



WESTERN AUSTRALIA



REPORT

**of the MINISTERIAL WORKING GROUP
investigating the
DARLING ESCARPMENT FIRE HAZARD**

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Chaired by JOHN DAY, MLA for Darling Range

**To Hon BOB WIESE, Minister for Police and Emergency
Services**

24 May 1994



JOHN H. D. DAY
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Hon R L Wiese MLA
Minister for Police and
Emergency Services
13th Floor Dumas House
2 Havelock Street
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Dear Minister,

I am pleased to present to you the report of the Ministerial Working Group investigating the Darling Escarpment Fire Hazard.

This report is based on the deliberations of the working group over the past four months following the receipt of written submissions from interested parties, oral discussions, observations and inspections by the group and in the light of the combined experience of those members of the group who have had a long involvement in bushfire issues.

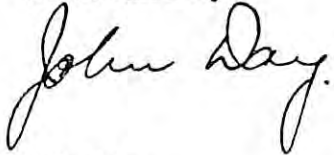
The working group was established by you following the recent fires in New South Wales as a result of concern which was expressed by the Premier and yourself about the potential for serious bushfire problems in the Darling Escarpment region.

The group has come to the considered view that the management of bushfire related issues in the study area does need significant change to improve the situation and recommendations are made to that effect. This statement is in no way a criticism of those people who are currently involved - it is a comment on the existing "system". In fact there are many individuals, both paid and volunteers, who make an outstanding contribution to improving the safety of those who live or work in the Hills or who visit for recreational purposes. It is up to the State Government to provide the lead in further backing up the work of such people.

Although the terms of reference confined the group's considerations to the Darling Escarpment area, it is impossible to consider bush fire issues in that area without considering issues of much wider application. Consequently many of the recommendations have broader implications.

I express my thanks to the members of the working group who have contributed many hours and shown a great deal of commitment and dedication to dealing with this important issue.

Yours sincerely

A handwritten signature in cursive script that reads "John Day".

John Day
Chairman
Ministerial Working Group
Investigating the Darling Escarpment
Fire Hazard

24 May 1994

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- Member for Darling Range, Legislative Assembly, Parliament of WA

Members: Mr Rob de Burgh

- Regional Manager, Swan Region, Bush Fires Board of WA

Mr Kevin Cuneo

- Assistant Chief Officer (Country) WA
Fire Brigades Board (from 31 March 1994)

Mr Barry Duck

- Assistant Chief Officer (Metropolitan), WAFBB (until 31 March 1994)

Cr John Ellery

- Deputy President, Shire of Mundaring and
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Mr Bob Fawcett

- Chief Bushfire Control Officer, Shire of Serpentine-Jarrahdale

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- Policy Adviser, Office of the Minister for Emergency Services

Cr Pat Hart

- Deputy Mayor, City of Armadale and Member of Swan Region Fire Protection Advisory Committee

Mr Ross Mead

- Fire Protection Officer, Swan Region Department of Conservation and Land Management

Mr Tony Pestell

- Chief Bushfire Control Officer, Shire of Swan and
Chairman, Swan Region Regional Operations Advisory Committee

Mr Alan Pugh

- Captain, Kalamunda Volunteer Fire Brigade

Mr Neil Robinson

- Senior Field Management Officer, Department of Planning and Urban Development

Mr Graham Rowe

- Principal Engineer, Northern Region, State Energy Commission

ACKNOWLEDGMENTS

The working group expresses its thanks to all those who have assisted its investigations and deliberations including:

- for administrative and secretarial assistance:
Miss Donna Thomas (Bush Fires Board, Swan Region)
Mrs Dawn Stratton (electorate officer John Day's office)
- all those who have made written submissions
- all those who were involved in discussions with the group
- the Country Fire Authority of Victoria
- the Country Fire Service of South Australia
- the employers who allowed members of the working group time to attend meetings, in particular:
West Australian Petroleum Pty Ltd (for Alan Pugh)
Swan View Senior High School (for John Ellery)

INTRODUCTION

Following the extensive and well publicised bushfires in New South Wales in early January 1994, both the Premier of Western Australia, Hon Richard Court, and the Minister for Emergency Services, Hon Bob Wiese were concerned about conditions in the Darling Range area to the east of Perth.

A working group was established by the Minister to assess the situation and make recommendations for any changes needed. The investigation was announced on 21 January 1994 and the group was comprised of representatives of the fire combat agencies in WA, local government and other relevant government authorities and was chaired by John Day, MLA for Darling Range.

Following the 1983 Ash Wednesday Fires in Victoria and South Australia a Select Committee of the Legislative Assembly of WA was established in 1984 to enquire into bushfires in Western Australia. Many recommendations were made and to a large extent these were similar to the conclusions of this report, however it is evident that much remains to be done.

Methodology of Investigation

The working group invited submissions through local newspapers and the *West Australian* and also wrote to relevant organisations which had a role or interest in fire prevention and suppression in the study area.

The group met on eleven occasions from February to May to consider the submissions and determine recommendations. A field inspection was conducted on 9 March and discussions were held with various people during the group's deliberations.

Further details of the group's activities are listed in the Appendix 3.

TERMS OF REFERENCE

Purpose of the Working Group:

- (i) to review the standard of fire prevention and operational preparedness within the Perth hills area.
- (ii) to report to the Hon Minister on the vulnerability of the hills area surrounding Perth in relation to fire hazard and to make recommendations on how these problems may be reduced.

Issues to be Addressed:

- (i) Examine the area from north of Helena Valley to south of Bedfordale to identify the extent of the fire hazard problem. (This was subsequently defined by the working group to include the Shires of Swan, Mundaring, Kalamunda and Serpentine-Jarrahdale and the Cities of Gosnells and Armadale).
- (ii) Areas to be examined will include private land, vacant crown land and land vested in Government departments or agencies. This will include the assessing of fuel loadings and prevention measures in and around private property, community centres and particularly in large areas of vacant land and the management plans for this land.
- (iii) Examine the ability of existing services including firefighting units, emergency services, water and power supplies to the area to ascertain the extent to which those services could cope in an emergency fire situation.
- (iv) Examine town planning and building code regulations in relation to fire prevention for both private dwellings and commercial buildings and bushland reserves and other bushland areas.
- (v) Assess the level of public awareness regarding fire prevention and planning and emergency evacuation procedures.
- (vi) Identify ways that the recognised areas of fire hazard can be reduced and the levels of public awareness and planning increased.
- (vii) Examine any other issues that the working group deems relevant to improving standards of fire prevention and suppression.

SUMMARY OF RECOMMENDATIONS

Vulnerability of the Hills Area to Wildfire

1. That the Bush Fires Board and the W.A. Fire Brigades Board jointly and in consultation with CALM, DPUD and local authorities should complete a comprehensive bush fire hazard analysis of the study area as a matter of priority.

Community Awareness and "Ownership" of the Fire Threat

2. That the Bush Fires Board should be adequately funded so that it can develop (in consultation with the WAFBB, CALM and local authorities) and implement ongoing community awareness and education programs relating to bush fire prevention and management.
3. That consideration be given to establishing the Victoria CFA's Community Fireguard program in Western Australia.
4. That the Minister for Education be requested to review the existing schools curriculum in relation to studies involving all aspects of fire with a view to increasing awareness of this issue (fire safety awareness and the role of fire in environmental management).

Local Government and Fire Prevention

- 5.(i) That local authorities should be required by legislation to appoint dedicated Fire Prevention Officers for the purpose of ensuring fire prevention activities within their areas (but not so as to duplicate the existing activities of the WAFBB).
- (ii) That the Bush Fires Board should provide the necessary training for such officers.
6. That local authorities be required by legislation to develop and implement adequate bush fire prevention plans for their areas and that these plans should meet the standards of, and be approved by, the Bush Fires Board in consultation with other agencies as appropriate.
7. That Fire Prevention Committees be established through legislation and that volunteer fire brigades be given the opportunity to make input into local fire prevention planning and related works programs through such committees.
8. That local authorities should be involved as a high priority in the provision of a co-ordinated public education program (refer to recommendation 2) and provide the necessary advice to the community on all aspects of fire prevention and planning.

9. That changes should be implemented to ensure that the WA Fire Brigades Board is involved in bush fire prevention as appropriate within its gazetted area.
10. That State and Local authorities should ensure more information is made available to land owners about alternatives to standard fire breaks where appropriate.

Land Use Planning and Building Design

11. That the State Planning Commission guidelines for bushfire prevention should be reviewed in consultation with the BFB, WAFBB, CALM and Local Authorities and then made mandatory through legislative change as a matter of priority.
12. That local authorities should be required to refer development and rezoning applications for fire prone areas to the BFB or WAFBB (as appropriate) for approval.
13. That Curtin University should be requested to review, in conjunction with the BFB and WAFBB as required, and if necessary increase, the amount of training in fire protection in its Urban and Regional Studies course.
14. That the BFB and the WAFBB provide training as necessary for local authority planners and building approval officers in respect of fire protection.
15. That the Government should act to ensure that AS 3959 is reviewed and modified if necessary so that it can be used in Western Australia.
16. That bushfire prone areas are designated through the necessary legislation or regulation so that appropriate building and land use planning requirements can be enforced.

State and Federal Government Controlled Land

17. That State and Federal government authorities and agencies should be required to prepare and implement adequate fire prevention plans for land within their responsibility and that these plans should meet the standards of, and be approved by, the Bush Fires Board in consultation with other agencies as appropriate.
18. That all Government agencies be provided with sufficient funding so as to ensure that fire prevention plans are developed and implemented.
19. That the Department of Conservation and Land Management's request for sufficient funding to adequately implement its fire prevention and management plans be supported.

20. That management and funding arrangements for the proposed Darling Range Regional Park be concluded as soon as possible so as to ensure adequate fire prevention measures for the area.

Restricted and Prohibited Burning Periods

21. That the planned review this year by the Bush Fires Board of restricted and prohibited burning periods be supported and that consideration be given to abolishing the prohibited period and introducing a system which will allow for the control of burning by permits all year and greater flexibility.

Weather Forecasting

22. That the Federal Government should be requested to resource the Bureau of Meteorology so that it can adequately expand its observing network and fire weather forecasting service for the Perth outer metropolitan area in consultation and conjunction with the Bush Fires Board, WAFBB, CALM and the EPA.

Environmental Considerations

23. That appropriate legislative changes should be made requiring all fire organisations (including the BFB, WAFBB, brigades, local authorities and other land managers) to take into account the environmental and ecological effects of hazard reduction burning when such burning is being planned and in fire suppression operations.
24. That unless there is clear medical or scientific evidence to the contrary, appropriate measures should be taken, including legislative change if necessary, to ensure that the EPA is not able to prevent hazard reduction burning on the grounds of smoke production.
25. That the Bureau of Meteorology and the EPA be requested to complete the development of a service which will enable authorities involved in hazard reduction burning to better predict the effect of smoke production on any given day.

The Organisational Structure of Fire Fighting Services in the Darling Escarpment Area

26. That the question of amalgamating the WA Fire Brigades Board and the Bush Fires Board of WA should be investigated further at the appropriate senior levels of government.

Local Government and Fire Suppression

27. That the Bush Fires Act should be changed so that the Bush Fires Board is able to direct, in consultation with local authorities, that appropriate standards are met by local authorities in respect of the provision of equipment, buildings and other matters relevant to fire suppression.

Standards of Fire Cover

28. That the government should ensure that the three fire combat agencies develop integrated Standards of Fire Cover models as a matter of priority and then carry out an analysis of the study area using such models so that the results of such analyses will be implemented.

Chain of Command

29. That the Bush Fires Act should be changed so as to establish a clear chain of command within the Bush Fire Brigades network for the whole State.

Inter-Agency Communications (during a fire)

30. That the three fire combat agencies, and if possible the Police and State Emergency Service and other emergency services, should adopt a common inter-agency management system before the start of the next fire season and that adequate training in its use be provided to all those involved.

Funding of Fire Fighting Services

31. That the proposed review of funding of the WAFBB permanent brigades announced by the Minister for Emergency Services should be extended to include funding of WAFBB volunteer brigades and Bush Fires Board brigades and that a new system should be introduced which will:
- (i) be more broadly based.
 - (ii) provide for a common and equitable method of funding of WAFBB Brigades and Bush Fire Brigades.
 - (iii) ensure that an appropriate contribution is made by State and Federal Government agencies which are responsible for land and other property.

Fire Fighting Equipment

32. That the State Government should ensure that sufficient funding is made available to volunteer brigades to ensure that provision of adequate levels of fire fighting equipment, protective clothing, call-out and communications systems with the levels being determined by the relevant standards of fire cover.

Availability and Recruitment of Volunteers

33. That the volunteer contribution to fire fighting in WA should be encouraged and enhanced by both local and state governments.
34. That the Bush Fires Board should be able to set minimum limits for the trained membership levels of brigades but that flexibility should exist with respect to the upper limits as determined appropriate by bush fire brigades and local authorities in consultation with the Bush Fires Board.
35. That the Bush Fires Board and the WAFBB should produce an appropriate information package for the benefit of new members joining a brigade so that they will be properly informed.
36. That where a brigade is decommissioned thorough follow up procedures should be implemented to ensure that volunteers continue to have the opportunity to remain involved in the organisation.

Training of Fire Fighting Personnel

37. That the Bush Fires Board, WAFBB and CALM should ensure that adequate training courses are provided for fire fighters at all levels and the three organisations should be resourced to allow this to occur. Other agencies involved in fire control (eg WAWA and DPUD) should also ensure that their relevant employees receive adequate training.
38. That the three fire combat agencies should ensure there is a more integrated approach to training.

