint representatives to meet representatives from adjoining shires to plan to support each other and to co-ordinate their plans.

It is surprising how many local authorities have not formed such advisory committees, but prefer to try to decide all their problems for themselves, thus depriving themselves of the opportunity of obtaining the concerted advice not only of their own fire control officers, but also of the people most directly concerned with the lighting and control of fires, namely the bush fire brigades.

It is suggested that all local governing bodies give consideration to section 18 (4) of the Bush Fires Act, which provides that a local authority may require any person desiring to burn to give notice of his desire by a certain date, after which the local authority may prescribe a schedule of burning for the district. If a bush fire brigade or association has been formed, the schedule is generally drawn up in consultation with either the bush fire brigade or association. The brigade is then in a position to ensure that the burning taking place in the district will not be excessive should dangerous fire weather develop, and to arrange its attendance at burnings when it is considered advisable in the general interests.

It is desirable that notices of desire to carry out clearing burns should reach the local authority in sufficient time before the beginning of the prohibited season to enable the authority to request land owners to put in essential firebreaks and to enable the

brigades to carry out work such as protective burning in the surrounding bush if it is considered necessary.

It was found that in some cases firefighting equipment was provided by the local authority for a central bush fire brigade unit which was used virtually as the town fire brigade. It is considered that, in some instances, this type of brigade would be more effective if it were under the supervision of the West Australian Fire Brigades Board, rather than under the Bush Fires Board. It is understood that, should application be made by a local authority, the Fire Brigades Board is prepared to give every consideration to equipping a volunteer brigade for town firefighting if the town has an adequate water reticulation system or if there is something of particular value to the community to protect. In other cases, it is at all times prepared to assist with advice.

It is recommended that the Bush Fires Board give consideration as to whether any centrally situated bush fire brigades primarily associated with the protection of the town from fire should be advised to seek the assistance of the West Australian Fire Brigades Board.

#### *(iv) Fire Weather Officers.*

Many witnesses complained that the general application of the restrictions governing burning prevented them from burning their clearings during reasonably hot weather. In this connection it is pointed out that the Board, upon the application of a local authority, may vary or suspend all or any of the statutory conditions governing burning in any district during the months of October, November, April and May. Upon the recommendation of the Bush Fires Board, and if he considers the seasonal conditions warrant it, the Minister may terminate the prohibited burning times in any district by not more than fourteen days earlier than the declared date.

In addition, a local authority can appoint a fire weather officer for the district. Except during the prohibited burning times or bush fire emergency periods, a fire weather officer has power to authorise a person to burn bush, for which he has a permit, on days on which the fire hazard for the locality has been forecast as "dangerous." This is designed to cover the case of localities where, for some reason, the "dangerous" condition does not apply. The local authority may also appoint a deputy weather officer to act in the absence of the weather officer, and an advisory committee to assist them both. The appointment of a weather officer places upon the local community the responsibility for permitting fires to be lit and is in conformity with the basic principles of the Bush Fires Act in this direction.

#### *(v) Firebreaks.*

The establishment of firebreaks is an essential part of fire control. Firebreak establishment is particularly necessary on the properties of absentee owners.

The Act makes provision for local authorities to require land owners and occupiers to establish firebreaks where, when and how the local authority specifies. If the owner or occupier fails to carry out these instructions, the local authority may direct that it be done at the expense of the owner or occupier. Local authorities generally issue orders requiring land occupiers or owners to establish firebreaks around their properties, but do not always ensure that such orders are obeyed. Seldom, if ever, do they prosecute. It is considered that much more care and thought should be given to planning the fire-break system for a district and there should be much more insistence upon the fulfilment of the local authority's instructions.

A number of witnesses suggested that local authorities should have an inspector of fire-breaks who could combine those duties with other duties, such as Traffic Inspector or Noxious Weed Inspector. The Act provides that the Minister may require a local authority to issue notices to land owners and occupiers to construct firebreaks and, in the event of the failure of the local authority or the land owner or occupier to do so, the Bush Fires Board may carry out such work at the expense of the local authority or the owner or occupier, as the case may be. This is a matter in which the Bush Fires Board should interest itself far more than it can probably do with the Board's present staff. It is believed, however, that direct action by the Board would seldom be necessary if the authority were judiciously exercised, as is apparently done by Noxious Weeds and Vermin Inspectors of the Agriculture Protection Board.

#### INSURANCE.

Reference has already been made to the duty of the local authority to insure bush fire control officers, bush fire brigade members and volunteers assisting them.

Some witnesses expressed doubt whether such insurance applied in cases where the fire control officers, brigade members and volunteers assisting them were engaged in the prevention, control and extinguishment of bush fires in forest land. An officer of the State Government Insurance Office has stated that the usual insurance policy does apply in such cases and that it also applies when such personnel were similarly engaged in the area of another local authority, provided that the latter local authority holds the usual insurance policy. It should be noted, however, that a local authority which does not maintain a bush fire brigade is not obliged to effect this insurance.

##### (a) National Insurance.

Any consideration of bush fires generally would be incomplete without some consideration of how such losses as are suffered might possibly be recovered. Several witnesses suggested the development of a scheme of national insurance against losses from bush fires. The general reason given for this suggestion was that sufferers would, under such a

scheme, receive relief in the way of food, clothing and fodder for stock much quicker than under the present system of distress fund relief, and that losses would be totally recovered instead of only partially as at present.

It is difficult to justify persons not insuring their assets for their full value. The insurance of farm assets against bush fires should not be treated any differently to the insurance of any other type of asset against damage or losses by fire. Pasture and crops can be insured on a seasonal basis, which would cover the months when maximum fire danger prevails. The premium rate at present prevailing for four months is 18s. per cent. for cereal crops standing or cut, and 36s. per cent. for meadow hay standing or cut.

It is normally accepted as sound business practice to provide adequate reserves against contingencies, and insurance provides one very effective way of providing such a reserve.

National insurance to cover losses by a section of the community would be difficult to justify. It is understood that the matter has already been considered at Commonwealth Government level and rejected as impracticable. If, however, a representative body of a rural industry were to suggest a scheme of co-operative insurance against losses from bush fires, it is considered that the Government might well accord it sympathetic consideration and give any assistance practicable towards its establishment. In bush fires the land owner is not the only sufferer. The country as a whole suffers by the loss of production, soil erosion, dam siltation and general wastage.

##### (b) Approved Areas.

The Bush Fires Act, 1954-58 provides that, when a bush fire brigade is established in the district of a local authority, the Minister may declare the district an approved area and that, within such approved area, the rate of premium charged for the insurance of crops shall not exceed 75 per cent. of the rate of insurance charged in respect of crops not situated in approved areas. In actual fact the Minister, before making such a declaration, requires that the Bush Fires Board examine the brigade and advise him if it is of reasonable standard. If, after the declaration of an approved area, the standard is not maintained, the Minister may revoke the declaration. In particular cases such declarations have, at times, been revoked.

It is considered, however, that this provision has had very limited value as an aid to fire control for the following reasons. Once a district has been declared an approved area, the incentive for further improvement of the bush fire fighting organisation is reduced. In most cases, the amount of money saved by the 25 per cent. reduction on the premium for the insurance of crops is small, and it is very doubtful if any of



it is devoted to improvement in fire control measures. Again, all people in an approved area are entitled to the 25 per cent. reduction in premiums on their crops, irrespective of whether they assist with bush fire control in their district or subscribe to the establishment and equipment of the bush fire brigade.

It is recommended that consideration might be given to whether it might not be better to dispense with this concession and bring an amount equal to the concession, i.e., 25 per cent. of the total premiums on rural insurance against fire, into a fund to be used in encouraging fire control by improving the equipment for training of bush fire brigades or assisting in fire control research.

### **(c) Bush Fire Equipment Funds.**

Many complaints were received of shortages of equipment, lack of finance and the need for Government subsidies, particularly in the poorer shires where the statement was not infrequently made that firefighters were working for the insurance companies in saving insured material from destruction. The new and the struggling settlers also emphasised their difficulty in providing themselves with the heavier but essential firefighting equipment, particularly vehicles and power pumps. New South Wales, Victoria and South Australia all have funds of this nature. In New South Wales the Government subscribes 25 per cent., the local authority 25 per cent. and the insurance companies engaged in fire insurance 50 per cent. of the fund. The local authorities' contribution is limited to 1/20th of 1d. in the pound on the unimproved capital value of rateable land in the area of the authority, excluding land within the jurisdiction of the Fire Brigades Act. This determines the maximum amount to be contributed by the Government and the insurance companies. The actual amount of contribution by the local authority is determined by the Minister, and local authorities may strike a rate to provide the moneys. The expense of administering the fund is limited to 10 per cent. of the total expenditure from the fund.

In the case of both Victoria and South Australia only the Government and the insurance companies contribute to their bush fire funds.

In Victoria, the Government contributes one-third and the insurance companies two-thirds. The amount of the insurance companies' contribution is determined by the Fire Authority.

In South Australia, the Government contributes half and the insurance companies half.

