THE ASH WEDNESDAY BUSHFIRES IN VICTORIA
16 FEBRUARY 1983.

J. Oliver
N.R. Britton
M.K. James

DISASTER INVESTIGATION REPORT

No. 7

CENTRE FOR DISASTER STUDIES

James Cook University
of
North Queensland

DISASTER INVESTIGATION REPORT NO. 7

THE ASH WEDNESDAY BUSHFIRES IN VICTORIA
16 February 1983

J. Oliver

Department of Geography and Centre for Disaster Studies

N.R. Britton
Department of Behavioural Sciences and
Centre for Disaster Studies

M.K. James
Department of Civil and Systems Engineering

ACKNOWLEDGEMENTS

CONTENTS

LIST OF FIGURES

LIST OF PLATES

THE ASH WEDNESDAY BUSHFIRES IN VICTORIA

16 FEBRUARY 1983

CHAPTER 1

THE SITUATION LEADING UP TO THE ASH WEDNESDAY BUSHFIRES

1.1 INTRODUCTION

Natural hazards display regional patterns in type, severity
and frequency. The degree of hazardousness likewise shows spat-
ial variations. Different areas of Australia experience contrast-
ing natural hazards. Some of these differences relate to a trop-
ical/extra tropical contrast, but others reflect the effects of
varying environmental conditions. The differences referred to
are first of all the consequence of regional variations in risk.
The spatial differentiation is accentuated, however, by the vari-
ations that occur in the many factors that influence the vulner-
ability of different communities.

In the case of Victoria the two major and most extensively
occurring natural hazards are bushfires and floods. Locally
other environmental extremes such as windstorms, hail, duststorms
or earthquake may occur. Drought, potentially a more extensive
threat, differs in its impact and management from the more suddenly
occurring form of natural hazard. Together with such areas as
the French Riviera and California, Victoria has been described
as amongst the most fire-prone areas in the world. Parts of South
Australia, Tasmania or New South Wales rival Victoria but a study
of the Ash Wednesday fires of 16 February 1983 provides a good
example of the problems that arise.

1.2 THE BUSHFIRE THREAT

The record of the past (Figure 1) demonstrates the widespread occurrence of the bushfire and grassfire threat in Victoria. This means that environmental adjustments are required to mitigate the effects of extensive wild fires. The view has been expressed that if you live in the forest you have to come to terms with it. People should be aware of the risks and be prepared to take them. Attainment of risk awareness may be difficult when the frequency of the threat is low. Bushfires of the intensity of those on Ash Wednesday may be expected on only 6 to 10 days in a century. Once severely burnt, an area can expect to be spared from a severe recurrence until sufficient time has elapsed for fuel to accumulate.

Bushfires or grass fires require a sufficient supply of fuel in a 'cured' (ie lowered moisture content) condition that makes the organic material readily flammable. While the amount of the accumulated vegetation is partly a function of the favourability of preceding growing conditions, much depends upon the management of areas and the control and clearance of the vegetation cover (especially ground cover) that takes place.

Other factors, however, are responsible for making many natural wildfires a major threat. As already indicated the state of dryness of the vegetation is relevant. A long drought contributes to the drying out of the vegetation. Hot, sunny, low humidity days will cause an increase in the risk. Such circumstances are frequently associated with the passage of an anticyclone and its drying, subsident air circulation.

The fire risk, therefore, shows fluctuations in severity. Once a bad fire day exists another important factor comes into play. Strong winds can all too easily convert a controllable fire situation into one that, however large the fighting force and elaborate the equipment are, little can be done to prevent the spread of the fire. The spread may not be controllable but its advance
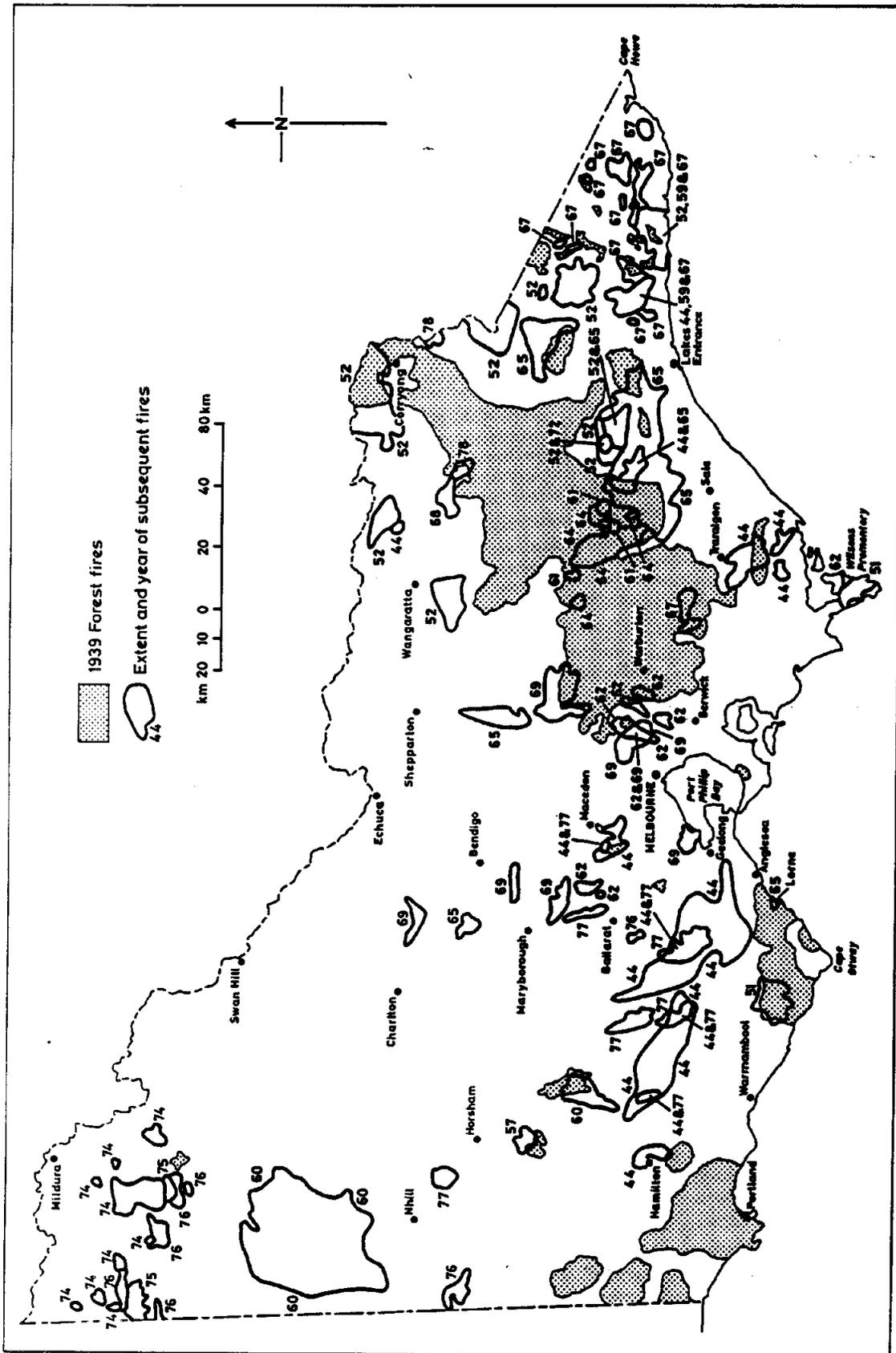
Figure 1. Victorian bushfires – areas affected, 1939–1979.

(Reprinted with permission from Atlas of Victoria (1982), Victorian Government Printing Office, PO Box 203, North Melbourne 3051.)

may be forecast and at least some action taken to avoid the most disastrous and dangerous consequences. The worst situation of all is the result of an abrupt strong wind change which suddenly threatens unexpected areas with the onset of an already fierce fire-front. This sort of wind change is associated with a frontal wind shift which can be squally as well as high velocity. If the change is not associated with heavy rain dangerous changes in wind direction and velocity result. Victoria is particularly prone to the combination of the circumstances indicated.

Fires also generate their own wind systems as a result of the concentration of intense heat and the convective circulation this generates. The 'fire storm' may well accentuate the regional wind velocities. Locally the terrain can give rise to even more severe and difficult to manage fire situations. Steeply sloping terrain and gullies incised in such slopes produce chimney-like conditions. A fire at the foot of such a slope on its windward side accelerates up the slope with increased velocity and intensity, while the heat and flames may be projected beyond the crest almost like the jet from a flame-thrower. In the case of the Victorian Ash Wednesday fires the accidented terrain of the Dandenongs, the coastal stretch between Lorne and Anglesea and parts of the Mt Macedon area provided many instances of the accentuated fire danger to which middle and upper slopes are exposed.

Some of the native vegetation of Victoria, the gums, melaleuca and introduced pines provide potentially high fire risk conditions. The areas of Victoria which have close forest cover, especially with certain flammable species, are those which, at irregular intervals, are most likely to experience fierce and dangerous fires. To a significant degree the regions that are most prone are coterminous with forest areas. However, as the Ash Wednesday fires demonstrated, grass areas if the grass cover is not too thin, can also experience devastating fires. Such fires driven by strong winds can travel with frightening speed. Many properties outside the forested regions were lost to fires that spread across the dried out pastures adjacent to the woodlands.

1.3 AN IMPACT SURVEY OF THE VICTORIAN ASH WEDNESDAY BUSHFIRES

The material that is presented in this report was assembled
by the three authors over a brief period of survey in the field
and through discussion with many of those involved in the disaster.
One or other of us undertook this investigation between Saturday
20 February and Sunday 7 March. In such a short space of time,
and with such an extensive fire devastated area, it is inevitable
that only a partial coverage of all the relevant information
could be achieved.

Since the fires occurred a wealth of opinions, criticisms,
individual interpretations and new information have surfaced.
Coronial enquiries, an investigating commission, departmental and
agency enquiries, scientific analyses and court injuctions etc
have dealt with the events. Many of the reports have still to
appear and others are not generally available to the public.
The media initially gave extensive coverage. The whole of Aust-
ralia heard of (or saw on television) the details and human stor-
ies of fire experiences. It cannot be expected that this report
can extend beyond the opportunities the investigation team had.
The contents of the report, it is hoped, will be a reflection of
the impressions gained by outside observers in the days very soon
after the disaster had occurred.

Disasters have been variously defined but they tend to occur
when an event, usually extreme in its severity or extent or both,
exceeds the community's capacity to adjust to or resolve the res-
ultant stress and disruption. Failures in the ability to adjust
imply inadequacies in pre-planning, in the anticipation of the pot-
tential threat or in the capacity of the established organization
to cope with the disaster. It is therefore inevitable that, in
some way or another, a disaster by definition generates criticism
and recriminations. The Ash Wednesday fires are no exception.
The search for explanation, the identification of causes, the
pursuit of scapegoats·and the confrontation of conflicting view-
points have all followed the fires. This report does not seek to

participate in these activities. It would be presumptious to be
involved with the placement of blame on the basis of a very short
investigation. This does not mean, however, that the personal
observations of the team, identifying the problems as seen by them,
will be excluded from the report.

1.4   THE CIRCUMSTANCES LEADING UP TO THE FIRES

By the date of the Ash Wednesday fires most of Victoria,
especially the north and east, had been in the grip of a severe
drought for 10 months or more. The fire authorities were already
well aware of the seriousness of the fire threat by November 1982.
The rainfall received over the summer in northern Victoria amounted
to only 25 percent of the normal. In the south the deficiency
was still 50 percent. All the vegetation, whether trees or grass,
was severely drought-stressed. Ninety-five per cent of the State
was drought affected.

The drought persisted. The soil moisture declined and water
supplies were exhausted or seriously decreased. The water storage
of Melbourne and its surroundings dropped to 55 percent of capacity.
A total fire-ban was proclaimed for the 24 November, which was the
earliest it had ever been ordered. On 25 November the first wide-
spread fires of the summer occurred. Between the beginning of the
fire season and 16 February 1983, 854 bushfires were reported.
Other bad fire dates were 3 and 13 December, 8 January and 1 Feb-
ruary. Fires on some of these dates got out of control. On 1
February the Mt Macedon suffered a devastating fire, while two
other fire areas included the Cann River area and Mt Donna Buang.
The prevailing danger of the situation was apparent. Still more
fire outbreaks occurred in the Branxeholme and Craigieburn areas
on 6 February and a bad day was on the 8 February when strong
northerly winds preceded a south-west change with high temperat-
ures and 95 fires were reported over Victoria.

By 16 February Victoria had experienced several hot, dry days and it was only a matter of time before further serious fires would break out. In February, up to 16 February, the temperature maxima had exceeded 40°C on 3 occasions. It was one of the hottest and driest Februaries in Melbourne (0.6 mm compared with 49.1 mm average rainfall).

No-one was complacent about the overall severity of the situation. Though with the wisdom of hindsight a number of actions might have been taken that would have reduced the impact of the disaster, it seems unlikely that the disaster could have been avoided. The November 1982 position had been sufficiently clear for the Minister for Police and Emergency Services to convene the first meeting of the State Disaster Executive Committee which had recently been established under the State Disaster Plan (DISPLAN) of Feburary 1980 to oversee preparations for dealing with emergencies and disasters. The Committee was to examine the readiness of the fire combating agencies and it concluded at its November meeting that the CFA and Forests Commission were adequately prepared as were the co-ordinating and supporting agencies, especially the Police and SES. The Mt Macedon fire of 8 February provided the first test of DISPLAN. (The full organisational structure is discussed in Section 6.2.)

The Premier in his statement of 16 March indicated the actions taken since November to prepare for a potentially serious fire situation. He listed the following:

- Fire restrictions were introduced by the Forests Commission and the CFA six to eight weeks earlier than usual because of the weather conditions and the drought.

- Arrangements were made between various Ministries whereby personnel from Government agencies, such as the Lands Department, would be available as required.

- The Government approved the employment by the Forests Commission of an additional 600 men in early December to be trained as fire fighters.

- The Government arranged for the Modular Airborne Fire Fighting System (MAFFS) to be brought out from America and for an RAAF Hercules to be available to carry the MAFFS.

- The Forests Commission arranged for agricultural aircraft to be on stand-by to drop fire retardants as required.

- The Forests Commission made arrangements that other agricultural aircraft be available for hire and placed two helicopters and a fixed wing aircraft under contract for fire surveillance and reconnaissance and personnel movement.

- Arrangements were also made prior to the fire season with owners of equipment, such as bulldozers, to be available should the situation require.

The day before the fire disaster, the whole of Victoria was experiencing light winds with coastal sea breezes. In the northern parts skies were clear and subsident air with maximum temperatures between the high 30s and low 40s^{o}C and relative humidities dropping to between 7 and 14 per cent prevailed. In the south conditions were cloudier or overcast, even with some light rain associated with an eastward moving cold front. Maxima were between the mid 20s and low 30s^{o}C and the relative humidity was about 30 per cent in the south.

These weather conditions did not change significantly over the night 15/16. Early on the morning of 16 February a trough line, with some associated thunderstorm activity, was located to the west of South Australia near the head of the Great Australian Bight. Light to moderate northeast winds ahead of the trough affected Victoria. The night minima fell between the mid and upper 20°C and relative humidities were between 40 and 60 per cent.

From 0800 (EDST) skies were clearing over south Victoria and became clear by 1100. In western Victoria north to north-east winds were starting to freshen ahead of an intensifying cold change

over the head of the Bight with the cold front oriented towards the south-east. The situation did not clearly indicate the full severity of the fire threat that was to develop later that day. Nevertheless the developing and intensifying front separated hot, dry air of continental origin over Victoria (and the rest of south-east Australia) from relatively cold air from the Southern Ocean. The pre-frontal wind pattern was characterised by hot, turbulent gale force northerly winds (68 km h^{-1} early in the day increasing to 89 km h^{-1} after the direction change). The winds were initially less strong in the eastern half of Victoria but tended to increase in velocity up to just before the frontal change arrived in the west. Temperatures rapidly rose by the afternoon to over 40°C and relative humidities declined to below 15 per cent. In the Melbourne area the maximum reached 43°C. These winds raised considerable dust from the drought affected surface and when fires started to develop the drifted smoke contributed to a severe decline in visibility, below the inversion layer, which concealed the exact whereabouts of individual fire areas to people downwind. The general severity of the fire situation became evident by mid-morning 16 February, but poor visibility meant that people had a poor idea of their immediate danger. According to the McArthur index* (see Luke and McArthur p 115) an index of over 50 points equated to the development of an extreme fire danger and when conditions reach 100 any fires that develop are likely to be uncontrollable. In Victoria the index showed a sharp rise from before mid-morning on 16 February. The value at Warrnambool, Ballarat and at Melbourne airport exceeded 100 for several hours and the duration of this period increased eastwards in Victoria. Locally there were variations according to the terrain, the curing of the vegetation, the amount of dry vegetation debris on the surface, local temperatures and humidity. However, Victoria undoubtedly suffered conditions conducive to extreme fire risk for a considerable part of Wednesday 16 February.

---

*Note: The McArthur index reflects meteorological conditions (temperature, relative humidity and wind speed) and antecedent growing and drought conditions which affect the flammability of the vegetation. It provides a pointer to the likelihood of a fire starting, its intensity, rate of spread and to the chances of suppression.

The frontal system moved rapidly eastwards with the southern part of the front advancing at a greater speed than the northern part. The squally south to south-west wind shift moved through South Australia in the middle of the afternoon of 16 February and by early evening through much of south-west Victoria, giving some light rain in the west of the State. Temperatures dropped 10 to 15°C and the relative humidity rose 25 per cent. The squally conditions reached central Victoria later in the evening and moved out of Victoria eastwards about 0300 17 February. In the east the wind change was rather less than in the centre and west. Some light rain contracted east to southern Gippsland. 17 February experienced cool, gusty south to south-west winds which moderated first in the west during the day and became more south to south-east in the south-east of the State. Figure 2, based on the report produced by the Bureau of Meteorology (1983), shows the progressive eastward movement of the front.

Table 1 also shows the eastward progress of the wind change, and the time and maximum velocity of the extreme gust.

	WIND DIRECTION	MAXIMUM GUST $KM\ H^{-1}$	TIME (EDST)
Mt Gambier (SA/Victoria border)	W	102	1559
Mildura	SW	70	2110
Pt Henry	W	109	2025
Avalon	W	106	2020
Melbourne	SW	102	2040
Victoria RFC	W	89	2040
East Sale	SW	83	2320

Table 1 Change in the time of the maximum gust from west to east on 16 February 1983
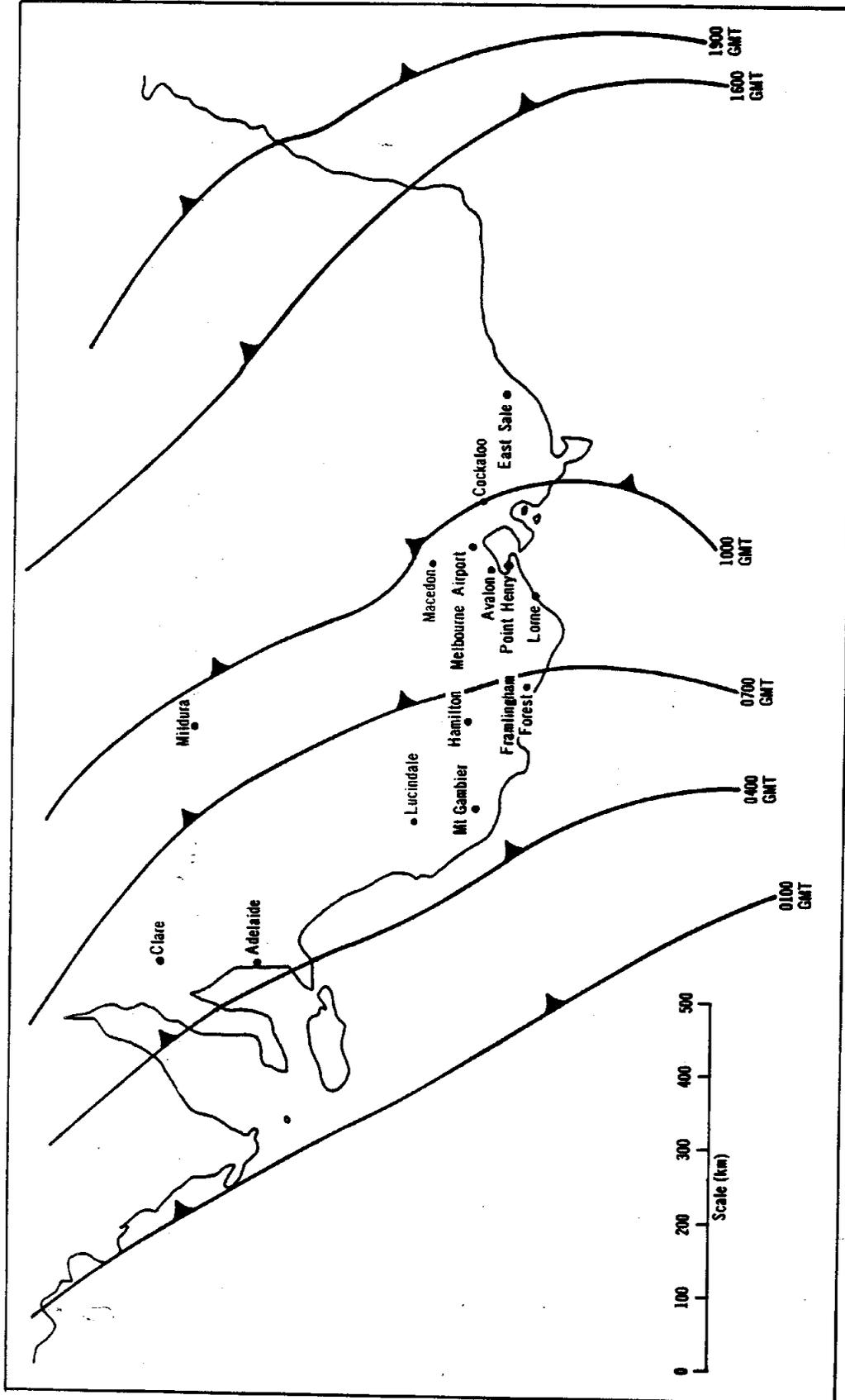
Figure 2. Movement of cold front across south-east Australia, 16 February 1983.

(By courtesy of the Director, Bureau of Meteorology. From Preliminary Report on the Ash Wednesday Fires, 16 February 1983.)

1.5 WEATHER AND FIRE INDICATORS PRECEDING THE ASH WEDNESDAY BUSH FIRES

1.5.1 General Comments

Each type of natural hazard has its own characteristic pattern of warning. The threatened community has different opportunities to respond according to these different warning patterns. These opportunities determine the range of options available and the span of time in which to choose and implement these chosen options. As well as showing many common attributes separate categories of natural hazard have unique features and present unique challenges.

This discussion is directed towards the fire hazard and more specifically the fires experienced in the Ash Wednesday situation. Fire behaviour on days conducive to intense fire development is highly responsive to marked changes in wind velocity and direction. The time scale in which the situation can shift from a controllable to an uncontrollable state can be measured in minutes. Allowing for the difficulties that face any weather forecaster a surprising level of accuracy can be achieved in the prediction of such regional wind changes which are related often to the passage of cold frontal discontinuities. Such fronts usually travel in an easterly direction within the general flow of the temperate westerlies. The steering of the front and its speed of advance is subject to the change over time of the pressure pattern. This means that despite the skills of the weather forecaster the strength of the strong squally winds may depart from expectations and the time of the frontal passage can vary even though this may be in fractions of an hour. Nevertheless the speed of fire response means that even a small amount of uncertainty poses some serious problems to the firefighter.

When a bushfire situation attains the critical McArthur fire index level (or any similar indicator developed for the same purpose) a potential disaster threatens. This disaster is characterised by a high level of uncertainty and a time scale that distinguishes it from many other natural disasters. Severe windstorms, tornadoes, hail may be even less predictable but are likely to

be more local in their occurrence and less extensively and com-
pletely devastating in their overall impact (at least in the
Australian context), though their onset may provide virtually
no time in which to take evasive or immediately pre-event prepar-
atory action. Bushfires of the sort that have recently been
experienced in South Australia and Victoria achieved a level of
destruction and threat to human life in a number of localities
that in total makes them comparable with such devastating events
as tropical cyclones or extensive floods.

In the case of the Victorian bushfires the fires changed their
direction and in a matter of a few minutes threatened areas con-
sidered not to be in danger from the direction of advance prior to
the wind shift. Much of the worst devastation and loss of life
was caused in an hour or less in many of the worst affected areas.
This question of warning, response to the signs of potential danger
and opportunities to evacuate in the face of the threat will be
discussed more fully in a later section. In this discussion the
availability of warning indications that a serious fire situation
existed and could develop in a particular manner will be examined.

The excellent (and rapidly produced) survey of the overall
situation made by the Bureau of Meteorology includes an interesting
commentary on the information that was made available to the res-
ponsible authorities such as Country Fire Authority (CFA), Forests
Commission, Police and State Emergency Service. The purpose of
this analysis is not to seek to praise nor blame anyone concerned
but to identify what information there was to act upon and to see
whether it might have been made better use of.

Warning information concerning the fire risk was available
in a number of forms such as Fire Weather Warnings, Gale Warnings,
Road Weather Alerts, Routine Weather Forecasts as well as specific
advice to concerned organizations notably the Country Fire Authority.

1.5.2 Fire Weather Warnings

When the McArthur index reaches or exceeds 50 this warning
is issued. On the preceding day (15 February) at 1715 (EDST) the
Fire Weather warning was issued for the Mallee District and this
was renewed at 0515 (16 February). The CFA on 16 February, after
early morning consultation with the Bureau of Meteorology, issued
a State-wide fire ban to be effective from 0700. The Fire Weather
Warning of the early morning was extended by 0930 to include the
Wimmera and the western and central districts, and then by 1030
was applied to the whole State. So before any serious fire had
been reported the potential danger of the situation was recognised.
As events turned out the lead time from these warnings was about
6 hours for the eastern part of the State and 15 hours for the Mallee.