Water Supplies

39. That the Water Authority be requested to develop a strategic plan in conjunction with the WA Fire Brigades Board and the Bush Fires Board to overcome water supply problems in the event of a loss in electricity supply to water pumping stations.
40. That the Water Authority and SECWA be requested to jointly develop strategies which will set priorities on power supply restoration in the event of an emergency. This should include the establishment of direct communication between WAWA and SECWA's Power System Control Centre.

41. That the fire authorities, the Water Authority and local authorities assess where there is a deficiency of hydrants in reticulated areas and develop and implement a program of works to rectify the problem.
42. That the strategic placement of water reservoirs, dedicated to fire suppression needs, should continue.
43. That any regulatory or legislative impediment to fire fighting agencies accessing water in swimming pools or tanks where necessary during times of fire suppression should be removed.

Electricity Supplies and the Bush Fire Hazard

44. That arrangements between the State Energy Commission and local authorities with respect to tree pruning be concluded as soon as possible to ensure that appropriate and necessary tree pruning is undertaken.
45. That where cables are being replaced in high fire hazard areas, SECWA be requested to use aerial bundled conductors wherever possible.
46. That within new subdivision in fire prone areas, SECWA should require the installation of underground cables.
47. That the SECWA's policy of not using karri or pine poles in high fire risk areas is supported.

Communications with the Public During a Fire

48. That the State Government should take action to ensure that adequate warnings and information are conveyed to the public during a fire threat. Such action should include investigating the feasibility of a dedicated radio frequency for emergencies and establishing more effective arrangements with existing radio and television stations.

Evacuation and Local Emergency Planning

49. That the Police be provided with more training at the recruit and promotional levels on fire behaviour and responses to fire including the role and functions of the agencies responsible for fire suppression and incident control.
50. That the role of and responsibilities of police in terms of co-ordination and implementation of evacuation should be reinforced to existing police officers, especially those likely to be involved in a fire situation.
51. That a greater degree of inter-agency liaison at a regional level between the fire authorities, the police and the SES be encouraged.

52. That the Police Department be requested to co-ordinate a review by the relevant agencies of existing local and regional emergency response plans so as to ensure that they are capable of fully meeting the needs of resident evacuation and accommodation, burn victim care and evacuation, post incident controls, security and counselling.
53. That the Police and SES in conjunction with the fire agencies and local authorities should ensure that suitable emergency operations centres which are available for use where necessary exist.
54. That the standards are developed for refuges for emergency evacuation and that these refuges would be included and promoted within the local emergency committee brief.
55. That the public should be provided with more information about evacuation issues.

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54. That the standards are developed for refuges for emergency evacuation and that these refuges would be included and promoted within the local emergency committee brief.
55. That the public should be provided with more information about evacuation issues.

Conclusion

56. That where necessary, the recommendations of this report are effected by amending or replacing the Bush Fires Act and other Acts as appropriate as soon as possible.
57. That there should be adequate consultation with local authorities and the community generally in the preparation of new fire agencies legislation, but in a time frame which will allow necessary changes to occur in a reasonable time.
58. That this report should be released for public information and discussion.

REPORT

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VULNERABILITY OF THE HILLS AREA TO WILDFIRE

There is no question that the Darling escarpment region is an area which can generally be described as having a very high fire hazard rating. Although there are some particular locations where, because of development which has occurred, the hazard is less, these areas are relatively small and there are numerous locations where the relationship of buildings (and therefore people) to the bush is such that a very high hazard exists.

The very high hazard rating is due to a combination of the following factors:

1. The nature of the vegetation:

- fuels which have the potential to be highly combustible, including the Jarrah, Marri and Wandoo forest to the east and coastal grasslands and Tea Tree thickets and swamp areas below the scarp to the west.

2. The topography:

- steep western faces and valleys including the Avon/Swan River valley, the Helena River valley, the Canning River valley and the Serpentine River valley. This topography increases the difficulty of both fire prevention and control.

3. Weather patterns:

- a long dry summer when fuels become very dry.
- periodic strong winds during the dry months - typically from a generally easterly direction earlier in the day followed by westerly sea breezes later in the day.
- cyclones which originate to the north or north-west of the State may reach the south western areas without breaking up and result in destructive winds and bush fires. Cyclone *Alby* in April 1978 was a notable example of this and resulted in 367 reported fires in 43 local authority areas.
(Further information supplied by the Bureau of Meteorology about the fire weather threat is contained in Appendix 1).

4. Access and egress difficulties in many habitated areas:

- leading to difficulties in fire suppression and evacuation (discussed further under urban planning issues).

Much of the land within the study area is residential in a bushland setting and the problem has been exacerbated over the years by the encroachment of urbanisation further into bushland areas. It is the interface between residential development and bushland vegetation which presents particular problems and which needs to be managed carefully so as to minimise the possibilities of a disaster occurring.

The region is an important recreational area and visual resource for the whole Perth metropolitan area. The number of visitors is increasing and will do so further as the Darling Range Regional Park is ultimately developed. For example, there were 135,000 visitors to the John Forrest National Park in 1992/93. This leads to greater risks of ignition and also to greater potential problems in the event of fire.

Bush Fires Board statistics indicate that in 1992/93 35% of fires in the outer metropolitan area were deliberately lit, compared with 13% in country areas. Arson appears to have been a major problem in the fire season just concluded.

There is concern that some deliberately lit bush fires are not being adequately followed up, partly because of a lack of information being passed on to police in some cases and partly because of a lack of police personnel to do so in others (although the group is aware that the police have made a large attempt to apprehend offenders following the high number of fires over the past season). It appears that more training of fire fighting personnel in relation to investigating the cause of bushfires would be helpful.

In summary, all of the factors which, in certain conditions, could contribute to a significant disaster exist in the Darling escarpment area. These include steep inaccessible terrain, population density, minimum reticulated water supplies, high fuel loadings, varying wind patterns and a history of fire occurrences.

Memories of the fires in New South Wales in January this year are fresh in the minds of most people, as are the effects of the Ash Wednesday fires in February 1983 in Victoria and South Australia. The working group is firmly of the view that the potential for a serious outcome does exist in Western Australia, and in the Darling Range area in particular.

It should be recognised that fires do not need to burn for days for substantial damage or loss of life to occur. Wildfire can travel at speeds of up to 1000 metres per hour and homes can be lost or people killed within a short time frame, such as one or two hours. This was demonstrated in the Walliston area on 12 March this year when one home was totally destroyed and two others were badly damaged within one hour of the outbreak of fire.

The working group was informed by Mr Phil Koperberg, Commissioner of Bush Fire Services in NSW, that on 8 January 1994, homes were ignited within 4 minutes of a fire unexpectedly jumping the Woronora River and proceeding up a valley in the Como/Janalli area in the southern Sydney metropolitan area. Approximately 88 homes were burnt and one person died as a result. (This was of course only one part of the NSW fires and was in an area not previously considered to be of high risk).

Analysis of the Bush Fire Hazard

Although it is possible to provide a general description of the hazard in the Darling escarpment area, to date there has been no systematic and comprehensive analysis of the area.

The Bush Fires Board and the W.A. Fire Brigades Board either have commenced or will be undertaking such a hazard analysis but their studies are not yet complete. The Department of Conservation and Land Management also has a wildfire threat analysis system for land under its control and has prepared analyses for such land in the Darling Range area. However, to some extent the priorities of CALM are necessarily different to the priorities of those agencies which have responsibility for fire control in residential areas.

The aim of bush fire hazard analysis is to identify and classify geographic areas in which life, structure or environmental loss is more likely to occur. The information can then be used for decision making in relation to two issues:-

- (i) future planning,
- (ii) the distribution of fire fighting resources in the most effective and efficient manner.

Such a classification process firstly involves an analysis of the factors that affect bush fire behaviour, including topography, vegetation and weather statistics. A map overlay system (manual or computer) is used to assist in the process.

Secondly, those features which are threatened, including life and property are identified by overlaying existing and proposed urban and rural development. The process can be further refined by including information relating to previous fire history for the particular area.

In recent years, some organisations such as the Country Fire Authority of Victoria and the Country Fire Service of South Australia have used a computer based Geographic Information System (GIS) to assist in the process. It is understood that in Western Australia the Department of Planning and Urban Development possesses a GIS database which is being used by some local authorities and could assist with fire hazard analyses. The Bush Fires Board has commenced using the Department of Agriculture's system for this purpose and CALM is also using a GIS based system.

The working group believes it is important for future planning of both urban development and fire services that a bushfire hazard analysis be completed as soon as possible for the study area. The use of GIS should be further developed for this purpose and in such a way that duplication by agencies does not occur.

Recommendation

1. **That the Bush Fires Board and the W.A. Fire Brigades Board jointly and in consultation with CALM, DPUD and local authorities should complete a comprehensive bush fire hazard analysis of the study area as a matter of priority.**

COMMUNITY AWARENESS AND "OWNERSHIP" OF THE FIRE THREAT

The working group is strongly of the view that, in general, there is a substantial deficiency in the amount of awareness amongst the Darling Escarpment community (and the rest of the State for that matter) about the potential for rapid destruction which bush fires can cause. This view is backed up by comments in many of the submissions, particularly those from organisations involved in fire management. Certainly there has been an increase in awareness following the recent New South Wales fires, as there was following the 1983 Ash Wednesday fires in Victoria and South Australia. The large number of fires in the study area over the last fire season has also contributed.

However there is still a common feeling that "it won't happen here" and it is essential that much more is done to educate the community firstly about the potential effects of fire and secondly about what measures can be taken to reasonably manage the fire threat. In some cases people appear not to care about the threat. Programs which are effective need to be designed and implemented in an ongoing manner.

Examples of methods include:

- appropriate school based programs
- use of newspaper, television and radio advertising
- local press articles
- community based activities

The BFB and the WAFBB do have some programs at present, for example in schools the Koala Bill and Freddie Fire-engine activities are available. There is also a limited amount of printed material available for distribution to the public.

However, the group considers that what is done at present is seriously inadequate. In the current year the Bush Fires Board's budget for public education is \$21,000 and there is an additional \$30,000 in private sponsorship. This is very much less than what is necessary to adequately educate the community about what needs to be done to help reduce the threat from fires.

The group believes that the BFB should receive a substantial increase in funding so this inadequacy can be addressed. It is important for the Board to have appropriate professional advice from an advertising/marketing perspective for this purpose. It should be recognised that in addition to material which is presently available in WA, a great deal of literature and other information has been produced by eastern states organisations, for example the CFA in Victoria and the CFS in South Australia, and much of this could be adapted for use here.

It is felt that within schools perhaps more could be done to inform students of the role of fire as a natural phenomenon in the Australian environment and its use in the management of ecosystems (in addition to fire safety awareness).

The CFA has produced a good publication for use in schools and the community generally entitled "Fire in the Australian Environment" which may be of use. It is recognised that there is a lot of pressure for more to be incorporated into school courses in relation to many issues, but perhaps more information about the role and effects of fire could be included in existing subjects.

It is considered that it would be greatly preferable for a central agency to develop and co-ordinate a community awareness and public education campaign than for each local authority to do so. This is to avoid duplication of costs and effort. Certainly local authorities should be involved.

It is worth noting that prevention of damage by fires can be very cost effective.

Local Communities

One of the most important aspects of the whole bushfire threat issue is that local communities need to take responsibility for and be involved in prevention and education at a local level.

It is important to realise that in some circumstances, regardless of the resources which are available and the commitment of fire fighters, it may not be possible to protect some homes from wildfires. This may be because of a widespread and/or fast moving fire.

In such a situation, it is important that residents and communities are prepared so the fire can be survived. In Victoria the CFA has developed a community based self-help program known as "Community Fireguard". It is similar in principle to the Police Department's Neighbourhood Watch program and in relevant locations the two could perhaps be combined.

The introduction to the Community Fireguard booklet states that:

"It is about local people taking responsibility for their own fire safety. These people work in small community groups to develop strategies to cope with the local fire threat. These strategies are based on a solid understanding of wildfire safety issues".

Such a program would be equally relevant to high fire risk areas of WA.

Recommendations

2. **That the Bush Fires Board should be adequately funded so that it can develop (in consultation with the WAFBB, CALM and local authorities) and implement ongoing community awareness and education programs relating to bush fire prevention and management.**
3. **That consideration be given to establishing the Victoria CFA's Community Fireguard program in Western Australia.**

4. That the Minister for Education be requested to review the existing schools curriculum in relation to studies involving all aspects of fire with a view to increasing awareness of this issue (fire safety awareness and the role of fire in environmental management).

LOCAL GOVERNMENT AND FIRE PREVENTION

The working group is of the view that while local government authorities do give attention to fire prevention in their areas, more needs to be done and a greater focus given to this issue.

Some local authorities have fire prevention plans but it should be mandatory that these are both produced and implemented according to agreed standards.

Generally local authorities address the issues of fire prevention through their ranger services which are also responsible for other activities such as dog control. Consequently, the issues of fire prevention programs, public education and advice on fire related matters generally may not receive the attention they should.

There is a need for local authorities to appoint a suitably qualified staff member to the position of Fire Prevention Officer for the purposes of fire prevention planning, identifying and reducing fire hazards, issuing hazard reduction orders, carrying out liaison, education and advisory services and ensuring an integrated approach to fire safety within the local community. It is understood that some local authorities are currently considering making such an appointment and some currently employ staff who are fulfilling this role.

It may, at least in theory, be possible for a fire prevention officer to also have other duties within the municipality, but fire prevention duties should be the primary responsibility. The Bush Fires Board should provide the necessary training.