Representatives of the Fire & Accident Underwriters' Association of Western Australia advised that the insurance companies are opposed to any form of contribution to fire brigades. They point out that any expenditure in which they are involved in this way must be passed on to the insuring

public. They claim that their business is solely to indemnify policy holders against loss or damage by fire, not to protect life and property, and that they should not be involved in collecting for fire brigades. Indeed they believe that, without fire brigades, not only would many more people insure their properties, but they would be more likely to insure them for their full value. They believe that funds needed for fire control should be provided by the local authorities, supplemented by the Government.

Your Commissioner does not propose to suggest the actual details of such a scheme for Western Australia but is of the opinion that a subsidised fund to assist with the purchase of firefighting equipment for the bush fire brigades is essential to the attainment of a satisfactory standard of efficiency by the brigades. A fund to which the local authority contributed would have the advantage of giving the brigade members, who would be responsible for maintaining and using the equipment, some degree of personal financial interest in any equipment purchased with the funds.

### **COMMUNICATIONS.**

It is considered that, in some districts, delay in the provisions of telephonic communication is a matter for deep concern. It would seem that, in the interests of the protection of life and property, telephone communication should accompany land development. Particular cases brought forward were those of the districts of Courtney and Nillup in the Augusta-Margaret River Shire and the Eneabba War Service Settlement in the Three Springs and Carnamah Shires. In the Eneabba Settlement there are about forty settlers, the nearest one being 35 miles from a telephone and the farthest one 73 miles. It is understood that negotiations are in train for the supply of a telephone service to these areas, and it is suggested that the Government endeavour to accelerate action in order that the service shall be provided to these and all other outlying settlements of any size before the next fire season commences in October.

An officer of the Bush Fires Board stated, in evidence, that the Board has decided that it needs an emergency network of, say, 10 to 12 radio sets which were obtainable at a total cost of about £2,500. These sets would be portable ones of a type which can be carried about in vehicles. The proposal is that these sets should be held in Perth, available for immediate transport to the scene of any fires which seem likely to assume serious proportions. Their retention in Perth would mean that it should be possible to keep them in good working order between fires.

Some bush fire brigades already possess radio communication sets and others propose to purchase them but, throughout the inquiry, there were persistent references to the need for bush fire brigades to be equipped with radio communication and the difficulty

of the brigades obtaining the money required for their purchase. The use of Police and Army radio networks has not always proved satisfactory and, apart from any other objections, the Police, Army and Forests Departments may consider it unwise to have their frequencies used generally for bushfire control by other authorities.

There is no doubt that improved means of communication are a vital necessity with most bush fire brigades, particularly when a large fire develops, and radio offers the best system available to meet this need. Many brigades claim, however, that they cannot afford to purchase this type of equipment, and a number of witnesses suggested that financial assistance for the purchase of radio equipment for bush fire brigades should be made available by local authorities or the Government, on the basis of a pound for pound subsidy on the monies provided by the bush fire brigade concerned. Other witnesses suggested a special local authority rate to provide the money, or a subsidy.

It is considered that the matter of the purchase and supply of radio equipment for bush fire brigades needs much closer technical examination than it has received to date.

Generally speaking, radio equipment manufacturers have made little progress in producing equipment suitable for bush fire work. In some circumstances, V.H.F. has advantages over H.F. equipment and *vice versa*. The Forests Department is carrying out extensive experiments in this matter, and it appears as if the present H.F. system it uses may be gradually replaced by V.H.F. equipment for fire-fighting purposes, although the H.F. equipment may be retained, at least in part, for transmission of fire weather and organisation messages, between fixed stations. Many farmers "Listen in" to the Department's weather forecasts.

With the development of fully transistorised transmitters and receivers, the opportunity now exists to plan an up-to-date system of bush fire radio equipment to suit the needs of the State as a whole. It is considered that the Bush Fires Board should appoint a committee consisting of such technical personnel as the telecommunications officers of the Forests and the Police Departments and the Senior Warden of the Board, and, if available, a telecommunication officer of the Commonwealth P.M.G.'s Department to draw up a specification for equipment suitable for bush fire control purposes, develop a transceiver prototype suited to the conditions in this State and prepare technical guidance for bush fire brigades in the use of radio equipment.

It is considered that the Bush Fires Board should not provide more than a skeleton network at head office in the first place and that later, in each ward, when initial difficulties of testing the most suitable equipment and sufficient maintenance have been overcome, other sets could be supplied to wardens' districts for retention at their headquarters against an emergency.

The provision of radio communication to local authorities or to individual bush fire brigades should be dependent upon their providing some portion of the cost, and their ability to adequately maintain the equipment.

#### FIRE FIGHTING.

It is not proposed to describe in this report how firefighting should be carried out, but there are some points in connection with it to which attention needs to be drawn.

Speed is essential to efficient fire suppression. Too often witnesses made the statement that the country in which a fire occurred was inaccessible and that they had to wait for the fire to come out of such country before it could be tackled. This was a bad mistake. A fire must be tackled as quickly as possible no matter where it occurs. If not, then when it does have to be attacked, the burning conditions may be so severe and the face of the fire of such magnitude that, for the time being, it will be impossible to control it.

Important as speed is in tackling a fire, it is just as important to be efficient in the use of manpower and water. This efficiency can only be obtained by practice in the art of fire suppression. If the headfire can be attacked directly and suppressed, then total suppression of the fire should offer no problem but, for a brigade to be efficient, it should be competent in the process of pinching out the more severe fires from the flanks, keeping the treated portion under control until such time as a successful attack can be made on the headfire—generally when conditions ease in the late afternoon and evening—and then determinedly undertaking the long and tedious process of mopping up and patrolling the fire until it is black out.

Counterfiring, which means the lighting of a fire to burn against an advancing fire, is a method commonly adopted to suppress bush fires, and is a most effective tool if it is done with due regard to the conditions prevailing, so that the counterfire itself does not break away ahead of the main fire and cause unnecessary destruction. Counterfiring is the most difficult of all bush fire control operations to perform efficiently. It should only be undertaken when a fire cannot be brought under control by any other practical means and when it is virtually certain that there is adequate manpower and equipment available to keep the counterfire under control.

A counterfire against an advancing headfire must be lit so that, at least at some stage, it is burning directly into the wind. In such cases, and in forest country in particular, it is very difficult to prevent it from jumping back over the break from which it was started, thus advancing the fire at a greater rate than would otherwise be the case, and so worsening the overall position.

When counterfiring is used to control a flank fire it can generally be burnt across the wind, which makes it much easier to control, but it is essential that the fireline

be sited as close as possible to the fire edge to avoid burning unnecessarily large areas and to ensure that no unburnt fuel is left between the main fire and the counterfire. Failure to do this has often resulted in such lines breaking away when conditions worsened and the wind changed.

There is no doubt that, in the fires of last summer, particularly in the Dwellingup fires, counterfires burnt a large area of country unnecessarily. This was largely due to the fact that those responsible for lighting or directing the lighting of the counterfires did not possess an adequate knowledge of what was happening on the fire front or of the country between the fire front and the counterfire line, and did not place sufficient reliance on the knowledge of landholders living on the properties they burnt. Evidence records that, in disputes which arose over counterfiring at Gidgegannup and Dwellingup, the landholders were correct. At the same time, the fire control officers concerned had to make momentous decisions and, had the weather taken a different turn from what it did, their action may have been fully justified. The forecasts of the Perth Weather Bureau were generally their guide and they cannot be held blameworthy for their decisions.

Many farmers, especially the struggling farmers, are inclined to be self-sufficient in their outlook. They have developed their ideas in some degree of solitude and often their ideas have become convictions from which it is almost impossible to move them, other than by practical demonstrations. The forester or the local authority officers seeking to enlist the support of such members of the community should seek their assistance and not try to dictate to them what they should do or should not do. No matter to what extremes it may appear that their ideas tend, it should be remembered that they know their country and its surroundings, and know better than most others what can be done to protect it from fire. Their ideas may not fit in with the general scheme, but it will often be found that the general scheme can be adapted to absorb their ideas if due credit is given to them.

#### THE FORESTS DEPARTMENT.

The Forests Department, in matters of fire control, is governed by the Forests Act, 1918-1954, as well as the Bush Fires Act, 1954-1958.

The Forests Act provides that any person who lights a fire within a State forest or timber reserve, or within 20 yards thereof, and any person who lights a fire in the open air or any land contiguous to a State forest or timber reserve without giving notice to a forestry officer, shall be guilty of an offence. In addition, the Bush Fires Act provides that, if bush is to be burnt within two miles of a State forest between the 15th day of December and the 15th day of April, notice must be given to a forestry officer at least four days beforehand. It further provides that, if a forestry officer is present at a bush fire

on or near Crown lands or land under the control of the Forests Department, he shall take supreme control of the operations.

These provisions have produced the somewhat general impression that the Forests Department is opposed to controlled burning. Many witnesses criticised the Department for not keeping its forests continually burnt clean. Upon examination it was generally found that such witnesses had little real knowledge of the forests or the Department's practices in these matters. Sometimes it was found that the Department was being blamed for the condition of Crown lands and even private property over which it had no control at all. Too often the condition of the forests was blamed for damage done by fires escaping from settlers' burning-off operations.