The information made available about strong wind conditions was
rather less satisfactory. For the land areas of Victoria a gale
warning was issued at 1615 16 February. While this gave about a
7 hour warning for the east it meant that squally strong winds
had already been experienced in parts of the west and centre of the
State for several hours prior to the time of the warning. The
regional wind velocities (based on a 10-minute mean) attained gale
force only when the wind shift occurred (1600 on the western border,
2000-2130 in the central district). Locally fire-induced winds
could have exceeded gale force and occurred earlier than the gale
warning, but such circumstances cannot be anticipated in an area
forecast. The fire fighters' experience would have enabled those
who have had previously to deal with such situations to be prepared
for such local conditions. It is a matter for consideration that
some supplementary comment might accompany the rather bald state-
ment of the likelihood of gales, for example a comment on the nature
and potential significance of the wind shift and the occurrence of
fire-storms. Even if the general prospect of a fire-threat is apprec-
iated, it is the authors' opinion that reinforcing additional inter-
pretation or comment can do more good to sharpen awareness and under-
standing than it is likely to do harm or mislead people. This opin-
ion can apply to the general public or to the decision-makers and
the counter-disaster personnel in the field.

1.5.3 Road Weather Alerts

A Road Weather Alert was issued at 1715 16 February to warn
motorists of the deterioration of visibility because of the dust
raised by the squally northerly winds ahead of the wind change
and with the wind itself. In the case of Melbourne this gave
about a 3-hour lead time, but was more confirmatory than warning
information for those further west. Frontal passages as already
indicated are not easily predicted in detail. If one is to be on
the safe side then the warning time tends to be cut down to a very
small margin. So we have another instance of trying to achieve a
balance between adequate warning time and increased frequency of
incorrect or exaggerated warnings.

1.5.4 Routine Weather Forecasts

Routine weather forecasts, that can reach a large proportion
of the general public, have potentially a very important role to
play. Judiciously chosen information can set the scene so that
whatever indications are available to the individual can be inter-
preted more effectively and rapidly. Decisions about the actions
to take can then be given some prior thought and are not sudden
emergency responses.

The 1715 forecast of the previous day predicted "generally
high to very high fire danger increasing to extreme in the north-
west". For the central and southern parts of Victoria a very warm
to hot day was predicted, but it was also anticipated that it would
cloud over, that there could be early isolated showers and winds
would be light to moderate north-west. No sudden wind change was
expected except for the development of coastal sea breezes. No
alteration was introduced into the 2115 forecast of 15 February,
except to include the prospect of a southerly change developing
during the 17 February. This was the form of the routine fore-
cast of 0515 16 February. Melbourne's maximum temperature was
expected to be 34°C and indeed a Road Weather Alert indicated the
possibility of greater driving hazards because of rain.

The situation was modified however, when the 0815 routine forecast, 16 February, included the indication of a strengthening of the north-westerlies (with possible raising of dust), while the timing of the cool south-west change was brought forward to 'tonight'. By 0930 further amendments were incorporated. The maximum temperature forecasts were increased (Melbourne going up to 39°C) and the reference to cloud and patchy rain in the south disappeared. The next issue at 1115 predicted the continuance of extreme fire danger during 16 February with a decrease to high to very high danger on 17 February. Though strong winds were anticipated their strength was underestimated and the predicted time of the cool change was a little late. The 1715 16 February forecast correctly predicted the overnight weather and the moderation of the winds on the next day.

In retrospect it might be fairly stated that, while alerted to possible fire dangers, there was little, until too late, to highlight the convergence of weather circumstances that did so much to turn Ash Wednesday into a holocaust instead of a repeat of the several fire-days that had already occurred earlier during the summer. Given the same set of conditions and available data, it is unlikely that much more could have been expected. Those who do not have the weather forecaster's job of the analysis of the prevailing atmospheric conditions are always too ready to take him to task. If all the possibilities were to be canvassed the forecast would provide even less guidance than a more cautious reliance on the high probability events. However, natural disasters have a low probability and unfortunately it is the occurrence of the circumstances that are unlikely, extreme but not impossible that convert a manageable into an unmanageable situation.

1.5.5 Special Forecasts for the Combat Authorities

In the authors' view the Bureau carried out its function with admirable responsibility. The Bureau provides a regular service to the CFA and the Victoria Forests Commission. This was supplemented by 29 special forecasts for the fire situation as well as

many telephone discussions with responsible officers on specific
fire situations. The meteorologist on the fire weather shift
(specially introduced during the 1000-1821 period of the day for
the fire season) and the senior meteorologist at the Regional
Forecasting Centre worked overtime. For three successive 3-hourly
stages the Bureau presented maps of the frontal wind-change. The
progress of the wind change was closely watched. Subsequent invest-
igations, beyond the opportunities of the investigating team, will
perhaps permit an assessment to be made as to whether the full implic-
ations of the effect of the change, when a number of serious fires
were already temporarily out of control, were made sufficiently
emphatic. Should the threat of the danger, even though no-one
could be sure of its absolute severity, have been translated into a
more urgent public warning and better advice to brigade crews?

On purely meteorological grounds, it is not possible to make
strong criticisms about the perception of the danger and the form of
response. Not all was perfect in the estimates of the events that
were to transpire. At 0630 16 February fire authorities were warned
of the prediction that wind speeds were likely to be some 10 km h^{-1}
above the evening forecasts of the previous day. The prospect of
extreme fire danger and a south-west change that night was indic-
ated. The CFA reacted properly so that from 0700 the whole State
was under a total fire ban. The information in the amended routine
weather forecasts was, of course, conveyed to the CFA. At 1030
the early morning wind speed forecasts increased the predicted val-
ues 10 to 20 km h^{-1} above those in the earlier forecast.

1.5.6 Forecast Accuracies

The Bureau of Meteorology's report (op cit) provides a very
honest evaluation of the accuracy of the forecasts. The wind
strengths during the day, and the gust speeds anticipated with
the change, were mostly within 10 to 15 km h^{-1} of the observed
values. The earlier estimates of the eastward advance of the cold
front underestimated the speed of movement. Later estimates were
accurate to within one to two hours for the arrival of the wind
change and this meant that, for most of the fire areas, the first
operational forecasts provided a 3 to 6-hour warning of that
change.

The forecasts of 1700 15 February would not have led to the expectations of what was to transpire the next day. The maxima were 2 to 6°C too low in many cases and as much as $6-12^{\circ}$C too low in the Wimmera and the west and central parts of the State. Wind speeds fell short by about 15 km h^{-1} in the east and 25-35 km h^{-1} in the west. The 0630 forecast 16 February did little to amend the temperature forecast, but did increase the anticipated wind speeds for the Mallee, Wimmera and the western and central districts by 10 km h^{-1}. By 0930 most maximum temperature estimates were raised 4 to 5°C and some small increases in the wind speeds were made. Further temperature adjustments in the 1030 forecast brought the forecast values up to about 2 to 4°C below the levels that were later observed. A further 15 km h^{-1} lift in wind speed estimates brought most of the forecasts within 10 km h^{-1} of the observed values. Although not seriously so, the forecast temperature maxima and wind speeds were too low in almost all cases. The special short-term forecasts for the fire areas were generally accurate.

CHAPTER 2

THE ASH WEDNESDAY BUSH FIRES

2.1 THE FIRE SITUATION ON 16 FEBRUARY

Between 16 and 18 February 18 major fires broke out in various
parts of the State. On 16 February about 93 fires were burning in
different parts of Victoria. A further 11 were reported up to 0430
17 February.   In 7 areas in separate localities fierce and dev-
astating fires were burning uncontrollably before nightfall on Ash
Wednesday. In the period 16-20 February some 30 municipalities
suffered severely. The last fires were only contained by 20 Feb-
ruary.

From the sources of information available to the present auth-
ors, the pattern of these fire developments have been set down
below. It is likely that this can be refined in detail from the
information available in the log books of the CFA brigades, and
from the Police, the State Emergency Service and the Forests Com-
mission. It does not seem that most of the observations included
here will be radically modified by the subsequent improvement in
information, though it is admitted that the whole question of the
time available for response, for the delivery of warnings, the under-
taking of evacuation and the opportunity to assist people hinges on
availability of time, perhaps measurable in minutes or half-hours
and no more. Some of the opinions on the speed of spread of the
fire or the rate at which buildings burst into flames are open to
argument and indeed may be very critical when considering what, if
anything, can be done to reduce or avoid a similar disaster in the
future.

The set of recorded instrumental traces for pressure, dry bulb
temperature, relative humidity, wind speed and direction for Melb-
ourne Airport (Figure 3) for 16 February provides a graphic picture
of the weather conditions. The frontal passage is dramatically
demonstrated. The high temperatures and low humidities from midday,
or just after, show the circumstances in which the afternoon fires
began. The observed maximum at Melbourne was $42^{\circ}C$ ($4^{\circ}C$ above the
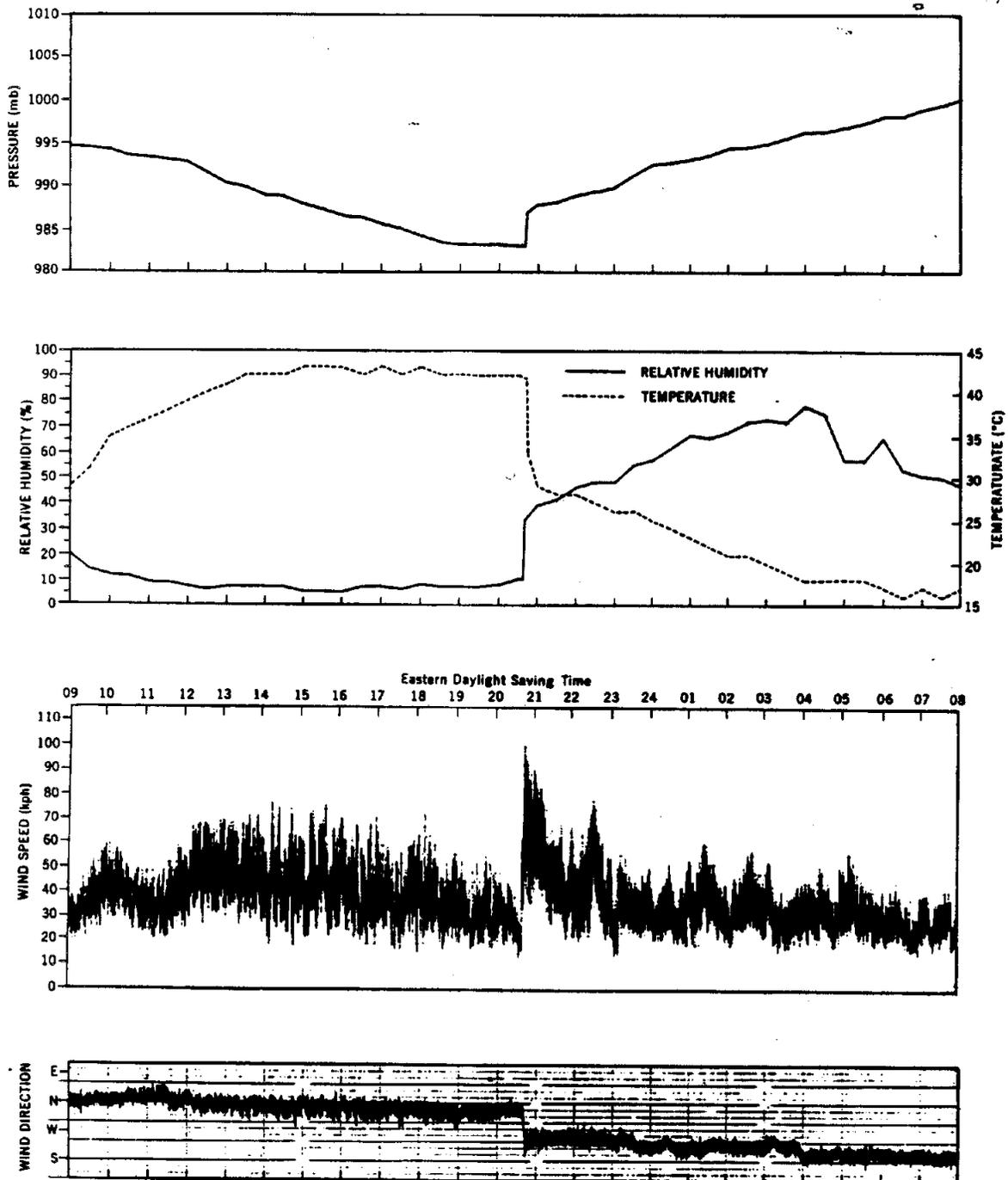
Figure 3. Variations in pressure, temperature, humidity, wind speed and direction at Melbourne Airport, 16 February 1983.

(By courtesy of the Director, Bureau of Meteorology. From the Preliminary Report on the Ash Wednesday Fires, 16 February 1983.)

forecast value given at 1030). There was little drop in temp-
erature until the front passed through. Throughout Victoria,
except for higher altitude or coastal stations, maxima topped 40°C
with Mildura and Nhill reaching 44°C. From about midday, until
the cool change at about 2040, relative humidities at Melbourne
Airport were below 10 per cent, getting as low as 7 per cent.
Accompanying these conditions was a northerly wind gusting to 70
km h^{-1} or more.

The initial fires mostly were well established and being driven
in a southerly direction in the afternoon hours of 16 February.
The Warrnambool fires started about 1530 hours. The fire that
ravaged Lorne and subsequently the coastal side of the Otway ranges
to Anglesea began west of Deans Marsh about 1530 hours (times given
in sources consulted ranged between 1456 and 1530). Another fire
also broke out west of Apollo Bay at Moonlight Head during the
afternoon. The fire that subsequently drove towards Gisborne and
devastated Macedon and Mt Macedon started at about 1415 hours at
East Trentham. In the Cockatoo area a number of fires were involved.
The first in the general area was at Belgrave Heights at about 1530
hours. About 1600 another fire erupted about 10 kilometres from the
Belgrave fire and north of Cockatoo. The two fires burned parallel
driven south by the winds. Small fires on the outskirts of Cockatoo
at about 1830 soon got out of control with the strong winds. A
separate fire caused devastation at Upper Beaconsfield. The fire
that threatened the Warburton area, and was still a major risk the
next day, developed first about 1930 at Millgrove on the slopes of
Mt Little Joe and then moved north-east to threaten Warburton.
Subsequent detailed information, not available to the present auth-
ors', may well lead to revision of some of these times but the
general pattern is not likely to be altered.

A number of points are relevant to an anlysis of the Ash
Wednesday disaster. The fires were severe, in some instances not
under control before the wind shift in the evening. In almost
all cases they were well alight in the day-light hours in the hot-
test and driest part of the day. It was obvious, despite the poor
general visibility because of dust and smoke, that a very serious

fire threat existed. Except in the west of the State there were several hours before the most devastating phase of the fires when the strong squally wind change occurred and within less than an hour in many cases the fire had rampaged through townships and populated areas destroying property and killing both fire-fighters and residents.

Many, of the comments arising from interviews reported in the media referred to the suddenness of the fire's arrival, so that little or no time was available to provide adequate warnings, to make last minute preparations and to adopt calm decisions about evacuation and when and where to go. Responses suggested that many were caught more or less unawares. It does seem, however, that there was an unwarranted degree of confidence (complacency may be too strong a word) about the ability to control the fires. At least there was a tendency to view the threat to life and property as less dangerous than it turned out to be.

2.2   THE ASH WEDNESDAY FIRES

2.2.1   General Comments

The authors were unable to devote sufficient time to a comprehensive survey of all the fire areas. It was possible to make field investigations of three areas. Two of these were examined in closer detail than the third. These localities were Macedon/ Mt Macedon and Cockatoo/Beaconsfield. The third area visited, but more briefly, was the coastal region Anglesea to Lorne. Apart from the information derived from field observations, from interviews with those in the fire affected areas, including in some instances SES and CFA personnel, some of the comments have had to be based upon media reports. It has not proved possible to obtain reports of the various agencies which were involved in dealing with the fires and their subsequent impact. It is recognised, therefore, that some of the material used may be revised or re-interpreted in the period that has passed since the initial impact.

In the studies of the particular fire situations that follow the emphasis is on the dynamics of the event. Matters concerned with the effects of the fires and the related problems of emergency relief and welfare receive attention in later sections of the report.

The behaviour of the fires is decribed in broad terms to demonstrate the fire pattern in time and space in the context of the meteorological events already examined. The Macedon fire will receive a more detailed anlaysis as an indication of the uncertainties surrounding decision-making during the emergency and the nature of community response.

In the case of the East Trentham, Lorne and Belgrave Heights areas the initial fire outbreaks occurred in the early afternoon. Abundant 'cured' vegetation, the prevailing high temperatures and low relative humidity and the strong northerly wind (40-50 km h^{-1}) combined to produce fires of such intensity that they were virtually uncontrollable at their heads (and also on their flanks in difficult terrain). The narrow fire heads were driven south-south-west through hilly forested country carrying heavy fuel loads (unofficially estimated by the Forests Commission at 10-15 tonnes ha^{-1} for Macedon and 15-25 tonnes ha^{-1} for Lorne).

2.2.2 The East Trentham, Macedon and Mt Macedon Fires

The spread pattern is depicted in Figure 4 (derived from a CFA compilation based on all available information including comments from the Forests Commission, observations of the fire-fighters, photographic surveys, etc). Each isopleth represents an estimate of the perimeter of the burned (and burning) area at the EDST times indicated.

Initially the fire started within two kilometres of East Trentham at approximately 1415 and drove south through hilly country into the Wombat State Forest. It reached the area previously burned out by the earlier Greendale fire of 8 January 1983. This halted the
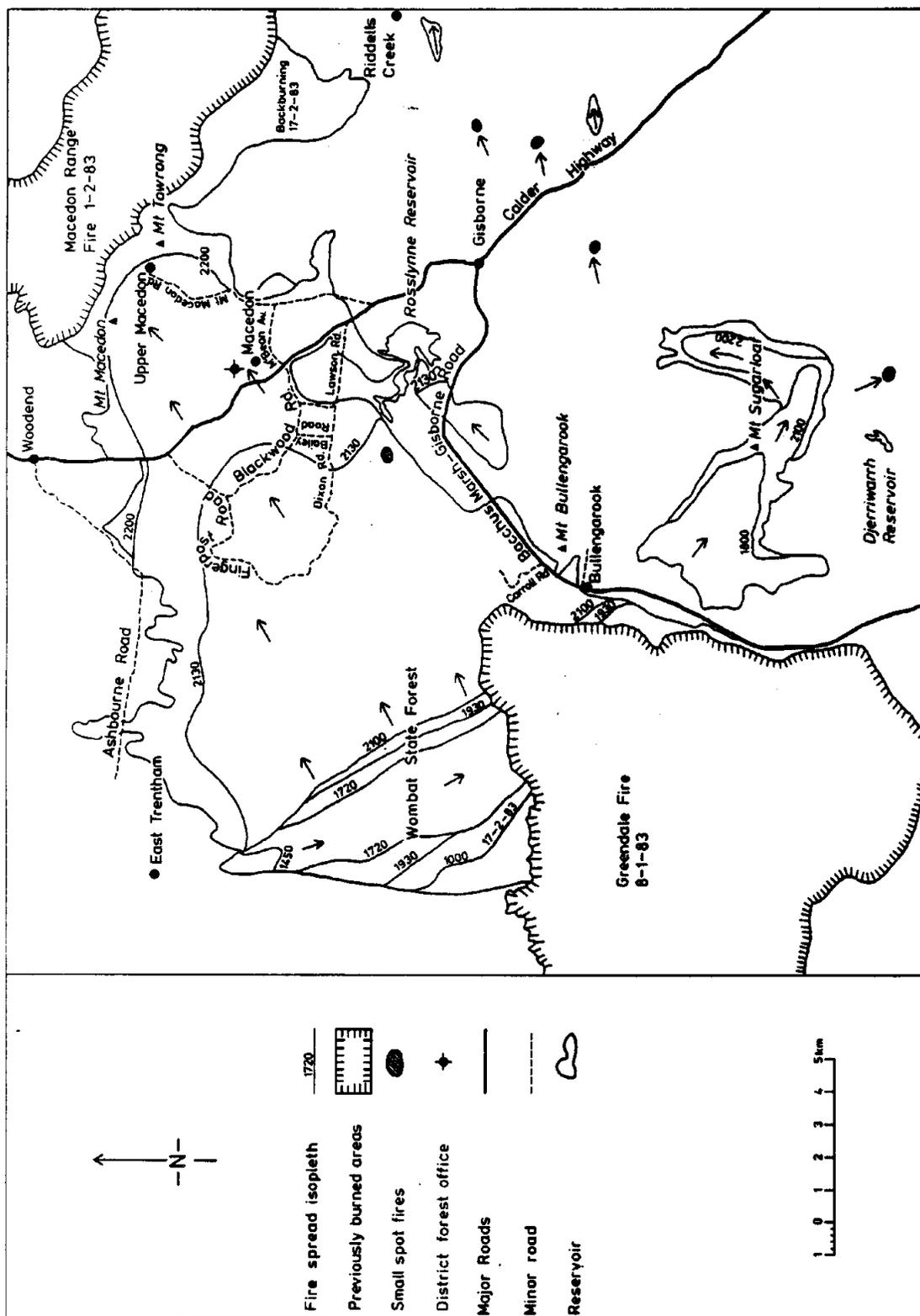
Figure 4. Spread of bushfires in the East Trentham area.

advance between 1600 and 1700 but the fire continued to burn fier-
cely on the flanks causing spot fires to start as far away as Djer-
riwarrh Reservoir (Figure 4).

The abrupt wind change to south-south-west about 2030 hours
in this area drove the fire back towards the north-east to the
fringes of Woodend.   A violent fire-storm developed and within
two and a half hours engulfed Macedon and Mt Macedon. The Macedon
newsagency/post office was burnt to the ground not long after 2115
and by soon after 2206 (when the fire was at its peak) the fire-
storm had virtually cleared through Macedon. The speed of fire
advance and darkness made the impact of these fires particularly
devastating and unanticipated. Five hundred fire-fighters could do
nothing to save property. Little time was available for warning or
evacuation and in several respects the response was chaotic, even
bordering on the edge of panic. These aspects will be returned to
in later sections.

By 0100 17 February the forward perimeter of the fire-storm
reached those parts of the Macedon Range which had been burned by
the fire of 1 February 1983. This halted the progress towards
the north-east, although serious fires continued for several hours.
House fires in Macedon were still reported as late as 0600 17 Feb-
ruary.

2.2.3 The Otway Ranges and Coastal Fires, Lorne to Anglesea

The spread pattern for this fire is depicted in Figure 5
(based on a preliminary assessment of the Forests Commission).

The critical situation developed when the fire, that origin-
ated near   Deans Marsh at approximately 1530 was driven south-
south-east helped by spotting and the strong gusty north-west winds
to the north-eastern fringes of Lorne. Spot fires were burning in
and around Lorne by 1730 and the main but narrow front of the south-
ward advancing fire was half way to Lorne by 1725 (see Figure 5),
indicating an average rate of advance of about 4 km h^{-1}. Another
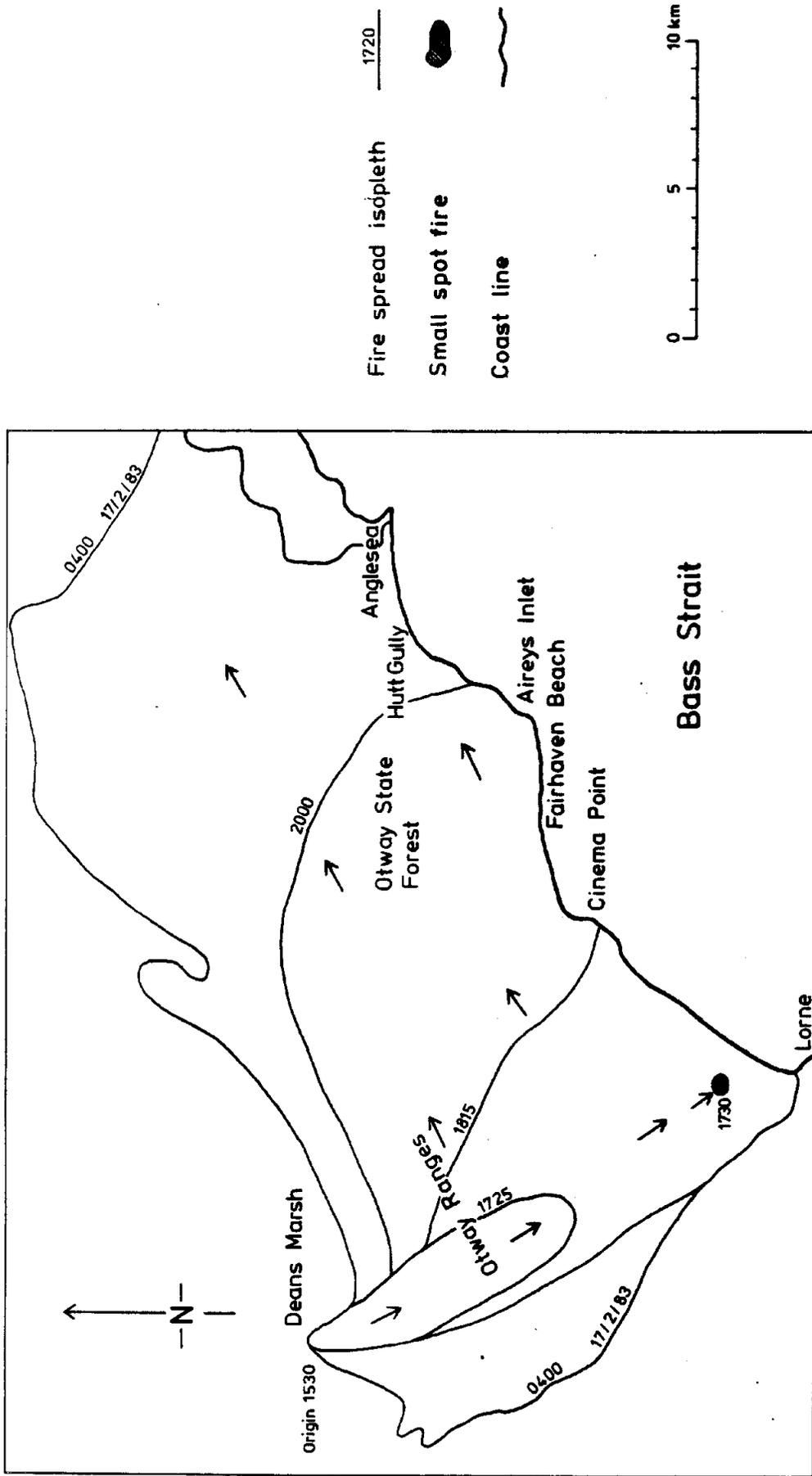
Figure 5. Spread of bushfires Lorne to Anglesea.

fire advanced east on the north side of the Otways. The wet sclero-phyll forest of the Otway Ranges carried a dry load perhaps as high as 15-25 tonnes ha^{-1}. Following the wind change (about 1800) the fire swept rapidly eastward. About the time of the wind change the eastern flank stretched 15 kilometres from Cinema Point back towards Deans Marsh. It was then driven on an eight kilometre wide front parallel to the coast (and right down to the shoreline where there was vegetation to burn) towards Anglesea, devastating Eastern View, Mogg's Creek, Fairhaven and Aireys Inlet (hit by 'a wall of flame' about 1924) on the way. At Fairhaven roofing iron had been stripped off buildings before the fire struck and carried some distance (Plate I).