It is also desirable that local authority based Bush Fire Prevention Committees are appointed for purposes including:

- the promotion of public awareness in respect of fire prevention.
 - assessing the extent of fire hazards within their area.
 - advising appropriate authorities of the existence of fire hazards and to make recommendations for their removal.
 - the preparation of plans for bushfire prevention.
 - consultation with other similar committees in adjacent areas.
 - advising the appropriate authorities on general bushfire prevention matters with their area.
- (reference: Country Fires Act 1989 of South Australia).

Bush Fire Prevention Committees would be separate from the existing Bush Fire Advisory Committees which are more concerned with fire suppression (although there may be an overlap of personnel). Membership would include the Fire Prevention Officer and representatives of the Council of the local authority, each volunteer fire brigade within the area, other government organisations (such as CALM) as appropriate and other community representatives if and as necessary.

It may also be appropriate to appoint Regional Fire Prevention Committees so as to co-ordinate and advise on a regional basis.

Over the years, most of the emphasis on fire prevention on private land appears to have been through the use of standard 3 metre wide firebreaks. Although firebreaks are of use in some circumstances in a large or quickly spreading fire they may have limited effect.

They may also cause problems of erosion in some situations. It is necessary for local authorities to give a higher priority to other aspects and methods of fire prevention including the removal of ground fuel buildup around homes and the slashing or mowing of long grass. The group believes that more information should be made available to assist land owners with alternatives to standard fire breaks which can be used where appropriate.

The working group does not advocate a heavy handed approach to the enforcement of fire prevention measures and believes that an educational and co-operative approach is by far preferable. Nevertheless, there are occasions where education and co-operation has not succeeded and the imposition of penalties is necessary. Generally infringement notices are issued only where a hazard which is present is causing potential danger to a neighbouring property or properties.

The WAFBB is limited in its ability to give priority to bushfire prevention issues within its gazetted area in the Darling Escarpment region. This is primarily because of the fact that such matters are not specified in the Fire Brigades Act and the Act should be changed to ensure this occurs. (The WAFBB is involved in fire prevention assessment in respect of structural fires in non-residential buildings).

Recommendations

5. (i) That local authorities should be required by legislation to appoint dedicated Fire Prevention Officers for the purpose of ensuring fire prevention activities within their areas (but not so as to duplicate the existing activities of the WAFBB).
- (ii) That the Bush Fires Board should provide the necessary training for such officers.
6. That local authorities be required by legislation to develop and implement adequate bush fire prevention plans for their areas and that these plans should meet the standards of, and be approved by, the Bush Fires Board in consultation with other agencies as appropriate.
7. That Fire Prevention Committees be established through legislation and that volunteer fire brigades be given the opportunity to make input into local fire prevention planning and related works programs through such committees.
8. That local authorities should be involved as a high priority in the provision of a co-ordinated public education program (refer to recommendation 2) and provide the necessary advice to the community on all aspects of fire prevention and planning.

9. That changes should be implemented to ensure that the WA Fire Brigades Board is involved in bush fire prevention as appropriate within its gazetted area.
10. That State and Local authorities should ensure more information is made available to land owners about alternatives to standard fire breaks where appropriate.

LAND USE PLANNING AND BUILDING DESIGN

Land use planning and the design and siting of buildings are very important aspects of prevention of the effect of bushfires. The working group has been shown examples in the Darling escarpment area where either the urban planning and/or the building construction has significantly increased the risk.

In some cases such developments were undertaken or buildings constructed years ago when there was little thought given to the threat of fire or when there was less knowledge. However, there is still very much a need to increase the attention given to these issues.

Land Use Planning

Although some local authorities now do give specific consideration to fire prevention when considering development applications, and do in some cases impose conditions on approvals, there is concern that if tested legally, such conditions may not be enforceable.

The Department of Planning and Urban Development has guidelines for fire prevention but the group considers these should be reviewed and then made mandatory rather than just being guidelines.

There is also concern that in general, urban planners have insufficient knowledge of fire prevention issues and that it would be helpful if a greater degree of training in fire protection as part of the relevant undergraduate course occurred together with adequate information and updating being supplied to existing planners.

Issues which are important in the planning of developments include:

- adapting to the natural or existing features so as to provide the best protection from fire.
- allowing for adequate access and egress for residents and emergency vehicles.
- ensuring that adequate supplies of water are available to residents and emergency services to be able to suppress a fire.
- the provision of fuel managed buffer zones between subdivisions and hazards where necessary.
- the provision of fire refuges where necessary.

Recommendations

11. That the State Planning Commission guidelines for bushfire prevention should be reviewed in consultation with the BFB, WAFBB, CALM and Local Authorities and then made mandatory through legislative change as a matter of priority.
12. That local authorities should be required to refer development and rezoning applications for fire prone areas to the BFB or WAFBB (as appropriate) for approval.
13. That Curtin University should be requested to review, in conjunction with the BFB and WAFBB as required, and if necessary increase, the amount of training in fire protection in its Urban and Regional Studies course.
14. That the BFB and the WAFBB provide training as necessary for local authority planners and building approval officers in respect of fire protection.

Building Design

Factors involved in the construction of a building can be of major importance in determining whether or not a building and its occupants are able to withstand a significant fire threat. The working group has seen examples of homes in the Darling escarpment area which are much more vulnerable than if they had been designed with the possibility of wildfire in mind.

Obviously it is difficult to enforce changes to existing buildings but the group is of the view that more attention needs to be given to the design of buildings from the perspective of fire protection in the future.

The factors involved include the design, construction materials used, location with respect to surrounding countryside and the proximity and type of adjacent vegetation (ref: "Building in bushfire prone areas" - CSIRO and Standards Australia, 1993)

Standards Australia has prepared a standard (AS 3959) - "Construction of buildings in bushfire-prone areas") which is intended for inclusion in the Building Code of Australia. This specifies minimum requirements to make a building more resistant to burning debris.

However, the standard cannot be enforced unless bushfire prone areas are formally designated. Although some local authorities have started to impose requirements on buildings in high fire risk areas, legislative backing is necessary to ensure this is further progressed and beyond challenge.

The designation of fire prone areas for building purposes should not be used as a reason by insurance companies to increase premiums. As can be seen from this report, the fire threat can be managed so that the loss of buildings to bushfire is no greater than the loss in other areas. Other parts of the metropolitan area have a greater risk of damage from other threats, for example flooding or winter storm damage.

There is however concern that AS 3959 needs to be modified to some extent so that it is relevant and applicable to Western Australia.

Some of the matters which may need to be considered in drawing up building requirements are:-

- elimination of guttering or the provision of leafless guttering.
- suitable protection for open underfloor areas.
- the use of shutters over windows
- minimisation of the size and number of openings on the side of a building exposed to bushfire.
- the provision of an internal tap and hose of sufficient length to reach all parts of the building, including the roof space.
- designing the shape of the building, including the roof, so as to minimise the likelihood of burning debris being caught.
- providing solid core doors and metal screen doors where used in exposed areas, together with draught excluders.
- allowing for adequate access for fire fighting vehicles.
- planting of suitable trees on the exposed sides of the building to help provide protection from radiant heat and embers.
- the provision of a suitable sprinkler system on the exposed side of the house.
- the provision of an independent water supply (such as a tank or swimming pool) with its own petrol or diesel powered pump.
- the requirement for control of surface fuels within 20 metres of the building and the removal of overhanging trees adjacent to buildings.

(This list is not prescriptive and merely gives some points for consideration. These issues need to be considered in further detail for their applicability to WA and expert advice should be sought).

Recommendations

15. That the Government should act to ensure that AS 3959 is reviewed and modified if necessary so that it can be used in Western Australia.
16. That bushfire prone areas are designated through the necessary legislation or regulation so that appropriate building and land use planning requirements can be enforced.

STATE AND FEDERAL GOVERNMENT CONTROLLED LAND

Many of the submissions made by individuals and local government referred to the fire hazard which exists on land which is the responsibility of government organisations (either state, local or federal).

Residents are concerned firstly about the danger which exists in the event of a fire due to the fuel buildup. Secondly they believe that if they are required to reduce the hazard on their block, then government organisations should do the same.

Government organisations which control such land include the Department of Conservation and Land Management, State Planning Commission, Water Authority, Department of Land Administration, Ministry of Justice, Education Department, Department of Defence and Local Authorities.

As explained elsewhere, CALM is very actively involved in fire prevention, hazard reduction and fire suppression. In the case of fire suppression this applies to both CALM land and elsewhere. However it has been stated that the problems of increasing demands from fire issues and decreasing fire related staff has produced a "difficult, untenable situation".

The two CALM districts within the study area are Mundaring and Jarrahdale and both are considered to have about half the number of staff necessary for fire management. The Department is seeking to rectify this situation.

CALM has a program of prescribed burning planned for this year in the area to the east of the escarpment.

The State Planning Commission, through the Department of Planning and Urban Development, is currently responsible for 3950 hectares of the 14,000 hectares of land which is reserved for parks and recreation in the escarpment area.

The Commission has a full time field officer allocated to the Darling escarpment who in part is responsible for liaising with the fire fighting agencies. Hazard reduction burning on SPC land is contracted out to local bush fire brigades which the Commission says has worked well in the past but it appears that some brigades are beginning to appear to struggle under the workload.

It will provide assistance in fire fighting where necessary by arranging for earthmoving equipment but is concerned that in the past this may have been relied on excessively by those controlling fires. ("Many reserved areas still bear the scars of this activity often in close proximity to well constructed and maintained fire trails").

The SPC currently has a proposal to form a Darling Range Regional Park which will absorb much of its land when formed. It is important that arrangements between the SPC and CALM are made as soon as possible about management of this land so that the necessary attention can be given to fire prevention.

The Department of Land Administration has advised that it has management responsibility for vested reserves and vacant Crown land but that it is neither structured nor resourced to undertake this role to any large degree. However since the 1970's DOLA has made annual budget allocations to some extent for hazard reduction. In 1993/94 this amount is \$105,000 for the whole state and most of the funds are directed to the Bush Fires Board for distribution at its discretion. The Department is seeking to increase this amount for future years. The amount available for work in the metropolitan area is currently \$20,000 p.a. of which much is spent in the Shires of Mundaring and Kalamunda and the City of Armadale.

DOLA has acknowledged the assistance of local authorities in the study area in undertaking hazard reduction work on Crown land without necessarily passing on the costs to DOLA.

DOLA has further advised that although it acknowledges its responsibilities for fire hazard reduction on Crown land under its control,

"Certainly DOLA is not structured or resourced to undertake this role on a large scale and given Public Sector Reform and general economic constraints, there are no plans for this situation to change. It is considered that this role is more appropriately the responsibility of, or more efficiently discharged by, management bodies such as Department of Conservation and Land Management, Bush Fires Board (although its changing role is acknowledged) and local government authorities. Obviously this could only occur with proper funding and resourcing to these bodies."

and that

"The question of management responsibility of Section 20A reserves is one that generates considerable debate between DOLA and local government authorities. DOLA has a role in the administration of policy guidelines designed to ensure proper use of land ceded to the Crown as a condition of subdivision. However, it believes management of the areas to be more the responsibility of a local government authority which has an input into planning proposals and which has benefited from the resulting subdivision by the influx of residents, rate payments etc.

It is recognised that some of these areas should be vested in other bodies such as the Waterways Commission (e.g, foreshore areas) as appropriate".

The Department of Defence has responsibility for the Bushmead rifle range land and fire matters are handled by an Inspector of Fire Services, a position which is currently being filled.

The Ministry of Justice, Corrective Services Division, has prisons at Karnet (near Jarrahdale) and Wooroloo and a non-operational facility at Barton's Mill (near Pickering Brook). At Karnet and Wooroloo fire fighting equipment is maintained. At Barton's Mill a caretaker only is in attendance and the local brigades would be required in the event of a fire.

The Water Authority also has responsibility for large areas of land in water catchment areas in the Darling Range.

Recommendations

17. That State and Federal government authorities and agencies should be required to prepare and implement adequate fire prevention plans for land within their responsibility and that these plans should meet the standards of, and be approved by, the Bush Fires Board in consultation with other agencies as appropriate.
18. That all Government agencies be provided with sufficient funding so as to ensure that fire prevention plans are developed and implemented.
19. That the Department of Conservation and Land Management's request for sufficient funding to adequately implement its fire prevention and management plans be supported.
20. That management and funding arrangements for the proposed Darling Range Regional Park be concluded as soon as possible so as to ensure adequate fire prevention measures for the area.

RESTRICTED AND PROHIBITED BURNING PERIODS

At present in the study area burning is prohibited (except in limited circumstances) between early December and mid to late March (the exact dates can vary). On either side of this period there is approximately a six week period when burning is restricted by the issuing of permits. This restricted period can be extended by local authorities if necessary.

There have been some suggestions that this system should be changed. For example:

- that the prohibited period should be abolished so that hazard reduction burning can be carried out at any time by brigades so long as it is safe and appropriate to do so, i.e. there should be more flexibility in the system.
- that burning all year (except for small piles of rubbish) by the public should be subject to the issue of a permit, with local authorities being able to declare that permits are not needed in periods when weather conditions are appropriate.

This issue is somewhat involved and it is understood will be reviewed by the Bush Fires Board this year.

It is noted that the CALM fire review has recommended that the prohibited burning period should be removed and that all burning inside the periods a local authority believes to be dangerous be by permit.

Recommendation

21. That the planned review this year by the Bush Fires Board of restricted and prohibited burning periods be supported and that consideration be given to abolishing the prohibited period and introducing a system which will allow for the control of burning by permits all year and greater flexibility.