The Department is rightly opposed to indiscriminate and uncontrolled burning but, on the other hand, has been carrying out controlled burning for the protection of its forests for the last 40 years. Table four is informative with regard to the Department's work in this direction over the last thirteen years.

When account is taken of the fact that in Western Australia in December, 1948-49, the basic wage was £6 1s. 7d. per week and in December, 1960, £14 14s. 7d. per week, roughly two-and-one-third times as much, it will be seen that the area under protection has varied somewhat directly with the moneys available for expenditure. The increase in the percentage of the protected area control burnt since 1950-51 is noteworthy. This has possibly been assisted by the improved types and quantities of fire control equipment which have become available over the years and the fact that firebreak burning, which has gradually diminished in extent, is much more expensive to carry out than controlled burning, which has considerably increased.

The Department has, in short, always carried out as much protective burning as the funds available to it and the weather have permitted. The annual reports of the Department in past years have frequently made reference to the need for controlled burning. Directions to officers have always emphasised the need for this work and for co-operation in it with neighbouring land owners. A number of witnesses were strong in their praise of the way the Department co-operated with them in controlled burning.

There has undoubtedly been lack of co-operation in this work in some cases but the fault, on the whole, has been just as much with the local authority as with the Forests Department. As far as could be ascertained, no forestry officer had ever refused a neighbour permission to burn if weather conditions and the precautions taken by the farmer made it safe enough to carry out the burn but there were times when, owing to other commitments, the Department was unable to assist a neighbour to burn his bush on a particular day.

Table 4  
AREAS OF STATE FOREST, PROTECTED FOREST, CONTROLLED BURNING AND TOTAL EXPENDITURE OF THE FORESTS  
DEPARTMENT FOR 13 YEARS FROM 1941/49 TO 1960/61

Year	Total acreage protected from fire	Acreage of protected forest burnt in bush fires	Percentage of protected area burnt	Acreage control burnt in compartments	Acreage control burnt in firebreaks	Acreage control burnt in advance burning and top disposal operations	Total acreage control burnt	Percentage of protected area control burnt	Total Annual Expenditure of Department
1948/49	1,928,456	23,405	1.2	51,536	48,350	60,000	159,936	8.3	303,845
1949/50	1,942,801	202,504	10.4	35,103	52,806	78,415	166,324	8.5	471,280
1950/51	1,944,376	8,978	0.5	50,683	54,400	59,679	164,762	8.5	377,759
1951/52	1,964,830	52,539	2.7	150,546	63,400	78,100	292,046	14.9	623,260
1952/53	2,111,310	8,692	0.4	100,783	66,800	82,584	230,167	10.9	766,776
1953/54	2,312,180	23,056	1.0	218,775	57,400	198,015	474,190	20.5	819,253
1954/55	2,318,550	11,618	0.5	317,243	23,020	44,176	384,419	16.6	936,885
1955/56	2,411,870	18,685	0.8	344,596	19,750	40,896	405,242	16.8	1,183,707
1956/57	3,348,045	11,192	0.3	400,030	18,100	56,652	474,782	14.2	1,189,636
1957/58	3,402,352	33,617	1.0	316,847	20,020	74,869	411,716	12.1	1,249,285
1958/59	3,518,325	22,503	0.6	312,704	29,020	56,482	398,186	11.3	1,232,198
1959/60	4,102,616	7,621	0.2	416,608	17,280	69,584	503,472	12.2	1,427,983
1960/61	4,102,616	482,109	11.7	481,800	7,700	80,950	570,450	13.9	1,535,403

The Australian forester has still much to learn with regard to the effect of fire upon the forest. The frequent burning of the forest should certainly assist to prevent serious fires but, in the course of time, it could result in the deterioration of the forest. Some witnesses, on the other hand, suggested that the increased frequency of tree deaths occurring in the jarrah forest in recent years is due to the lack of regular burning. No evidence was produced, however, to indicate that such statements might be any more correct than the reverse.

Control burning of a forest is an operation which must be practised as an art if it is to be carried out without obvious damage to the stand by the destruction of regeneration and damage to standing trees. It requires a study of the effect of litter accumulation, bark inflammability and climatic conditions and a knowledge of the result of the interaction of these factors.

Many witnesses referred to the "good old days" when the forest was burnt and kept burnt. Actually, the position appears to have been that, while the forest may have been frequently burnt in the early days of settlement, it was not kept burnt. On the contrary, many of the fires which occurred from time to time resulted from deliberate action by man to destroy the fire hazard of logging debris left lying in the forest. These burnings generated intense heat and resulted in the destruction of all regrowth and in serious damage to the remaining trees, while no attempts were made to control the fire or extinguish it until it threatened other property.

It is worthy of note, though far from conclusive on this limited evidence, that Table 4 shows the proportion of the protected area burnt each year to have varied according to a roughly regular pattern of alternating large and small percentages with very extensive fires eleven years apart.

It is true that the severity of the Dwellingup fire was, to an appreciable extent, due to the fact that parts of the forest had not been burnt for a number of years and, consequently, could carry a hot fire. It has also to be remembered, however, that so many lightning strikes occurred at the one time that insufficient staff was available to ex-

tinguish them immediately, no matter with what promptitude they had acted. Such a situation can always occur once in any organisation. It should not occur twice. There can be no guarantee, however, that other conditions never before experienced will not arise again in the future to test the fire control organisation of the Department beyond its planned resources.

It is not many years since the forests of the Landes of France, which had been successfully protected from a major fire for generations, were ravished by a disastrous fire covering 339,000 acres—a very close approximation to the area of 335,000 acres of forest covered by the Dwellingup fires. Unfortunately, the Landes fire resulted in 84 persons losing their lives, 100 being injured and 269 families being rendered homeless, as a result of "an unusual cyclonic disturbance," apparently similar to that which swept the town of Dwellingup this year.

The fact that no lives were lost in any of the bush fires which occurred in Western Australia in the 1960-61 season says much for the organisation and practical fire sense of the Western Australian firefighting units, particularly in the forests of the Dwellingup district.

The firefighting gangs of the Western Australian Forests Department have an enviable record of efficiency and, in many districts, they are regarded by the local community as their main protection against bush fires. Table 5 sets out the number of fires they attended in the five years from 1956-57 to 1960-61.

Table 5

FIRES ATTENDED BY THE FORESTS DEPARTMENT STAFF AND EMPLOYEES, ACCORDING TO WHETHER THEY ORIGINATED ON STATE FOREST, CROWN LANDS OR PRIVATE PROPERTY OVER THE FIVE YEARS 1956/57 TO 1960/61.

Suspected Fire Cause	Fires Arising on State Forest		Fires Arising on Crown Lands		Fires Arising on Private Property	
	No. of Fires	Total Acres Burnt	No. of Fires	Total Acres Burnt	No. of Fires	Total Acres Burnt
Burning-off	188	28,002	39	10,964	372	651,587
Accidental	199	9,214	120	4,817	80	49,467
Domestic	165	23,145	68	4,321	131	15,794
Malicious	101	786	29	3,509	83	25,902
Lightning	133	451,200	6	330	25	25,298
Unknown	43	6,083	26	45,690	79	37,388
Total	829	518,440	283	69,631	770	805,436



It will be noted that the total number of fires attended was nearly double that shown in Table 1 as being attended by the Bush Fire Brigades throughout the State. It will also be noted that on Crown lands and private property combined, the Forests Department gangs attended more fires than they did on State Forest.

The figures shown under "Total Acres Burnt" and under "State Forest," "Crown Lands" and "Private Property" represent in each case the area burnt by the fires starting on State forest, Crown lands or private property, as the case may be. They do not represent the areas burnt on the State forests, Crown lands or private property under which they are shown. Thus, if a fire started on Crown lands and burnt onto State forest and then private property, the whole area burnt is shown in this Table under "Crown Lands," whereon the fire started. It will be noted that the total area burnt by fires arising on State forests was 518,440 acres and the average area burnt per fire was 625 acres, while from fires arising on private property the area burnt was 393,507 acres and the average acreage burnt per fire was 1,046 acres.

Forestry is not the only industry which is subject to calamitous losses from time to time due to the development of circumstances, the extent of which it was scarcely reasonable to expect anyone to visualise.

The fact is that, in the present stage of the development of this State and forest management, it is impracticable to provide complete protection to the forests. Some losses must continue to be expected from time to time. A policy of protective burning and the removal of fire hazards each year is proceeding on strategically situated areas with the ultimate aim that it will be impossible for a major fire to develop over any extensive area.

The Forests Department realises its responsibility in this matter, and I am satisfied it is attempting to cope with it. As further information and experience become available, its methods will be improved but, at present, there is much to learn and the methods will need to vary according to the type of forest and climatic conditions. In the meantime the area covered each year by protective burning will continue to be governed by the availability of manpower and finance as well as by the season.