By 2022 a spot fire was burning at Hutt Gully (Figure 5) and by 2108 the fire had reached Anglesea which was surrounded on the inland side by 2200. It then swept on towards Belbrae. The fire was eventually brought under control east of Anglesea at 0400 17 February. Inland the fire flank extended as far as the margin of the agricultural land. In Anglesea the brown coal open cut mine of the Alcoa power station was ignited and subsequently quenched by partial flooding.

The combined effect of the strong winds from the change and of spotting (claimed to have occurred up to 10 kilometres ahead of the main fire front) in heavily timbered pine and eucalypt areas gave rise to the extreme rapidity of advance of the fire and the danger-ous situation when, with little or no warning, residents or fire-fighters were cut off by fires that broke out and cut escape routes. It is claimed that along parts of the Great Ocean Road the fire advance reached as much as 10 kilometres in 8 minutes. Places were subjected to more than one fire attack as spot fires ignited new areas. Deans Marsh suffered two separate fire threats. Lorne suf-fered its first blow to the north but a second and a third fire (the latter about 0200 17 February) each took their toll of still more buildings further south.

2.2.4 Upper Beaconsfield - Cockatoo Area

Different fires were involved in these areas. In all about
a quarter of the shire of Sherbrooke was devastated with parts of
Belgrave Heights, Belgrave South, Narrewarren, Lysterfield, Menzies
Creek, Emerald and Avonsleigh being affected. The Belgrave fire
moved over 15 kilometres south to the Princes Highway and was cut
off north of Pakenham, at Officer and Berwick. The wind change at
about 2030 caused the fire to move back to the north-east. The
fire situation in the wooded dissected areas with steep slopes was
particularly difficult to determine. The winds, accentuated by the
fire generated effects drove the flames like a blow torch through
the area with great rapidity. In many cases the ground cover was
completely burnt, the first two metres or so of the trunks of trees
scorched and the foliage above only heat dried (Plate 2). Trees
had large branches broken off or were blown down entirely
(Plates 3 and 4). Fires followed selective routes guided by the
terrain and the wind, curving around hills, approaching from unex-
pected quarters with further confusion arising from the spotting
from burning leaf and bark material. In Cockatoo the fire, des-
cribed as the smallest but the worst of the Ash Wednesday fires,
suddenly appeared about 1930 on the slopes above the township and
within under an hour had left a trail of burnt-out houses, though
a few miraculously had escaped in the vagaries of the fire advance
across the area. Once more there were problems of warning and evac-
uation perhaps accentuated in the Dandenongs by the inadequacy of
access roads, the scattered nature of properties and the steep
slopes. Again this matter will be examined later.

2.2.5 Warburton

This area presents even more difficult country in which to
fight fires than the previous area. The fire which started at about
1930 hours three kilometres west of Warburton spread on a wide front
bounded by the Warburton Highway and the Powelltown - Noojee Road.
It got to within about two kilometres of Warburton. It invaded the

Plate 1.   Roofing iron blown from housing: Fairhaven Beach.

Plate 2.   Scorched trunks of trees, foliage unburnt: Cockatoo.

Plate 3.

Wind damaged
trees: Cockatoo.

Plate 4 (below).

Wind damaged trees:
Cockatoo.

rugged mountain country near the Upper Yarra Dam causing the evac-
uation of the small townships of McMahon's Creek and Reefton (the
most severely affected by building loss). The fires were still
not under control the next day. Although a vast extent of forest
(estimated as great as 70 000 hectares by 19 February) was devas-
tated it was fortunate that it was not so densely settled as the
Dandenongs.

Because of the difficulty of control, the fire was still mov-
ing north towards Marysville on the 19 February. By that time it
had burnt through an area about 35 km long and 25 km across.
Indeed it was only on 21 February that this fire (and one in the
Mt Buffalo area which started 17 February) was contained.

2.2.6 Warrnambool

The nature of the fires in the Warrnambool – Timboon area
was rather different from those in the forested areas. Grass fires
were mainly involved and these can travel with considerable speed:
a circumstance exemplified in this case by a press comment 'every-
thing seemed to explode at once'. These, however, were devastating
in not only causing the loss of human life (9 deaths) and consider-
able destruction of buildings but also the loss of large numbers of
cattle and sheep. In an area already desiccated by drought, fire
destroyed extensive areas of pasture and stocks of hay.

Two fires were involved initially. One started about 1400
hours at Cudgee, while another began soon after near Ballangeich
to the north. At its peak a fire front extended from Ballangeich
in the north to Curdie Vale in the south. The wind change reached
Naringal about 1800, the different fires combined and then moved
east over farmland towards Terang on a 12 kilometre front. The
fire was eventually contained about 0400 17 February about one
kilometre from Terang on its western outskirts. Many small settle-
ments were devastated including Framlingham, Naringal, Aynford,
Laang, Tarvon, Garvoc and Nulla Warre.

2.3   THE MACEDON FIRE AS A CASE STUDY

In this section the behaviour of the East Trentham to Macedon
fire is discussed in greater detail. Attention will also be paid
in subsequent discussion to the community response - fire-fighting,
the preparation and relay of information and warnings, and evacuat-
ion. Many details (eg the time of certain events) were extracted
from the radio communication log kept by the CFA at the Gisborne
radio communication centre and from the telephone log of the CFA
Regional Office in Melton.

The behaviour of the fire and the response of combating auth-
orities have been differentiated into four phases:

i) Pre-Ash Wednesday
        Two major fires had already occurred in the 1982-3 fire
    season. The Greendale fire of 8 January (Figure 4) destroyed
    12 000 hectares of the Wombat State Forest and killed two For-
    ests Commission fire-fighters. On 1 February the Macedon
    Ranges fire burned 6 000 hectares and destroyed 24 homes. The
    burned area was still requiring attention on 16 February when,
    from 0530, fire crews were working on the control and 'black-
    ing out' of the earlier fire area. Such antecedent experiences
    should have raised the community's fire consciousness to a high
    level.
        A minor outbreak occurred near Mt Bullengarook and close
    to Dunn Road (Figure 6) in the early afternoon. There was
    considerable concern that, driven by the strong north-west
    winds, this blaze might escape into the bush of the Pyrites
    Creek area and burn into Mt Sugarloaf. Therefore, when the
    news first came of an outbreak at East Trentham (Figure 6)
    at about 1415, in an area controlled by the Forests Commission,
    the brigades of CFA Region 14 continued to concentrate on the
    Dunn Road fire which was eventually controlled. The East Trent-
    ham fire was in fact in the CFA Region 15, as well as being in
    an area under control of the Forests Commission, which therefore
    became the combating authority, supported by the CFA group from
    Kyneton.
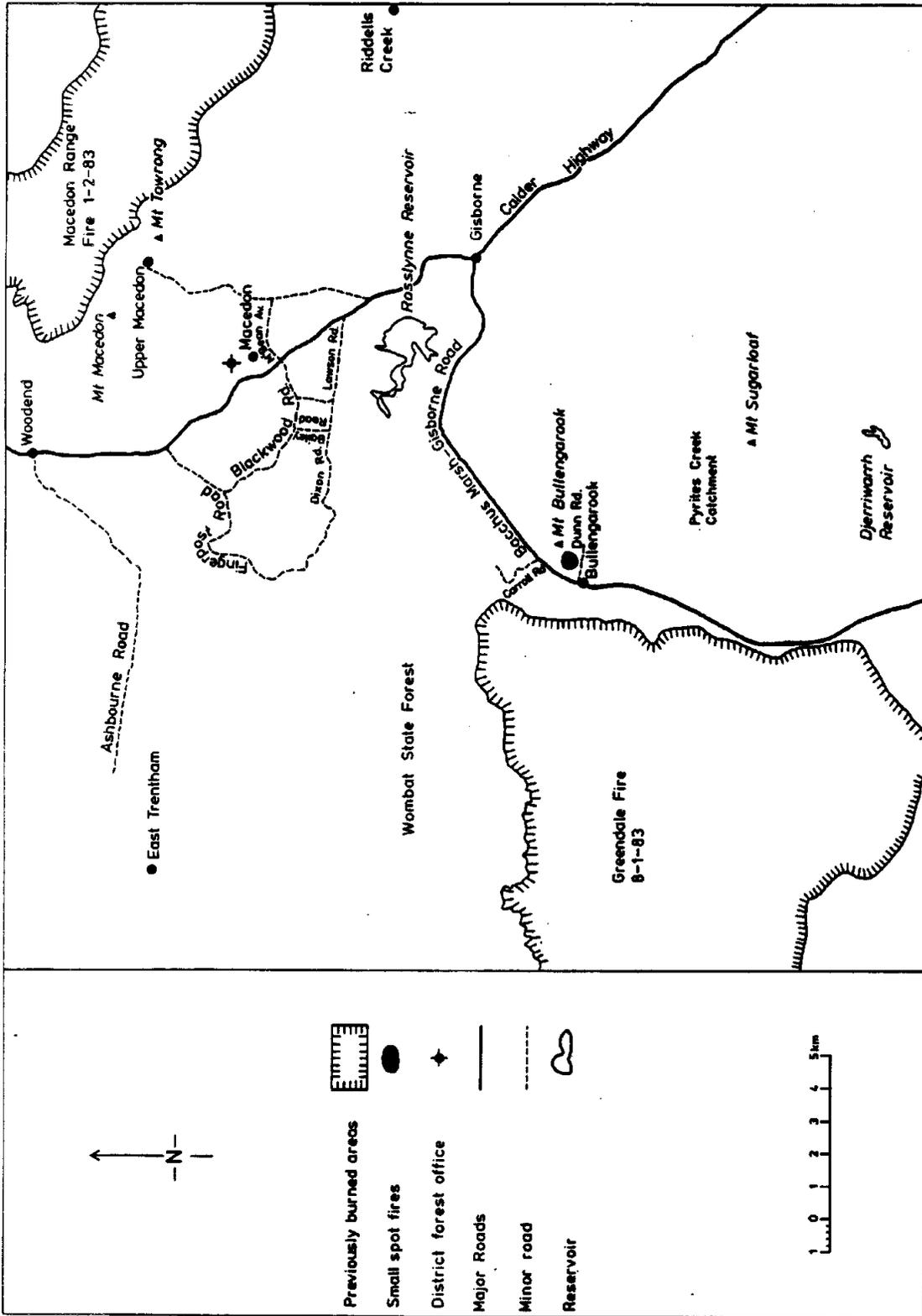
Figure 6. Conditions prior to the East Trentham outbreak.

ii) The East Tentham Outbreak

By 1425, it was clear that the East Trentham fire was developing strongly and advancing quickly on a narrow front in a direction slightly east of south (Figure 7). With a forecast of a strong south-west change in the evening there was an obvious risk of the fire moving in the direction of Macedon. At 1435 the Mt Macedon CFA group was therefore relieved of responsibility for the Macedon Ranges fire in readiness for whatever threat the wind change might bring.

At this stage the Forests Commission combat force believed that the fire could be contained and excluded from the forested area. However, the fire continued to move south and it soon became clear that it could not be held.

The fire then burned fiercely through the difficult terrain of the Wombat State Forest. Some long range spotting occurred. By 1543 a spot fire, ahead of the main blaze, was burning close to the northern edge of the area burned out by previous Greendale fire. At 1640 brigades of the Mt Cotterel group were fighting (and controlling) spot fires in the grasslands near Djerriwarrh Reservoir (a spotting distance of at least 13 kilometres).

By 1700 the head of the fire had reached the Greendale burn and was losing intensity. However it was not possible to bring the eastern flank under control. Further spot fires were started to the south-east, including a large one which burned unchecked into the Pyrites Creek catchment (Figure 7). This fire was the probable source of other spot fires which occurred later (at 2200) in the vicinity of Riddells Creek.

The initial run of the fire covered a distance of approximately 10 kilometres in (probably) less than two hours. From 1700, until the arrival of the wind change at 2030, the fire continued to burn fiercely on its flanks in spite of the efforts of the CFA and Forests Commission fire-fighters working in the very difficult terrain.

At this point some tactical discussion took place among leaders of the groups likely to be affected after the wind change. Fire-breaks were planned in the hope that the fire could be controlled well before it could reach Macedon, but only the Woodend brigade was able to implement these plans.

Legend:

- Fire spread isopleth — 1720
- Previously burned areas
- Small spot fires
- District forest office
- Major Roads
- Minor road
- Reservoir

Scale: 1 0 1 2 3 4 5km

N

Map labels:

Macedon Range Fire 1-2-83

Woodend

Mt Towrong

Upper Macedon

Mt Macedon

Macedon

Mt Macedon Rd

Alton Av

Lawson Rd

Blackwood Rd

Bailey Road

Dixon Rd.

Finger Post Road

Ashbourne Road

East Trentham

Origin 1415

Wombat State Forest

1450

1720

1930

1720

2100

1930

1528

1535

1543

Greendale Fire 8-1-83

Riddells Creek

Rosslynne Reservoir

Gisborne

Calder Highway

Gisborne Road

Bacchus Marsh-Gisborne Road

Mt Bullengarook

Bullengarook

Corral Rd.

2100

1920

Mt Sugarloaf

Pyrites Creek Catchment

1800

2100

Djerriwarrh Reservoir

1640

The earlier Bureau of Meteorology forecast at 1525 timed the wind change for 2200, but in the 1710 forecast the time was amended to 2100. Wind gusts up to 90 km h^{-1} were predicted.

iii) The Fire-Storm

This third phase saw the development of the fire disaster. Luke and McArthur's comment (1977, p 89) is particularly relevant: "The effect of sudden wind changes, especially those associated with the passage of a cold front, has been frequently mentioned in the literature, ... Almost invariably when a flank fire moves away on a broad front in a new direction as a head fire, rate of spread and other fire behaviour characteristics increase out of all proportion to the strength of the wind and other meterorological conditions."

The advance of the cold front accelerated and the radio communication log at Gisborne (2004) recorded the expectation that gale force winds would arrive at 2030, 30 minutes earlier than the 1710 Bureau of Meteorology forecast. At 2030 the wind change was reported at Carroll Road, near Mt Bullengarook (Figure 8). The fire then swept north-east on a broad front of at least 7.5 kilometres driven by winds conservatively estimated as reaching 100 km h^{-1} (see Table 1). In most of the fire areas the highest gusts almost certainly exceeded this value and indeed the nature and degree of wind damage to trees (Plates 5 and 6) indicate very high wind speeds.

Given the hilly terrain, with numerous gullies and steep ridges, the wind strength and direction could be expected to be extremely variable in both time and space throughout the affected area. Reported observations bear out the chaotic nature of this variability.

The fire-spread map (Figure 4) indicates the spread of the fire as a function of time, but it should not be interpreted as representing the steady evolution of a large fire burning on a well-defined, broad front. The pattern of spread was irregular and often unpredictable.

With the strong winds, fire propagation occurred almost entirely through the action of short or medium range spotting. The terrain would have enhanced this process since spots can typically be thrown long distances from the crests of ridges
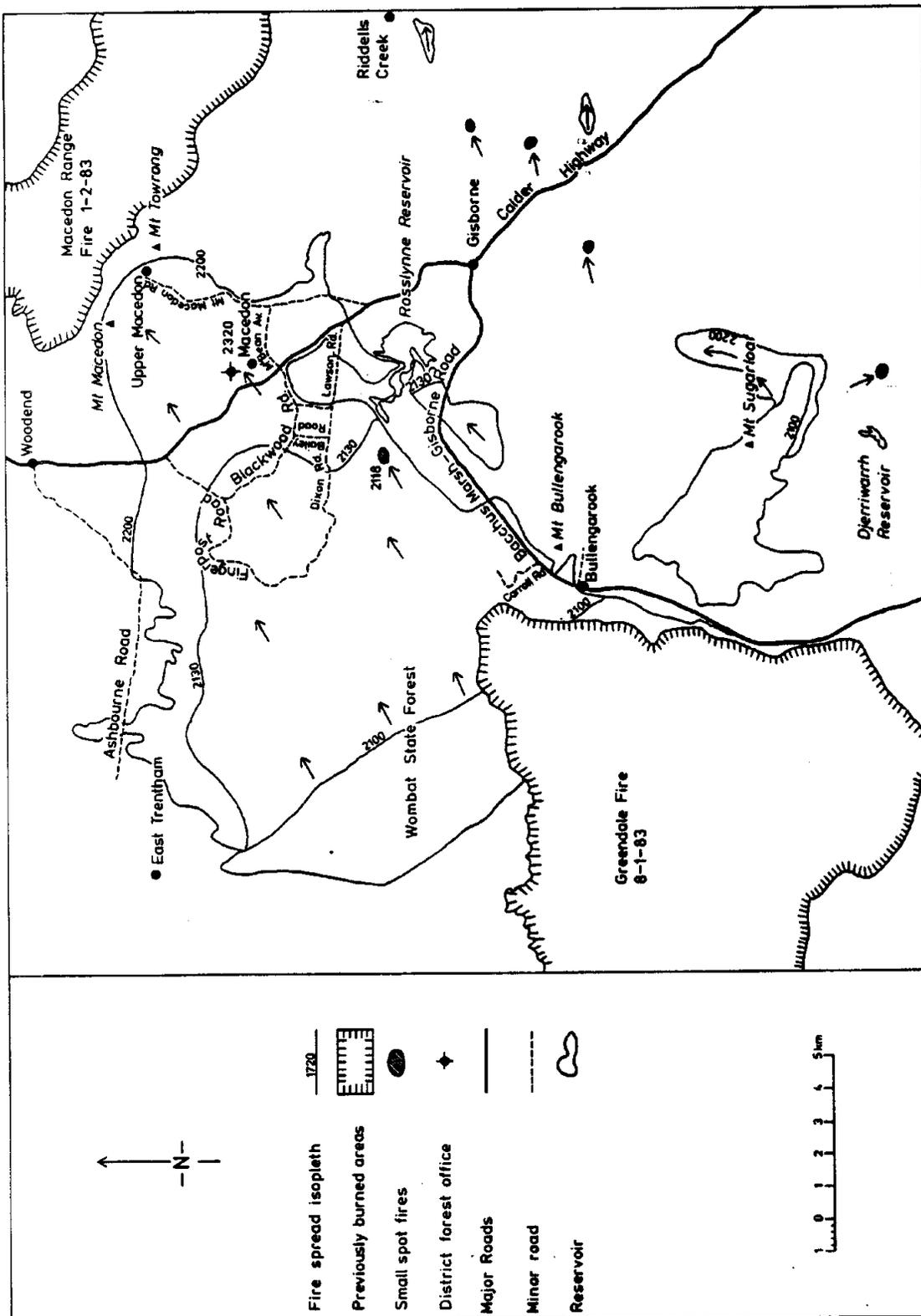
Figure 8. Development of the fire-storm in the Macedon area.
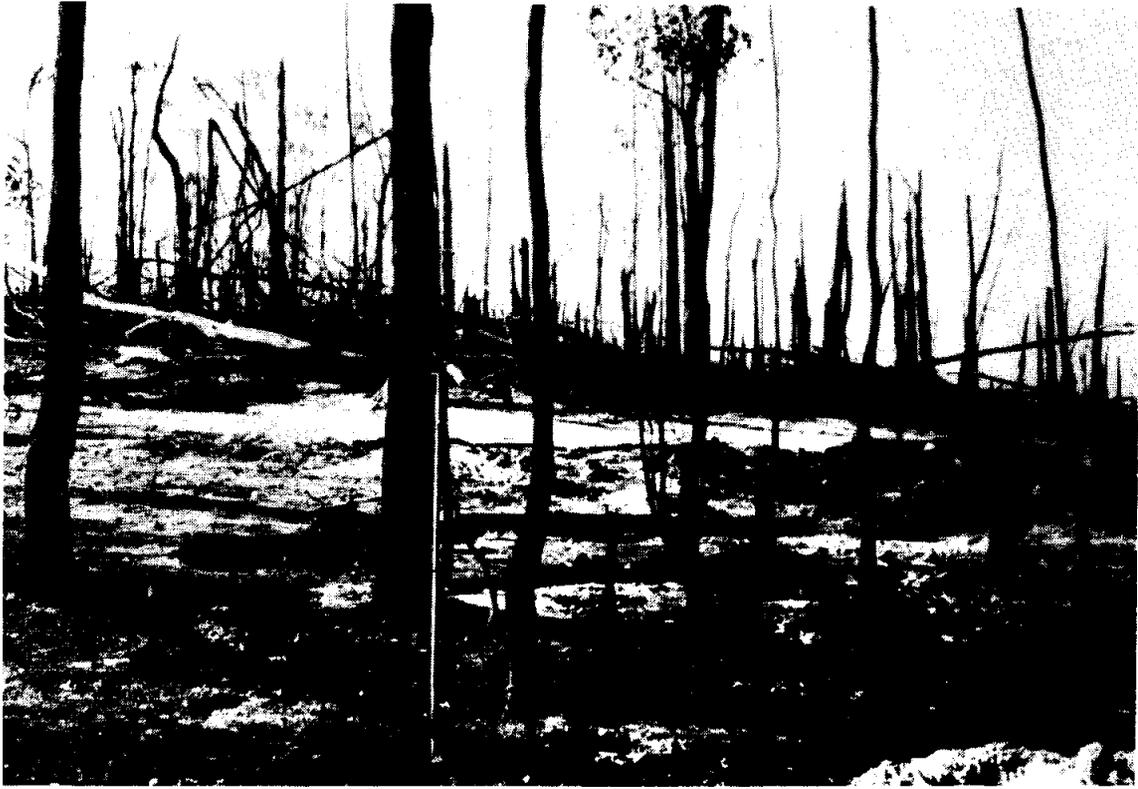
Plate 5. Wind damaged trees: Macedon.

Plate 6. Wind damaged trees: Macedon.

(Luke and McArthur, p 96). A heavy rain of burning debris hundreds of metres ahead of the flames was reported by many observers. A strong spot-fire was burning at Mt Towrong (Figure 8), a distance of 16 kilometres from the initial front, before 2300 (ie less than two and a half hours after the wind change and perhaps before the main conflagration had developed in Macedon).

As a result of erratic spotting in high winds, what occurred was not a single fire but a fire-storm involving a number of individual fires, often moving in different directions. This could help account for widely differing reports from different observers of the direction from which the fire approached as well as an observation that the fire seemed to come in "three or four waves".

Preliminary observations support the conclusions of Luke and McArthur (p 94) concerning the relationship between wind speed and flame height. The fire appeared to have burned mainly at lower levels and crown fires were not able to develop (Plates 7 and 8). In fact, according to the CFA, there is evidence to show that in some cases the wind was so strong that the fire could not be sustained. Also, the very strong wind created a shadow effect so that areas sheltered by almost any type of obstacle were not burned.

As the main fire-storm propagated north-east under the effect of the near surface winds, the upper level winds, with a more westerly component, (Bureau of Meteorology, 1983, p 30) caused a number of spot fires to develop to the east in the vicinity of Gisborne and Riddells Creek (Figure 8).

The radio communication log permits a sketchy account of the fire's progress to be reconstructed. Figure 8 indicates the times and location of fire-reports taken from the log. These show that, within about 45 minutes of the wind change, the fire was burning at the back of the Rosslyn Reservoir, over half-way to Macedon. By one hour after the change a fire was burning at Dixon Road, and threatening houses in Bailey Road on the outskirts of Macedon. Half an hour later (2156) the fire jumped the Calder Highway near McBean Avenue and swept into Macedon itself. At 2234 both the Highway and the railway were jumped near Lawson Road.

Plate 7. Lack of crown fire: Macedon.

Plate 8. Lack of crown fire: Macedon.

At 2230 the Macedon District Forest Office was destroyed and by 0025 the fire had reached the Cross monument at the top of Mt Macedon. By then it appeared that the townships of Macedon and Mt Macedon had been largely destroyed.

The fire then encountered the area previously burned in the Macedon Ranges and, apart from one isolated spot fire carried over towards Lancefield, no further north-east movement occurred after 0100 17 February.

After the wind change the fire-storm became uncontrollable. Apart from a fruitless attempt to make a stand on the Calder Highway at 2130, the fire-fighters' efforts could be directed only towards the saving of life and property(at the worst of the fire-storm mainly life alone) and the control of spot fires breaking out away from the heavily timbered hills.

All possible resources had been employed, the Forests Commission, the CFA (reinforced by additional resources from as far afield as Swan Hill) together with further assistance from privately owned water-tankers, equipment and personnel from the Department of Aviation, Army personnel, airborne firefighting systems operated by the RAAF.

iv) After the Fire-storm

In one important respect this fire was different from those of 'Black Friday' (1939). This time strong gusty winds persisted for several hours after the frontal squalls. These winds prolonged the critical period during which fires maintained their intensity and made the saving of property very difficult. Some houses did not, in fact, burn until many hours after the main fire had passed (as late as 0600, 17 February in some cases).

The danger of fresh outbreaks continued for many days. Even as much as a week later some blacking-out had yet to be thoroughly completed.

The account presented demonstrates different aspects of the fire-storm in the Macedon area. With some regional variations there were many common characteristics of the fire-ordeal that different communities suffered. How the communities responded to the situation and what sorts of immediate problems surfaced in the response patterns are subjects to which this report will be directed later.

2.4 AN INVENTORY OF FIRE LOSSES

The data presented here are derived from the Victorian Prem-
ier's statement of 16 March (Cain 1983). For future rehabilitation
and planning it is necessary to have detailed information on the
losses in individual localities. Such analyses are part of the
story of post-disaster reconstruction and are beyond the scope of
this particular survey. However, the assessment of full significance
of the scale and severity of the Ash Wednesday fires requires at
least a summary of the losses and effects they caused.

i)   Altogether 47 lives were lost (including 13 CFA volunteers).
        These occurred as follows:

        Warrnambool (Framlingham)   9

        Macedon and Mt Macedon   7

        Beaconsfield and Cockatoo   28

        Otways and Aireys Inlet   3

ii)   Property destruction included 1719 houses (especially in
        the Lorne to Anglesea tract and the Macedon/Mt Macedon and the
        Cockatoo/Beaconsfield areas). In addition a further 82 commer-
        cial properties (hotels, restaurants, stores, etc), a large
        number of cars and 23 dairies were lost and 1 238 farms were
        damaged. About 8 000 people were reported to have been made
        homeless.

iii)   Stock losses amounted to 7 000 cattle, 18 000 sheep and
        smaller numbers of horses, donkeys, pigs and deer.

iv)   5 900 kilometres of fencing were destroyed.

v)   85 000 hectares of public land were burnt out.

vi)   The estimate of the total financial loss was $195 m (of
        which $16 m were for State agency losses, $10 m other public
        sector, mainly local government, losses, $164 m private sector
        losses and $5 m for the operating costs of State agencies).
        This can be compared with the 1982/83 bushfire season up to

and including Ash Wednesday for which the cost was estimated
as $228 m. These losses were recorded with the comment that
there was little doubt that the final account would be greater*.
Many other records of losses have appeared in press accounts.
The Bureau of Meteorology report made an estimate of a $400 m
loss for Victoria and South Australia combined. Inevitably, in
trying to establish the balance sheet for a major disaster,
'guesstimates' cannot be avoided especially in the early days.
For tangible damage sometimes the losses are exaggerated,
though this hardly seems the case in this instance. For intang-
ible effects no adequate measure can be established and some
aspects are overlooked or recorded only in qualitative terms.
It has been observed that there were still some residual envir-
onmental impacts from the severe 1939 fires.