WEATHER FORECASTING

The provision of adequate weather forecasts is crucial in the management of the bush fire threat and are the responsibility of the Western Australian Region of the Bureau of Meteorology. The Bureau has provided the following information:

"The Bureau's role in the provision of Fire Weather Services in WA

Fire weather services are provided by the Perth Regional Forecasting Centre (RFC) to the general public and to the fire authorities. The fire weather service to the general public comprises routine forecasts of fire danger during the fire weather season together with the issue of fire weather warnings whenever the fire danger is expected to exceed a critical level. Fire danger is expressed in qualitative terms such as 'high, very high, extreme', etc. These forecasts and warnings are disseminated via the various media outlets in conjunction with other meteorological information and are a well recognised component of the general weather forecast during the warmer months of the year.

The services for fire authorities Australia-wide were developed to meet their individual needs and reflected the diverse nature of the fire problem and the organisation of these local fire control authorities. Although this resulted in significant variations between States, the services can be described in general terms as set out below.

Each afternoon, forecasts of maximum temperature for the following day together with the wind speed and humidity at the time of the maximum temperature for a number of districts throughout the Region are prepared. This information, together with the fuel amount and dryness, is used to estimate fire danger. These estimates are provided to the fire control authorities during the mid or late afternoon. They are reassessed the following morning, revised if necessary and then kept under constant review.

Special site-specific forecasts of surface wind, temperature and humidity together with other parameters such as cloud cover, stability and upper winds are provided to fire control authorities on request to assist in planning fire fighting activities.

In general, the tasks involved are carried out by the duty forecaster or the shift supervisor as part of his/her routine duties. Since 1988, the creation of the Severe Weather Section in the Perth Regional Office has allowed specialised severe weather staff to complement the existing services through closer liaison with state fire authorities. Additional services provided by this section include the provision of briefings at Bush Fire Headquarters during periods of enhanced fire threat, longer period outlooks (2 to 3 days ahead) of potential fire "blow-up" situations, regular weekend outlooks for planning purposes, and research into fire weather problems.

The Bureau's role in training in fire weather and public education.

The Bureau's Severe Weather Section has been active in the training of fire weather officers, particularly with CALM in recent years but also with the Bush Fires Board. In conjunction with the Bush Fires Board a number of initiatives have been put into place over the last twelve months to increase public awareness of fire danger. These include the use of the phrase..."and a total fire ban applies" on all public weather forecasts when the forecast fire danger rating is expected to be very high or extreme. The Bureau has also written to media outlets highlighting the importance of their role in the dissemination of fire danger forecasts to the public.

Observing networks around the Darling Escarpment

The Bureau maintains a relatively high density of observations around the Perth Metropolitan area, compared to other parts of the state. Automatic Weather Stations (AWS) measuring wind speed and direction, temperature, atmospheric moisture and rainfall on a continuous basis are located at Gooseberry Hill, Mt Lawley, Jandakot, Swanbourne Beach, Ocean Reef and Rottnest Island. These observations are supplemented by half hourly reports from Pearce, Perth Airport, and Mandurah and less frequent (twice daily) data from sites such as Bickley and Gosnells. Although substantial, the existing network does not cover the fire prone areas of the escarpment to a desirable level. The Bureau has considerable expertise in the siting, installation and maintenance of high-technology observing systems, however budgetary constraints and large nation-wide demands on the Bureau's resources make expansion of the observing network in the Perth area difficult to achieve. The network may expand in future years as co-operative ventures with State Government authorities who also need to monitor the atmosphere and who maintain observing equipment in the area, such as CALM, the EPA and the Bush Fires Board develop".

One problem identified in the group's discussions is that at present the Hills forecast area covers a wide band from the foothills to the eastern boundary of the metropolitan area when in fact there may be significant differences between the extremities, for example at Swan View at the base of the scarp and Wooroloo in the east.

In view of the Bureau's statement that the existing observational network does not cover the fire prone areas of the escarpment to a desirable level, it is necessary that this matter be given further attention.

Recommendation

- 22. That the Federal Government should be requested to resource the Bureau of Meteorology so that it can adequately expand its observing network and fire weather forecasting service for the Perth outer metropolitan area in consultation and conjunction with the Bush Fires Board, WAFBB, CALM and the EPA.**

ENVIRONMENTAL CONSIDERATIONS

Some submissions raised the issue of the environmental and ecological consequences of prescribed burning by CALM and other authorities.

One concern expressed was that hazard reduction burning should be conducted in autumn rather than spring because there is considered to be less impact on the natural flora and fauna at that time. There was also a request for smaller mosaic burns and more resources for the planning and management of such burning.

The group is aware that the recent CALM Fire Review Panel has considered these matters in detail and made various recommendations in its report, including that the area burnt in autumn be increased subject to the needs for specific habitat management.

It is beyond the scope or the expertise of the working group to deal with these issues in detail and in any event the CALM Panel was established to do so. The report of that Panel should be referred to for comment and recommendations on these matters.

It is also noted that CALM has an extensive research program to study and improve methods of hazard reduction burning. The group also notes that the most deleterious environmental effects are caused by uncontrolled intense bushfires which occur in areas where there is a large fuel build up.

CALM is also aware that it needs to increase its communications with the public about the purposes and effects of hazard reduction burning.

There was some concern expressed in the group's discussions that in the past on some occasions insufficient attention has been given by brigades to the environmental and ecological effects of hazard reduction burning and that more education and training of brigades in this respect is necessary. CALM has offered to assist with this.

The Bush Fires Board has a policy that brigades should not burn with the earning of money being the reason for burning. In other words brigades should only do hazard reduction burning if it is the best way of dealing with the situation (bearing in mind that other methods of hazard reduction may in some cases be preferable.) If in this circumstance the brigade is then paid, then that is acceptable. The only criteria for burning should be fuel reduction or for habitat management. However it is felt that in the past this has not always been the case. The ad hoc burning of grass blocks should be discouraged.

The Bush Fires Board has a brigade prescription burning form which includes the requirement that environmental aspects are taken into account and it is important that this is used.

It was reported that a few brigades have now appointed environmental officers who are responsible for dealing with these issues. It was suggested that the Bush Fires Board and the WAFBB should appoint staff with environmental qualifications to relevant positions in the future.

The other aspect of environmental considerations is that of smoke production from prescribed burning. There is concern that control of smoke over the metropolitan area by the Environmental Protection Authority (or the Department of Environmental Protection) is an excessive constraint on the effective execution of hazard reduction programs. It is considered that the presence of smoke on some days over Perth is a small price to pay in order to reduce the threat to life, property and the environment which can be caused by wildfire in the Darling Range region.

However, it is recognised, as stated previously, that CALM and other agencies should be required to take into account the environmental consequences of burning and CALM does have its own guidelines for this purpose.

The group is of the view that it would be helpful if more information could be provided to authorities engaged in burning on the effects of smoke on any given day.

The Bureau of Meteorology has advised that following a request by CALM in 1992, work has commenced to provide an advisory service for the provision of information on the suitability of days on which to burn. However, it appears that further progress needs to be made in this respect.

Recommendations

23. That appropriate legislative changes should be made requiring all fire organisations (including the BFB, WAFBB, brigades, local authorities and other land managers) to take into account the environmental and ecological effects of hazard reduction burning when such burning is being planned and in fire suppression operations.
24. That unless there is clear medical or scientific evidence to the contrary, appropriate measures should be taken, including legislative change if necessary, to ensure that the EPA is not able to prevent hazard reduction burning on the grounds of smoke production.
25. That the Bureau of Meteorology and the EPA be requested to complete the development of a service which will enable authorities involved in hazard reduction burning to better predict the effect of smoke production on any given day.

THE ORGANISATIONAL STRUCTURE OF FIRE FIGHTING SERVICES IN THE DARLING ESCARPMENT AREA

Within the study area, three fire combat authorities are primarily involved in fire prevention and fire control.

The WA Fire Brigades Board has responsibility for certain geographically defined areas which are generally more urban in nature (although it is important to note that there are significant areas of bush land within the WAFBB area).

The WAFBB has both permanent and volunteer brigades. The permanent brigades which are primarily involved are based at Midland, Welshpool and Armadale and the volunteer brigades are at Kalamunda and Armadale (additional to the permanent brigade).

The Department of Conservation and Land Management has responsibility for land under its control (State forests and national parks, etc). CALM has its own fire prevention and suppression personnel and equipment (discussed elsewhere in this report).

The remainder of the area is generally covered by 31 volunteer bush fire brigades which are organised within local government areas and controlled by the relevant local government authority. Each local authority appoints its own chief bush fire control officer and other senior staff as necessary.

The Bush Fires Board has the responsibility of administering the Bush Fires Act and provides a supportive and co-ordinating role to local government and the bush fire brigades.

The Department of Planning and Urban Development and the Water Authority have minor fire suppression capabilities which support the main combat agencies.

The geographic areas of responsibility of each agency are defined on the relevant maps. Although a particular agency has primary responsibility for fire suppression within its particular area, the agencies do have mutual aid agreements to assist each other where the need dictates - mainly in the event of a large fire.

The interaction between the various agencies works in all directions. For example, CALM has advised that approximately 50% of fires attended by its personnel are on private or other (non CALM) government land. Volunteer bush fire brigades attend many fires on CALM land or in WAFBB areas and WAFBB brigades attend many fires outside its defined area.

The increased development of mutual aid agreements in the last few years has gone a long way towards overcoming the natural problems which can arise from having areas defined, to some extent arbitrarily, by lines on a map. In fact, there is generally a very good working relationship between the various organisations on the ground.

However, comments were made by a number of members of the group to the effect that interaction between the groups needs to go further and that mutual aid agreements do not solve everything and need to be further developed. For example, there is the issue of jurisdictional authority where the head of one organisation has legal responsibility for a particular area but may not actually be in control of activities in that area.

One comment made was that agencies need to commit themselves to a plan and work to it on the day.

Problems have occurred in the past because of debate over who has the responsibility for a particular fire.

One volunteer brigade commented;

"we are concerned that there appear to be political problems between the various fire fighting agencies, particularly at a fire situation. We feel that there should be one senior person who has the power to co-ordinate and 'pull together' the various groups for greater efficiency and co-operation".

In fact, the structure does exist to co-ordinate the various agencies but it is apparent from this comment that further attention needs to be given to this area.

Some submissions, including from a brigade and a local authority stated that the WA Fire Brigades Board and the Bush Fires Board should be combined to create a single fire suppression authority (or at least that this option should be further considered). The point was made that there are currently two statutory authorities concerned with fire control operating under two separate Acts and that amalgamation may lead to a more effective and efficient service by eliminating any duplication of effort.

It is recognised that such an approach would have significant financial, personnel and other implications which would need to be addressed.

This issue is particularly apparent in the Kalamunda area where there are both WAFBB and BFB brigades located relatively close to each other. The WAFBB brigade currently has a waiting list of volunteers wishing to join and the BFB brigade is in need of more active members - clearly a less than ideal situation.

The working group has discussed the question of having one fire fighting service but feels that is outside the scope of its investigations to pursue the matter fully. It does however believe that the issue should be further investigated.

Recommendation

26. That the question of amalgamating the WA Fire Brigades Board and the Bush Fires Board of WA should be investigated further at the appropriate senior levels of government.

LOCAL GOVERNMENT AND FIRE SUPPRESSION

Local authorities play a major role in both the funding and the organisation of fire fighting services outside the gazetted WAFBB areas throughout the State, including in the Darling escarpment area. As previously mentioned, all volunteer bush fire brigades are organised and controlled within local government areas. Most funding for these brigades comes from local government.

In contrast, within the WAFBB areas local authorities are not involved directly in the management or organisation of brigades. However, they do contribute to the funding of the permanent brigades where those brigades provide the fire service within the local authority's boundary - generally in the coastal plain, foothills or more urban areas. The issue of funding is discussed further elsewhere in this report.

The question of what role local government should play in determining the fire service which is provided in a particular area was addressed by the group. It was observed that police and ambulance services are organised and planned on a statewide basis, and that perhaps the fire service should operate in the same manner.

Some concern was expressed that the existing system potentially allows excessive differences across local government areas to occur in respect of fire fighting services and that a greater degree of consistency should be developed.

It was also felt that the BFB should be at least a partner in fire suppression within its area rather than merely a co-ordinator or supporter and that a proper training and career path needed to exist for fire control officers.

The Board should determine appropriate standards and be able to ensure that these standards are met by providers of fire fighting services. The State Government should ensure that sufficient funding is available for these standards to be achieved.

In summary, the group concluded that the BFB needed to play a greater role in fire fighting and that the legislation should be changed to allow this to occur.

Recommendation

27. That the Bush Fires Act should be changed so that the Bush Fires Board is able to direct, in consultation with local authorities, that appropriate standards are met by local authorities in respect of the provision of equipment, buildings and other matters relevant to fire suppression.

STANDARDS OF FIRE COVER

Standards of fire cover models are being developed separately by the WA Fire Brigades Board and the Bush Fires Board for their respective areas.

These models are designed to analyse the degree of the hazard in a particular area, including the concentration of population, the value of physical assets and any other particular environmental or heritage values that may exist. This information is then used to determine the best manner in which to respond to the fire threat, including the most appropriate location of brigades and the provision of equipment.

In a similar manner the Department of Conservation and Land Management has a system of "Wildfire Threat Analysis" to assist it in determining the most appropriate use of resources.