The Department needs to devote more staff to the planning and co-ordination necessary to ensure that emergency conditions can be met by ample reserves and that co-operation with the neighbouring local authorities and bush fire brigades is as complete as possible. Much more energy should also be devoted to research on both the scientific and practical side of fire control than has been done to date. Meantime, protection of the forest from fire must basically depend upon speed in attacking any fire arising and the planned availability of reserves of men and equipment to meet any emergency.

## CROWN LANDS.

No authority accepts responsibility for the control of fire on the vacant Crown lands.

The Bush Fires Act provides that when a forest officer is present at a fire burning on Crown lands, he shall take supreme charge of all operations. This might be regarded as suggesting that it is the responsibility of the Forests Department to control fire on Crown lands, especially as the Department collects revenue from Crown lands in the form of stumpage on timber cut thereon.

However, even with this revenue, the Forests Department has insufficient funds to enable it to provide all the protection needed by State forests, which are dedicated to the growth of timber. It is not reasonable, therefore, to expect that the Forests Department should expend any of its financial resources upon the protection of forest land which, in many instances, is liable to be clear-felled for settlement.

The plain fact of the matter is that it is not practicable for the State to undertake the protection from fire of all vacant Crown lands.

It is a generally accepted principle that the local community must accept responsibility for the care of any vacant Crown lands that may be in their district, insofar as the local community is the body that will suffer from their neglect or gain from their care.

The Bush Fires Act provides that the owner or occupier of land may enter upon any Crown land, a reserve or other land which is unoccupied by abandonment where it abuts upon his land, and may establish firebreaks thereon by clearing or ploughing breaks not more than 10 chains in width from the boundary and may clear these firebreaks by burning, during restricted burning times, provided it is carried out in accordance with the conditions laid down in the Act for burning bush at that time. Such burning may not be done in the prohibited burning times or in a fire protected area.

It would be of assistance in fire control generally if permission could be given by a forestry officer to local fire brigades to control burn vacant Crown land within two miles of a State forest or timber reserve and by the bush fire warden for similar burning on vacant Crown Lands elsewhere. Crown lands under the contract of another authority such as a National Park Board would be excluded from such an arrangement.

Access to Crown lands provides a problem which some shires cannot meet adequately from their own resources. Responsibility for the protection from fire of State forests and timber reserves rests with the Forests Department. After deducting these areas in each of the following shires—Denmark, Nanup and Manjimup—one-half and more of the remaining area is non-rateable Crown lands. In some cases, as in Denmark Shire, land values are particularly low and the greatest difficulty is experienced in raising the monies required for fire-fighting costs alone.

In the case of the district generally, extending from Augusta to Albany, there is a large proportion of vacant Crown lands and the unimproved capital value of the rateable land is low.

The local people, with their limited finance and fire-fighting resources and the difficulties of access are inclined to wait for bush fires to come out of rough country. This tendency must be overcome, and they must be encouraged to get in and put the fires out as early as possible.

Another matter requiring attention in this regard is the indiscriminate burning for cattle grazing of Crown lands, especially in the south coast area from Augusta to Denmark, which is wasteful and should be replaced by systematic controlled burning.

The appointment of a committee consisting of representatives of the Forests Department and Shire Councils, to develop and co-ordinate activities for the protection of this area from fire, would overcome many difficulties.

The duty of such a committee would be to prevent uncontrolled fires, reduce fire hazards, by controlled burning, construct roads and trails of access for fire-fighters, and provide such other fire-fighting facilities as equipment, lookout towers and communication systems. Such a committee should not replace or interfere with the present fire control activities of the shire councils' fire control officers, bush fire brigades or the Forests Department, but should encourage their expansion, supplement their activities, develop new areas of local protection and generally maintain public interest in bush fire control in the region.

The protection of forest assets and the conservation of soil and water resources should be regarded as being as important as the protection of other forms of property.

The committee would need to be provided with finance at, say 2d. per acre of Crown lands in the district, with provision for a total expenditure of around £15,000 per annum for five years in the first instance.

A plan for work on the area could be prepared by an officer of the Forests Department and submitted to the committee for its agreement. This plan should not only set out the work to be done each year for the next few years, but also visualise the eventual development, after which maintenance would be all that would be necessary and which could, in time, be taken over by the local inhabitants.

It is possible, in fact probable, that some reserves such as National Parks need special protection. For this reason it is suggested that a body such as the National Parks Board should act in an administrative capacity for all National Parks, even those which may be under the control of a local committee. This need not interfere with the administration and supervision of the reserves or parks by the local committee, but it should ensure co-ordination of effort and economy of Government expenditure on such reserves throughout the State.

## PROTECTION OF LIFE AND PROPERTY.

The measures to be taken for the protection of life and property are inseparable from those to be taken for the prevention of the spread of fires generally, but some points can be given special emphasis as applying to the protection of life and property.

Under the Bush Fires Act every local authority has the power to enforce the establishment and maintenance of such firebreaks as it prescribes. The order of the local authority may prescribe the method, time and place for the construction of the firebreaks as well as the dimensions and the number of firebreaks. It may also prescribe the action to be taken in connection with anything likely to be conducive to the outbreak or spread of fire. It may require any such operations to be carried out separately or in co-ordination with neighbours. If an owner or occupier fails to take action in the direction requested, the local authority may do so at the land owners' or occupiers' expense. For the purpose of clearing a firebreak or inflammable material any method may be used, including ploughing, cultivating, scarifying, raking or burning.

It is necessary to make it quite clear that reliance cannot be placed on a firebreak alone, to stop a running fire. Firebreaks are a tool to be used by man. The efficiency with which they are used depends upon the type of surrounding vegetation, the type of firebreak, the weather and the ability of the firefighter. The firefighter is just as essential to complete an attack against fire as the infantry man is to consolidate gains in war. The misapprehension expressed by some witnesses as to the use of firebreaks makes this explanation necessary.

It is considered that local authorities do not utilise their powers in the enforcement of firebreaks construction and maintenance to the extent that is necessary, particularly in the case of unoccupied and undeveloped lands. This is a matter which the Bush Fires Board should take up more vigorously with the local authority than it does as, if the local authority fails to give such a notice to an owner, or occupier of land when requested to do so by the Minister, the Board may give the notice and, if the owner or occupier fails to carry out the order, the Board may carry it out at the expense of the local authority or the owner or occupier of the land. The possible operation of the Bush Fires Board in this direction is limited at the present time by a few wardens available for examination purposes. It is one of the most useful features of the fire defence legislation of the State.

The type of firebreak required will vary with circumstances. In the State forests and other lands being managed for the production of timber, the first lines of protection are afforded by roads and tracks. In the case of particularly valuable forest areas such as softwood plantations, a more intensive system of roads, tracks and firebreaks is needed.

In the native forest there are, as previously stated, many dead trees and trees with dead tops. When the tops of these trees catch alight they usually burn for some time and, under a strong wind, pieces of the burning material from them can be blown considerable distances.

Under these conditions, roads and tracks and even firebreaks up to five or ten chains in width will be of little assistance in halting a fire. During the 1960-61 fire season, many throws of burning material up to between 40 and 80 chains were reported, while throws of over two miles were not uncommon. Many attempts at counterfiring were circumvented by this ability of our eucalypt forest to cause spot fires so far in advance of the headfire.

It would be uneconomic and impracticable to construct and maintain a cleared firebreak of sufficient width under these conditions. For this reason, the use of controlled burning is employed. In the present stage of forestry in Western Australia, this is the most practicable and effective type of firebreak that can be made in the native eucalypt forest.

It is desirable that the sides of all major roads and firelines in forested land should be cleared of trees containing a large proportion of dead wood as rapidly as manpower and economics permit. This applies especially to places where the forest adjoins private property. This work though expensive will, unlike ploughing or burning, not have to be repeated for many years. The existence of such trees is the usual cause of a fire escaping from control, and the felling and extinguishing of standing trees burning along the edge of a fire after it has been halted takes much manpower and equipment which can ill be spared.

This work would also reduce the possibility of a large number of trees falling across roads and so preventing ready access to and through a fire area. Ring-barked and other dead trees standing on pasture land, as well as in areas which it is proposed to burn-off, should be felled wherever practicable, and particularly near the edges of the areas. Nearly all escapes from settlers' burning-off fires were the result of burning material from a standing dead tree in the burn area being thrown across the firebreak when a strong wind arose a few days after the fire had been put through.

It cannot be too strongly emphasised that the conditions of the Bush Fires Act regarding the width of firebreaks around areas to be burnt in the restricted period, as well as the other conditions are minima and that they cannot possibly be adequate for all cases. It is the duty of the fire control officer issuing the permit to burn, to add such other conditions as the circumstances may appear to warrant. For instance, a ten foot cleared break around a timbered or partially cleared area to be burnt is, in most cases, totally inadequate to contain a fire, even under mild weather conditions.

If it is proposed to clear private timbered land within a reasonably short period, protective burning can be carried out on it as frequently as possible, and without much regard to the damage that may be done to the trees, provided the fire can be contained within the prescribed boundaries.