Disruption of forest management must inevitably follow from the
devastation of Forests Commission tree resources. Damage to Forests
Commission assets has been put at $45-46 m. Pine plantations were
particularly vulnerable after the long dry summer. Even two weeks
after the devastation the mature trees in the Aireys Inlet were
showing signs of leaf budding, a situation that could hardly have
been credited when the scene was surveyed a day or two after the
fires when the trees were charred and completely blackened and the
ground cover completely burnt off (Plate 9). By the end of July
the trunks of trees were green with new leaves and grass and other
low vegetation were well established (Plate 10). Considerable losses
of wild fauna (kangaroos, wallabies, possums, koalas and birds) res-
ulted from the fires. Soil was laid bare and the prospect of soil
erosion especially on steeper slopes was serious, not only making
rebuilding on devastated lands a potentially difficult matter should
heavy rain occur, but also affecting water catchments.

Some other forms of damage were caused. The use of the Great
Ocean Road was disrupted by the burning of the bridge timbers at
Grassy Creek (cutting off Lorne from any help from the east until

---

*The State Treasurer later raised this total to $236 m.

Plate 9. Vegetation fire destroyed 31.3.83; Lorne-Anglesea fires.

Plate 10. Vegetation recovery 1.8.83: location as for Plate 9.

a detour was bulldozed). Altogether 5 bridges suffered fire-damage
on this road. Ninety per cent of the wooden railway sleepers were
burnt on the 28 kilometre stretch of the railway line between Gis-
borne and Kyneton. Considerable damage was caused to overhead
power and telephone cables. Some of the areas, notably the Lorne
to Anglesea coastal stretch, provided in the past considerable rec-
reational attractions. The fire had serious repercussions on tourism
prospects. Though this will be a passing phase it will take some
time before the appeal of the area and its facilities will recover.

CHAPTER 3

ASPECTS OF RESPONSE

3.1 PERCEPTION OF THE RISK

Despite a summer of frequent fire-events and an awareness
that there was a major fire-risk, many of the fire-victims who
were interviewed by the press expressed amazement at the speed
of events, the way the fire moved and even surprise that they
had found themselves threatened. Whilst individual remarks can-
not form the basis for a purely objective analysis they do pro-
vide a pointer to how communities saw the situation. In the
case of Cockatoo the last serious fire in the area was in 1954.

"It came with the speed of a jet and hit with the force of
an atomic bomb" (Cockatoo)

"Fire balls seared and exploded far ahead of the main
blaze" (Cockatoo)

"The fire roared down the hillside like a fiery wall with
incredible speed" (Cockatoo)

Many made comments about the great noise the advancing fire
produced.

Over the years there had been several fires in the Aireys
Inlet area but it had been relatively safe. The signs of the fire
to the west were observed but were felt to be far away and not
likely to reach Aireys Inlet.

"I've lived here 16 years and I've never seen a fire like
it" (Belgrave Heights, CFA Brigade)

"I could not believe the speed at which the flames moved.
The whole thing just exploded - there's no way you could have
beaten it running" (Warrnambool)

The report of Judge LB Stretton, following the 1939 fires,
is worth quoting, "Balls of crackling fire sped at a great pace
in advance of the fires, consuming with a roaring explosive noise
all that they touched. Houses of brick were seen and heard to
leap into a roar of flame before the fires had reached them".

In general how the community perceived the hazard was similar
to hazard perception in other hazard-prone areas. Individuals
were well aware of the danger of the general fire-risk, but, for
those who had not had first hand experience of a serious fire-
danger, appreciation of what was involved and how to respond were
relatively vague. This failure to think through the situation
and the tendency to distance oneself from the real impact influ-
enced many aspects of response, both those related to the more
immediate emergency and also longer term issues, such as land
management, house siting and construction. At the level of dec-
ision-making and official responsibility the significance of the
fire-risk and the need for regulations and an infrastructure for
dealing with that risk received a high level of recognition. Plans
and systems established on paper are rarely understood as well as
those who have to implement them believe they are. The snags and
gaps often become apparent only when the arrangements are put to
a major test. Computer and other simulations, theoretical or prac-
tical exercises help to indicate areas of weakness; the real thing
emphasizes any inadequacies. The more severe the event and the
greater the deficiencies in the pre-planning the greater is the
potential for a disaster. There is nothing new or not already
known in these remarks, but, despite the fact that they are so
obvious, even trite, disasters occur and the list of aspects that
require to be attended to and improved upon is too often similar
to that identified in earlier events.

3.2 WARNINGS

Warnings of impending danger become increasingly difficult to
issue the shorter the lead time available between the knowledge that
a danger threatens and when it is anticipated it will occur. The

difficulty is accentuated when the exact time and location of impact are uncertain. Bearing in mind the factors that influence the severity and behaviour of bushfires, it is clear that they present a particularly difficult hazard. Details already noted indicated that sudden changes in fire-movement produced serious threats which developed almost in tens of minutes. Under these circumstances it is not surprising that in retrospect several deficiences were apparent in the warning procedures. The experience of the Ash Wednesday fires did not reveal the existence of an effective public warning system. Apart from CFA 'listening posts' scattered through the community (individually operated receivers tuned in to CFA communications channels) there is no formal network capable of keeping the public informed.

If adequate preparatory fire-protection steps are to be taken, or fire-fighting resources marshalled in appropriate areas, sufficient warning time is essential. The necessary decisions to implement these responses require time. Fire is a hazard which, when it gets out of hand, rarely permits the luxury of the warning time desired.

In many of the fire-devastated areas individual properties are dispersed in forested situations often on steep slopes. Road access to them is difficult. Roads are winding, narrow, poorly surfaced, and in many instances end in a cul-de-sac or at a property where a larger vehicle such as a fire-tender cannot readily manoeuvre. Where only one exit is available there is a high probability that fallen trees or power lines can block that exit. These access problems made difficult both the processes of warning and evacuation. It was often impossible too for the police or others in an official capacity to get individually to all those threatened. Even with far more personnel and vehicles, helped by a public address system, this form of personalised warning could not succeed in the limited time available. In making this comment it is still recognised that the police made major efforts to warn individuals in many of the threatened areas. Where possible the addresses where elderly people were known to live were specifically checked. The warning and evacuation situation in the Macedon area is treated separately (section 3.5).

The number of houses, for example at Cockatoo, Upper Beacons-
field or Aireys Inlet, precluded a comprehensive telephone warning
system based upon individual calls (even allowing that not all
properties were connected). A simple computerised system of tele-
phoning warnings at the same time to groups of say 50 or so could
speed up the process as well as provide information on addresses
that responded or did not. This system would still have limitations
and problems but it offers the opportunity of saving precious time.

A siren system operated at CFA brigade premises, local govern-
ment offices or other suitable locations provides a partial solution
which, however, is least effective in the night hours. Another prob-
lem surfaced in the case of Macedon where the sirens could not be
used because of the failure at a critical time (2137) of the power
supply on which they relied. Not all those at risk could be warned
with certainty by this means, and it would be essential that all
those in the community had a full understanding of the meaning of
the siren and pre-planned actions that should follow the receipt of
such a warning. A siren warning can only indicate that danger is
threatened, it cannot give information on timing, the direction and
nature of the fire or any other critical information about evacu-
ation, escape routes, reception centres etc. Such information needs
to have been made available in the lead-up hours to a potentially
critical situation.

In the case of Cockatoo, which presents some of the most acute
warning problems, about 1945 a police helicopter flew over carrying
a siren. This certainly alerted people to the existence of a danger,
and supplemented the CFA siren, but, unless those who heard it made
the correct conclusions from an unexpected form of warning, it could
not achieve much more than sharpening their awareness of the need to
take careful note of the situation. However, people converged on the
township centre, where they were directed by the CFA to use the
Woori-Yallock Road to evacuate.

Not all persons could be warned. Some residents and holiday-
makers in Aireys Inlet claimed they received no adequate warning.
The fire-alarm was sounded but by that time the fire was almost
there. The local police station, owing to staffing limitations,

was not manned at the time. In the case of Aireys Inlet it was a
time consuming and difficult task to locate many of the houses sited
within the woodland. Sometimes the task was made more difficult,
here or elsewhere, where people preferred to ignore the warning and
advice to leave. For many the warning that the fire was coming
gave only ten minutes or so for them to act. Not surprisingly with
orders being shouted on radio, on loud hailers or by individuals
there was considerable confusion.

A considerable amount of informal warning occurred. Relatives
and friends got in touch by telephone and helped to convey informat-
ion about the fire-situation, to provide the confirmation that is
often sought by those who have already received a warning, and to
offer comfort and allay concern. This system was often very effect-
ive where it involved the wives of CFA volunteers who were often
not only better informed but also appreciated the real nature of the
potential danger. On the other hand an informal intercommunication
of this nature can only be partial and selective, and is always liable
to be a source of misinformation, or, in a few instances, a possible
cause of panic response.

Local radio can provide its listeners with a general picture of
the fire-situation. This is more so in the use of local commercial
stations which often have a closer local tie-up. The ABC programmes
often have centralised programming and find it more difficult to
incorporate local material. This restriction on local notices is,
of course, even more the case with television. Local radio can
assist by alerting the public to the need to keep themselves informed
about the fire-situation and to start thinking about what preparatory
steps they can take.

As for conveying warnings of the immediate risks, it seems less
probable that the normal radio programmes could focus upon the very
local circumstances that often arise in a general bushfire threat.
The local knowledge required for the radio station would have to
come from the CFA, the police or possibly the SES personnel on the
ground and would have to be transmitted to the radio station and

there understood, edited and re-transmitted to very selective groups
of potential listeners. Some skilled knowledge of the fire-problem
and of local conditions would be necessary (and not likely to be had)
at the radio station. The dangers of misinformation are considerable,
and there still remains the problem of who will hear the broadcast
especially in the night hours. An interesting situation was reported
from interviews in the field at Macedon, where it was suggested that
some residents, bothered by the smoke and the distant glow of fires
(before there was any threat to Macedon), pulled the curtains and
settled down to watch the television. Thus cut off from the world
around them some only became aware of the danger when the roar of
the fire alerted them.

Unlike somewhat more slowly developing hazards such as tropical
cyclones or floods, bushfires present major problems with respect
to the delivery of warnings. It is felt, however, that in hindsight
more information about the potential severity of the situation could
have been conveyed earlier to people in the areas in which fires
were burning. Distant smoke is not a sufficient warning in itself,
particularly in areas which, in any dry summer, may see such evidence
on frequent occasions.

Provided with this information a community would have the opport-
unity to make decisions, in a calmer, less hurried atmosphere, about
the taking of necessary precautions and ensuring the safety of docu-
ments and small valuables. Better informed decisions about evacu-
ation, routes to follow and reception centres to travel to could be
reached. People would have had a clearer idea of the nature of the
sudden wind shifts and perhaps thereby a better prospect of avoiding
last minute emergencies. In the particular circumstances of the Ash
Wednesday fires many of the residents had to make their risk assess-
ments and reach their own decisions about evacuation without adeq-
uate information.

3.3 EVACUATION

As a solution to an impending disaster situation, evacuation
has always been a controversial strategy. One is thinking of the
safety of life and property. Is one safer in one's own home or
should it be abandoned before the threat develops? Are there more
dangers (and discomforts) in making one's way, perhaps under dif-
ficult conditions, and with little time to spare, to friends and
relatives, to known reception centres or just out of the danger
area with no known place to escape to? Are property and possessions
safer if the owner remains to protect them from the danger, to
ensure their security from those who may steal or damage them? This
question raises the issue as to whether looting is a common or uncom-
mon occurrence in disasters. Many hold that it is a rare occurrence.
A number of reports of the arrest of looters appeared in the press.
Under scrutiny the number of confirmed cases were very few and nothing
appeared to support a more widely held public view that looting was a
significant threat or a deterrent to evacuation.

The divergence of viewpoint about evacuation surfaced soon after
(if not at the time of) the disaster. The Division of Building Res-
earch of CSIRO (1983) came down positively, in a report of a survey
that they carried out of the bushfire effects, that it was better
and safer to remain in the house having taken all the advised pre-
cautions. This meant that people were in the building to extinguish
any incipient fires before they could do any damage. The advice of
the police had been to evacuate, and in most cases (though not all)
residents were anxious to move out or had already made their own
decision to do so.

The Building Research team, under Dr Caird Ramsay, obviously
made a most careful field and questionnaire survey and had expert
knowledge of the nature of building behaviour in bushfire situations.
Field surveys of a much briefer nature by the authors emphasised to
them the completeness of the destruction in areas through which the
main fire-heads had moved. The flame-thrower or jet description that
was repeated in the press seemed to represent a reasonable statement

of the fire-behaviour. The evidence of very high temperatures in the burnt buildings, in the way glass and even alloy metals were melted and all combustible material had been completely consumed, accords with the stories of those who had close contact with dangerous fire-situations. There were repeated comments about the enormous heat that occurred downwind of the immediate burning firefront. It may well be that the repetitive use of terms like 'fireballs' preceding the main flames of the fires and of houses 'exploding' suddenly into a complete conflagration, rather than catching fire and the fire then building up, are dramatic forms of journalese. A graphic (correct?) description of buildings catching fire at Deans Marsh referred to them "going up like Napalm bombs". Such was the heat that moisture in the bark and trunks of trees caused them to explode.

Some discussion was undertaken by the impact survey team with house owners who had gone through the fire and had returned to caravans on their former house sites or those who had taken shelter in the Cockatoo kindergarten. They seemed to have little doubt about the fact that buildings were intact one minute and the next minute were in flames from end to end. Admittedly they had read the newspaper accounts too and were perhaps being observant and wise after the event.

The causes of buildings catching fire were probably numerous. Any opening like an under-floor ventilator, space under the eaves or at the roof gable could admit either burning debris or flames blown in the wind or even perhaps enable the whole house to be heated by abnormally hot air to ignition point. If the heat ahead of the fire broke the windows the burning bark, leaves etc had ready access to the interior of the building.

In some cases those who could not or would not evacuate, especially women and children, when the husband was away with the CFA brigade, took shelter. The two outstanding examples were the Macedon Family Hotel and the Cockatoo kindergarten. In both cases throughout the fire and with great bravery and determination fire-fighters hosed the building exterior to keep the temperature down. It was nevertheless hot enough inside for the towels, blankets or other clothes that were soaked in water and used to cover people to dry out and have to be wetted every few minutes. In neither case did windows break.

The question that is relevant to evacuation, is whether, had people stayed, could most of them have saved their properties using hoses to keep them cooler. Alternatively had the occupants of buildings remained to extinguish burning debris which had got inside would they have been able to save the premises? Would the windows have gone or not? The uncertainty, which could have lead to a disastrously greater loss of life, is whether the people might have been driven from their houses near the time the fire was at its peak, and then found themselves without shelter in an impossible fire-situation.

The four coronial enquiries in progress at the time of writing will no doubt ascertain much more reliably and correctly the circumstances that led to the 45 deaths in Victoria. Much of the discussion in this report has had to depend upon press reports. Some of the details may be incorrect. However, many of those who waited too late to leave their homes, or decided to take shelter outside but in the fire area (like the young engaged couple at Cockatoo) perished in the intense heat. The conventional wisdom for those who get trapped by bushfire whilst in cars is to remain in the car with all the windows closed and lie on the floor covered by a wet blanket. The argument is that the fire at its peak heat usually passes by in a few minutes. A sealed petrol tank is said rarely to explode and at worst burns only at the filler pipe in a controlled jet of flame. The most likely part of a vehicle to burn are the tyres. However, there were a number of people who were burnt in their cars, as well as others who had decided to try to escape from the vehicle only to be struck down within a short distance by the intense heat. The danger is tragically highlighted by the two fire tenders from Narrewarren and Panton caught on a forest track on the way to save an isolated house. Eleven CFA firefighters died, whether sheltering in the cab of the tender, under the tender or against the roadside bank.

The arguments about the correct drill will continue. There is no doubt that those who have to advise or instruct the public in safety matters as well as the public when making its own decisions want as much reliable information as can be provided.

The question of what action to take when people refuse to leave
is extremely difficult to resolve. Human freedom to decide one's
own action without interference is valued dearly. Unfortunately
cases occurred where people were allowed to stay and died. In
other instances police or others risked their own lives and vehicles
to assist those who then refused to move. In a few instances exas-
peration by the rescuers led to people being forcibly evacuated.
The cases were few and far between. The judgment about whether to
compel evacuation or allow the person possibly to die is extremely
hard to reach. The problem arises in all disaster events in which
evacuation is considered necessary.

There are other points that should be introduced into this dis-
cussion. Remembering the short warning period, the problems of what
possessions to take when forced to leave and which route to choose
had to be decided very rapidly. The thick smoke made visibility
almost nil (in most of the fire-situations it was dark or getting
dark) and accidents, where vehicles ran into obstacles blown down
across roads, were numerous and sometimes fatal. It has already been
mentioned that many tracks to houses on hill slopes were difficult
to negotiate. Evacuation was a dangerous business and without guid-
ance many people were unsure of which route to take. Some made
their way through burning areas only to be turned back through such
areas because they were moving into greater danger. A comment in
The Age from a house owner at Upper Beaconsfield exemplifies the
position: "I was on top of the house hosing the gutters and you
couldn't see the fire. The next thing we knew it was across the
road. There was fire on all sides and I didn't know where to go".

It is hard to envisage circumstances where, on a day such as
Ash Wednesday, sufficient police, CFA or SES volunteers could be
available to direct traffic. There were some difficult bottle-neck
situations such as the problem experienced by those from Aireys
Inlet who tried to join the stream of traffic on the Great Ocean
Road moving east from Lorne, and other places on the road, towards
Anglesea and Geelong. Getting into the main traffic stream from
the side roads was a hazardous and difficult task. Had there been
major accidents a grim situation could have developed.

An exodus of large numbers of people raisesmany problems. Perhaps as many as 8 000 people moved out from the residential areas. About one third of the total population of the Cockatoo area evacuated. Police or other officials gave some guidance as to where to go, but many people had little idea of what to do. The Cockatoo evacuees were advised to escape by the Woori-Yallock road, though some made their way to Gembrook. Others made their way to relatives at Fern Tree Gully where, as well as at Emerald, there was an emergency centre. Those in the Upper Beaconsfield area, where evacuation was well under way by 1800 hours, were directed to the Berwick Leisure Centre (where 500 were registered) as well as to Akoona Park and Lilydale. There were, however, complaints of under-use of relief centres. This has been explained by the inability of people to find their way to the centres. It was stated that, though 400 beds were made available in three migrant hostels in Melbourne, by 20 February only 10 had been taken up. Four hundred people are reported to have assembled at Woodend Racecourse, while others went to Kyneton. Many from Macedon, starting from about 2030 hours, travelled to Gisborne (where 1 000 people are said to have assembled at the High School) and even some from Gisborne itself were relocated. In the Warrnambool-Framlingham area evacuation took place to a reception centre at the Panmure Mechanics Institute (which was beyond the western edge of the fire). Many hundreds at Lorne, Aireys Inlet and Anglesea had an uncomfortable night on the beach, or even in the sea, but with a grandstand view of the fires to the north. Others were able to evacuate in their cars and park at the Marine Parade, Lorne. In all cases people had no more time than to gather a few belongings together. Seven buses were also brought into service to transport others further afield to Geelong where they were billeted by the Red Cross and in halls. In the Warburton area some 200 people from the houses in the thickly timbered area around the timber milling settlement of Powelltown camped overnight (17 February) on the local football oval, while a small group sheltered in a nearby dugout. About 83 people from McMahon's Creek and Reefton sheltered the same night in a tunnel between two pipes from the Upper Yarra Dam.

An important element of evacuation procedures is the registration of evacuees to identify from where they came and where they were going. This is clearly important for a host of administrative needs - for relief administration, to keep relatives and families

together or in contact and to assist future planning. The impossibility of achieving a measured and orderly evacuation and the dispersal of evacuees made it difficult to achieve registration. There were complaints about failures of many to register, so people lost track of each other. Press reports (19 February) suggest that 8 000 evacuated and that the Red Cross registered 5 000. Registration was still in progress on 19 February.

Two stories made news in the midst of all the evacuation. In Cockatoo 120 women and children sheltered in the kindergarden which was kept from catching fire by being hosed by 2 men on its roof. In Macedon the Macedon Family Hotel was the refuge for 250 people. Here too the building was protected by the efforts of the fire brigade hosing it down. Had either building become untenable at the height of the fire a horrific situation might have developed.

3.4 PRESENT POLICIES ON WARNING AND EVACUATION

While a serious attempt has been made to develop a comprehensive Disaster Plan (DISPLAN; see section 6.2) to guide the management of emergencies of the sort created by these fires, it seems that considerably less planning has been devoted to issues such as the scope, timing and broadcasting of warnings in the early stages of the crisis, and the possible initiation and control of evacuation procedures. It is the CFA's responsibility to alert police when a serious risk is perceived. It is then up to the police to decide the nature of any warning, and to deliver that warning. Police are not empowered to force any individual to leave a property in which he holds a pecuniary interest.

It appears that overall the only formal policy on evacuation from bushfires is a negative one. The CFA holds that, generally speaking, it is better for residents to stay in their homes and not evacuate, provided those homes have been 'made safe' in terms of fire-prevention measures widely promulgated by the CFA. The

CFA policy does recognize situations in which residents are forced to flee from their homes; feel too unsafe to remain; or dwell in particularly exposed or dangerous locations, such as steep western slopes.

Any feasible evacuation plan should aim to complete the bulk of the evacuation well before conditions become critical, so that panic and congestion are minimized. Under existing policy, no attempt has been made to develop an effective public warning or information system. A real need exists for public information during the hours leading up to the crisis, and a system of emergency sirens clearly cannot provide this. Thus, while residents are largely left to assess the risk and make their own decisions regarding evacuation, they are not provided with the information necessary to make that assessment.

In the conveyance of warning information to the public, in addition to the problem of establishing an effective rapid pro- cedure for the delivery of such warnings, there are matters of judgment involved. The question of judgment involves assessment of the situation by the CFA and the provision of advice to the police who have to take the warning steps. When time is short and communications are difficult, the opportunity for maintaining close links between CFA and police is curtailed. Inevitably indiv- idual police are faced with late decisions with inadequate know- ledge on which to base them. In the case of the Macedon fire in the crisis stages young police constables, without the experience of a fire situation of such severity, were attempting to coax people from their threatened homes at the peak of the fire-storm to evacuate into conditions outside which were highly dangerous.

3.5 WARNING/EVACUATION PATTERN IN THE MACEDON AREA

The sequence of events from warning to evacuation was looked at rather more closely in the Macedon area and is therefore treated separately in this section.

3.5.1 Assessments of the Situation

The Regional Officer's telephone log shows that, as early as
1435 (ie within 15 minutes of the start of the fire at East Trent-
ham), the danger threatened by the forecast wind change was well
appreciated. The Mt Macedon group communications were placed on a
separate radio channel in readiness for whatever might develop
after the wind change.

By 1550 it became obvious that the East Trentham blaze could
not be held, and it would continue to burn on a southerly course.
At this time, the area assessed as being at risk following the
wind change (expected at 2200) was bounded to the north by Ashbourne
Road, to the south by the Bacchus Marsh - Gisborne road, and to the
east by the Calder Highway (Fig 6). The CFA Regional Officer asked
the Coordinator to move police into this area, to warn residents of
the situation they could face after the change came. He was also
asked to consider setting up a disaster headquarters at the Gisborne
Shire Hall, in anticipation of what could develop.

At this stage, the possibility of the fire actually crossing
the Calder Highway does not appear to have been seriously consid-
ered. In fact following discussion by the brigade leaders involved,
it appears that there was a belief that the fire would be controlled
before it reached the vicinity of Dixon Road. Tentative firebreak
plans were drawn up with this in mind: it proved impossible to
put these plans into effect.

At approximately 1700, it was established that the head of
the fire had reached the old Greendale burn, and the FCV (supported
by some CFA crews) could not control the eastern flank. It was then
recommended to the Coordinator that a Stage 2 Disaster be declared
for the Shire of Gisborne. Again, this was in anticipation of
what could develop, and it allowed the early mobilization of organ-
izations later involved in dealing with the disaster.

3.5.2 Warnings and Evacuation

The police began door-to-door warnings in the Bullengarook area at approximately 1630 with a request that residents (mainly the women and children) should move to the Bullengarook Reserve. At 1700 the police were advised that they should work more to the north, in the areas of Fingerpost Road, Blackwood Road and Lawson Road (Figure 4). People were advised that the fire was likely to sweep through the area after 2200 (at about this time the Bureau of Meteorology forecast brought the expected time of the wind change forward to 2100).

The official warnings were initially influenced by the belief that the fire would be halted before it could cross the Calder Highway. Some believed that with the fall of darkness and the possibility of rain from the cold front the rate of spread would decline significantly. No official warnings were given, in the circumstances, in Macedon or Mt Macedon. It was decided not to broadcast warnings over the Melbourne radio stations in fear that serious panic would occur in the north-west outskirts of Melbourne. It could be argued that the belief in community panic is exaggerated and that better warning to the communities at real risk is better than the hypothetical fear of panic elsewhere.

With the inherent slowness of the delivery of door-to-door warnings and the earlier than expected arrival of the wind change, it is unlikely that the official warning process was very effective. The police started warnings four hours or more before the main emergency and continued, throughout the development of the fire-storm, warning or trying to persuade people to leave their homes.

Warnings were also delivered by some fire brigade members. For example, at 2130 residents in Bailey Road (Figure 4) were advised by the Mt Macedon brigade captain to evacuate after a large spot fire developed near Dixon Road. He also spent some time driving round the area warning residents in severely exposed or poorly prepared dwellings to leave. As elsewhere an unofficial warning network by telephone operated between friends and relatives.