The aim is to analyse in a scientific manner the response required so that the response is based on sound and rational decisions. It is important that, particularly in areas where there is a concentration of habitation and structures, that there is an "automatic predetermined response" by fire fighting agencies. The WAFBB has been advised that for structural fires the internationally accepted standard for the response time is 6 - 7 minutes.

The WAFBB is trialing its Standards of Fire Cover model in the Shire of Mundaring later this year. (The Shire and the WAFBB have had some discussions with a view to a volunteer WAFBB brigade being established in Mundaring).

Although the WAFBB and the BFB models have similarities, they do have different priorities and it is important that integrated models are agreed on and developed jointly. The same applies to CALM's Wildfire Threat Analysis in so far as it impacts on the urban/rural interface.

The completion of a thorough and objective analysis may lead to the establishment of new brigades in some areas and the amalgamation of brigades in other areas in order to maximise their effectiveness. What is important is that the process for such an analysis is firstly agreed on and then carried out in a fixed time-frame with input from all relevant agencies. It is necessary then that an automatic immediate response plan is implemented.

Recommendation

28. **That the government should ensure that the three fire combat agencies develop integrated Standards of Fire Cover models as a matter of priority and then carry out an analysis of the study area using such models so that the results of such analyses will be implemented.**

CHAIN OF COMMAND

Within the WAFBB there is a clear command structure within the agency up to the level of Chief Officer. This means that, where necessary, a more senior officer can direct certain action to be taken in response to an emergency. With such direction of course goes the responsibility for decisions.

However, it has been pointed out that within the Bush Fire Brigades network the command structure stops at the Chief Bush Fire Control Officer level within each local authority area. In other words there is no clear chain of command up to a State wide level for emergencies that involve more than one local authority.

The current situation reflects the fact that at present the Bush Fires Board is not directly involved in fire suppression - it merely serves a supportive and co-ordinating role. Given that the Bush Fire Brigade system is part of the emergency service structure of Western Australia this situation should be changed.

It is important that a clear chain of command is established throughout the State up to the level of a single individual for use when and where necessary.

Recommendation

29. **That the Bush Fires Act should be changed so as to establish a clear chain of command within the Bush Fire Brigades network for the whole State.**

INTER-AGENCY COMMUNICATION (during a fire)

In the case of a moderate to large size fire, or one which crosses boundaries, it is normal for two or more fire combat agencies to be involved. For example, bush fire brigades from one or more local authorities, WAFBB Brigades and Conservation and Land Management staff and equipment may all be involved in one fire, as may the Police and State Emergency Service.

In this situation it is necessary that there be a clear command and organisational structure which allows for the effective co-ordination of all the agencies involved.

For this reason the Australian Association of Rural Fire Authorities has developed the Australian Inter-service Incident Management System (AIIMS) which can be used to respond to public emergencies of any type including fires, floods cyclones, major accidents etc. The operation component is known as the Incident Control System (ICS).

ICS has been adopted by the Bush Fires Board and CALM. However the WAFBB has not yet adopted the system and uses another because of some reservations about ICS, although these reservations are apparently not major ones. The group has been advised that the Police also do not use ICS at present.

It is important that the three fire combat agencies use the same basic management system so that their combined effectiveness is maximised during a multi-agency incident. It was reported to the group that this was a problem during the fire in Walliston on 12 March 1994. It would also be desirable for the other emergency services, including the Police and the State Emergency Service to fit in with the same system.

Recommendation

30. That the three fire combat agencies, and if possible the Police and State Emergency Service and other emergency services, should adopt a common inter-agency management system before the start of the next fire season and that adequate training in its use be provided to all those involved.

FUNDING OF FIRE FIGHTING SERVICES

Fire fighting services in Western Australia, and therefore the Darling escarpment area, are funded in a variety of different ways.

The WAFBB permanent brigades, such as the Midland, Welshpool and Armadale stations, are financed through the WAFBB budget which is contributed to by:

- 75% from insurance levies on building and contents policies within the WAFBB gazetted area (the levy rate is 24% of the premium and therefore is about \$75-100 for a typical home)
- 12.5% from Local Governments
- 12.5% from the State Government

Local governments within the study area therefore contribute to the funding of such brigades, where there are gazetted areas within their boundaries. For example in 1993/94 - Shire of Kalamunda \$80,000; Shire of Mundaring \$60,000; Shire of Swan \$234,000; City of Armadale \$120,000.

WAFBB volunteer brigades (Kalamunda and Armadale) are funded 100% by the State Government. This has been the case for many years and is apparently in recognition of the fact that local residents are providing free labour through the contribution of the volunteers (and employers of volunteers in some cases). Labour costs account for about 80% of the budget of the WAFBB permanent brigades.

In contrast the volunteer Bush Fire Brigades are funded entirely by the local government in which area they are located and by their own fund raising efforts.

An exception to this is that over the last three years the Lotteries Commission has contributed \$500,000 per annum to the upgrading of bush fire brigade equipment throughout the State and this has certainly assisted in replacing some inadequate vehicles and other equipment. In 1994/95 the Commission will be contributing \$700,000 for this purpose but the scheme is not expected to be extended beyond then. The support of the Lotteries Commission is very much appreciated but it is clear that the fire fighting services will not be able to rely on charitable handouts in the future and nor as an emergency service should they.

The subject of funding was raised in many submissions - particularly those made by local governments and the volunteer brigades. There is a strong and widespread view which is shared by members of the working group that the existing disparate system leads to anomalies and inequities. In particular, the volunteer bush fire brigades are considered to be seriously under resourced, in spite of the contribution which ratepayers have made through local government over the years.

(The WAFBB has also pointed out that, although its funding base is much more assured, it is also very much in need of funds to replace equipment which is past the working life).

One of the inequities which exists is due to the fact that some people are required to pay the insurance levy and others are not. Those who do not pay it include those who are not insured, those who insure offshore (apparently more of a problem in the central city area of Perth) and those who live outside a fire district. Such people nevertheless receive the same fire service if they are within a fire district and may, depending on the circumstances, receive a service from the WAFBB if they are outside a district.

Another problem exists because of the fact that bush fire brigades receive no funding from the State government even though they are required to provide the same service in respect of fire fighting as the WAFBB in some areas. In addition, these brigades are also required to cover large areas of land which is owned by either State or Commonwealth government authorities and for which little or no funding is provided by those authorities.

Examples of agencies controlling such land are the Water Authority, State Planning Commission, Department of Land Administration, Ministry of Justice, Education Department and the Department of Defence. Local authorities through their bushfire brigades are required to provide a fire service for these areas and the agencies or the State and Federal Governments on their behalf should make a greater contribution to the costs of providing the service.

On the other hand, the point was made during the group's discussions that often local authorities do not ask for funds from such agencies (because they don't believe they will receive any) but if asked, money may be forthcoming. Whether or not this is wishful thinking is a matter of conjecture at this stage.

A common complaint by volunteer brigades is that they need to put in a significant amount of effort and time into fundraising in order to keep operating and providing the community service they do. Fundraising activities include the usual methods used by community organisations and include doorknocking, raffles, variety and quiz nights, etc. The money raised is largely used to operate the brigades, including the purchase of fuel, protective clothing and equipment and the paying of telephone and electricity accounts. In some cases members are required to buy their own protective clothing.

Whilst fundraising activities may be appropriate for the social activities of a brigade (the importance of social activities to the morale of a brigade should not be underestimated) or for the purchase of "extras", it is not considered acceptable that volunteers who provide an essential community service should have to spend time fundraising in order to provide that service. Some of the comments made by brigades include:

- "During the 'off' season when we do this fundraising is when we should be doing much of our training. With so much time spent raising money little time is left over to train. We are finding it increasingly difficult to sustain the effort required in raising this amount of money each year".
- "Brigade members join the brigade to fight fires and provide a community service. The need to finance a large portion of the brigade's operational costs by fund raising is an unfair imposition on volunteers. We believe that time spent on raising funds could be better spent in training and fire prevention operations".
- "A way must be found for brigades everywhere to no longer be in the position of having to go cap in hand to authorities because their fire unit is unroadworthy, unsafe and in some instances absolutely dangerous".

The question of the funding of fire services, in particular urban fire services, has been reviewed by a variety of organisations over the past twenty years and the group is aware that the Minister for Emergency Services has announced that the current funding situation for the WAFBB permanent brigades will be reviewed in the near future.

Alternatives to the current system include:

- 100% by the State Government from consolidated revenue
- a system based on local government rates
- a system based on land titles
- a system based on water rates
- enhancing the current insurance based system so that it is much more inclusive.

Various systems operate around Australia. For example Queensland moved to a local government rates based system in the mid 1980's for urban areas only and in Victoria the Country Fire Authority is funded 77.5% by insurance levies and 22.5% by the State Government.

One ratepayers' association in the study area recently passed a motion suggesting that the local Shire should impose a levy on Shire rates for the purpose of increasing funding to local bushfire brigades.

The WA Division of the Insurance Council of Australia has indicated that it believes emergency services should not need to be funded by the private sector and would like the current system to be changed. Certainly a broadening of the base of fire service funding would be fairer to the community as a whole and depend less on those who choose to insure onshore.

In its submission to the New South Wales Cabinet committee on bush fire management and control in February this year, the CFA in Victoria has expressed the view that the key features of a suitable funding scheme should include:-

1. the owners of all property assets sharing in the cost regardless of whether an insurance risk is underwritten.
2. there must be equity in the system.
3. the contributor base should be broad.
4. the system should be cost effective.

The CFA has further stated that it is not considered appropriate for funding to be based on a "fee for service basis" where a charge would be made for attendance at incidents.

The working group believes that the above criteria should also apply to Western Australia. This includes the view that the State Government should provide funding to the Bush Fires Board and bush fire brigades in the same way as it does for the WAFBB.

[Fire services also have a major role in dealing with car accidents and fires and hazardous chemical spills and although outside the terms of reference of this report the group is of the view that any funding review should also address this issue.]

Recommendation

31. That the proposed review of funding of the WAFBB permanent brigades announced by the Minister for Emergency Services should be extended to include funding of WAFBB volunteer brigades and Bush Fires Board brigades and that a new system should be introduced which will:
 - (i) be more broadly based.
 - (ii) provide for a common and equitable method of funding of WAFBB Brigades and Bush Fire Brigades.
 - (iii) ensure that an appropriate contribution is made by State and Federal Government agencies which are responsible for land and other property.

FIRE FIGHTING EQUIPMENT

The need for fire fighters to have vehicles and other equipment which is effective, reliable and safe is obvious.

However, this is far from being universally the case at present. The Bush Fires Board has advised that:

"The standard of volunteer bush fire fighting vehicles is considered to be well below an acceptable standard in respect of road worthiness, age criteria, pumping performance and crew safety for volunteer fire fighters".

This statement is supported by the working group.

Examples of some of the comments by brigades illustrate the problem:-

"We have two fire fighting units. One, a light duty Toyota, works well. The other is a larger rather aged Ford which is often off the road with mechanical defects. Should this vehicle be condemned at any time, we will have serious problems replacing it".

"4WD light units: our older vehicles were found to be legally overweight, largely due to the old heavy materials used, and had to be stripped of much of the equipment they previously carried. Also, and most seriously, the tanks can not now be fitted for the same reason. Hence the usefulness of these units has been impaired. They soon run of water!".

"Both of these vehicles (4WD light attack vehicles) have served the brigade well but due to the nature of their work, are quickly aging. Expenditure for repairs and maintenance on (them) for this financial year has already doubled last year's total. (They) often have to be withdrawn from fire fighting duties due to mechanical breakdowns and failure".

In recent years some improvements have been made with some units being replaced by local authorities and brigades, in some cases with assistance from the Lotteries Commission. However, there is a long way to go.

The subject of equipment and building standards is inextricably related to that of finance and the funding of brigades. As stated in that section, the group considers that the same method of funding bush fire brigades and WAFBB brigades should apply. Assuming State Government support for WAFBB brigades continues, then the State needs to provide substantial support for bush fire brigades, which are serving the same purpose.

The question of raising the necessary finance is also discussed in the section on funding.

As mentioned in the section on recruiting the standard of equipment and buildings is important in attracting committed volunteers and the morale of a brigade.

The BFB has developed specifications for a range of different capacity vehicles based on vehicles designed by the Victorian CFA. However, there appears to be a need for greater provision of information by the BFB to local authorities about what is required of them in respect of equipment standards.

There is also a need for a more co-ordinated and centralised approach to the purchasing of new equipment so that the necessary standards are met and the best prices achieved.

Some brigades have requested more larger capacity vehicles so that they do not have to return to refill as often and to provide more room for fire fighters. On the other hand it has also been pointed out that the smaller capacity 4WD light attack vehicles are also very necessary for their manoeuvrability and speed. The ideal combination for a brigade with two vehicles may therefore be a 700 litre 4WD light unit and a 2000 litre 4WD larger capacity unit, but of course each situation needs to be determined on its merits.

The group also discussed the question of petrol versus diesel powered vehicles. There are examples of where the lives of fire fighters were put in serious jeopardy by the vaporisation of fuel in petrol powered vehicles which become immobile (for example in the Ash Wednesday fires in Victoria). On the other hand it was stated to the group that petrol engines do have some practical (and cost) advantages and that new vehicles with fuel injection are unlikely to vaporise. This is a matter which should receive further attention from the BFB and the WAFBB.

Communications and Call Out Systems

The Swan Region Fire Protection Advisory Committee has advised:

"The volunteer bush fire organisation in the Region generally operates on the VHF low band frequency. The national requirement to change to a new band plan by mid 1995 will require replacement of many older radios which cannot be modified to the new specifications. As many as 50% of radios may have to be scrapped, considerably affecting the viability of those brigades. Financial support may well be needed to ensure a smooth transition to effective communications in 1995/96. Currently it is clear that more transmitters are needed to provide quality communications of the face of the escarpment".