In the case of pasture and crops much narrower firebreaks, either ploughed, graded or burnt, are adequate to contain fire, except on the worst days. In view of the last-named possibility, it is desirable that areas under fallow should be located in such a way as to present an obstacle to the extensive development of any fire that may escape and that, as a further precaution, protective spring burning be carried out in any bushland adjoining a proposed burn.

In the matter of the protection of buildings, the Bush Fires Act, 1954-1958, allows the owner or occupier of land, during the prohibited burning period, to burn bush within firebreaks up to a distance of five chains from any building or stack of hay, wheat or other produce and, during the early part of the prohibited burning period, to burn the bush on roads up to one chain wide on any grassland. He may also enter upon any unoccupied Crown land, except land under the control of the Forests Department, for the purpose of establishing firebreaks up to ten chains in width abutting his own land. All such burnings are subject to the conditions prescribed in the Act.

A radius of at least five chains should, where practicable, be kept clear of inflammable material around isolated buildings. With such protection, it is possible for people to stay and defend the buildings without endangering themselves. Moreover, it saves the firefighters wasting a lot of valuable time and energy in their protection during a fire. The concentration of grazing in paddocks surrounding the farm buildings is a cheap and effective way of providing a firebreak. The growing of summer green crops, such as lucerne, is another means of affording protection. Wherever practicable, houses in forest and mill towns and settlements should be at least one chain apart to reduce the chance of fires spreading from one to the other.

All ground around, between and under houses should be kept clear of inflammable material. Fire hazards, such as firewood stacks or heaps should be kept some distance from the main buildings. Local authorities should require landowners to observe these precautions. Hedges and trees can, however, give farm buildings good protection from a sweeping fire, but care needs to be taken that they are kept some distance from the building and are not of very inflammable species. Even a picket fence can, at times, give a certain degree of protection to a house.

In the Dwellingup fire, the ignition of buildings appeared to depend largely upon where a burning brand lodged, and whether persons were present to extinguish it quickly.

Older buildings ignited more readily than those more recently built, and unpainted ones perhaps more readily than painted buildings of the same age. Generally, very little loss was experienced with wooden buildings erected within the last ten years, whereas a high proportion of wooden buildings over 30 years of age was destroyed.

Methods of house construction are more important than the material of which they are constructed. Instructions with regard to such method are contained in a publication issued by the Forest Products Division of the Commonwealth Scientific and Industrial Research Organisation.

#### RESEARCH.

Forest fire control research is carried out by the Commonwealth Government through the Forestry and Timber Bureau and the Commonwealth Scientific and Industrial Research Organisation. The former organisation concentrated upon fire behaviour research, whilst the latter deals with research into chemical methods of firefighting and the development of protective aids for firefighters. The Western Australian Forests Department has carried out some research into fire weather and the effect of fire on forest growth and forest soil.

Research in connection with fire prevention and control is included amongst the duties of the Bush Fires Board. The Bush Fires Board as at present constituted, however, is not competent to carry out scientific fire control research of any consequence. It is in a position, however, to have the results of such research tested in practice. The Forests Department is in a far better position than the Bush Fires Board to carry out fire control research, owing to the staff and the areas under its control. No point is seen in these two Government bodies entering this same field of research. If work needs to be carried out in regions or fields not normally associated with forestry, there is no reason why it should not be carried out in co-operation with the Forests Department.

It is considered, however, that a bush fire control research advisory committee should be appointed, consisting of representatives of the Forests Department, the Bush Fires Board, the University, the Department of Agriculture and, if practicable, the Forestry and Timber Bureau and the C.S.I.R.O. The function of such a committee would be to advise the Conservator of Forests on any matters he might refer to it, and of any matters in which their organisations considered research was needed, as well as to advise their own organisations of the nature and progress of the research being undertaken.

#### CHAPTER IV.

##### THE BASIC REQUIREMENTS OF A STATE EMERGENCY SERVICE.

The Bush Fires Board, in co-operation with the State Emergency Service, should be capable of providing all that is needed in the direction of a fire emergency service.

The State Emergency Service was set up in 1959 to cope with civil disasters. It is a co-ordinating body providing liaison between various agencies. The main requirements to make it as effective as possible for use in bush fires would appear to be the establishment of reliable lines of communication and advice.

In the recent fires there were occasions when assistance was sent to the scene of fires by the State Emergency Service when it was not required, or when the local resources in manpower, equipment, medical and Red Cross facilities were capable of meeting the needs of the situation. As far as can be ascertained, this was due to the difficulty of the State Emergency Service executive obtaining reliable information on which to check requests received from casual sources. In the circumstances, the action taken was probably preferable to taking no action at all.

All requests for assistance at bush fires should be directed to the Bush Fires Board.

It is essential that the Bush Fires Board should maintain a senior officer with a general knowledge of the State and its fire control potentialities continuously in Perth and available by telephone during the fire season. The head office of the Board should not be left to the clerical staff on such occasions, tempting as it may be for the senior executives to be present at the fire and prepared to render assistance. Firefighting should not be a function of the Bush Fires Board. This should be left to the local authority or the Forests Department, as the case may require, and the Bush Fires Board officers during fires should concentrate upon organising for the local authority, its fire control officers and its bush fire brigades any assistance they need.

When the Bush Fires Board considers that the services of the State Emergency Service are needed, it should approach the Commissioner of Police for such assistance.

Where a direct approach to the Bush Fires Board is not practicable, any approach to the State Emergency Service should be through the Police Station nearest to the fire and then via the District Police Inspector's office. Before taking action in such case, it would be advisable for the Commissioner to check the position with the Bush Fires Board executive in Perth. This executive should be in fairly close touch with the Board's wardens and, through them, with the local authority concerned and the local chief bush fire control officer and, when appropriate, with the Forests Department.

The Commissioner should then have a reasonable appreciation of the essentiality of the services requested and, whether it is necessary for the State Emergency Service to take action and, if so, the nature and urgency of any service requested.

Some complaints were made that at some fires the Police unnecessarily took charge of firefighting operations. This is not correct.



When something needs to be done immediately during a fire and nobody else is prepared to do it, it is naturally expected that a police officer, if present, will take action. If the local bush fire brigades are properly organised and trained, the police will be kept sufficiently busy in controlling the movements of traffic, assisting in evacuations when necessary and in protecting property and persons from other dangers. The position is thoroughly understood by the Police Department.

Many compliments were paid by fire control authorities to the valuable assistance rendered by men of the Army S.A.S. during the fires of 1960-1961, and many witnesses suggested that arrangements should be made for their services to be available on any such future occasions.

The Minister for the Army has made a statement to the effect that, in the event of firefighting emergencies which are beyond the capacity of civilian resources, the Army will assist at firefighting within the limits of its local resources following requests from the recognised State authority, but that the limited manpower resources available to the Army prevented the formation of special units for firefighting purposes.

Actually, much of the value of the Army in such emergencies is due to its organisation and discipline. Somewhat similar results were noted when mine-workers from Collie appeared on the scene of fires in organised gangs. The same result and better can be expected when the bush fire brigades are properly organised and trained and their operations properly co-ordinated.

The trained firefighter is worth much more than an untrained firefighter. In fact, an untrained firefighter is usually greater trouble than value at a fire unless under the direction of a trained firefighter.

Nevertheless, no need is seen for the establishment of a pool of trained firefighters or equipment. It is believed that normally it should be possible for the Bush Fires Board to arrange for any additional assistance as may be required in manpower or firefighting equipment to come from bush fire brigade units in other centres. At the same time, no objection is seen to the Bush Fires Board endeavouring to arrange for the formation of a small body of voluntary firefighters in the city, who could be trained in bush firefighting methods and who could be called upon should an emergency become sufficiently serious. Such an organisation could, perhaps, be built into the Civil Defence Forces. Plans could also be made for the provision from civil sources of the transport and equipment which they would need, should they be called upon.

The Royal Aero Club of Western Australia advised the Commission that the utmost co-operation could be expected from its staff pilots, engaged on charter flights, in reporting fires without any additional cost, unless they were asked to make a deviation or circle suspected areas. Club planes would be avail-

able for charter at £8 15s. per flying hour. It was also confidently considered that members embarking on cross-country flights would deem it an honour to report on suspected fire outbreaks without remuneration.

The Bush Fires Board might investigate the possibility of organising the use of the service of the Club's members against an emergency.

When a fire emergency period has been declared the Minister has power under the Bush Fires Act to appoint a person to take charge of bush firefighting operations in an area to which the declaration applies. The value of this provision would be greatly increased if the person put in charge in this manner could have early notice of the intention. Shortly before each fire season the Minister might advise appropriate persons in various districts of the State, each such district covering the area of two or more local authorities, that in the event of an emergency arising and a Bush Fire Emergency Period being declared for his district, the Minister proposes to appoint him to take charge of all firefighting operations in the whole of the district.

Each of the persons so advised could be given an outline of what is expected of him and of the principles upon which he should act. He should have the authority to co-opt any assistance he may need to establish his communications but should not have power to delegate his main responsibility. He should appreciate that he will be dealing mainly with volunteers and his instructions though firm should be tactful.