Three modes and stages of evacuation can be identified. A small number left early and in an orderly fashion in response to warnings delivered door-to-door to police, mainly in the Bullengarook area. A second group left the Macedon area at a very late stage in response to warnings by friends and police insistence on evacuation reinforced by their own perception of the danger. Many in this group moved to places set aside as safe refuges. These included the 250 people at the Macedon Family Hotel, 100 cars which went to the Tony Clarke Reserve, two people who stayed at the Macedon State School and the 120 families who took refuge in the car park of the Australian Counter Disaster College at Mt Macedon. A third group was made up of those who spontaneously elected to escape by road about 2200 (ie near the peak of the fire storm) from Mt Macedon. It was estimated that 70 to 80 percent of the Mt Macedon residents left their homes, under very dangerous conditions, driving south from Mt Macedon almost directly into the path of the fire-storm. Whilst it might be an exaggeration to describe this exodus as panic stricken, there were numerous examples of reckless driving under circumstances of great traffic congestion from 2030 onwards and very poor visibility in the darkness and smoke.

3.5.3 Discussion

When police commenced door-to-door warnings in the Bullengarook area the East Trentham outbreak was only two hours old, and the wind change was not expected for another five and a half hours. Thus the timing of these warnings could hardly have been much earlier.

On the other hand, the planned scope of the warning effort was seriously deficient, because of the mistaken belief that the fire would not cross the Calder Highway. This error in assessing the extent of the threat may reflect a poor appreciation of the extreme severity of the conditions, both prevailing and expected.

On the other hand, the meteorological expectations were for moderating temperature, increasing humidity, decreasing wind speeds and the possibility of showers or even thunderstorms as the cold

front moved across. It may have seemed reasonable to assume that conditions would moderate quickly enough to enable the fire to be contained at the Calder Highway.

In the event, even for the erroneously small area perceived to be at risk, police were faced with an impossible task in attempting to carry warnings door to door. The area to be covered, the small force of men available, and the early arrival of the wind change (one and a half hours earlier than expected at the time the warning effort commenced) meant that time ran out before effective warning could be delivered.

CHAPTER 4

AN APPROACH TO THE RESOLUTION OF THE PROBLEMS OF

WARNING AND EVACUATION

From the foregoing discussion it is clear that there are
serious deficiencies in the tools available to those responsible
for overseeing the safety of populations threatened by bushfires.
In this section an attempt is made to define the problems faced
by those in charge, and the various uncertainties which make
solution of those problems so difficult. Methods which may help
to resolve these difficulties are then proposed.

4.1 THE MANAGEMENT PROBLEM

Suppose it is accepted that certain authorities (eg the
police) have a responsibility to provide residents with
appropriate warnings on which to base their decisions to evacuate
or remain in their homes. To perform this task it would be nec-
essary first to decide the following questions:

a)   To whom should warning be directed?

b)   When should warnings be issued?

c)   What types of warnings should be given?

These questions constitute a decision problem which involves
very difficult trade-offs between the costs of provoking unnecess-
ary and unwarranted alarm, and the costs of providing insufficient
warning; and between the costs of unneccessary evacuation, and
the costs of needless loss of life. The problem is made difficult
by the uncertain dynamics of intense bushfires, and by the lack of
appropriate measures of cost on which to base the above trade-offs.

Fire dynamics are governed by a variety of factors, including
the following: fuel load and condition; temperature and relative
humidity; wind speed and direction on the ground and at altitude

(especially following a wind change); length of fire-front, follow-
ing a wind change; terrain; time at which wind change occurs;
period for which the fire danger rating remains high.

Most of these factors cannot be known with certainty before-
hand. In addition, some of them are highly variable in space
(eg fuel load and terrain).

Let us consider the Macedon fire as an example. Fuel loads
here were not known with any certainty. Unofficial estimates
after the fire suggest a value in the range from 10 to 15 tonnes
per hectare. Wind speed following the change was underestimated
in the forecast issued at 1710; for at least thirty minutes after
the change, mean wind speed at Tullamarine was approximately 70
km h^{-1}, rather than 55 km h^{-1} as forecast for Macedon. Peak gusts
were also significantly (eg 10 per cent) higher than expected.

The duration of high speed winds following the change was
greater than expected, so that the period of extreme fire danger
(and hence high intensity fire) was considerably prolonged. The
precipitation which usually accompanies such a change (and was
expected in this case) was largely absent. The time at which
the change arrived was half an hour earlier than expected at 1710
in the forecast (and one and a half hours earlier than expected
in the 1525 forecast), so that the breathing space before the
fire 'blew-up' was 3 hours rather than 3½ hours. Mean wind dir-
ection was forecast to be south-west after the change but in
fact was at least 20° closer to west (Bureau of Meteorology
Report 1983, Fig 50).

While long-run analysis of records will be necessary to
establish if such levels of uncertainty are typical, it is well
established that fire-dynamics are very sensitive to variations
in these parameters. Of particular importance are fuel moisture
content, and average wind speed.

Combustion rate in eucalypt fuels could be four times as great
in fuels with a moisture content of 3 per cent (close to the extreme
lower limit) as in fuels containing 10 per cent moisture (Luke and

McArthur, p 83). Below 7 per cent, a lowering of moisture content
by 2 per cent could double the fire spread rate. When moisture
content exceeds about 20 per cent forest fires tend to become self-
extinguishing. Thus variations in fuel moisture content can have
dramatic effects on rate of spread, flame height and spotting pot-
ential. Therefore, prior uncertainty in fuel moisture content
must generate very significant uncertainty in predicted fire dyn-
amics.

The rate of forward spread in both eucalypt and pine forest
appears to have a quadratic dependence on wind speed (measured in
the open, at 10 m height) (Luke and McArthur, pp 87, 88). Thus a
10 per cent error in predicted wind speed can lead to a 20 per
cent error in predicted spread rate.

The situation is much worse if one considers the combined
effect of uncertainties in these parameters, as can be done by
examining Figure 9, reproduced from Luke and McArthur (p 88).

Rate of speed also depends in a sensitive manner on ground
slope in the direction of the wind. Luke and McArthur (p 95)
suggest an approximate quadratic relationship under which the
spread rate of a "fire on level ground doubles on a 10° slope and
increases almost fourfold travelling up a 20° slope". The rate
of spread is greatly reduced on down-slopes. Therefore the uncert-
ainties in prediction are aggravated if there is a high spatial
variation in terrain, as well as in fuel availability and condition.

In the extreme conditions under which the delivery of warn-
ings and the evacuation of residents become serious issues, the
applicability of simple models for relating variables such as those
discussed above, becomes less certain. For example, the most
extreme curve in Figure 9, for a moisture content of 3 per cent,
indicates a rate of forward spread of approximately 3.85 km h^{-1}
for an average wind speed of 45 km h^{-1} such as existed during the
southward run of the East Trentham fire. However, it was observed
in Section 2.2.7 that the actual rate of spread during this time
may have been closer to 5 km h^{-1}.
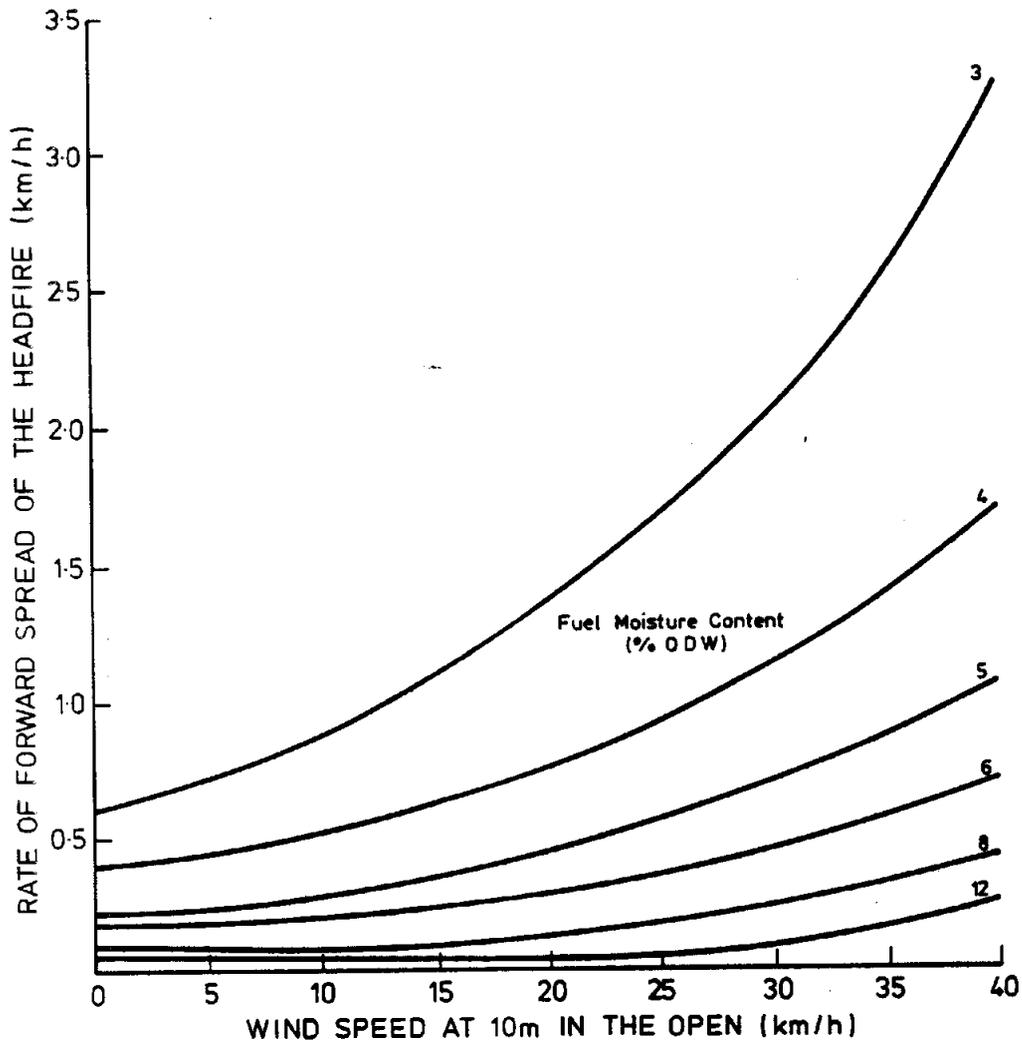
Figure 9. Rate of spread of a headfire in eucalypt forest
under specified conditions of height and quantity
of fuel, wind speed and moisture content of
surface litter.

(Reproduced from Luke and McArthur (1977)).

This may be due in part to the fact that under such extreme
conditions, the mode of propagation is likely to be dominated by
medium-range spotting - a process which is essentially stochastic
in nature. For a fire propagating in this way it makes little
sense to think in terms of steady forward progres. Massive short
to medium-range spotting can have a very large influence on the
effective rate of spread through a chain reaction process, and
sometimes leads to a mass fire effect as spot-fires coalesce.

The spotting process depends in a complex way on many vari-
ables, including fuel condition and distribution (notably, the
characteristics of bark), atmospheric instability, and wind speed.
Spot-fires are very likely to be thrown from the top of a ridge,
following a fast upslope run, so the spotting pattern could be

greatly complicated in a highly variable terrain. The severity
of spotting can also be enhanced by the atmospheric and mechan-
ical turbulence associated with a front.

In summary, those attempting to make decisions based on pre-
dictions of extreme fire dynamics are faced with:

i)   Uncertainties in the present and future values of the
        parameters of the situation.

ii)   The essentially random nature of fire propagation
        dominated by medium-range spotting.

iii)   Inaccuracies in the models used to relate the variables
        involved.

4.2 AN APPROACH TO DECISION MAKING

In the face of such uncertainties, those in charge must make
decisions and provide information to the public. They must work
under considerable pressure, since decisions are required within
a very short time frame, and they must eventually be answerable
for the decisions made in a situation where lives and property are
at stake. Decision-makers would almost certainly benefit from using
analytical methods which help to make their decisions defendable in
other than a purely subjective fashion.

Since it appears that extreme fire-dynamics can be predicted
with little certainty, it is desirable that decision-makers should
learn to base their decisions on probabilistic data and analyses.
At the beginning of section 4.1, three questions were posed. An
attempt is now made to indicate how a probabilistic approach might
provide a rational basis for deciding those questions.

In deciding whom to warn, it should first be recalled that a
primary objective is to provide information in a general sense.
This calls for more or less universal warnings of a general nature,

in much the same way as tropical cyclone warnings are issued in Queensland. In this way one would hope to maintain a high level of awareness of the situation.

More specific warnings will be necessary for those likely to be critically affected, and this requires the identification of the areas and inhabitants under threat.

To illustrate the need for a probabilistic analysis, consider the highly simplified situation in which one attempts to predict the total area which will be affected before conditions moderate and the fire can be brought quickly under control. That is, consider a period of time τ during which the fire is essentially uncontrollable. The value of τ is uncertain, as it depends on how quickly conditions moderate. Suppose it is estimated to be 3 hours, but it could be anywhere in the range from 2½ hours to 3½ hours. Suppose the fire burns through uniform country with a fuel load of 20 tonnes per hectare on a constant, straight front perpendicular to the constant wind (Figure 10).

The rate of spread, v, depends on the wind strength, w, and the moisture content, q of the fuel. Suppose q is estimated to be 4 per cent, but could lie anywhere between 3 and 5 per cent; and the average wind speed is forecast to be 35 km h^{-1} but could lie anywhere between 30 km h^{-1} and 40 km h^{-1}. Reference to Figure 9 then shows that v could be anywhere in the range from about .7 km h^{-1} to about 3.25 km h^{-1}.

Figure 10 illustrates the range of variation in the area affected, as implied by these uncertainties, and assuming the model represented by Figure 9 to be accurate. The diagram neglects many factors which would serve to introduce more uncertainty into the prediction. Nevertheless there is a clear indication that the use of forecast point estimates as in Figure 10(a), neglecting the possible uncertainties in those estimates, could lead to serious errors in defining the area, and the inhabitants affected.
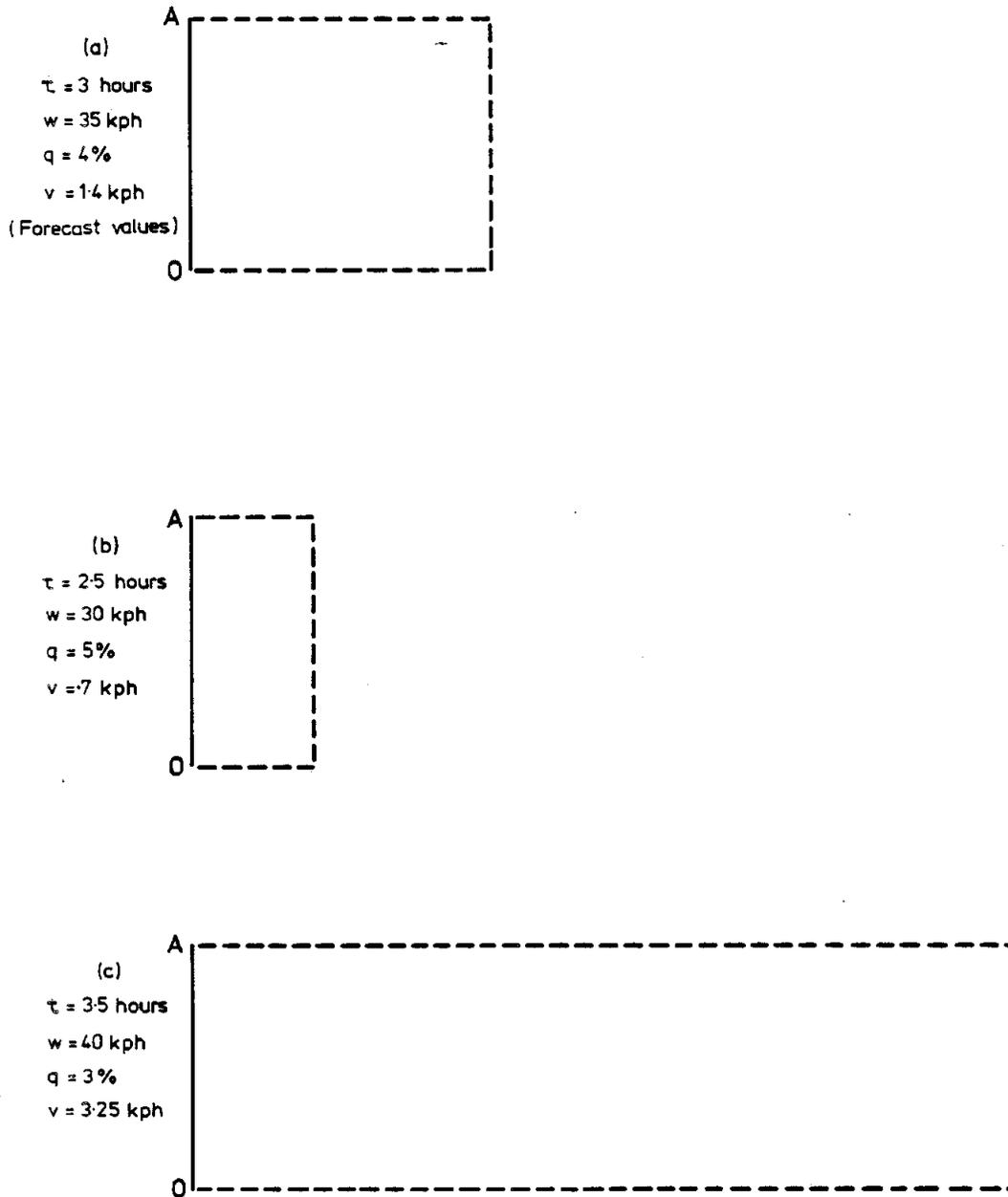
Figure 10.   Range of variation in the area ultimately affected
given an initial fire-front OA.

In a probabilistic analysis, instead of attempting to predict the area affected, one might try to compute the probability $p(x, y)$ that fire will be experienced at the location (x, y). This is illustrated in Figure 11, in which the vertical contours connect points of constant values of $p(x, y)$, for the case where τ lies, with uniform likelihood, between $2\frac{1}{2}$ hours and $3\frac{1}{2}$ hours, and v lies (also uniformly) between 1 km h^{-1} and 3 km h^{-1}. In this way, areas at risk are ranked according to their probabilities of experiencing uncontrollable fire at some time in the interval of time τ.

Such an analysis might be carried out several hours prior to an expected wind change. The decision-makers would then be presented with information which takes account of the uncertainties of the situation. They might then decide, for example, that all inhabitants in areas for which p is greater than 0.6 should immediately be advised to evacuate, while those for which p lies between 0.2 and 0.6 should be placed on extreme alert. Such information could also provide the basis for more general information disseminated to a wider audience.

The above example was deliberately simplified to enable an analytical solution, purely for the purposes of illustration. In practise, the situation would be much more complex. One factor which may have important implications for decision-making is the spatial variation in conditions. For example, of two locations having the same probability of experiencing fire, one might involve a steep upward slope in the direction of fire spread, while the other is on level ground. Other things being equal, fire experienced at the former location is potentially less controllable and more dangerous. Similarly some locations may have much more restricted access and escape routes than others.

Therefore, while the above analysis will provide a map of the probabilities of experiencing fire, it should also be made possible for the probability map to be overlayed with other relevant spatial information.
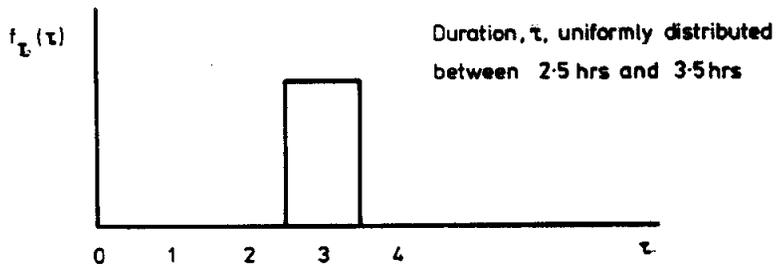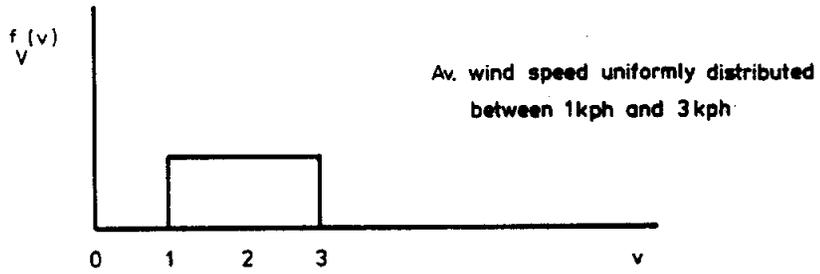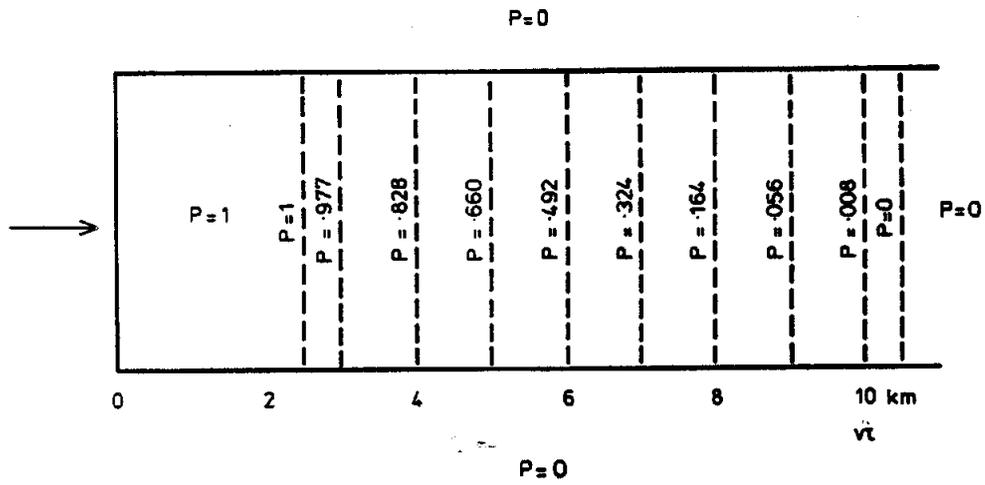
Figure 11. Probabilistic analysis of fire-spread.

The probabilistic analysis should employ the best available fire-propagation models. In practice, the resulting computations will be far too complex to allow an analytical solution. It will be necessary instead to employ Monte Carlo simulation techniques, in which the values of uncertain parameters such as wind strength, fuel moisture content, spotting range and frequency, etc, are drawn from appropriate probability distributions, and the resulting model is solved numerically. If the same fire situation is simulated repeatedly in this way (N repetitions, where N is large), and if fire is experienced at the location (x, y) in n of these simulations, then $p(x, y)$, the probability of fire at (x, y), is estimated by computing n/N.

The timing of warnings can be of crucial importance. The events in Macedon and Mt Macedon amply demonstrate the need for evacuation to be conducted at an early stage. After the wind change, events moved so quickly that any hopes of an orderly safe evacuation were lost.

Factors involved here include the time required to broadcast warnings, and the time needed for residents to respond to these warnings. The former will be discussed in the next section. The latter involves the psychology of community response, which is beyond the scope of this discussion (see for example, Perry et al, 1981), as well as the potential traffic flow problems posed by a sudden exodus of citizens from settled areas.

Such traffic flow problems (in situations where they are non-trivial) are amenable to Monte Carlo simulation techniques (see for example, Land, 1981) which can be used to provide estimates of time requirements for the physical process of evacuation, under a variety of conditions.

The probabilistic simulations of fire behaviour discussed earlier could also be used to estimate $p(x, y, t)$ for different locations (x, y) and different times t, where $p(x, y, t)$ is the probability of experiencing fire at (x, y), by time t. These results would

find expression as a series of probability maps, one for each discrete time, t - the probabilistic analogue of the fire-spread maps now in common use to represent overall fire dynamics.

These results would then be considered in conjunction with likely evacuation times to define deadlines by which evacuation warnings should be issued if orderly, safe evacuation is to be achieved by those deciding to leave.

4.3 PRACTICAL ISSUES

A number of practical issues will need to be resolved before the approach outlined above can be implemented. These relate to the provision of an appropriate computer system, and an effective communication network.

Effectively, one must choose between a centralised computer facility located in Melbourne, and a distributed network, with smaller facilities located in the regional centres.

To some extent, the choice depends on the modelling approach employed. Real-time modelling and analysis are clearly essential, so the speed with which the relevant data can be assembled, and the fire-behaviour models implemented, will be of crucial importance. If large, complex, state-of-the-art models are employed, it is likely that the computing capacity required will not be provided in smaller distributed facilities - a large central machine serving all regions may be the appropriate choice.

Wild fires do not observe regional boundaries. The modelling of any given fire situation will usually require the integration of data for several adjoining regions. This may be more difficult to achieve if computing power and data bases are distributed regionally.

An extensive data base must be set up and maintained. Information such as the following will be necessary for all areas:

i)   Up-to-date data on fire weather and conditions.

ii) Classification of areas on the basis of topography, vegetation type and condition.

iii) Population distribution.

iv) Transportation networks.

The authors understand that the CFA is presently contemplating the establishment of large-scale computer facilities capable of managing such a data base. It is recommended that modern techniques of geographic data base design (eg Turner, 1981) should be adopted.

A centralised system will call for an efficient and reliable communication network. This will enable the data base to be continually updated during the event. It will also ensure that the results of computer analyses can be fed back rapidly and accurately to controllers in the field. Such a communication network is, in any case, an essential component of the existing centralised fire-management system.

CHAPTER 5

FIGHTING THE FIRES

5.1 THE USE OF FIRE-FIGHTING RESOURCES

The overall pattern of the fire behaviour was not unusual.
Previous fires in Victoria which have been reported in some detail
(eg McArthur, Cheney and Barber, 1982) followed a very similar pat-
tern. The very great intensity of the Ash Wednesday fires, their
rapid rate of spread and the chaotic mode of propagation combined to
make them a relatively rare occurrence and one with which the combat-
ing resources and emergency preparedness could not cope.