These comments are endorsed by the working group.

The Bush Fires Board has also advised that there is a lack of co-ordinated emergency response or call-out systems used by brigades and the WAFBB advised that it was sometimes difficult to pass on calls received in its communications centre through the 000 number to volunteer brigades because people could not be contacted.

Another potential problem mentioned to the group is that with the move to a simplex frequency, when there is a fire on the edge of the escarpment, radios in vehicles in that location may drown out radios in the less elevated areas. This matter should receive attention from the BFB and WAFBB.

Recommendation

- 32. That the State Government should ensure that sufficient funding is made available to volunteer brigades to ensure that provision of adequate levels of fire fighting equipment, protective clothing, call-out and communications systems with the levels being determined by the relevant standards of fire cover.**

AVAILABILITY AND RECRUITMENT OF VOLUNTEERS

WAFBB volunteer brigades are limited by regulation to a maximum number of members (25 active members, 5 reserves and some additional probationary members). The two brigades with the study area (Kalamunda and Armadale) are currently well supplied with active members. The WAFBB is currently reviewing whether the limits should be altered.

Within the bush fire brigade system, the situation is variable. Some brigades have adequate members, others (particularly those in the more outer areas) need more. There are sometimes problems with a lack of available personnel on weekdays when members are away in the city at work. The increasing involvement of women as active members in recent years has been welcome and has helped the situation.

As well as it being important that there is a minimum number of volunteers available, the view was also expressed that a brigade should be able to limit its number of members because of the costs of fitting out and training. However there were varying points of view on this last point because it was also stated that backup members were important in the event of fires of long duration.

With respect to attracting members, it is considered that mass advertising campaigns are not successful and that personal canvassing and word of mouth within local communities is much more effective. The occurrence of major fires (such as the recent New South Wales fires) increases interest in volunteering following such an event.

The existence of adequate training (as discussed elsewhere in the report) and introductory information for new recruits is very important in attracting and maintaining new members. There is concern that sufficient training is not currently being provided with the need being greater than the supply.

There was also some concern that where a brigade is decommissioned, the members of the brigade are not provided with sufficient support to enable them to continue in the service or to continue to make a contribution if they so desire.

A major factor in attracting committed volunteers is the standard of the fire fighting vehicles and other equipment, call out systems and brigade buildings. Volunteers are much more likely to want to be involved in an organisation which looks up-to-date, suited to the tasks it has to perform, and safe.

The working group is strongly of the view that the volunteer system is essential to providing an effective fire fighting service in Western Australia (particularly in the outer metropolitan and rural areas). It would be impossible for the existing service to be provided by all paid personnel without great expense. The contribution made by volunteers should be recognised by the community.

Similarly, employers who allow staff time off to attend fires are also making a major contribution towards the protection of the community and they should be encouraged to continue to do so.

Recommendations

33. That the volunteer contribution to fire fighting in WA should be encouraged and enhanced by both local and state governments.
34. That the Bush Fires Board should be able to set minimum limits for the trained membership levels of brigades but that flexibility should exist with respect to the upper limits as determined appropriate by bush fire brigades and local authorities in consultation with the Bush Fires Board.
35. That the Bush Fires Board and the WAFBB should produce an appropriate information package for the benefit of new members joining a brigade so that they will be properly informed.
36. That where a brigade is decommissioned thorough follow up procedures should be implemented to ensure that volunteers continue to have the opportunity to remain involved in the organisation.

TRAINING OF FIRE FIGHTING PERSONNEL

There is a need for more training to be made available for members of brigades, especially at the senior level. This is illustrated by comments from two brigades:

"Basic and advanced training courses are too difficult to obtain for active members. Some members have been waiting for three years to complete Basic Fire Fighters Course and Senior Fire Fighters Course. We also have members who are keen to do the Structural Fire Fighters Course and the Breathing Apparatus Course. We believe funding shortages is the main reason hindering training courses. This situation needs to be addressed as a matter of urgency".

and

"We acknowledge that our Brigade Members are our most important resource. Most who join the Brigade have aspirations to achieve officer status and to further increase their knowledge of firefighting. For many this ambition is no longer realisable. A primary reason for this is the paucity of positions available on Bush Fires Board training courses which are a prerequisite for officer appointment. In most Brigades the officer positions seem to be rotated among the few who are qualified, the Brigade administration and operations become stilted and frustrated members drift away.

The loss of members could be reduced and the vitality of Brigades improved if there was an adequate provision of Bush Fires Board courses".

The Bush Fires Board itself agrees that there is an urgent need for more training to be provided. The WAFBB (especially in the case of its volunteers) and CALM say the same about their organisations.

Recommendations

37. That the Bush Fires Board, WAFBB and CALM should ensure that adequate training courses are provided for fire fighters at all levels and the three organisations should be resourced to allow this to occur. Other agencies involved in fire control (eg WAWA and DPUD) should also ensure that their relevant employees receive adequate training.
38. That the three fire combat agencies should ensure there is a more integrated approach to training.

WATER SUPPLIES

The availability of reliable water supplies is obviously crucial to fire fighting operations.

The Water Authority has provided information which shows that the limit of the mains pressure supply is essentially on the western side of the base of the escarpment. This means that to the east of the base, i.e. in all of the escarpment area, the water supply is via high level tanks which receive water pumped from the mains system.

The pumping system to the high level tanks relies on electricity and in the event of a loss of power, or the loss of a pump station, availability of water in a particular area would depend on the level in the storage prior to the blackout and the demand. In some isolated cases it is possible to transfer water from adjacent tanks and/or main trunk lines. However, some crucial areas depend solely on electric pumping. For example, these sites include the Lesmurdie pump station which pumps to Walliston, Soldiers Road (pumps to Roleystone), Araluen (pumps to the Araluen estate) and Hawtin Road (pumps to Kalamunda).

SECWA has provided further information regarding the electricity supply as follows:

"The electricity supply to WAWA's pumping stations is via the normal distribution system that supplies the surrounding domestic area. Typically, the distribution system is an overhead open wire configuration mounted on wood pole construction. Records show, SECWA has lost poles in areas where there have been high intensity slow moving fires. In other areas, the Jarrah poles, whether treated or untreated, have caught on fire but the fire has not been sustained once the fire has moved on and the pole remained in tact. Treated Karri and treated Pine poles once alight have been known to continue to burn and the pole destroyed. SECWA has a policy of not installing treated Pine or Karri poles in fire risk areas.

Whilst the power system does not have a high level of security, there is in a number of areas flexibility to interconnect and provide electricity supplies from different areas. However, this alternative supply arrangement can only be effective provided the main power transmission system is intact and the distribution system in the immediate area of the pump station which connects to the pump station is in tact.

In the event of a loss in electricity supply, restoration time would depend upon the extent of damage to SECWA's equipment and the delay in making a fire damaged zone safe before work crews could enter the area. Restoration times could well be days if several poles are destroyed. The Water Authority can mobilise portable generating sets to the pump stations. WAWA has some generating sets themselves and have access to hire company generators.

However some pumping stations like Hawtin Road have very large pumps and it would not be feasible to consider portable generating plant".

This is clearly an issue which needs further study and action and the Water Authority has offered to assist in this request. A similar study was recently completed by WAWA and the WAFBB for the East Fremantle area following problems in that district with water supplies during fires. The group believes that WAWA's offer should be taken up.

Hydrants

In some areas along the scarp there is a problem of insufficient hydrants thus compromising fire fighting activities. This is particularly the case in some of the older subdivisions.

Recommendations

39. That the Water Authority be requested to develop a strategic plan in conjunction with the WA Fire Brigades Board and the Bush Fires Board to overcome water supply problems in the event of a loss in electricity supply to water pumping stations.
40. That the Water Authority and SECWA be requested to jointly develop strategies which will set priorities on power supply restoration in the event of an emergency. This should include the establishment of direct communication between WAWA and SECWA's Power System Control Centre.
41. That the fire authorities, the Water Authority and local authorities assess where there is a deficiency of hydrants in reticulated areas and develop and implement a program of works to rectify the problem.
42. That the strategic placement of water reservoirs, dedicated to fire suppression needs, should continue.
43. That any regulatory or legislative impediment to fire fighting agencies accessing water in swimming pools or tanks where necessary during times of fire suppression should be removed.

ELECTRICITY SUPPLIES AND THE BUSH FIRE HAZARD

There are two aspects to the relationships between the fire hazard and electricity supplies:-

- (i) the potential for transmission lines to cause fires
- (ii) the effect of fires on power supplies.

On these subjects the State Energy Commission has advised as follows:

"The Darling Range area is strategically important to SECWA, not only in terms of the electricity supplies to its customers but also in terms of the number of major transmission lines which traverse the area. SECWA is conscious that fire can have a major impact upon its power system. For sometime SECWA has worked on addressing problems associated with vegetation interference with over head power lines. Not only do trees cause damage to SECWA overhead line equipment, often with loss of supply, but there is risk to the public of electric shocks and possible fire as a consequence.

SECWA has formed a Powerline and Vegetation Consultation Committee with representation from various Government departments and local councils. The task of the committee is to develop a Code of Practice for the establishment and maintenance of separation between powerlines and vegetation. The committee has reached general agreement on a code that will promote tree pruning methods which cause minimal damage to trees and retain a pleasing visual aspect.

SECWA is also preparing new regulations which will set out the responsibility of landowners, occupiers and managers (both private and government), in relation to the management of trees in the vicinity of powerlines. It is in this area that there is still some disagreement with local councils over the management of non council planted trees in road reserves.

The Darling Scarp is recognised as a unique urban environment and SECWA is prepared to give special consideration to the five local authorities concerned in terms of vegetation clearing requirements and funding arrangements.

SECWA believes the five councils which cover the Scarp should be responsible for the management of all the trees in the Scarp urban areas as part of their urban area management responsibilities, whereas SECWA will manage the trees in the vicinity of powerlines in rural areas; each entity being responsible for its own costs of controlling vegetation near power lines. To offset the initial financial cost to councils of adopting such a policy, SECWA has offered to fund council vegetation control activities in managing those trees growing in roadside verges other than council planted trees in Scarp areas. This offer covers a five year period.

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A major concern of the councils is the legal liability and possible consequences should the cause of a fire be attributed to a tree making contact with a powerline. SECWA has engaged the CSIRO to investigate and identify areas of the state most at risk of a fire caused by SECWA. The investigation will enable SECWA to develop and implement a risk reduction plan. With developments in technologies and new construction standards, there are alternative powerline systems that can reduce the risk. These new systems are very expensive and to gain the best benefit, SECWA would need to target the high risk areas.

As already mentioned, SECWA is most concerned about the possible damage to SECWA's assets in the event of a fire. In the Darling Range area electricity not only supplies local industry and domestic houses, other departments and utilities rely on the availability of a reliable power supply. Electricity supplies are required to provide communications be it telephone exchanges, radio transmitters and provide water pumping for local water supplies or pumped domestic supplies from tanks and/or bores. All these supplies are provided from the local power system network.

A number of transmission lines do traverse the Darling Range area. These lines provide the essential link between SECWA's major base load generating stations and the metropolitan power supply system. Intense fires below these lines can cause damage to these lines and result in the lines being faulted by a flashover as a result of the heat and smoke. This can severely jeopardise the security of the power supplies to the metropolitan area. SECWA regularly patrols these lines and instigates vegetation control measures to minimise the height of trees growing beneath the lines. These measures may not necessarily minimise the fuel loads beneath the lines".

The working group endorses the fact that discussions are taking place between SECWA and the relevant local authorities. The group believes it is important that a conclusion is reached as soon as possible so that tree pruning which is necessary will be done.

(Information about the use of karri and pine poles is contained in the previous section on water supplies).

Recommendations

44. That arrangements between the State Energy Commission and local authorities with respect to tree pruning be concluded as soon as possible to ensure that appropriate and necessary tree pruning is undertaken.
45. That where cables are being replaced in high fire hazard areas, SECWA be requested to use aerial bundled conductors wherever possible.
46. That within new subdivision in fire prone areas, SECWA should require the installation of underground cables.
47. That the SECWA's policy of not using karri or pine poles in high fire risk areas is supported.

COMMUNICATIONS WITH THE PUBLIC DURING A FIRE

Some submissions raised the concern that during fires insufficient information is available to the public, particularly those who may be directly affected, about the degree of the threat.

For example, one ratepayers' and residents' association said:

"We have been approached by a number of concerned residents following the recent fire in Darlington, and their concerns have been mainly to do with lack of information about the severity of the situation they have found themselves in. For instance, they do not know whether they should be making preparations to evacuate, whether there is any real threat at all or how fast the fire is travelling.

The radio stations do not offer any sensible source of information, and the telephone is not a suitable alternative because lines will be heavily engaged or may even have come down".

The working group agrees that there is frequently a lack of adequate information available for residents to be able to make an informed decision. That which is available via radio stations is usually sketchy and often superficial.

The State Emergency Management Advisory Committee does have procedures for conveying information via the news media, but these appear to be somewhat cumbersome and designed more to apply to a very widespread or long lasting emergency.

When a cyclone threatens communities along the State's coast, the ABC provides detailed hourly updates so that residents are fully informed. A bushfire can impose a much greater threat in some instances than a cyclone because of its intensity and speed.

It is essential that affected members of the public are satisfactorily informed about the threat which exists; it is also essential that information which is disseminated is factual and not exaggerated or sensational.