It should be made clear to him that this is a naming only and that he has no power until he is appointed during an actual Bush Fire Emergency Period. At the same time he should be asked to give consideration to the type of organisation he would need should an appointment become necessary at any time.

Once such an appointment is made it should be given wide publicity by radio and any other means available to ensure that the person and his powers are generally known.

Before making recommendations to the Minister on this matter the Bush Fires Board will need to first examine carefully the arrangements made between local authorities for co-ordinated bush firefighting operations.

Within its own area each local authority should be capable of arranging the grouping of brigades and the appointment of the group commanders needed to deal with any large fires which may arise. It should be the function of the Bush Fires Board to see that this is done.

It must continually be kept in mind that serious fires can be avoided by the organisation of the rural population into an efficient firefighting force ready and able to suppress immediately any uncontrolled fires that may arise. This entails the intelligent reduction of fire hazards prior to the season and constant alertness during the season.

## CHAPTER 5.

### SUMMARY.

### FINDINGS.

All the evidence presented to the Commission referred only to the South-West Land Division of the State. There was no evidence to suggest that the control of bush fires in the rest of the State was other than satisfactory.

Detailed investigations and inspections by the Commission were consequently confined to the South-West Land Division where evidence was given with regard to a total of 963,640 acres burnt over in the summer of 1960-61. There is little doubt that there were many fires which were not brought to notice and it is believed that the total area burnt (over the Division) in 1960-61 was approximately 1,250,000 acres.

The 1960-61 fire season was unusually severe and apart from a rainfall deficiency in winter, spring and early summer months was marked by an unusual number of dry thunderstorms and some severe cyclonic disturbances.

The Chittering fire started on or about 13th December, 1960, probably from unlawful burning on Avon Location M2061. It was not brought under control until 3rd January, 1961, and burnt over 31,800 acres. The large size it attained was in part due to the failure of the local bush fire brigades to go into the bush on the Army Training Centre and attack the fire vigorously at its inception and in part to the fact that one property owner to the south lit a counter fire around his property without taking any worthwhile precautions to prevent his protective fire from spreading outwards. The estimated direct damage from the fire was £7,000.

The Gidgegannup fire was started by lightning which ignited a dead tree on Swan Location 1317 about the 25th February, 1961. The tree was felled but the fire was not extinguished. Under extreme heat conditions it broke away on 1st March and was not brought under control until 4th March during which time it burnt over 18,250 acres and did direct damage estimated at £13,600.

The Dwellingup fire developed from numerous fires lit simultaneously by lightning on 19th and 20th January, 1961. Nineteen fires in all were reported some of which remained dormant until extreme heat conditions developed and then proved too much for the forest staff to control. On the morning of Saturday, 21st January, the fire was making rapid progress and threatening pasture land between the North and South Dandalup Rivers. This front was held by counterfires. The wind blew strongly from all points of the compass during the day and by midnight the fire had covered 72,000 acres of forest country. Between Sunday, 22nd January, and Monday, 23rd January, the fire was being

gradually brought under control. During the evening of Tuesday, 24th January, however, a cyclonic wind storm struck the fire and swept it southwards through the township of Dwellingup and the mill settlements of Holyoake and Nanga Brook. Intensive fire storms developed and fire induced winds reached velocities of up to 70 miles per hour. On Wednesday, 25th January, cooler conditions developed and rain commenced in the afternoon. By evening all running fire had been stopped but it was not considered safe until heavy rain fell late in March.

The area covered by the fire was 361,000 acres and the direct damage resulting was about one million pounds.

During the fire period, considerable apprehension was felt by farmers on the pasture land along the base of the escarpment on the western side of the Darling Ranges owing to their difficulty in obtaining reliable information of the position of the fire front and of the condition of the country between the base of the escarpment and the fire. As a result, some unnecessary counter firing was carried out. On the other hand it needs to be recognised that weather conditions and consequently the behaviour of a bush fire can never be foretold with certainty.

The Karridale fire was associated with eight other fires which escaped from settlers' burning off operations between the 27th February and 3rd March, 1961. Those which escaped in February caused little concern until 1st March, when the weather worsened and it was suddenly realised that a critical situation had arisen and that the local fire-fighting service could not control the fires. The fire which burnt the larger area, the township of Karridale and State forest 45 originated at Forest Grove and burnt over 60,400 acres. It was not brought under control until 6th March. The total area burnt over by these fires was 91,300 acres. Noteworthy points about them were that all the fires escaped from settlers' burning off operations, the persons responsible for lighting the fires failed to observe even the statutory conditions of the Bush Fires Act and the bush fire brigades had inadequate plans for co-operation and co-ordination of their efforts.

Early in February, 1961, two other fires burnt 15,600 acres of coastal scrubland between Flinders Bay and Scott River. These fires were lit either by graziers or visitors and little effort was made to control them.

The direct damage from all the fires in the district was estimated at £106,500.

The Pemberton fires occurred between December, 1960, and March, 1961. They burnt 110,250 acres, of which about 73,250 acres were mostly leased land and with a little private property on the coastal scrublands and 37,000 acres were State forest, mainly carrying karri. The fires in the coastal country, again, were lit either by graziers or visitors. The remainder were caused by escapes from settlers' burning off, lightning and

sparks from steam locomotives. The direct damage from these fires was estimated at £26,000.

The Denmark fires occurred in two distinct periods. The first fire, for which no cause was satisfactorily determined, originated in bush country in the shire of Plantagenet. It actually began in mid-December, 1960, and burnt until the end of January, 1961. The local bush fire brigades were not prepared to go in and attack it while it was small, but preferred to wait until it came to them, by which time it was too much for them to control. It burnt 160,000 acres. The second series of fires originated from burning off operations on private property during the first week in March. The person who lit this fire did not have a permit to do so and had insufficient manpower present to control the fire; about 27,650 acres were burnt. The direct damage caused by all the fires in the Denmark District was estimated at £27,000.

The Gleneagle fire started from a lightning strike on forest land on the 19th or 20th January, 1961, when numerous fires from a similar cause were arising in Dwellingup forest. Smoke from the latter fires delayed detection of the Gleneagle fire and the absence of the local forestry personnel at the Dwellingup fires delayed the attack upon the Gleneagle fire. It burnt 58,000 acres and the direct damage done was estimated at £30,000.

From various sources the Commission was informed of other fires along the coastal strip north and south of Perth and around Mundaring. They covered 120,000 acres. The suspected causes of these fires were various and included lightning, sparks from tractors, children, etc.

Information made available by the Bush Fires Board regarding other fires in the South-West Land Division and in the inland was also studied. One fire along the Eyre Highway between Norseman and the South Australian border travelled 150 miles in 50 days and burnt over approximately four million acres before it was attacked and extinguished. It was probably one of the most extensive fires of recent years but in the district of large pastoral holdings in which it occurred it was not regarded as of any particular economic importance.

Records of the number and extent of bush fires occurring in Western Australia each summer are incomplete, but sufficient information is available to show that settlers' burning-off fires are not only the greatest single cause of bush fire, but are also responsible for the largest area burnt over. The next largest area is burnt by bush fires caused by lightning, although by comparison the number of fires from this cause is small. Other major causes of bush fires are sparks from engines and machinery and escapes from such agencies as camp fires, incinerators and smokers. Maliciously lit fires and fires mischievously lit by children are, both numerically and in area burnt, of comparatively small account.

The Bush Fires Act, 1954-958, places the responsibility for lighting fires upon the individual and for their prevention and suppression upon the community through the local authority. The occurrence of destructive bush fires is largely due to the apathy of the local community with the result that the requirements of the Act are often ignored and there is far from sufficient co-ordination of planning and co-operation of effort between the various parties responsible for bush fire control.

The alternative principle on which to found a Bush Fires Act is to make some central policy authority responsible for ensuring that the provisions of the Act are obeyed. It is considered that if the community can be made aware of its responsibilities, the basis of the present Act is preferable.