In total, Victoria has, for the whole state, 107 000 CFA volun-
teers. In the Ash Wednesday fires an estimated 15 000 such volunteers
participated in the counter-fire activities. Supplementing their ser-
vices a further 1 200 employees from the Forests Commission, 1 000
police, 500 defence personnel and 33 National Parks and 9 Lands Depart-
ment officers took an active part. The Premier's report (Cain 1983)
listed the fire-fighting equipment which was employed. This included
400 fire-trucks and water tankers and bulldozers (from private owners
and the Defence Department), 11 helicopters (from the RAAF, the Nat-
ional Safety Council and Westpac Rescue helicopters), 14 aircraft
including a Forests Commission Hercules. It has been argued that
such was the severity of the fires that even had there been more equip-
ment or personnel no more could have been achieved, though some com-
plaints have been raised since about the outdated nature of some of
the equipment and vehicles.

In the earlier stages inadequate information may have been a
problem. This led to some of the fire-tenders going from their then
unthreatened areas to assist those areas already under fire-attack.
The Aireys Inlet fire-tender was despatched to assist with the Lorne
fires but did'nt get there. It went up a side track to try to save
a house then was radioed to get out for its own safety. It was not
available to protect Aireys Inlet as the fire raced east towards it.

In the case of Cockatoo when a local fire broke out about 1830 nearly all the local trucks were already busy fighting the fires at Belgrave. The dreadful tragedy to the CFA Narrewarren and Panton Hill firemen demonstrates the nature of the danger to the fire-fighters. In some instances the only step to be taken was to get the fire-tender and crew out of danger.

Smoke made it difficult to establish with precision the exact location of the fires. Infra-red photography provides a potential answer that can be used to greater extent. It provided some assistance in this particular situation.

As an aid for fire-control there were calls for a large-scale employment of aircraft for bombing fires with water and fire-retardant chemicals on the pattern used in North America. Whilst this can be a valuable strategy when the fire is in its early stages it is not suitable for coping with a major outbreak that is well established. In the Victorian case the amount of smoke and dust reduced visibility seriously and would have made visual pin-pointing of the fire locus often very difficult. Helicopters, if available, served well to map fire movements until the smoke obscured the main fire-centres.

5.2 FIRE-FIGHTING STRATEGIES

In retrospect, it is clear that the only possible hope of controlling the fires in question and of averting a major disaster was in the period prior to the wind change.

During the first hour of the East Trentham fire, for example, the fire-fighters believed that they had the head checked, and that they would be able to exclude it from the bush. In this they failed. It is a moot point whether, even if additional forces had been rapidly deployed, the outcome would have been different.

The well-established tactic when fighting a fire burning strongly southwards under a northerly wind, with a westerly change expected is to attack the eastern flank. The Forests Commission, supported to some extent by CFA men and equipment, adopted this strategy but the task was too difficult in the rough terrain. The basic question is, 'Was enough done in the four hours preceding the wind change? Should (or could) additional resources have been called upon in that critical period?'.

Some public discussion has been directed to questioning whether additional resources were called in early enough from other CFA regions. It does appear that in some cases special supporting task forces appear to have arrived on the scene some time after the situation had become critical. These matters will no doubt receive attention in the CFA report which, however, the authors of this report could not get access to. Our own survey did not permit us to carry out an informed discussion on this matter.

5.3   CASE STUDIES OF SUCCESSFUL HOUSE DEFENCE

Most residents sooner or later evacuated either from the fire-area or to designated shelters. A few residents chose to remain to try to save their property from destruction. Some lost their lives. Several successfully saved their own homes and even those of their neighbours. No conclusion is drawn here about the wisdom of the different decisions. The viewpoints range from support to absolute condemnation of staying.

The experiences of two residents who were well prepared for this emergency were described in some detail at a CFA debriefing held soon after the fire. The account that follows demonstrates some of the aspects of the defence against the fires that should be kept in mind.

One of the residents is a woman who had previously been employed by the Forests Commission at Beechworth and therefore had some familiarity with fire-fighting procedures. In addition she had attended a locally organized course on fire prevention two years before. She lives in a green-painted timber house with a brown iron roof. She was equipped with fire-fighting equipment, including a pump and a fire-hose on a private dam.

She initially became aware of the fire danger after sighting smoke from the East Trentham fire about 1530. She rang the local Forests Commission office and was informed of the concern aroused by the forecast wind change. She relayed this information by telephone to friends about five miles out on the Blackwood Road.

She and her teenage daughter then prepared to fight the fire. They donned suitable clothing, filled the house gutters and a large drum with water and located torches ready to work in the darkness.

Shortly before 2200 a friend warned her by telephone when the first spot fire reached Norton Road. Using both reticulated water and their private pumped supply, she and her daughter then began 'damping down' in earnest, particularly a tall laurel hedge on the side of the property from which the fire came. Although ground litter in the eucalyptus reserve across the road burned fiercely, the wet laurel hedge succeeded in dividing the fire and effectively protecting the house.

The pump and the hose survived the fire. However her planned escape route into the waters of the dam was cut off. She and her daughter found shelter 5 metres down in their well where they spent several hours.

The other resident is a member of the Macedon volunteer brigade. He returned to his house approximately thirty minutes before the fire-front passed through its vicinity. Even at that early stage the house was being continuously bombarded with burning debris, although no significant spot-fires had started. The house is a white painted weather Board structure with an iron roof.

He and his eleven year old son donned overalls, hosed each
other down and filled the house gutters with water. He relied
solely on the reticulated water supply. Although urged to leave
by several callers, including a police officer, he stayed to
defend the house.

As the fire-front came, they sheltered under a trailer in a
silver painted steel shed. They remained there until after the
main wave of radiant heat had passed. They then spent several
hours hosing down spot-fires and burning material about the house.
Fortunately the reticulated water supply continued at sufficient
pressure to enable this.

The house was sheltered to some extent by a hedge of deciduous
trees. He believed that the white paint helped to reflect the
radiant heat and also that the iron roof was less likely than a
tiled roof to allow the ingress of sparks.

Both of these persons elected to defend their properties because
they felt confident of being able to cope with the situation. This
belief was based on their state of preparedness together with their
background and training in fire prevention and combat. Both had a
high level of awareness of the situation leading up to the necessity
to defend their homes. This high level of awareness, however, did
not show itself among a number of those interviewed by the invest-
igation team.

5.4 COMMUNICATIONS

One problem that surfaced was that of communication. Indeed
this is one of the almost inevitable concomitants of disaster.
Physical problems caused by dust and smoke impeded radio and tele-
communications. Hilly, heavily timbered terrain added to the
radio difficulties in many areas. Although there were many radio
sets each with 10 frequencies there was a great deal of overlapping
frequencies and very high traffic load. In the pressures for fire-

tenders to communicate between each other and their specific con-
trol headquarters confusion reigned. It was very difficult for
field commanders to deliver or receive situation reports and to
control the movement of vehicles. Elsewhere reports indicated
that bulldozer drivers involved in establishing fire breaks were
inadequately informed where the fire front was. Amateur radio
operators had to be enlisted to cope with the breakdown of offic-
ial communication links. In other cases it was reported that
the Forests Commission and the army, without common radio freq-
uencies, were unable to communicate with each other. They also
lacked a control command structure. Other reports referred to
intercommunication difficulties between the Forests Commission and
the CFA.

The telephone network was jammed in Gisborne, Macedon and
Mt Macedon because of the heavy traffic generated by residents
calling friends and relatives to convey information and warnings
or by others attempting to report sightings of fires. In addit-
ion official traffic was increased by the needs to exchange sit-
uation reports and liaise about the general problem.

It is appropriate at this juncture to highlight another aspect
of the communications process which adds to the difficulties exper-
ienced within the emergency period. The statements above which are
related to aspects of communication have focussed on such things
as the type of equipment, the capabilities of the equipment in use,
and even the problems encountered with specific equipment under
emergency conditions. This focus is on communication as plant and
communication as the act of transmitting messages. It concentrates
on the physical aspects of communication.

The prerequisite for having the capability to transmit messages
to and from locations and between groups is that there is an organ-
ized procedure and an agreed to understanding amongst the groups who
are sending and receiving messages that they will be acted on, if
not immediately at least taken into account when the situation req-
uires. In other words, the act of communication also implies a

social component. It is arguable that the social component of the
communication process is the more important of the two variables
because if the transmission and reception of messages are made in a
social vacuum, or are not understood, or cannot be acted upon bec-
ause they have been received by an inappropriate group (inappropriate
in the sense that the message is not appropriate to their role in
the situation at hand); or if the planning of the physical communic-
ation procedures is inadequate, misunderstood or not followed by all
participating groups, then no matter how well the message is trans-
mitted or received its value will not be maximised. This is precisely
what occurs in most disaster situations. It is the opinion of at
least one of the authors that the term 'communication' as it is under-
stood by the majority of the personnel of Australia's disaster-
relevant organizations is nothing more - and nothing less - than the
acquisition of more and better (that is, more sophisticated technol-
ogically) physical plant. There is very little cognizance of the
social factors implicit in the act of communicating. Organizations,
for example, see the priority of installing multi-frequency trans-
receivers in their vehicles rather than attempting to get   to
know their offsiders in another disaster-relevant organization. Sen-
ior officials within organizations regard having an inter-organizat-
ional communication system that is dedicated to provide communications
facilities between those organizations and which bypasses the tradit-
ional means of communicating as important, despite the probability
that the organizational personnel themselves are barely on speaking
terms because of some misperceived boundary encroachments by one on
the other. Organizational leaders see the advantage of having the
physical capabilities of inter-organizational communication link-ups
during times of emergencies, despite the realization that none of
them really understands what part the other linked organizations
are playing, or are required to perform during the emergency period.

Communication, then, is more than the ability to transmit inform-
ation. The influence of the level of interaction, the type of inter-
action taking place as a result of the ability to communicate, and
the utility of the transmitted message on the performance of the
individual organization and the organizational network as a whole is
dependent on both the transmitter of the message and the receiver of
that message understanding the content of the message and the context

within which that message was sent to a particular organization.
Implicit within the act of communication is the understanding that
the message will be acted on. Enactment implies that both the
transmitter and the receiver is aware of the ability and likelihood
of the receiver to undertake action as a result of the reception of
the message. If not, then the act of communication need not have
taken place. Within the disaster setting, communication is vital
and the physical act of communicating is extremely important, not
only through the speed of transmitting information, and the ability
in fact to transmit and receive message, but also to act upon the
information obtained. In order for this to occur, the social envir-
onment in which the communication is made must be attended to.

In order for the flow of information to be effective during
periods of emergency operations there must be a commitment to inter-
and intra-organizational teamwork. An understanding of the role
that all the involved disaster-relevant organizations play, and what
each role encumbent does within the particular organization, is nec-
essary. If this is known, the corollary is that organizational per-
sonnel will have an understanding about how the transmitted message
will be received and in what manner it will be acted on. Without
the commitment of the disaster-relevant organizations to the social
aspects of the communication process, the maximization of communic-
ation cannot be achieved - whether or not sophisticated transmission/
reception devices are employed.

5.5 VIEWS ON FIRE-BEHAVIOUR AND FIRE-MANAGEMENT

The fundamental question is what measures can or should be
adopted either by residents or local authorities to reduce the level
of property destruction and other losses. To ascertain the answers
the first pre-requisite is to explore the nature of fire-behaviour
and the ways in which it causes its greatest damage.

In the immediate post-fire period it was difficult to find
clear reasons why some houses survived and others did not. Some
obvious differences in exposure or in surrounding vegetation cover
could be related to the fire-experiences, but these did not always

permit conclusive explanations. The amount of burning debris and
the distances it was being carried in the strong winds meant that
almost every house in the line of fire-advance was at risk. The
assembly and detailed analysis of data by CFA and CSIRO research
staff will no doubt advance understanding and identify useful
safety measures.

The CFA maintains a programme of public education, part of
which is aimed at persuading residents to carry out fire-prevention
measures (eg Morris and Barber). CFA firefighters in Macedon con-
sidered that many houses in the area were not 'made safe' in these
terms, but that in those cases where good fire-prevention work had
been carried out the damage was lower. But failing the availabil-
ity of pre- and post-disaster analyses of the relevance of preventive
measures, it is difficult to assess their value. One of the important
recommendations has been the establishment and maintenance of green
fire-resistant vegetation. To achieve this requires adequate water
and the drought had made it impossible.

The Insurance Council of Australia publishes an advisory
pamphlet (the details are summarised in appendix 2). This details
a range of desirable preventive measures. From a detailed examin-
ation of the Ash Wednesday circumstances it may be possible to deter-
mine whether, if at all, any of the recommendations need to be dropped,
changed or added to. With the information available from the CFA, the
Insurance Council and other sources there is no dearth of guidance
available to the general public. There is certainly need to examine
the extent and the ways in which the public responds to advice.

Bushfires in conditions favourable for their development start
suddenly, spread with frightening speed, leave a devastated land-
scape behind them with many of the clues of what happened in the
few destructive minutes destroyed by the fire itself. There are
usually other much more vital things to do than dispassionately
record the pattern and behaviour of the fire. Hence a diversity
of views are expressed on what really happened and therefore what
is the best course of action to take. Some took the view that

evacuation was the only thing. In certain circumstances this was
the view of the police and of CFA members. The public generally
agreed with this assessment though some refused to leave (and unfor-
tunately some of these paid the penalty) and decided to fight the
fires. Of the stayers some were able to point to the fact that, by
being present, they had saved their house. Their confidence in
their ability, providing they were adequately equipped and had taken
sensible precautions, to prevent fire getting into the building has
been backed up by a view put into print in Rebuild, the newsletter
of the CSIRO Division of Building Research (April 1983). The opin-
ions expressed are quoted here at length.

"Over all it appears that a house attended by people able to
extinguish the many small fires which occur outside and inside a
house will survive most bushfires. This is particularly true if
attention has been given to eliminating or protecting access
points for embers and minimising ground fuel against and around
the house."

"Whereas one cannot guarantee your survival in a house during
a bushfire it could be safer to stay put than to try to escape on
smoke-filled fire-lashed roads."

The popular emphasis upon 'fire-balls' and very hot gases
ahead of the main fire-front, and the frequently re-iterated
remark that houses 'exploded' into flames, are not accepted by
the field survey and questionnaire undertaken by the Division of
Building Research Safety and Risk Program. Dr Caird Ramsay's
investigating team recognised that fires differ in their charact-
eristics. Their distinction identified three types.

i)   The Warrnambool grass farmland fires varied according
        to the thickness of the grass cover. The main line of fire
        advance followed the longer grass on road reserves outflank-
        ing the paddocks that lacked sufficient fuel to sustain the
        fire. The result was a patchy development of the fire.
        Often the fire travelled much faster than in timbered area.
        Where the vegetation was heavy enough, in its drought affec-
        ted state, it produced a fierce and destructive fire that
        destroyed farms, fodder, fences and stock.

ii)   In the Macedon, Belgrave and Cockatoo areas the fire
         pattern was diverse because of the variable terrain and the
         interspersing of thickly timbered slopes with open paddocks.
         Where the grass was sparse the fire advanced more slowly,
         elsewhere fierce crown fires developed. Houses were lost
         both in the grass areas and in the forest.

iii)   In the Otways, it is suggested that the fire spread
         at an intense level burning areas comprehensively and com-
         pletely. The fierce fire, fed by the low scrub, left the
         ground surface completely bare and indeed sterilized the
         topsoil by the heat it generated.

         The authors of the survey downplay the idea that the Ash
Wednesday fires were unusual or unique. It was agreed, however,
that the fire advance was extremely rapid and fierce. The sur-
vey revealed that there were many cases where houses did not
catch fire as the fire-front passed but only after some delay,
sometimes as much as 4 hours later. It was claimed that where
owners returned to their houses soon after the fire-passage they
were able to put out small spot-fires burning slowly in the eaves
or on the doormat. In other words the argument was that fires
in houses often became established slowly, unless the spotting
material was able to gain access to flammable contents through
ventilators, under floor spaces, by undue fire ingress to the
roof timbers, or by the breaking of windows. The fact that, even
in severly burnt over areas, up to 40 per cent of the houses sur-
vived, it was suggested, was a demonstration that a wall of intense
heat had not burnt all in front of it.

         Extending this idea further is a view that those who aban-
doned their houses were more likely to die in the open as the
fire approached than if they had remained indoors.

         What is critical is whether the fire has means of ingress into
the building. The materials from which the main structure is built,
even bricks and steel, mean little if the fire gets into the build-
ing through broken windows or other unprotected openings and ignites
the contents or lodges on timber ledges, exterior stairs, verandah
floors etc. In the survey carried out in the Otways region the

conclusion was that flying burning debris and not direct flame or heat radiation was the main cause of house fires. The duration of peak radiation was limited to a minute or a minute and a half, flames in the surrounding vegetation lasted only 5 to 10 minutes while the bombardment of burning material started perhaps half an hour before the arrival of the fire-front and did not necessarily finish when the front passed by. The value of screens to prevent flying burning debris was pointed out.

An article in Habitat by Neil Douglas (1983) suggests that up-slope flames developed a jet-like structure which lengthened the extent of the flames beyond the actual fire front. Normally this extension did not exceed 20 metres in a horizontal direction in winds of 125 km h^{-1}, but up slope at the hill crest it could attain up to one hundred times this distance. He argued that not only was there a need for a clearing to extend up to 120 metres away from a building, but that fire-depleting mounds and fire-retardant shrubs and smooth barked trees were also necessary defences.

CHAPTER 6

THE COUNTER-DISASTER PLANNING BASE IN VICTORIA

6.1 INTRODUCTION

The States of Australia have approached the problems of
counter-disaster planning in different ways. The timing of the
establishment of their disaster plans and of the related legis-
lation has varied. While there are broad similarities in the
detail the emphasis may differ. To some extent these differ-
ences reflect the potential severity and the particular types
of natural hazards to which the different States feel themselves
exposed. As indicated earlier, bushfires are one of the natural
hazards considered to be a major threat in Victoria.

As an essential pre-requisite to the understanding and anal-
ysis of a specific disaster situation, the details of the State's
Disaster Plan must be appreciated, forming, as they do, the
framework within which various forms of official response take
place.

6.2 THE VICTORIA STATE DISASTER PLAN (DISPLAN)

The Victoria State Disaster Plan (DISPLAN) is designed to
incorporate all the resources available within the State govern-
mental departments, statutory authorities and instrumentalities,
and the various voluntary organizations, which must be activated
to counter a disaster situation or threat. The plan also includes
making available resources from the Federal government and other
states. The aim of DISPLAN, however, is to establish guidelines
at a local, regional and State level which will create provisions
for operational and supportive plans designed to function in times
of disaster.

Within the political framework, counter-disaster management, planning and preparedness are the responsibility of the Minister for Police and Emergency Services. To assist in the formulation of government policy in this area the plan has provision for a State Disaster Executive Committee, chaired by the Minister, which has the responsibility to take all measures considered necessary to ensure that the State Disaster Plan operates effectively. In turn, the Minister is obliged to report and make recommendations to the Victoria State Cabinet on all matters relating to counter-disaster actions, which, when approved by Cabinet, are incorporated into the State Disaster Plan. The State Disaster Executive Committee is empowered, through the Chairman, to co-opt representatives of other State departments not mentioned within DISPLAN and to invite the attendance of approprate representatives of Commonwealth departments to assist in matters associated with counter-disaster actions.

Additional to the functions stated above, the Committee decides policy matters relating to DISPLAN, and provides long-term planning policy on disaster-related matters. The Committee also acts as a steering committee for the Victoria State Disaster Planning Group.

The Minister is also Chairman of the Natural Disaster Relief Committee, which is attached to the Premier's Department. Whenever a major bushfire, flood or storm occurs funds may be available to assist in the rehabilitation of the victims and the restoration of affected services. The forms of assistance which would be provided are recommended to the Premier by the Natural Disaster Relief Committee, after considering reports of damage arranged by the State Disaster Co-ordinator of DISPLAN.

Although no funds are provided specifically for the operation of DISPLAN the Emergency Relief and State Disaster Plan Account, administered by the Premier's Department, is available to meet certain associated costs resulting from disaster operations. Policy decisions made or approved by the Premier enable charges relating to the operational, incidental, and administrative expenses of a State disaster operation to be met.

Co-ordination at the State level is assumed through the position of the State Disaster Co-ordinator, who is the Chief Commissioner of Police, or a police officer of Commissioner rank who has been designated to act as State Co-ordinator by the Chief Commissioner of Police. In the event of disaster it is a police responsibility to ensure co-ordination of the means of providing the most effective support to authorities directly responsible for combating the disaster (the Combat Authorities) and to the assisting services (ie the Supporting Services). The State Disaster Co-ordinator either initiates operations, or maintains operations which have been initiated by the Combating Authority, or initiates/continues those operations which are necessary in the public community interest.

Control of all disaster-combating operations, and the command of forces engaged in disaster-combat remains the function of the statutory authority which is directly responsible for combating the particular type of disaster agent*. The Combat Authority has control of its own forces and of the combat operations at all times. The combat authority will appoint an officer to be in control of the operation. This organization has its own headquarters which are separate from the State Disaster Headquarters (shown as Combating Authority Headquarters in figure 12), from which it controls and directs operations pertinent to its own role, independent of the State Disaster Headquarters. The function of the State Disaster Headquarters is to act as the co-ordinating centre for the activities of both the disaster-combating authorities and the Supporting Services. The State Disaster Headquarters is located at the Police Operations Centre. During a disaster the Co-ordinator is obliged to remain at the Disaster Headquarters at all times. Representatives of the combating authority and the supporting services should also be at the Disaster Headquarters and should remain in close contact with the State Co-ordinator. An Alternative State Disaster Headquarters is located at the Victoria State Emergency Service Headquarters.

---

*In the case of bushfire, the combating authority is the Country Fire Authority, or the Forests Commission of Victoria, overall authority being dependent on the location of the fire. The Victoria State Emergency Service is the Combat Authority for floods and wind storms.

Notes

* The task of integrating
support services is the
responsibility of either
VIC SES or the Dept of
Community Welfare Services,
dependent upon disaster-
time phase of the operation.

Alternative State Disaster
HQ is VIC SES HQ.
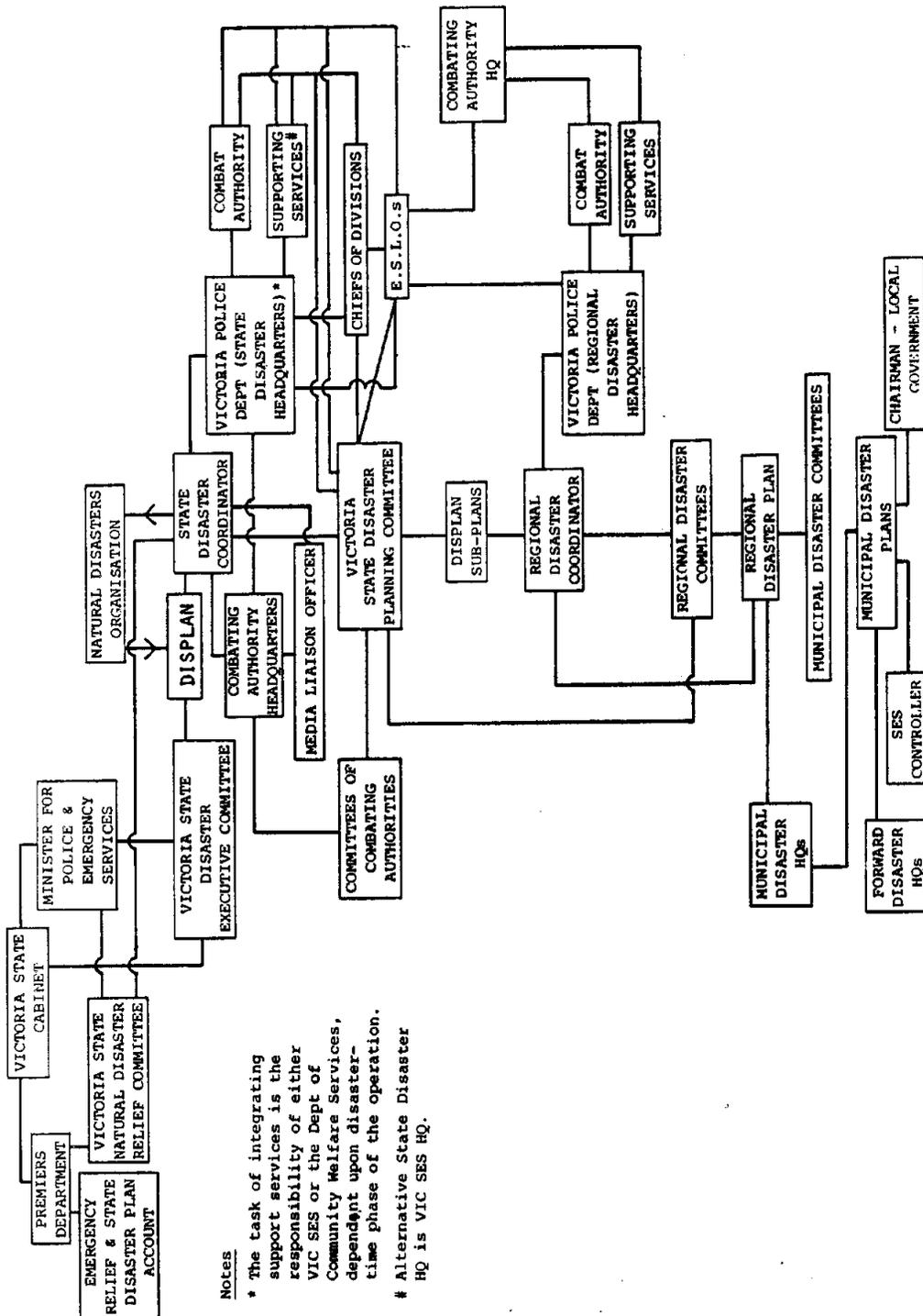
Figure 12. The Victoria State Disaster Plan: how it operates.

Supporting Services are those government departments and organizations (or voluntary organizations) which provide essential services, personnel or material required to assist in the overall ameliorative measures made necessary by the disaster impact. Supporting Services, however, are not Combating Authorities*. In addition to State resources, the Federal Natural Disasters Organisation, through its National Emergency Operations Centre, provides a focus for the co-ordination of national resources, and ensures that the State receives the full support of the Federal government departments. It is the responsibility of the Natural Disasters Organisation to co-ordinate all Australian government assistance during periods of state natural disaster, and to manage Australian government support programmes which provide emergency equipment and financial subsidies. The Natural Disasters Organisation also conducts national planning to assist in the mitigation of natural disasters. The National Emergency Operations Centre, which is manned 24-hours a day during times of state or national disasters, receives requests for assistance from the State Disaster Co-ordinator and in turn co-ordinates the assignment of resources provided by the Australian government departments. It also acts as the centre for the provision of all authoritative information to and from Federal government departments and the agencies involved in the disaster. Once the State Disaster Co-ordinator has requested Commonwealth assistance, the co-ordination of all physical assistance from the Commonwealth rests with the Natural Disasters Organisation.