The working group considers that the best way of improving the situation would be for a well publicised public radio frequency to be established so that warnings and other emergency information could be broadcast during emergencies. Obviously this could also be used for emergencies other than bushfires. With some commercial radio stations having vacated the AM band, it may be possible to set up such a service within this band. Another alternative would be to use the Federal parliamentary broadcast station with emergencies taking precedence over parliamentary broadcasts when necessary. This should involve little establishment costs because the station already exists.

A second preference would be to use local FM stations and this could also be investigated although would not appear to be as attractive as a single frequency with widespread coverage.

If it is not possible to establish a dedicated service, the group believes that the State Government should take action to improve the provision of information through the existing news media (and this should be done in any event).

In South Australia an arrangement exists whereby the Country Fire Service issues a series of phased warnings which are broadcast over radio and television stations as necessary. The system has four phases and provides advice on the location and direction of travel of a bushfire and also what residents should do. Two of the phase warnings are preceded by a five second warning signal.

Recommendation

48. That the State Government should take action to ensure that adequate warnings and information are conveyed to the public during a fire threat. Such action should include investigating the feasibility of a dedicated radio frequency for emergencies and establishing more effective arrangements with existing radio and television stations.

EVACUATION AND LOCAL EMERGENCY PLANNING

The State Emergency Management Advisory Committee has developed a policy for determining the need for evacuation in bushfire situations in WA (Policy Statement No 5 - Bushfires Evacuation Decision Policy).

Under this policy, responsibility for the decision to evacuate rests with the Fire Controller for the bushfire concerned in consultation with the senior Police Officer when in attendance. The conduct of the evacuation is then carried out by the police. (If the police are not present, evacuation is carried out by the lead fire agency).

It is considered that in some cases the police are not being provided with information about bushfires at an early enough stage and that better procedures for the notification of police need to exist.

It should be noted that even in a major fire, mass evacuation may not be appropriate. In the Ash Wednesday fires there were some homes destroyed because people had been evacuated and were not allowed to return. Often homes were lost after the main fire front had passed when embers gradually ignited the structure in a manner that could have been extinguished if someone was present.

In Victoria the CFA has a policy which acknowledges the value of the family home as a refuge from wildfire and the CFA Act allows a well informed family to make the evacuation decision for itself. Similarly, it may be preferable for children to be kept within school buildings if they are safe rather than being evacuated.

However, the above statements are made on the assumption that the appropriate planning and thought has been given in advance about what to do in the event of a fire, and that the necessary preventive measures have been taken.

In the Western Australian context, what all of this means is firstly that much more thought and planning needs to be given to local emergency planning by the relevant authorities. Secondly, the public needs to be much more educated about prevention and response so that informed and appropriate plans can be made in advance. This is very much related to the comments made in the section on public awareness.

The State Emergency Service has established local and regional emergency advisory committees but more needs to be done within local communities to ensure that the necessary arrangements are made.

It is also necessary to ensure that suitable local emergency operations centres are in existence for co-ordination of emergency responses.

Recommendations

49. That the Police be provided with more training at the recruit and promotional levels on fire behaviour and responses to fire including the role and functions of the agencies responsible for fire suppression and incident control.
50. That the role of and responsibilities of police in terms of co-ordination and implementation of evacuation should be reinforced to existing police officers, especially those likely to be involved in a fire situation.
51. That a greater degree of inter-agency liaison at a regional level between the fire authorities, the police and the SES be encouraged.
52. That the Police Department be requested to co-ordinate a review by the relevant agencies of existing local and regional emergency response plans so as to ensure that they are capable of fully meeting the needs of resident evacuation and accommodation, burn victim care and evacuation, post incident controls, security and counselling.
53. That the Police and SES in conjunction with the fire agencies and local authorities should ensure that suitable emergency operations centres which are available for use where necessary exist.
54. That the standards are developed for refuges for emergency evacuation and that these refuges would be included and promoted within the local emergency committee brief.
55. That the public should be provided with more information about evacuation issues.

CONCLUSION

It is understood there are plans to prepare a new Bush Fires Act for Western Australia in the near future. In any event, many of the recommendations of this report imply the need for legislative change and it is important that this is done with adequate consultation with local government and the community generally.

It is likely the Fire Brigades Act and possibly other Acts will also need changing. (In fact, a new Fire Brigades Act, which places more emphasis on prevention, amongst other things, was prepared in 1989 but was not introduced into Parliament).

Recommendations

56. That where necessary, the recommendations of this report are effected by amending or replacing the Bush Fires Act and other Acts as appropriate as soon as possible.
57. That there should be adequate consultation with local authorities and the community generally in the preparation of new fire agencies legislation, but in a time frame which will allow necessary changes to occur in a reasonable time.
58. That this report should be released for public information and discussion.

APPENDIX 1

THE FIRE WEATHER THREAT OVER SOUTHWEST WA

The Bureau of Meteorology has provided the following information:

"The Fire Weather Threat over Southwest WA

Bushfires have always been a noteworthy feature of the summer months in southern WA. Within the more settled areas of the state the majority of these are attributable to the escape of fires that have been deliberately lit. Lightning is also responsible for a significant proportion of the fires, particularly in the more remote areas. Some other blazes are due to incidents involving machinery or transport.

The forest areas are particularly prone to fires. On occasions these have resulted in the loss of large tracts of timber and of important wildlife habitats, the destruction of adjacent rural properties, and sometimes the loss of human life.

Several major bushfire events in the last century have highlighted the wildfire threat in the southwest region. Strong easterly winds associated with intense high pressure systems to the south of the State can cause extreme fire weather days in west coastal regions and in neighbouring agricultural areas. On 24 January 1961 a bushfire*(started by lightning following a prolonged period of hot, dry easterly winds) completely engulfed Dwellingup, destroying 132 homes and a number of other buildings.

Fortunately there were no serious human casualties. The 1960-61 bushfire season was a particularly bad one, with 506,000 hectares burnt, including 210,000 hectares of state forest.

The fire threat from tropical cyclones.

Tropical cyclones that pass close to or across the southwest may also cause a major fire threat. The ocean region to the north of Western Australia is one of the most tropical cyclone prone regions on the globe, experiencing on average 25 cyclones per decade. The vast majority of the storms which traverse this region dissipate their energy well to the north of Perth and the other major population centres in the southwest of the State. This decay occurs when the cyclones encounter strong winds in the higher levels of the atmosphere (which literally shear them apart) or when they move over land and are thereby cut off from their energy source provided by the tropical ocean surface.

There have been, however, a significant numbers of cyclones that have continued their journey southwards resulting in destructive winds, bushfires and/or torrential rains in the southwest of WA. On occasions the severity of the wind squalls during these cyclone events has surpassed that associated with even the fiercest winter storms.

In contrast to the fairly regular movement of their counterparts in the deep tropics (average speed 13km/h) cyclones have been known to impact the southwest coast travelling at speeds greater than 70km/h. Coupled with this phenomenal movement the cloud features associated with the storms are reorganised.

Rather than a fairly symmetrical structure as is observed with a typical cyclone, the regions of dense cloud and heavy rainfall are displaced towards the right quadrants of the storm (when looking along the direction of the track), leaving the left quadrants largely cloud free.

The strongest winds associated with these fast moving storms occur in the left quadrants, where the storms' rotational clockwise rotation is augmented by its translational speed. The co-location of warm squally winds and the absence of rainclouds leads to conditions highly favourable for the generation of severe duststorms and also creates an extremely dangerous environment in which wildfires, once ignited, can spread rapidly.

Since colonisation of the southwest of WA a tropical cyclone has caused strong winds over the area once every six years or so. Cyclones have influenced the area during the months of January to May but have been most common in March and April. Events that could be described as having inflicted major damage in the Perth area occurred in 1843, 1872, 1915, 1937, 1943, 1956, 1960 and 1978; on average once every twenty years or so.

The wildfires associated with the cyclone of February 1937 and with cyclone *Alby* in April 1978 typified this potentially devastating weather scenario. The cyclone of February 1937 resulted in severe bushfires near Denmark and Walpole. Hundreds of acres of forest, pasture and fruit trees were destroyed by the fires and stock losses were great. On 4 April 1978, gale force winds generated by tropical cyclone *Alby* fanned a large number of fires, some of which took days to control, burning over 114,000 hectares of farmland and forest.

Research into this phenomenon by the Severe Weather Section has resulted in improved understanding and forecasting performance and the Bureau can now issue much more reliable warnings than ever before, generally several days in advance of the event.

Frequency of occurrence of potentially dangerous fire conditions.

Background material about the fire weather threat in southern WA has not been readily available to fire management authorities, however a recent investigation by the Perth Severe Weather section has addressed this issue. The study looked at days of *extreme* and *very high* fire danger for the 22 seasons 1970/71 to 1991/92 (November to April inclusive) using 3 hourly data from Bureau of Meteorology stations in southern parts of the State. Calculations of the fire danger index (FDI) were made using the modified McArthur Mark IV grassland fire danger metre assuming "average" fuel amounts and 100% fuel curing. *Extreme* fire weather conditions would have occurred between the 3 hourly observations, however a control-check of half hourly data from Geraldton for the 1991-92 season showed that the percentage of these occasions was likely to be small.

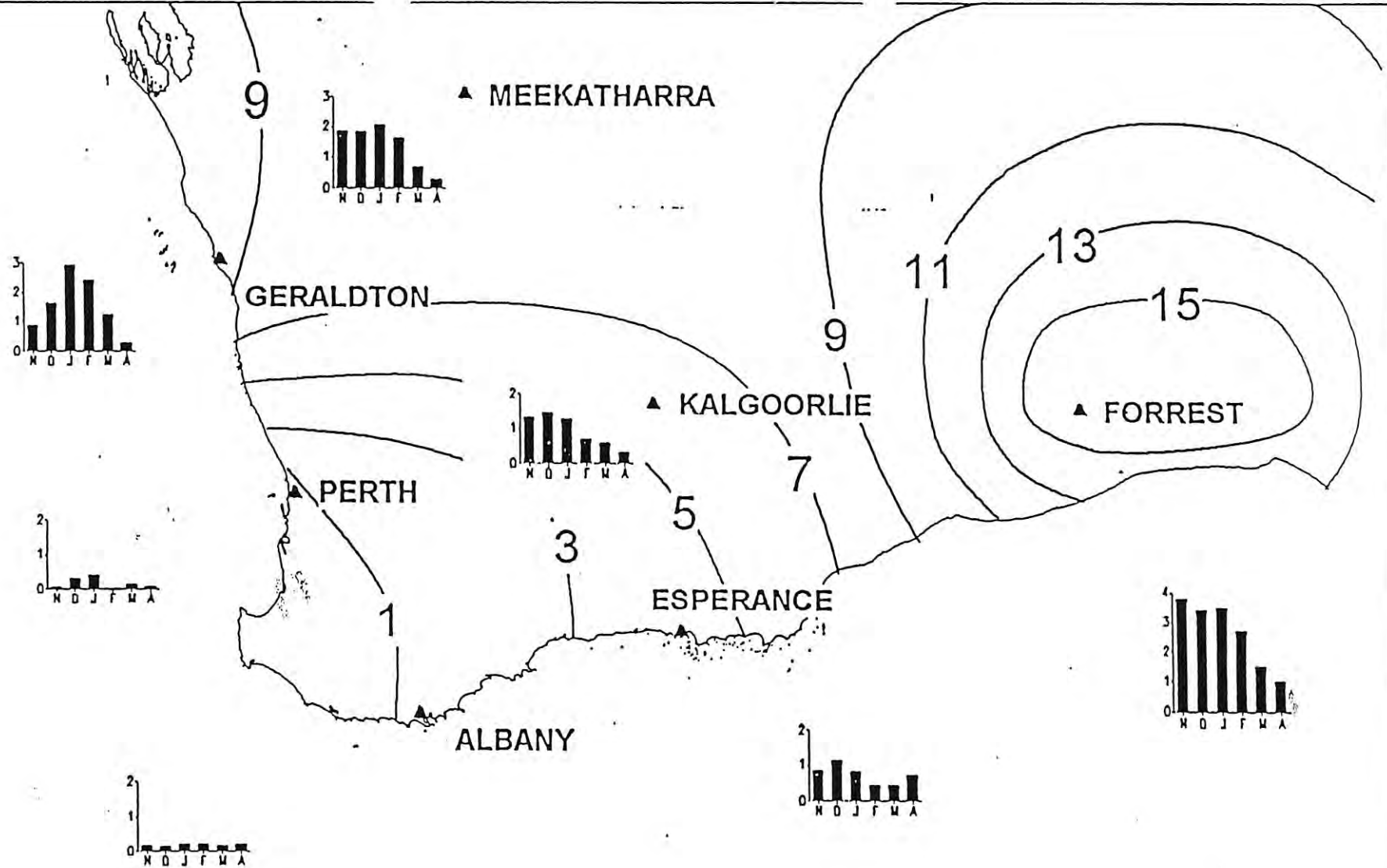
The average number of *extreme* (FDI > 49) days per season graded from about 1 in the southwest corner to more than 15 in the Eucla and 9 around Geraldton, with appreciable year-to-year variability. In southeast parts of the State most *extreme* days occurred during the first half of the season whereas along the west coast (including the Darling Escarpment) the majority of these occurred during January and February.

An analysis of *very high* and *extreme* fire danger days (FDI > 26) during the period revealed a similar distribution but values ranged from an average number of 10 days per season in the southwest corner to about 50 days at both Forrest and Geraldton.