#### RECOMMENDATIONS.

It is recommended that—

- (1) the Bush Fires Board take a more active part in enlightening the public generally and the local communities in particular to their responsibilities on fire control;
- (2) all members of the Board be selected for their interest in and experience and knowledge of matters directly associated with bush fire control and not merely as representatives of particular organisations, that the Chairman of the Board be appointed by the Governor instead of being an *ex officio* appointment, and that the Bush Fires Board be strengthened by the appointment of another forester, a member of the timber industry, a police officer and a person with a sound knowledge of weather and its effect upon fire behaviour;
- (3) the Bush Fires Board appoint a Standing Committee of about six of its members, all of whom are likely to be available at any time during the bush fire season to meet and take executive action as necessary;
- (4) the Bush Fires Board appoint a Regional Committee of Board members and co-opt local members for each climatic region of the State to study the bush fire control problems of the region and advise the Board so that inter alia adequate attention may be given by the Board to co-ordinating the beginning and termination of the prohibited burning times in adjoining districts and to any advisable variations of these duties according to seasonal conditions each year;
- (5) before the bush fire season starts the Minister on the recommendation of the Board nominate a person and a deputy person who will be instructed to take charge of fire fighting operations in each district

- should a dangerous fire occur and render such an appointment advisable;
- (6) that care be exercised in recommending the application of emergency bush fire periods so that they will not be applied to districts where their application is unnecessary;
  - (7) local authorities prosecute in all cases of deliberate breaches of the provisions of the Bush Fires Act and that failing this the Bush Fires Board take appropriate action to initiate such prosecutions;
  - (8) local authorities select bush fire control officers for their knowledge and experience of bush fires and their qualities of leadership and that as far as practicable, they be captains of bush fire brigades so that the person issuing the permit to burn has the responsibility of extinguishing the fire if it escapes;
  - (9) the relative seniority of bush fire control officers be determined with a view to appointing group leaders as chief bush fire control officers. The Shire Clerk should generally be a liaison bush fire control officer rather than a chief fire control officer;
  - (10) landowners desiring to carry out developmental burns be required to inform the local authority sufficiently early to enable that body to direct them or request the local bush fire brigade to carry out protective burning around the area before the prohibited season starts;
  - (11) it be made clear to all fire control officers that the conditions for burning prescribed in the Bush Fires Act are minima only, and that it is their duty to prescribe such further conditions as will ensure that should unfavourable weather conditions unexpectedly develop a situation would not arise which the local bush fire control organisation could not reasonably be expected to handle;
  - (12) no opportunity be lost of encouraging the formation of bush fire brigades and the maintenance of enthusiasm and that the Bush Fires Board assist the brigades in any way possible to obtain adequate training and equipment;
  - (13) a fund be established to subsidise the purchase of equipment for bush fire brigades but that the granting of subsidies depend upon a certificate being received from the Bush Fires Board that the brigade in question is of a standard that will be available at all times for effective use and that adequate facilities are available for its storage and maintenance at a centre suitable for the brigade;
  - (14) insurance companies be asked to subsidise the bush fire equipment fund by an amount at least equal to the amount they at present remit on premiums received for fire insurance in approved districts and that the Government contribute an amount to the fund at least equal to that contributed by the Insurance Companies;
  - (15) all local authorities form advisory committees of persons from bush fire brigades and of bush fire control officers to plan co-operation in effort and co-ordination between brigades, to group brigades under brigade group officers and to advise the local authority upon all matters of fire control, including the planning of the district firebreak layout and prosecuting for breaches of the Bush Fires Act;
  - (16) the Commonwealth Government be asked to complete as far as practicable, the connection of telephones to outlying country centres before the end of 1961;
  - (17) a sub-committee of telecommunication officers and representatives of the Bush Fires Board be appointed to investigate and encourage the development of a modern system of radio equipment for bush fire brigades;
  - (18) the Forests Department direct more staff to the planning and co-ordination of its bush fire control organisation so that emergency conditions can be met immediately by ample reserves of labour and equipment and that co-ordination between the Department, the local authority, sawmills and other sources of manpower and equipment in and around forestry districts is as complete as possible. This particularly includes co-operative protective burning around the boundaries of forest areas;
  - (19) the Forests Department carry out more research into both the technical and practical side of fire control as a necessary accompaniment to the expenditure of money on other forest works and that forest fire control officers be sent overseas at intervals to gain information regarding the latest developments in this work;
  - (20) the Forests Department make every endeavour to improve and extend the practice of control burning to ensure that the forests receive the maximum protection practicable consistent with silvicultural requirements;
  - (21) no opportunity be lost by the Forests Department to improve the efficiency of their fire fighting gangs,



radio and other equipment in the light of the latest practical and scientific developments;

- (22) a committee be formed and provided with the finance necessary to enable it to supplement the activities of the local bush fire brigades in districts in the far south-west of the State where ratable values are particularly low and the proportion of Crown lands high, and that the Forests Department be authorised to give approval for control burning of Crown lands throughout the State by bushfire brigades within two miles of a State Forest and that outside this distance the Bush Fires Board through its wardens have similar authority;
- (23) the management of all National Parks in the State be concentrated under one authority to ensure co-ordination in administration and protective measures.
- (24) a fire control research advisory committee be formed to co-operate with the Forests Department in carrying out scientific research into fire control;
- (25) local authorities and if necessary the Minister take active steps to enforce the removal of fire hazards from the vicinity of buildings in rural areas and that special attention be given to the removal of dead trees on the edges of pasture land and on firebreaks in timbered country;
- (26) that needs in the direction of a fire emergency service be met as far as practicable by the Bush Fires Board in its training programme and in the tactical organisation of existing brigades for use as reserves in districts other than their own;
- (27) the State Emergency Service be used to meet any additional needs but that as far as possible, requests for assistance be directed in the first instance to the Bush Fires Board or at least referred to that Board by the State Emergency Service for advice before action is taken.

## CONCLUSION.

Your Commissioner wishes to express his appreciation of the assistance he received from all quarters during the course of this enquiry. In particular he desires to express his gratitude to Mr. A. G. McArthur, Fire Control Research Officer with the Forestry and Timber Bureau, Canberra, who acted as Technical Assistant to the Commission. Mr. McArthur worked tirelessly collating and analysing all the information available and preparing detailed reports upon the development and suppression of each fire investigated, as well as a general appreciation of the weather and other conditions preceding and during the 1960-1961 fire season.

The work of the Commission would have been much more protracted without Mr. McArthur's assistance. His detailed reports are attached to this report as appendices. They will be of particular value to any student of bush fire control.

It is desired also to express appreciation of the assistance rendered by Mr. H. J. Hale, the representative of the Western Australian Bush Fires Board on the panel of consultants appointed to the Commission. Mr. Hale's knowledge of matters associated with bush fire control in Western Australia was invaluable.

Thanks are also due to Mr. F. J. Oates and Mr. R. J. Purse, representatives on the panel of consultants of the Farmers' Union of Western Australia and the Country Shires Association respectively. These gentlemen attended practically every public hearing of the Commission and by their questions to witnesses and later advice, endeavoured to ensure that the Commission obtained a balanced appreciation of the evidence presented.

Mr. J. R. Waldron, Secretary to the Commission, performed his duties in a most competent and effective manner. In addition to normal secretarial duties he was responsible for research into the origin and cause of bush fires in this country in the years preceding and immediately following early white settlement and into the history of bush fire legislation.

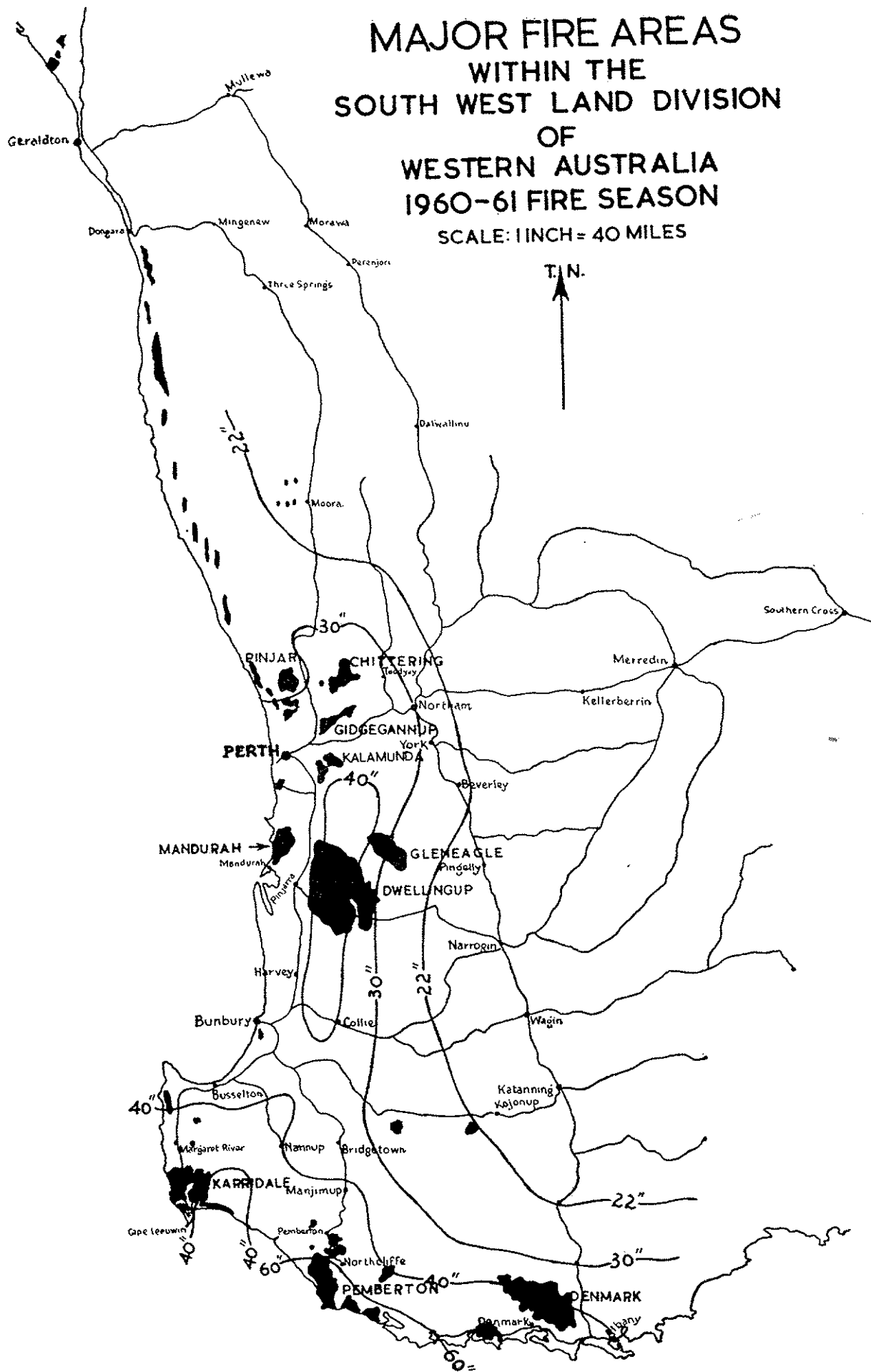
The stenographic staff worked with unselfish devotion to duty and the parliamentary Hansard staff gave valuable assistance.