The State Disaster Co-ordinator and the chief officer of the Combating Authority are responsible for the appointment of a Media Liaison Officer who will be responsible for all press releases related to the disaster and its operations. The setting up of a temporary press centre is the responsibility of the Media Liaison Officer.

---

* This point is slightly confused when the State Emergency Service is considered: it has a dual role of both Combat Authority for floods and windstorms; and is a prime support service.

The Victoria State Disaster Planning Committee is chaired by
the State Disaster Co-ordinator and includes within its membership
the Chiefs of the Combating Authorities and the Supporting Services.
These encumbents are responsible for the appropriate representation
of their Divisions on the State Disaster Headquarters staff during
disaster situations which require resources at a statewide level.
All contributing agencies and organizations are grouped into Divis-
ions. Each Division is sponsored by a Department or a government
authority which has a particular function to perform in countering
the effects of a disaster. Agencies and organizations within a
Division may have the capacity to be either a combating authority
(eg fire-fighting) or supporting service (eg transport, communic-
ations). The Disaster Planning Committee provides, through the
Chiefs of Divisions, the detailed planning and co-ordination which
is required to implement DISPLAN. A Chief of Division is the desig-
nated head of a functional Division within DISPLAN, and is respons-
ible to the State Disaster Co-ordinator for the integration and oper-
ation of the activities of the organizations within that division.
Chiefs of Divisions, along with the State Disaster Co-ordinator, are
located within the State Disaster Headquarters during a disaster
episode. When Chiefs are unable to attend, they may be represented
by their Emergency Services Liaison Officers (ESLOs), who must not
only be capable of effectively representing their organization, but
must be empowered by their superiors to commit available organiz-
ational resources as they are required under the provisions of DISPLAN.

The Disaster Planning Committee is empowered to co-opt repres-
entatives of other departments, authorities and organizations at the
discretion of the Committee. It also provides police guidance for
the Regional Disaster Committees. It does not, however, replace the
Committees of Combating Authorities or other individual organizations.

Victoria is divided into 26 Disaster Regions (similar to the
divisions adopted by the Victoria Police Force). Each Disaster reg-
ion consists of a number of municipalities, the responsibility for
which is in the hands of a Police Coordinator.

The Regional Disaster Co-ordinator is responsible for the formation of, and for acting as Chairman of, the Regional Disaster Committee. This Committee is comprised of regional representatives of the Combating Authorities and the Supporting Services, and is empowered to invite representatives from other organizations which are considered necessary or desirable for major disaster planning within the region. In conjunction with the Regional Disaster Committee, the Regional Disaster Co-ordinator is responsible for the formulation and the maintenance of a Regional Disaster Plan, like their counterparts in the State Disaster Planning Committee. Representatives of the Regional Disaster Committees should not only be capable of the effective representation of their own organizations at the regional level, they must also be able to advise on any resource commitment that might be made by the organization in question during the event of DISPLAN's activation. Regional Disaster Plans shall also include the establishment of a Regional Disaster Headquarters and specify the location of each of the Regional Disaster Headquarters, which will be used as regional emergency operations centres. The State Disaster Co-ordinator will appoint a police officer in command of the disaster operation. Regional Disaster Plans must also include specific information relating to the establishment of Municipal Disaster Headquarters.

Municipal Disaster Committees must consider and assess possible threats within the local area, prioritize the known and acknowledged threats and at the same time decide on counter-measures relevant to those threats within the framework of the resources available within the local area. Municipal Disaster Committees must also decide on a Plan commensurate with the resources available to meet expected situations, and must draw up this Plan in accordance with the requirements of the local area. This includes establishing local Disaster Headquarters, and must also provide for the establishment of Forward Disaster Headquarters if the situation requires a headquarters at or adjacent to the disaster site. The Chairman of a Municipal Disaster Committee will be a representative of the Local Government (a Mayor, Shire President, or nominated Alderman or Councillor); and the Executive Officer is to be the local State Emergency Service Controller.

DISPLAN also stipulates the circumstances in which the major recognized disaster-relevant organizations will assume Lead Combat Authority status. The key disaster-relevant organizations which fall into this category are: Police, Victoria State Emergency Service; Metropolitan Fire Board; Country Fire Authority; Forests Commission of Victoria. DISPLAN also stipulates which disaster-related organization is to assume the major role for the provisioning of support servicing:

CIRCUMSTANCE	COMBATING AUTHORITY
Search and rescue	- Police assisted by VIC SES
Fire operations	- Metropolitan Fire Board (within Metropolitan areas) Country Fire Authority (within private property outside Metropolitan areas) Forests Commission of Victoria (State forests National Parks, public land and private property 1.5 km from any of these)
Floods	- VIC SES
Windstorm	- VIC SES
Reception/Evacuation (up to immediate post-impact)	- VIC SES
Road accident assistance or victim extraction outside metropolitan areas	- VIC SES assists Police

CIRCUMSTANCE (DIVISION)	SUPPORTING SERVICES (DIVISION CHIEFS)
Air transport	Dept of Transport
Animal relief	Dept of Agriculture
Communications	Telecom
Essential services	Dept of Minerals and Energy
Medical	Dept of Health
Welfare	VIC SES & Dept of Community Welfare Services

The planning base for bushfire threat within the State of Victoria is established by the Victoria State Disaster Plan. The key factors in establishing the legislative and the planning base for bushfire control are based on two premises: firstly that the State of Victoria is a relatively small geographical area compared to other Australian States; and secondly that bushfire disasters have constantly recurred.

With specific reference to the bushfire threat, the Victoria State Disaster Plan needs to be considered in conjunction with three key Acts which have been introduced over the years as a direct consequence of this particular threat. The three key Acts all date, in their present form, from 1958. They are:

i)   The Metropolitan Fire Brigades Act 1958. This Act, while stating the areas of responsibility and the powers of the Municipal Fire Brigades also empowers the Brigades to move out of the Metropolitan Fire District should the need arise. If this does occur, however, the Metropolitan Fire Brigades come under the direction and control of the officer-in-charge of fire-suppression, who,in the case of bushfire threats, will usually be from either the Country Fire Authority, or the Forests Commission of Victoria.

ii)   The Forests Act, 1958, provides for fire control in State forests, National Parks and other areas declared as 'fire protected areas'.

iii)   The Country Fire Authority Act, 1958, established a body corporate with members appointed by the Governor-in-Council. The Act imposed on this group the general duties of taking, superintending and enforcing all steps considered necessary for the prevention and suppression of fires in the country area of Victoria, which is all of the State outside the Metropolitan Fire District (which is approximately 30 kilometres from the Melbourne General Post Office). The jurisdiction of the Country Fire Authority does not include those areas which have been designated areas of concern for the Forests Commission of Victoria.

6.3 THE VICTORIA STATE EMERGENCY SERVICE - VIC SES

The Victoria State Emergency Service is a branch of the Ministry for Police and Emergency Services, and operates under the provisions of a government charter which states -

"The role of the Victoria State Emergency Service is to plan, organize, co-ordinate and implement measures that are necessary or desirable in respect of the safety of the public and are designed to guard against, prevent, reduce or overcome the effects, or possible effects of emergencies inimical to life, health or property within the State of Victoria."

In terms of DISPLAN the State Emergency Service's role is to:

a)   supplement combating agencies in their tasks, relative to natural and other disasters. It may be used to counter other emergencies not the responsibility of specific combat authorities such as flood and windstorms, etc; and

b)   to assist municipalities to establish and train State Emergency Service units which will be required in disaster situations and in the event of enemy attack, when the activation of civil defence is directed.

In its civil defence role the State Emergency Service is required to carry out the planning and organization related to civil defence work when the Service has been activated by the State government. DISPLAN, however, does not provide any indication of what organized responses have been considered by the State in the event of a civil defence emergency, nor does it provide a generalized account of which State organizations are to be involved within civil defence emergencies. Nevertheless, during a period of natural hazard emergency or disaster, the role of the State Emergency Service is examined in slightly more detail.

Neither DISPLAN nor the Victoria State Emergency Service Act (1981) discusses the counter-disaster structure of VIC SES. In terms of geographical location, however, VIC SES is organized by a central headquarters in Melbourne (State HQ, which is also the auxiliary State Disaster Headquarters should the Police Department become inoperative), twelve Divisional headquarters, each covering two or more of the Disaster Regions; and 149 Local SES units based on a municipality.

As part of its task for providing general support to the
Police Department and the combat authorities, the State Emergency
Service headquarters are designated as the supporting or alterna-
tive State disaster headquarters, and as such, if required, they
will function as headquarters under the direction of the State
Disaster Co-ordinator. If the Emergency Service headquarters
are not used in this role, it is assumed that this facility will
remain within its traditional role as a centre for VIC SES act-
ivities - that is, as a general support organization and as the
SES Welfare Organization headquarters. Within this area of assigned
tasks the State Emergency Service is employed as the headquarters
for State emergency welfare tasks, particularly in the initial
phases of an emergency/disaster. Provision is made within DISPLAN
for the State Emergency Service headquarters to be outfitted with
additional communication facilities, mainly point-to-point direct
telephones, which will enable the facility to act as a State dis-
aster headquarters. Moreover, these additional resources which
would be installed for the above contingency are required during
the emergency situation in order that the Emergency Service can
carry out its other main role as the co-ordinator of welfare act-
ivities*. It is interesting to note that, within the context of
communication facilities, the participating authorities are respons-
ible for the adequacy of their own radio communication systems, and
for negotiating directly with TELECOM if additional telephone lines
are necessary.

Under DISPLAN the task of integrating the activities of the
statutory and voluntary organizations associated with welfare is
the responsibility of the Victoria State Emergency Service and the

---

*Throughout the State some Regional Offices of the Victoria State Emer-
gency Service have preplanned disaster communication lines connected
to them and cabled back to the local telephone exchange. Connections
can be established either between preplanned locations within speci-
fied areas, or back to any of the lines connected to the main connect-
ing panel at Melbourne, which has direct lines to the State Disaster
Headquarters.

Department of Community Welfare Services*. The division of responsibility between these two entities during DISPLAN activation is based upon temporal divisions of the emergency situation (that is, one of the above organizations will assume overall responsibility during certain phases of the disaster period, and the other organization will take over that responsibility at an agreed time and will lead the organized actions responsible for aspects commensurate to 'rehabilitation'], plus the functions bestowed on each of the two organizations by the requirements of DISPLAN and their own offices.

Government or statutory bodies have a normal community responsibility to look after the welfare of the people and it is they who have the primary responsibility for emergency welfare preparedness at time of major disaster. It is nevertheless important to maximise the resources and skills of welfare and social service organizations to enable them to play an effective part in an emergency situation. Such a part may be played using the normal organization augmented by additional personnel and with its functions adapted, where necessary for the special circumstances of an emergency.

In the case of the Victoria State Emergency Service, responsibility for welfare operations and the conduct of evacuation procedures are the most important tasks in terms of natural hazard counter-disaster operations (although within this, the overall responsibility

---

* In terms of DISPLAN terminology, welfare is defined as 'the provision of food, shelter, clothing (and personnel services) for the relief of disaster victims'. It is also used to define the provision of resources for disaster combating personnel. The Victoria Disaster Welfare Plan, essentially a sub-plan of DISPLAN, defines welfare in slightly different terms. Welfare, within the Welfare Plan is defined as 'the care of victims, displaced and homeless persons resulting from a disaster. It also applies to the provisioning of disaster combatants'. This latter definition highlights the status of the client-group in question and provides a criteria which can be employed to distinguish them from 'non-victims'. The former definition specifies what the actual requirements are that are needed by a set of people which has not been clearly defined. In the minds of the personnel who operate welfare services within DISPLAN, it is probably clear what needs to be done under situations of emergency, and how they can ultimately be carried out for the people identified as victims, even if the definitions that are employed within the planning facilities offer partial answers only.

for counter-disaster operations is in the hands of the Victoria
Police Department; and the initiation of evacuation and respons-
ibility for evacuation procedures is also a police matter). In
order to fulfill these tasks the State Emergency Service is rep-
resented on all the major counter-disaster planning committees
within the State. The Director attends the Victoria State Dis-
aster Executive Committee (DEC) sessions. He, or his designated
officer, attends meetings of the Victoria State Disaster Planning
Committee (DPC). Within this Committee the State Emergency Serv-
ice has three areas of authority: that as a combating authority
related to flood and windstorm hazards; as the body responsible for
immediate post-impact evacuation and reception; and as the organiz-
ation charged with general support operations to assist all the
other disaster-relevant and emergency-related organizations. The
Director is also Chairman of the Victorian Disaster Welfare Com-
mittee during specific phases of a disaster situation. The State
Emergency Service is also represented at the regional planning level
by holding a seat on the Regional Disaster Committees (RDC). Reg-
ional Officers within the Emergency Service carry out this task.
The fourth counter-disaster committee within the disaster mitig-
ation system adopted by the Victorian government is the Municipal
Disaster Committee (MDC). At this level the Local State Emergency
Service Controller is the Executive Officer and provisions are
available for the Regional Officer to be co-opted if it is required.

Being responsible for the conduct of evacuation and welfare
planning for the State*, and as part of the state-wide system
which oversees all preparatory measures for resource allocation
contingent upon natural hazard impact situations (that is, the
committee system described above), the State Emergency Service
plays an active role within the pre-disaster phase of a disaster.
Commitments within the DISPLAN also determine that the Emergency
Service will play its most active and most visible role within
the Impact Phase of the disaster situation, with a reduced involve-

---

*Within this area of responsibility the Department of Community
 Welfare Services is to 'co-operate with the Victoria State Emer-
 gency Service in the activities of welfare and evacuation oper-
 ations' (Appendix C to DISPLAN, Figure 13). An additional res-
 ponsibility of this State government department is to act as a
 liaison with the Commonwealth Department of Social Security
 during emergency operations.
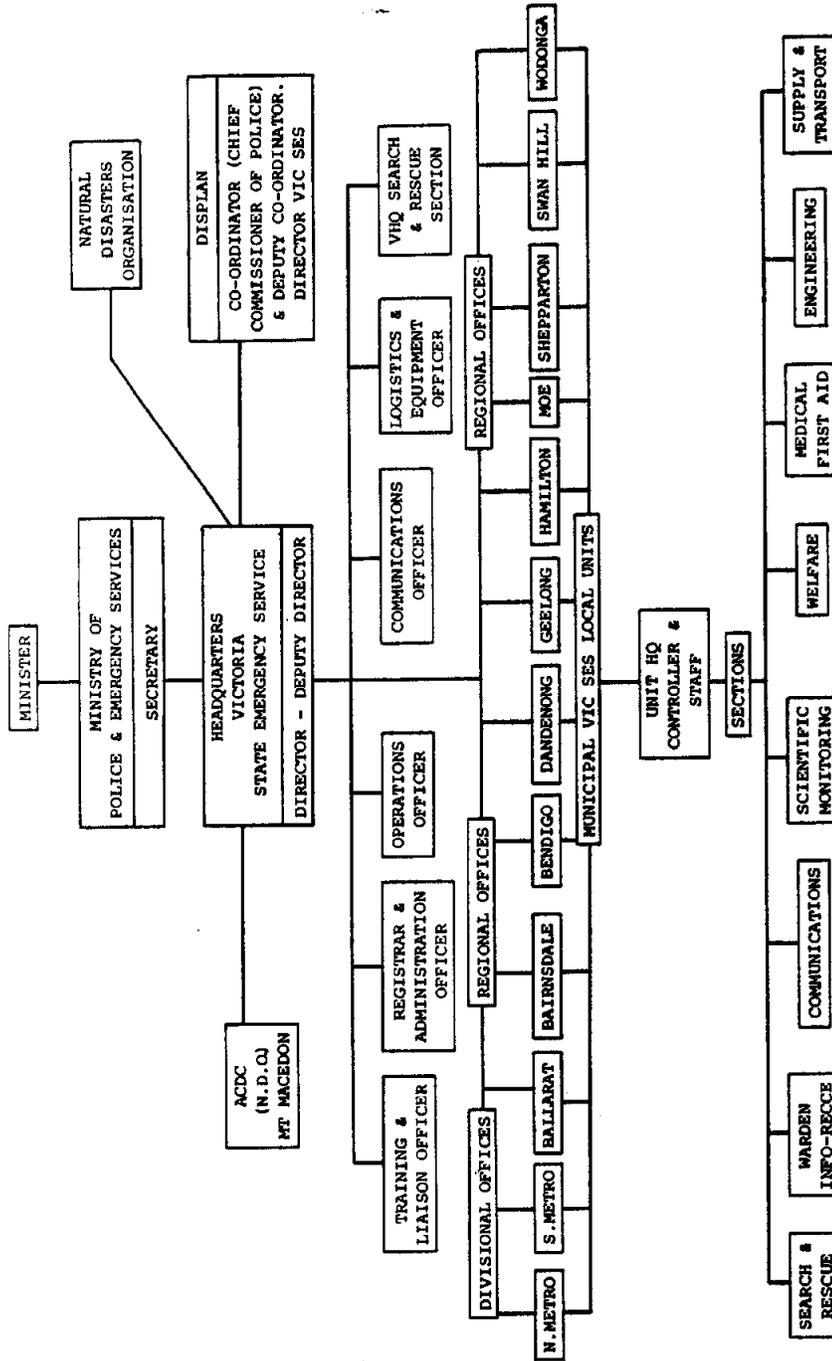
(Chart 1 to Appendix 'AC' DISPLAN)

Figure 13. The Victoria State Emergency Service. Organizational chart.

ment within the Post-Impact Phase*. DISPLAN, however, does not provide any indication of the types of activities or the extent to which operations will be pursued within the broad planning arrangements laid out by the plan. In order to explore the role of the Victoria State Emergency Service more comprehensively, and to explain further the specialization of roles between the State Emergency Service and the Department of Community Welfare Services, a review of the Victoria Disaster Welfare Plan is required.

The Victoria Disaster Welfare Plan (see Figure 14) is administered and co-ordinated by the Victoria Disaster Welfare Committee, a group representing one Commonwealth Department (the Department of Social Security), six Victoria State government departments, and fifteen non-statutory organizations operating in Victoria[#]. The Committee is chaired by the Director of the Victoria State Emergency Service during routine, or 'non-disaster' periods. In the event of a declared emergency, chairmanship of the Committee alters during the emergency sequence. It remains with the State Emergency Service during the stage leading to impact (that is, the warning and threat stages), and during the period defined by the Welfare Plan as the Impact Phase. Following the Impact Phase, responsibility for welfare co-ordination and the chairmanship of the Welfare Committee is transferred to the Director-General of the Department

---

*The Victoria Disaster Welfare Plan recognises only three phases of a disaster:
  i)   Impact Phase: that is, the phase in which victims of a disaster must be fed, clothed and sheltered and possibly evacuated;
  ii) Post-Impact Phase: that is, the phase in which disaster is contained and, the immediate effects of the disaster having been countered, action commences to restore the community to normal activity. In this phase longer term planning largely of community or individual relief and personnel services aspects takes place;
  iii) Rehabilitation Phase: the long term phase in which the normal community services and activities are restored and the long term effects of the disaster upon individuals are countered as far as possible.

DISPLAN does not mention any breakdown of 'disaster-time', nor does it have any allocation of duties commensurate to the different time periods which have been recognised by researchers as part of the observable processes during a disaster.

#Another non-statutory organization, the Insurance Council of Australia, will probably be included within the Committee structure if recommendations, which are before the Committee at the time of writing, are adopted, thereby increasing the total non-statutory organizations to sixteen.
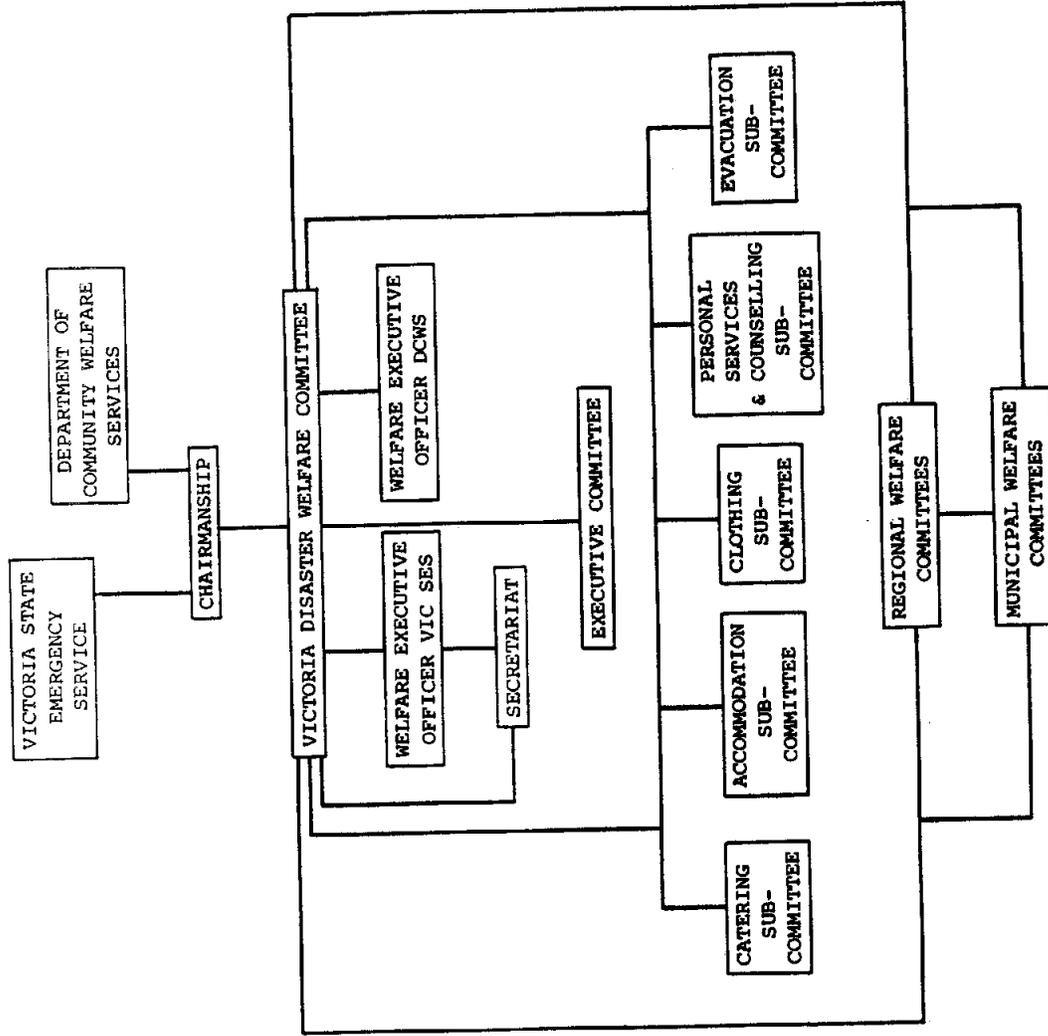
Figure 14. Victoria Disaster Welfare Plan: how it operates.

EXPLANATION

Figure 14

Under DISPLAN the task of integrating statutory and voluntary welfare organizations is the responsibility of VIC SES and DEPT COMMUNITY WELFARE SERVICES. VIC SES is tasked to co-ordinate all welfare operations. DCWS_is dutied to co-operate with VIC SES in welfare and evacuation activities.

CHAIRMANSHIP of the Welfare Committee is held by the Director VIC SES during non-disaster periods and during Impact Phase. At an agreed time usually during Post-Impact Phase, chairmanship is transferred to the Director - General DCWS who holds the position until the end of the Rehabilitation Phase. Position then reverts back to Director VIC SES.

The DISASTER WELFARE COMMITTEE is the administrative and co-ordinative cell of the VICTORIA DISASTER WELFARE PLAN. It consists of 22 Commonweatlh/State government, statutory/non-statutory organizational representatives involved in disaster-related activities, primarily in welfare aspects.

The role of the VIC SES WELFARE EXECUTIVE OFFICER is to implement the WELFARE PLAN during times of disaster. It is unclear, however, of the exact role of the DCWS EXECUTIVE OFFICER, although the WELFARE PLAN stipulates that responsibility for implementing the Plan will be transferred to this position during Post-Impact operations. See, however, the role of the Executive Committee.

The SECRETARIAT is established within VIC SES headquarters and provides secretarial service and assists in the training functions of the Disaster Welfare Committee.

The EXECUTIVE COMMITTEE is formed once a disaster situation has been recognised. It is responsible for conducting welfare operations during the entire emergency period. Membership is drawn from the DISASTER WELFARE COMMITTEE and consists of representatives of welfare organizations responsible for conducting specific welfare functions.

The SUB-COMMITTEES develop planning related to their specific area of responsibility.

REGIONAL WELFARE COMMITTEES are charged with developing planning and co-ordinating available regional resources related to welfare aspects with other organizations in accordance with DISPLAN. The VIC SES Regional Officer and DCWS counterpart will institute a parallel organization to that of the Disaster Welfare Committee in the regions.

MUNICIPAL WELFARE COMMITTEES - same as for Regional Committees but related to local area. Responsibility for this Committee rests with Local SES Controller.

of Community Welfare Services (that is, during the Post-Impact Phase, and all of the Rehabilitation Phase). The point during the Post Impact Phase when this transfer of responsibility occurs is nebulously referred to within the Welfare Plan (page 9) as 'at an agreed time'. How the smooth transition from one disaster-relevant organization to another is undertaken with the minimum disruption to both the client-group and the organizations involved is not made explicit within the Plan; nor has it been rehearsed in simulation exercises centring on this aspect of the Plan. The absence of any real emergency situation resulting in the Welfare Plan being activated has not helped either the VIC SES or the DCWS to be prepared to initiate actions that will assist in the smooth transferral of responsibility. Based on the Plan there appears to be no understanding of the actual requirements necessary for a smooth transferral to be undertaken. The discovery by welfare personnel (amongst many other observers) during the 1983 bushfires that at least one of the two organizations mandated for welfare co-ordination was ill-prepared to assume responsibility for that role suggests that this aspect of the Welfare Plan requires further consideration. This development is no doubt related to both internal and external politics associated with both the organizations involved; a clear understanding of why the transition from one organization to the other was impeded will be attempted in other parts of the report, although it will not be possible to arrive at a full explanation of the events.

With the exception of a few minor proposals which are presently under consideration, the Welfare Plan and the Welfare Committee system is the same today as when it was formalized, February 1980. Although the legal status of both DISPLAN and the Welfare Plan is uncertain*, the Welfare Plan does provide a guideline for the division of responsbility among key statutory and voluntary organizations and a number of relevant government departments, although the vocabulary of the Welfare Plan is more suggestive of an optimistic, probabilistic guideline, rather than a normative prerequisite for action.