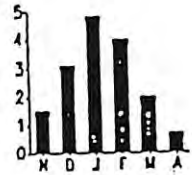
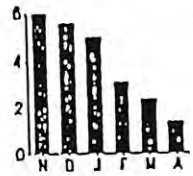
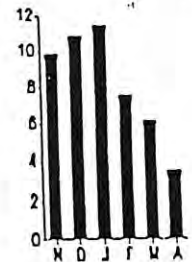
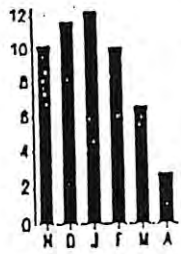
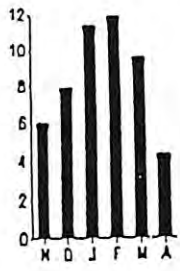
The monthly distribution of these events was also similar. (Maps depicting the spatial and monthly distribution of very high and extreme fire weather days follow).

With reference to Perth and the Darling Escarpment, the average number of *extreme* fire danger (FDI > 49) days (data based on observations made at Perth Airport) was approximately 1 per season with *very high* conditions (FDI > 26) reported 16 days per season on average".

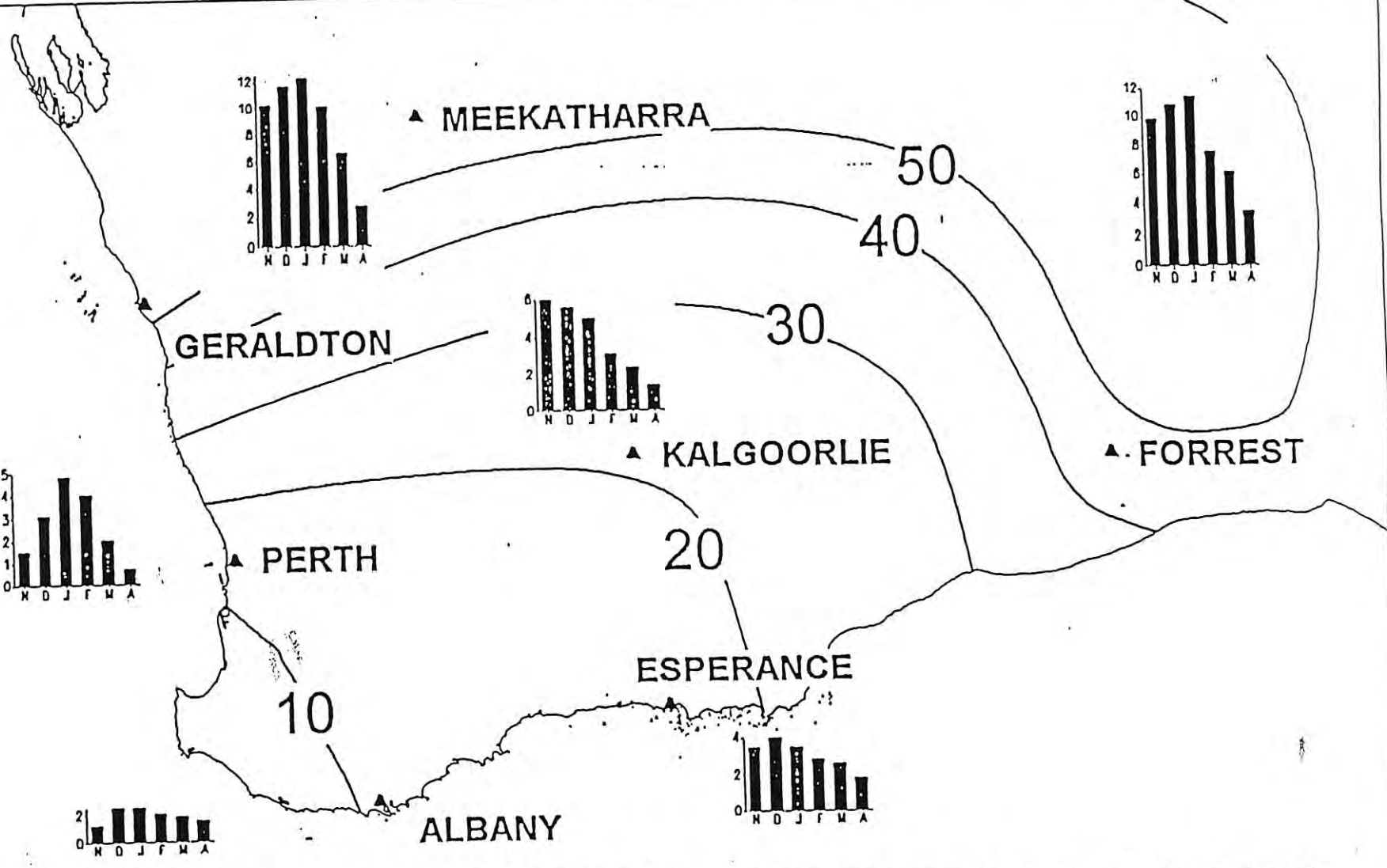
* The working group was advised that there were actually 21 fires started by lightning on that occasion.



CONTOURS SHOW AVERAGE NUMBER OF EXTREME FIRE WEATHER DAYS PER SEASON
 GRAPHS SHOW AVERAGE NUMBER OF EXTREME FIRE WEATHER DAYS PER MONTH



CONTOURS SHOW AVERAGE NUMBER OF VH/EX FIRE WEATHER DAYS PER SEASON
 GRAPHS SHOW AVERAGE NUMBER OF VH/EX FIRE WEATHER DAYS PER MONTH



APPENDIX 2

LIST OF ABBREVIATIONS AND DEFINITIONS

ABBREVIATIONS

BFB	Bush Fires Board of Western Australia
CALM	Department of Conservation and Land Management
CFA	Country Fire Authority of Victoria
CFS	Country Fire Service of South Australia
DOLA	Department of Land Administration
DPUD	Department of Planning and Urban Development
SECWA	State Energy Commission of Western Australia
SES	State Emergency Service Of Western Australia
SPC	State Planning Commission
WAFBB	Western Australian Fire Brigades Board
WAWA	Water Authority of Western Australia

DEFINITIONS

BUSHFIRE: Any unplanned or uncontrolled fire burning in forest, scrub or grassland.

FIRE BREAK: Any natural or constructed discontinuity in a fuel bed utilised to segregate, stop, and control the spread of fire or to provide a control line from which to suppress a fire.

FIRE DANGER: Sum of constant and variable fire danger factors affecting the inception, spread and resistance to control of a bushfire.

FIRE DANGER RATING: An index which predicts the relative rate of spread and intensity of a fire, and its potential to do damage and suppression difficulty.

FIRE HAZARD: Describes the fuel potentially available for burning and takes into consideration such factors as location, quantity, arrangement and current or potential flammability of the fuel. When considered in combination with fire weather variables, it determines the difficulty of suppression once the fuel is ignited and also signifies the potential threat to human life, property and other assets.

FIRE MANAGEMENT: The planning, conduct and review of all aspects of fire prevention fire suppression and use of prescribed burning in land and natural resource management.

FIRE RISK: Refers to relative chance or probability of fires starting and is determined by the presence or absence of causative agencies. The degree of risk in an area is assessed by studying the probable frequency of dry electrical storms and the many ways in which people use or cause fires. As fires cannot burn without fuel, risk must be studied in conjunction with fire hazard.

FIRE THREAT: Sum of all factors which affect the inception, spread, difficulty of control of a fire and the damage it may cause.

FUEL: Generally any plant or plant products that burns.

PRESCRIBED BURNED (= CONTROLLED BURNING): the planned application of fire under selected weather and fuel conditions so that the fire is confined to a predetermined area and burns with the intensity and rate of spread necessary to achieve the objectives of management.

WILDFIRE: See Bushfire.

APPENDIX 3

SUMMARY OF WORKING GROUP ACTIVITIES

1994

- 21 January Establishment of Working Group announced by Minister for Emergency Services.
- 4 February Inaugural meeting.
- 17 February Chairman visited the Country Fire Authority of Victoria including an inspection of the Dandenongs region.
- 18 February Chairman visited the Country Fire Service of South Australia including an inspection of the Mt Lofty Range region.
- 23 February Meeting including discussions with Greg McKay (BFB) and Len Caple (WAFBB), both of whom were involved in the NSW fires and attended the subsequent debriefing in NSW.
- 9 March Field inspection of the Darling Escarpment Region.
- 19 March Inspection of the Walliston area with councillors and staff of the Shire of Kalamunda following a major fire on 12 March.
- 21 March Meeting including discussions with Dave Everell, Manager, Regional Parks and Reserves Branch of Department of Planning and Urban Development.
- 31 March Meeting including discussions with John Herington, Chief Bush Fire Control Officer and Gary Hill, Deputy Chief Bush Fire Control Officer, Shire of Mundaring.
- 8 April Meeting including discussions with Rick Sneeuwjagt, Manager, Fire Protection Branch and Neil Burrows, Principal Fire Research Scientist, Department of Conservation and Land Management; Ian Townson, Building Surveyor, City of Armadale and Warren Mortlock, Community Environmental Officer, Shire of Serpentine-Jarrahdale.
- 11 April Meeting including discussions with Max Williams, General Manager, Shire of Mundaring.
- 19 April Meeting including discussions with Tony Carter, Group Manager - Western Australia, Insurance Council of Australia and Jack Little, Chief Executive Officer, WA Fire Brigades Board.
- 26 April Meeting.

- 3 May Meeting including discussions with Mr Phil Koperberg, Commissioner and Mr Keith Simpson, Regional Co-ordinator, NSW Department of Bush Fire Services.
- 13 May Meeting.
- 17 May Final Meeting.
- 24 May Presentation of report to Minister.

APPENDIX 4

COPY OF ADVERTISEMENT CALLING FOR SUBMISSIONS



**DARLING ESCARPMENT FIRE REVIEW
CALLS FOR PUBLIC COMMENT**

The Minister for Emergency Services, Hon Bob Wiese MLA, has established a working group to review the standard of fire prevention and operational preparedness within the Darling Escarpment area and to recommend any changes to the existing practices or arrangements which are considered necessary.

Issues to be addressed include:

- Assessment of fuel loadings on all land, particularly large areas of vacant land.
- Preventive measures to reduce the hazard.
- The ability of authorities to cope with a major fire emergency.
- Emergency evacuation plans.
- Assess the level of public awareness regarding fire prevention and planning and emergency evacuation procedures.
- Any other issues pertaining to improving standards of fire prevention and suppression.

Submissions from members of the public are invited until 14 March 1994 and should be sent to:

John Day, MLA
Chairman
Darling Escarpment Fire Review
PO Box 610, Kalamunda WA 6076

APPENDIX 5

LIST OF SUBMISSIONS RECEIVED

INDIVIDUALS

Anderson, David	Lesmurdie
Baxter, John K	Maida Vale
Bell, Thomas	Armada
Binckes, RK	Boya
Burgess, Don	Gidgegannup
Crouch, Michael A	Kalamunda
Deighton, Mary K	Bedfordale
Garfield, John	Glen Forrest
Glover, Joy	Serpentine
Hargreaves, Mary	Kalamunda
Herlihy, A	Kalamunda
Humfrey, C	Walliston
Jones, Clare	Darlington
Lloyd-Mostyn, David	Gooseberry Hill
Mars, Ross	Hovea
Marshall, RB	Forrestfield
Nizielski, A	Glen Forrest
Pavlinovich, John	Darlington
Repacholi, Paul	Kalamunda
Sawyer, Pauline	Darlington
Skinner, RW	Lesmurdie
Spittle, Brian	Gooseberry Hill
van de Klashorst, June	MLA for Swan Hills
Van der sluys, Tom	Roleystone
Wheeler, Eileen D	Bedfordale
Williams, Trevor	Kalamunda
Woolven, HW & J	Serpentine

GROUPS

Darlington Ratepayers' & Residents' Assoc Inc
Helena Valley Rural Assoc
Hovea Residents' & Ratepayers' Inc
Karragullen Progress Assoc
Mundaring Residents' & Ratepayers' Assoc Inc
WA Wildflower Society (Inc) - Eastern Hills Branch

FIREFIGHTING ORGANISATIONS

Bullsbrook Volunteer Bush Fire Brigade Inc
Bush Fires Board of WA
Byford Volunteer Bush Fire Brigade
Conservation and Land Management, Department of
Darlington Volunteer Bush Fire Brigade
East Gidgegannup Volunteer Bush Fire Inc
Glen Forrest Volunteer Bush Fire Brigade Inc
Jarrahdale Volunteer Bush Fire Brigade
Kalamunda Volunteer Fire Brigade (WAFBB)
Kalamunda Volunteer Bush Fire Brigade
Mundijong Volunteer Bush Fire Brigade
Parkerville Volunteer Bush Fire Brigade
Serpentine Volunteer Bush Fire Brigade
South Gidgegannup Volunteer Bush Fire Brigade Inc
Stoneville Volunteer Bush Fire Brigade
Swan Region Fire Protection Advisory Committee
W A Fire Brigades Board
West Swan Volunteer Bush Fire Brigade
Woorloo Volunteer Bush Fire Brigade

OTHER LOCAL, STATE & FEDERAL GOVERNMENT ORGANISATIONS

Armadale, City of
Defence Centre - Perth
Gosnells, City of
Justice, Ministry of
Kalamunda, Shire of
Land Administration, Department of
Meteorology, Bureau of
Mundaring, Shire of
Serpentine - Jarrahdale, Shire of
State Emergency Service - Gosnells
State Energy Commission of WA
State Planning Commission
Water Authority of WA
Western Australian State Emergency Service