G. J. RODGER,  
Commissioner.

18th August, 1961.

# MAJOR FIRE AREAS WITHIN THE SOUTH WEST LAND DIVISION OF WESTERN AUSTRALIA 1960-61 FIRE SEASON

SCALE: 1 INCH = 40 MILES



# LIST OF WITNESSES WHO APPEARED BEFORE THE COMMISSION.

Witness.	Occupation.	Address.
ANGELL, J.	Farmer	Rosa Brook.
ATKINS, E. C.	Farmer	North Dandalup.
BAKER, H. A.	Retired Farmer	Guildford.
BARRON, G. W.	Farmer	Boyup Brook.
BATEMAN, M. J. C.	Farmer	Bow River.
BATEMAN, N. E. (Mrs.)	Farmer	Denmark.
BEGGS, B. J.	Divisional Forest Officer	Forests Department.
BELL, J. R.	Farmer	Warner Glen.
BERKELAAR, P.	Farmer	Keysbrook.
BERKELAAR, N.	Farmer	Keysbrook.
BIRMINGHAM, E. B.	Orchardist	Dwellingup.
BISHOP, F. (Mrs.)	Caterer	Fremantle.
BROCKMAN, F. C.	Farmer	Nannup.
BROWN, C. J.	Grazier	Cundinup.
BUNNING, C. R.	Chairman	Associated Sawmillers and Timber Merchants (Perth) of W.A.
BUSBY, T. W.	Farmer	Nilup.
BUSHBY, J.	Farmer	Karridale.
CAMPBELL, C. E.	Farmer	Warner Glen.
CARTMEL, G. (Dr.)	Medical Practitioner	Dwellingup.
COLEMAN, R. S.	Officer-in-Charge, Apiculture	Agricultural Department.
COLLINS, F. H. H.	Forester	Forests Department.
COLYER, A. L.	Farmer	Karridale.
CONNOR, J. C.	Farmer	Boyup Brook.
COOK, S. G.	Apiarist	Toodyay.
CRAIN, H. L.	Farmer	Karridale.
CROUCH, T. S.	Farmer	Manjimup.
CUTHBERTSON, D. J.	Shire Clerk	Rockingham.
DENNIS, J. W.	Farmer	Karridale.
DUNN, A. C.	Shire President	South Coogee.
EASTMAN, W. H.	Divisional Forest Officer	Forests Department.
EDWARDS, E. A.	Farmer	Manjimup.
ESPINOS, P.	Farmer	Karridale.
EVETT, J. J.	Farmer	Chittering.
FAWCETT, H.	Orchardist	Serpentine.
FLETCHER, N. S.	Farmer	Keysbrook.
FROST, W. T. S.	Farmer	Kendenup.
GALE, H. E.	Farmer	Kudardup.
GUTHRIE, A. C.	Farmer	Busseton.
HALE, H. J.	Senior Warden	Bush Fires Board.
HARGREAVES, J. D.	Farmer	Coolup.
HARRIS, A. C.	Conservator of Forests	Forests Department.
HEWITT, P. N.	Assistant Divisional Forest Officer	Forests Department.
HEPPINGSTONE, A.G.	Retired Pastoralist	South Perth.
HOLLAND, H. L.	Farmer	Forest Grove.
HONNIBALT, J. J.	Superintendent of Timber Production	State Building Supplies.
HULL, R. G.	Farmer	Waroona.
IRONMONGER, C. H.	Farmer	Karridale.
KELLY, A. R.	Secretary, National Parks Board	Pemberton.
KING, W. P.	Farmer	Dwellingup.
KNIGHT, L. G.	Farmer	Harvey.
KNIGHT, S. C.	Shire President	Cuballing.
LADHAMS, G. L.	Sawmill Manager	Serpentine.
LEGGOE, J.	Farmer	Arthur River.
LEITCH, T. A. E.	Farmer	Clackline.
LEWIS, R. L.	Farmer	Kojonup.
MACKEY, G. W.	Deputy Director, Meteorology Bureau	Perth.
MARKOVIC, V.	Farmer	Karridale.
MEACHEM, J. C.	Senior Divisional Forest Officer	Forests Department.
MICHELIDES, E.	Farmer	Pemberton.
MILES, A. W.	Shire President	Beverley.
MILES, A. J.	Fire Control Superintendent	Forests Department.
MITCHELL, S. C.	Farmer and Grazier	Cookanup.
MONEY, J. G.	Farmer	North Dandalup.
MURRAY, C. G.	Farmer	North Dandalup.
MYERS, R. C.	Detective	Police Department, Perth.
MCDONALD, P. T.	Farmer	Karridale.
MCDONALD, W. A.	Farmer	Karridale.
MCDONALD, W. G.	General President	Farmers' Union of W.A. (Perth).
McKAY, D. B.	Farmer	Coolup.
McLOUGHLIN, C. P.	Farmer	Warner Glen.
McNEILL, N.	Farmer	Waroona.
NOAKES, H. L.	Farmer	Forest Grove.
NUNN, G. W. M.	Superintendent, Forest Management and Plantations, Northern Division	Perth.
O'BRIEN, J. M.	Commissioner of Police	Perth.
PACAK, J.	Surveyor	Perth.
PATMORE, W. D.	Farmer	Warner Glen.
PEARSON, T. W.	Farmer	Brunswick Junction.
PICKETT, A. M.	Farmer	Lower Chittering.
POLLARD, W.	Farmer	North Dandalup.
PRINCE, C. H.	Farmer	Gingin.
QUICK, E. C.	Farmer	Wooroloo.

LIST OF WITNESSES WHO APPEARED BEFORE THE COMMISSION—*continued.*

Witness.	Occupation.	Address.
RATE, J. H.	Forester	Forests Department.
ROSE, A.	Farmer	Kudardup.
SALTER, R. E.	Farmer	Pinjarra.
SAW, C. H.	Farmer	Bow River.
SAW, H. T.	Farmer	Bow River.
SCADDEN, N. E.	Farmer	Courtney.
SHEDLEY, A. C.	Chairman, National Parks Board	Perth.
SHORTLAND, R. G.	Farmer	Karridale.
SIBSON, J.	Salesman	Margaret River.
SMITH, C. S.	Shire President	Margaret River.
SMITH, G. E.	Farmer	Karridale.
SMITH, G. J. S.	Farmer	Mt. Barker.
SMITH, R. K.	Orchardist	Lower Chittering.
SPARKS, R. J.	Police Officer	Police Department.
STAGBOEUR, G. L.	Farmer	Boddington.
STANLEY, S.	Farmer	Forest Grove.
STEWART, D. W. R.	Forests Department Officer	Forests Department.
STOKES, G. M.	Farmer	McAlinden.
STRAKER, H. E.	Warden	Bush Fires Board.
STRETCH, A. F.	Farmer	Boyup Brook.
STYLES, H. G.	Forester	Forests Department.
SUTHERLAND, A. H.	Secretary	Bush Fires Board.
THOMSON, H. D.	Farmer	Bridgetown.
THOMSON, J.	Farmer	Margaret River.
THORN, D. W.	Farmer	North Dandalup.
TIMOTHY, F. W.	Shire Clerk	Denmark.
TONKIN, F. H. C.	Farmer	Serpentine.
TUCKER, J.	Farmer	Pinjarra.
WALLACE, W. R.	Deputy Conservator	Forests Department.
WALKER, L.	Detective	Police Department, Perth.
WATKINS, D. G.	Farmer	Jarrahdale.
WHATMAN, A. M.	Labourer	Karridale.
WILDING, T. D.	Farmer	Clackline.
WOOD, A.	Displaced Coal Miner	Collie.
YOUNG, A. M.	Grazier	Peel Estate.