---

*If the contents of both DISPLAN and the Welfare Plan were legally binding several of the government departments and statutory organizations involved in the 1983 bushfires which, under the provisions of the plans, are obliged to carry out certain functions and activities, could be considered negligent in those duties.

The objectives of the Victoria Disaster Welfare Committee are:

a)   to serve in an advisory capacity to all levels of government, particularly the departments and authorities which have the statutory social welfare responsibilities to provide welfare service in times of emergency and disaster;

b)   to serve as a catalyst to effect co-operative arrangements for improving and effectively utilizing all available welfare resources both statutory and non-statutory in emergencies and disasters;

c)   to survey and maintain records of all available welfare resources at the disposal of the State in an emergency and disaster;

d)   to provide welfare advice to the Director of the State Emergency Service in the context of the Victoria Disaster Welfare Plan in accordance with the appropriate actions within DISPLAN

(Welfare Plan, pp 8-9)

In order to effect the objectives of the Committee and to translate the actions which the Committee recognizes as being necessary for the operationalization of the responsibilities of the welfare organizations, a system of organizing bodies has been created. Chief among these, apart from the position of Chairman, are the Welfare Executive Officers. Two disaster welfare executive officers are appointed to the Committee, one from the Victoria State Emergency Service, and the other from the Department of Community Welfare Services. The role of these officers is to implement the Welfare Plan during periods of declared emergencies or disasters. During the Impact Phase of the disaster situation the State Emergency Service Welfare Executive Officer will take precedence in implementing the Plan. This responsibility will be transferred to the Department

of Community Welfare Services Executive Officer during the Post-Impact Phase, whose responsibilities will be mainly in the Rehabilitation Phase*.

Additional to these appointments a Secretariat is established by the existing manpower resources available within the State Emergency Service Headquarters staff. The Secretariat provides a secretarial service and assists in the training functions of the Disaster Welfare Committee. The Secretariat, as determined by the Welfare Plan, will be administered by the officer responsible for the Welfare Service of the State Emergency Service.

There is also an Executive Committee which is formed once an emergency or a disaster situation has been recognised. It is the Executive Committee's responsibility to conduct the welfare operations during the emergency period. Membership of this Committee is drawn from the Disaster Welfare Committee and consists of representatives of those statutory and voluntary organizations which have accepted the co-ordination of specific welfare functions (for example, catering, accommodation, clothing, etc), the Welfare Executive Officers, a representative from the Commonwealth Department of Social Security, a representative from the Natural Disaster Relief Committee (part of the Department of the Premier, Victoria State Government), and the Victoria Police representative. Membership of this Executive Committee can be augmented by other organizational representatives if the Committee thinks it necessary.

Additional to this is the Sub-Committee level, which is permanently established within the Victoria Disaster Welfare Committee. The Sub-Committees are obliged to study problem areas within their own areas of pre-determined expertise and which coincide with their area of welfare functioning within the Welfare Plan. It is their

---

*It is unclear from the terms of the Welfare Plan what the exact role of the DCWS Executive Officer is, especially when this role is compared to the role prescribed for the Executive Committee. The Executive Committee's task is to 'conduct welfare operations during the emergency period'. This would imply that the actions implemented by the VIC SES Welfare Officer would be taken over by the Executive Committee, thus maintaining the flow of management and control. The role of the DCWS Executive Officer thus appears to be redundant, or superfluous.

task to develop these functions in accordance with the Plans and the policies of the Committee. How this is achieved is not elaborated on. These Sub-Committees are also invited to make recommendations to the Welfare Committee concerning the Welfare Plan, and to tender advice if it is necessary.

Finally, there is provision for municipal and regional Welfare Committees. These are in conjunction with the DISPLAN Regional and Municipal Disaster Planning Committees. These Committees are charged with developing, planning and co-ordinating all available local and regional resources with other departments, agencies and organizations in accordance with the overall plans and policies of the DISPLAN. At the regional level the State Emergency Service Regional Officer and the appropriate Department of Community Welfare Services Officer will institute a parallel welfare organization to that of the Victoria Disaster Welfare Committee under the auspices of the Regional Police Co-ordinator. At the municipal level, this responsibility rests with the Local State Emergency Service Controller.

6.4   SOME ASPECTS OF THE EFFECTIVENESS OF DISPLAN

When considering the effectiveness of DISPLAN and the Victoria State Disaster Welfare Plan, one important distinction should be made between the two. In the case of DISPLAN it is important to note that the aim of this arrangement is not intended to be as a "manual of procedures to be adopted when disasters occur ... Its aim is to establish guidelines for government departments, municipalities, statutory authorities, instrumentalities, and voluntary organizations, at local, regional and State levels so that they may prepare operational and supportive plans designed to function in times of disaster" (DISPLAN 1982:15).

In the case of the Victoria State Disaster Welfare Plan, however, its aim is quite opposite in terms of guidance. The aims are threefold:

i)   To provide a prompt and efficient welfare service to persons affected or threatened by a disaster.

ii)   To define the roles of departments, statutory and non-statutory authorities in preparation for, response to and recovery from a disaster.

iii)   To establish practice and principles for the co-ordination of emergency assistance and relief measures to be carried out by non-statutory agencies and professional or business organizations.

(Victoria State Disaster Welfare Plan 1980:3)

DISPLAN, then is a preliminary attempt to set out the general principles which State government officials and senior departmental officers consider appropriate to follow when establishing actual plans for natural disaster and/or mass emergencies. DISPLAN is the first step along the road to prescriptive planning. The Disaster Welfare Plan, on the other hand, is based on the premise that DISPLAN is a formalized document whose guidelines have been legalised and accepted, and are in fact operational, contingent upon a disaster being declared. The Disaster Welfare Plan is such an operational plan.

DISPLAN is meant to provide the overall framework within which specific plans can be formulated, and the Welfare Plan is an example of a specific plan which has the status of a prescriptive 'action' plan. What is of interest in the present situation with respect to planning within Victoria is that DISPLAN itself is regarded by many disaster-relevant organizational personnel as a prescriptive document, despite its aims limiting it only to a framework, or a guideline, for the State to undertake disaster planning.

In the absence of any other disaster planning document, this is hardly surprising, especially when the only other piece of documentation that refers specifically to disasters in Victoria is the State Disaster Act, which is significant for its lack of detail relevant to any aspects of disaster actions. A suggestion is made here that DISPLAN is assumed by most persons operating within the institutional

framework of counter-disaster operations in Victoria to be an
operating instructional manual - a reference manual of what
organization is responsible for what activity following a
disaster.

The reliance on the channels suggested by the DISPLAN (although,
admittedly, not always adhered to during actual operations), and the
system of committees suggested by DISPLAN that have been established
following the distributions of DISPLAN have made this document
something more than the guideline for planning preparations. In
essence, it appears that DISPLAN is The Plan. In this respect,
it is not possible to distinguish correctly between the purpose and
intent of DISPLAN from the Victoria State Disaster Welfare Plan
following actual disaster operations. It is also in this respect
that some confusion is apparent between organizational personnel
who do pursue the contents of DISPLAN as if it were a manual of
procedures, and those who consider it as a discretionary set of
guidelines. The net result appears to be a planning arrangement that
fails to work properly due in large part to the differences in organ-
izational commitment to DISPLAN which prevents an overall response to
counter-disaster operations being consummated.

DISPLAN, if nothing else, is designed to ensure that every
section of the network of organizations which comprise the Vic-
toria counter-disaster capability is kept fully informed of all
aspects related to the disaster event. The theoretical achievement
of this within the framework of the plan is to ensure that liaison
and co-ordination between the organizations are first of all, est-
ablished and, from then on, maintained at full operational levels
for the duration of the entire disaster sequence. The establish-
ment of a system of committees, the creation of liaison officers,
from all the organizations within the counter-disaster network (with
the creation of Emergency Service Liaison Officers), the development
of specific communication linkages between organizations, and the
interconnectedness of the different levels of planning (local, reg-
ional, State, Federal) are all supposed to create a system whereby
it is possible for every segment of the network to be cognizant of
the entire emergency operation. The development of such an operational

liaison system is also meant to enhance the possibility that greater co-ordination of activities is provided, with speedier and more appropriate responses being directed at the relevant times.

In practice, however, a different story appears to be emerging. The complexity of DISPLAN's arrangements, marked by its labyrinthine approach to the provision of communication, the duplication of organizational resources and personnel (particularly illustrated at the welfare level of operations), together with inter-organizational mistrust and conflicts, plus a remarkable lack of awareness by the majority of organizational encumbents as to what other disaster-relevant organizations are meant to do under DISPLAN all reduce the effectiveness of this planning arrangement to a considerable extent.

Consider DISPLAN as a practical guideline for the establishment of an effective inter-organizational communication system - a system for organizational liaison. How effective was liaison and the transmission of information to and from the various organizations involved in the Ash Wednesday bushfires? While we do not possess the full story of what happened throughout the entire bushfire operations, we are aware of a number of circumstances that developed at different locations and at different times which suggest that this aspect of the plan was not as effective as it should have been or, particularly in some cases, the system of liaison was not implemented in the first place. There are many reasons for the failure of effective liaison during the bushfire operations. Some of the reasons can be seen to result from difficulties within specific organizations and the problems they had in maintaining effective communication between parts of their own organization. We know, for example, that co-ordination within the Police Force was problematic a number of times. The police communications centre, code-named 'D.24', did not provide timely or accurate information between its own personnel and those officers in field units or in regional headquarters. Two examples will illustrate this. D.24 did not inform one of its regional headquarters that it had instructed metropolitan units to enter into

the jurisdiction of the particular regional headquarters. It
did not confer with regional HQ whether these units were required
initially (they were not), nor did D.24 ensure that the officers
in the particular units were aware of where they were going (they
were not). As a consequence, they got lost. In another instance,
units were directed by D.24 to enter a region and go immediately
to a purported fire-site (which had already been controlled),
without consulting Regional HQ, which had a number of mobile units
waiting to be used if and when they were required elsewhere.
There are other instances involving different organizations which
illustrate the same type of problem. The Victoria State Emergency
Service, for example, had difficulties maintaining a continuous
flow in information to and from its regional personnel and between
regions. Regional Officers were prone, in some cases, to leave
their headquarters and advance to the scene of fire-fighting oper-
ations without informing HQ of their departure. This prevented
effective centre-periphery communication. The Emergency Service
(VIC SES) did not always receive from its peripheries the inform-
ation it needed to ensure beneficial operations within the areas
concerned. Other VIC SES personnel authorised decisions which were
outside their jurisdiction and created problems when these directions
had to be reversed.

It is not surprising, then, under conditions whereby intra-
organizational communication problems were experienced, that liaison
between organizations was also problematic. Some examples of the
difficulties experienced during the bushfire operations which were
caused by inter-organizational communication difficulties may illus-
trate the point.

Both the Police Force and VIC SES Operations Room personnel
stated they had difficulty combating reports that mass media oper-
ators were disseminating to the general public. Misleading informat-
ion was being broadcast in some instances, and in others, some radio
announcers, under their own volition, suggested to listeners that
they should donate blankets, food and cothing to the victims, and
deposit them with the various clubs and agencies which they thought
would distribute it to the victims. The net result of the public

outpouring of generosity on such an unorganized scale almost
halted the welfare operations entirely by the Friday following
the Ash Wednesday fires. Several warehouses within the Melbourne
metropolitan area were full of donated material, vehicles were
tied up transporting the donations from one full warehouse to
another, volunteers were taken away from some areas of operat-
ions to assist in the storage of the donations, a lot of which
were not capable of being used by the victims because of the
deplorable state of the donated material or because the donations
were inappropriate to the situation. If DISPLAN had been followed,
and as suggested by the guideline set out in DISPLAN, a Media Liai-
son Officer had been appointed, the media organizations could have
co-ordinated their statements, and their enthusiasm for the inform-
ation supplied from this source. Apparently, the Media Liaison
Officer was not considered during this particular operation.

The Red Cross Society set up evacuation centres for the bush-
fire victims without informing other welfare-oriented organizations
of their intentions. It appears that the Red Cross did not consider
the use of their ESLO in this particular situation.

St Vincent de Paul sent representatives to some of the bush-
fire stricken areas and provided caravans in other locations without
reference to the DISPLAN Welfare Plan provisions. It is interesting
to note that in the case of St Vincent de Paul, this voluntary
agency had previously declined to participate in the State Disaster
Welfare Plan.

On the Friday 18 February, following the Ash Wednesday fires,
the Director-General of the Department of Community Welfare Serv-
ices called a welfare meeting without informing VIC SES, or offering
an invitation to them to attend, despite the pre-eminent role of
VIC SES within welfare aspects of disaster operations in Victoria
as suggested under DISPLAN. VIC SES attended subsequent meetings,
however, albeit without being officially invited by the Community
Welfare Service Department.

A large number of requests submitted by VIC SES to the police
for Natural Disaster Organization assistance were delayed for
periods of two hours or longer because the Police Department
(which under the DISPLAN arrangement is responsible for liaison
between State and Federal sources) failed to realise the importance
of the requests.

During the first week of emergency operations under disaster
conditions the Department of Community Welfare Services provided
a lower hierarchy ESLO to VIC SES Headquarters despite the repeated
request for a more senior person, who was able to commit the res-
ources of the Welfare Services, to be present.

With reference to the ESLO system, a number of disaster-
relevant organizations did not send Liaison Officers to the State
Disaster Headquarters at the Police Department Headquarters bec-
ause they apparently did not recognise the importance of the role.
In the words of one senior official, the lack of ESLOs "often
stuffed things up" because Disaster HQ had to contact the organiz-
ation directly, often experiencing considerable delays while the
organization in question was contacted in the first instance and
then it was necessary to wait for a person to be found who had
authority to assent to the request.

A number of complaints from several organizational sources
mentioned that office-bearers from other organizations, as well
as their own, did not fully understand what DISPLAN was, how it
worked, and what role they were meant to perform. This inability
to understand the functions of the planning procedures caused
additional confusion at a time when confusion was reigning supreme.

The examples also suggest that another function that DISPLAN
was meant to help overcome - the co-ordination of the organized
response to disaster events - was not as satisfactory as hoped.
Perhaps the problems of liaison and co-ordination that were wit-
nessed and reported during the Ash Wednesday events could be
attributable to the lack of appreciation for having a well-conceived,
sound and well-oiled disaster plan, a proficient network of organ-
izations to administer that plan. Misunderstanding of the necessity
for teamwork at the inter-organizational level compounded the problem.

Apart from the behavioural aspects of implementing DISPLAN, there appear to be inherent structural constraints in the arrangement of the plan that add to the difficulties of making DISPLAN a more practical document. The structural difficulties within DISPLAN are basically related to the practical problem of co-ordination. The bureaucratization of the disaster planning arrangements have reduced the clarity of the planning document and, rather than providing an easy-to-follow logically integrated guide that relates all the disaster-relevant organizations together into a specific plan of action, DISPLAN has unintentionally obfuscated both the intention of, and the means of achieving, the intended aims of the plan by confounding the actors - whether they be individuals or whole organizations. The difficulties tend to slow the process of amelioration.

The system of committees that DISPLAN established, for instance, is a potential arena for duplication of man-power, organizational time, and a circuitous track for the matchment of actual aims. If one looks at two of the committees which have been established by DISPLAN, one of which is an advisory and planning committee prior to a disaster, and the other of which comes into being following a disaster, the aims of both are almost identical, and the composition of the two committees are nearly the same. Why, than are there two separate committees - the State Disaster Executive Committee (the former committee), and the Victoria State Disaster Planning Committee (the latter)? The Disaster Planning Committee provides representatives from all the various organizations involved in counter-disaster operations on a divisional basis - with the aid of Division Officers (who may themselves have representatives on the Executive Committee above)? The creation of Division Officers in itself is an additional potential cause of confusion and an example of bureaucratization.

Two additional levels of committees make up the four 'levels' of planning within the Victorian system. The Local Municipal Disaster Planning Committee, and the Regional Disaster Planning Committee oversee the majority of the State's 177-odd disaster plans (149 Municipalities which are each meant to have a disaster plan; and 26 Disaster regions). The specialised sub-plans, such as the Victoria State Disaster Welfare Plan, and DISPLAN itself are the responsibility of the two State level planning committees.

Philosophically the emphasis on disaster plans rests in the first instance at the local level. In the case of Victoria it is the Municipal level which is the grass-roots level of disaster planning. All municipalities are required to be cognizant of the potential hazards within their area, what resources they have on hand to cope with the potential threats, and what external assistance they would require should any of those threats become a reality. The same action is pursued at the regional level of planning. At the State level the counter-disaster resources are organized to their greatest effect, and this often requires contingencies for external assistance. In the DISPLAN guidelines this is taken care of by the involvement of the Natural Disasters Organization in Canberra. Although DISPLAN is a State counter-disaster plan, it operates on the premise that the lower levels - the regions and the municipalities - are effective in their stipulated roles. They are overseen by the Regional Planning Committee or the Municipal Planning Committee within their specific geographical locality. Whether every municipality and every region has undertaken the appropriate planning commensurate with the planning guidelines is doubtful, given the comments of some senior officials when asked this question. Whether the plans that have been undertaken by those which have in fact achieved this are sufficient, have been rehearsed, updated or have been distributed is probably yet another matter. Structurally, however, the two lower levels of planning administration do not appear to be problematic. They are relatively straight-forward. The only question of real immediate concern is whether or not the plans have been undertaken, and whether or not they are sufficient for the purpose they were originally designed (by DISPLAN) to achieve. What is structurally interesting, though, is the upper level planning - the two State planning committees.

Briefly, the Victoria State Disaster Executive Committee serves the following purposes:

i)   the effective operation of DISPLAN;

ii)   long term planning policy;

iii)   policy matters relating to DISPLAN;

iv)   advice and reporting to government and

v)   a steering committee for the Victoria State Disaster Planning Committee.

Chaired by the Minister for Police and Emergency Services with the Under-Secretary of the Chief Secretary's Department as secretary, the Victoria State Disaster Executive Committee comprises eight key disaster-relevant organizations (police, VIC SES, CFA, MET Fire Bd, Health Dept DCWS, Forestry, and Treasury).

The composition of the Victoria State Disaster Planning Committee, which is chaired by the Police Chief Commissioner, with the Director VIC SES as Executive Officer, is made up of a further 14 chiefs of various combating authorities and supporting services. The function of this committee is to provide, through the chiefs of Divisions (the 14 organizational members) the detailed planning and co-ordination required to implement DISPLAN, supported by the Regional Disaster Planning Committees.

Some rationalization of DISPLAN's committee structure could well be undertaken, particularly if one of the two committees illustrated above has, as part of its task, the oversight of the other when membership and function is similar. Streamlining of the committee system and hence a re-vamping of the decision-making processes may enhance effective and appropriate implementation of actions.

Another area which has the potential to exacerbate the problems of co-ordinating the organized response necessary in disaster operations is the command structure. In DISPLAN there are three controlling - or command - systems within an operation the size of the Ash Wednesday operation. Although it is the task of DISPLAN to co-ordinate control and command, there is always the possibility under the provisions of DISPLAN, that the command system may disintegrate according to the type of operation undertaken. In the Ash Wednesday situation the three controlling networks were the State Disaster Headquarters which was controlled by the Police Force, who are the main co-ordinating system; the Lead Combat Authority, which is charged with the control

and elimination of the threatening agent (in this case it was the
Country Fire Authority assisted by the Forests Commission of Victoria);
the third controlling body was the Natural Disaster Organization,
which has control of the external resources required by the State
authorities. There is also a fourth controlling agency if welfare
is introduced. Under DISPLAN, the VIC SES is charged with the
co-ordination of welfare services (which it shares with the Department
of Community Welfare Services). This situation implies that at any
given time, in a large scale operation, at least three 'masters' could
direct different aspects of the one operation. While the planning
arrangements stipulate that the Police Force, through the State Dis-
aster Headquarters, assumes overall control, this may not be in the
best interest of disaster mitigation. It is not clear in reality,
given that a disaster situation is extremely dynamic, where co-ordin-
ation of these separate parts, all of which may be operating at once,
is achieved, or how the plan itself aids in the achievement of co-ord-
ination. The possibility of any of the three sources of control depart-
ing from the purported organized response is a real problem, and it is
not solved within DISPLAN which does not reconcile the practicalities
inherent within disaster operations of eliminating the disaster threat.
It is uncertain whether DISPLAN orientates its main thrust towards the
requirements of the Lead Combat Authority to eliminate the agent in the
speediest way if it is a hazard like a bushfire; or whether the Lead
Combat Authority is required to subordinate its role for the effective
operation of post-disaster operations, which then spotlights the
support services as well as the combat agencies. It appears that
DISPLAN's guidelines have been established for precipitate disaster
events and not for any on-going or prolonged event such as the Ash
Wednesday bushfires.

Turning briefly to look at the Victoria State Disaster Welfare
Plan, the decision-making basis behind this plan bears a remarkable
resemblance to a compromise solution between two organizations,
neither of which are prepared to play second fiddle. The Welfare
Plan has been apportioned between VIC SES and the DCWS. One possible
negative feature of this sort of compromise is that the client-
group (that is, the victim population) tend to be regarded as second-
ary to the pre-eminent concern of organizational status.

The intention of the Plan which is to provide continual welfare service, assistance, provisons and guidance to both the disaster victims and the wider community which wishes to assist, appears to have been lost in the jockeying for positions between the competitors. The inappropriateness of having two discrete organizations controlling resources requiring a significant regard for continuity, in order to provide essential services, is highlighted when the advantage of one organization being the controlling unit is considered. If one organization were to assume direction for the control and co-ordination of welfare services following disaster, it could be assumed also that the following factors be concomitants: there would be a greater accountability of the organization to perform the tasks; there would be a greater determination by that organization to ensure the tasks are performed; there would be a clear chain of command, both within the organization, and between the other organizations that assist in the welfare provisioning; there would be a greater influence by that one organization over the other organizations operating within the welfare operations, which in turn would ensure greater effectiveness; there would be better co-ordination and apportioning of appropriate resources rather than the possibility of organizations vying to undertake the more 'visible' operations (which may bring greater future returns to that organization);there may be a lessening of potential duplication of resources; and there should be less confusion amongst personnel within the focal organization and within the organization network.

Each of these seven factors were problem areas when the Welfare Plan was operationalized during the bushfire emergency. The basic reasons for the under-utilization of the welfare resources were because the control of resources was divided on a 'disaster-time' basis between two different organizations, the apportioning of the 'timing' never being made clear enough for practical organizational purposes, and there was a determination by probably both organizations to grab the lion's share of the task because of conflicts between the two organizations which were no doubt present prior to operationalization. Another reason why the two organizations were unable to perform their tasks sufficiently can be seen as a conseq-

uence of the planning arrangements itself. It would come as no surprise that a drastic re-definition of welfare roles will be one of the many recommendations to come out of the enquiries following Ash Wednesday 1983.

The statements above make it apparent that any planning arrangements for effective counter-disaster operations require high levels of commitment to inter-organizational co-operation. Such a commitment must come from all levels of the specific organizations. What did become noticeable as a result of the Victorian bushfires was that effectiveness of the DISPLAN as a viable guide to organized response for the purposes of countering disasters is dependent on three general points:

i)   the appropriateness of the planning guidelines;

ii)   the level of commitment each listed organization within the Plan has to its role and to the Plan as a whole; and

iii)   the degree to which each part of the whole understands the roles it has to perform, and the roles of all other parts.

The 1983 bushfire disaster in Victoria demonstrated, amongst many other aspects, that these three points all require further consideration.

6.5   DELIVERY OF RELIEF

In the survey only the early stages of relief delivery were observed. However relief was being organised very early even while the fires were still being combated. Under these circumstances only limited comment upon this very important aspect can be made.

Few relief delivery programmes escape criticism. Some of these criticisms are unwarranted and are the outcome of different opinions on what relief is most desirable and how it should be dispersed. In other cases there may be justification for adverse comment either because individuals have failed to live up to expectations or because an apparently satisfactory system has shown weaknesses when put to the test.

The SES, with its overall responsiblity for relief co-ordination in the early period after the disaster, got off the mark quickly. By 1930 hours, 16 February, its headquarters were fully activated and within a further one and a half hours were fully manned. By that time liaison staff from other concerned bodies, the Department of Community-Welfare Services, the Red Cross, Salvation Army, Seventh Day Adventists, Victorian Council of Churches, etc had assembled at the headquarters. By 21 February the Department of Community Welfare Services took over the responsibility from the SES under the guidance of the Disaster Welfare Executive. In the worst devastated areas Welfare Contact Centres, at which a total of 100 Community Welfare Services staff were involved together with help from Red Cross, Salvation Army, Victorian Council of Churches and others, were set up to meet immediate needs for food, clothing, bedding, household goods and money. The Counter-disaster personnel and those who returned to the devastated areas were catered for by the Salvation Army and other volunteers. The problem was perhaps an oversupply of relief goods which piled up in such quantities that needs were exceeded.

A number of specific decisions were made in the DISPLAN to identify particular activities with individual voluntary organizations, which were assisted planning-wise by smaller sectional sub-committee groupings of those most closely associated with the area of activity.

i)   Catering - the Red Cross

ii)   Accommodation - Seventh Day Adventists

iii)   Clothing - Salvation Army

iv)   Personnel Services - Department of Community Welfare
          Services

v)   Personal Counselling - Victorian Council of Churches

vi)   Evacuation - Director of the State Emergency Service

vii)   Registration and Tracing - Red Cross

Assistance to the victims, publicised by the Premier's
Department, included relief of hardship, restoration of public
assets, concessional loans to small businesses and primary pro-
ducers, loans for home rebuilding, fence replacement. Negotiat-
ions were in hand to extend those grants towards health costs,
rental subsidies, extraordinary costs incurred by emergency
agencies and compensation to casual volunteers.

From the public appeal funds payments available included:

i)   Funeral expenses for bushfire victims

ii) $1 000 grant to each registered household (including
          tenants) which had lost its principal residence

iii)   Up to $5 000 for the replacement of tools of trade

iv)   Income maintenance subsidies where the sole breadwinner
          had been killed or seriously incapacitated by bushfires or
          where children were educationally disadvantaged by serious
          injury or death of parents.

v)   Four grants of $150 000 to the affected Area Committees
          at Warrnambool, Otway Ranges, Mt Macedon Ranges and the
          Dandenongs.

The relief funds come from different sources, public appeals
(the State Disaster Appeal, Bushfires, 1983), privately sponsored
appeals, organizations whose objectives are community help, other
voluntary bodies who direct their efforts to specific disasters,
government agencies and departments at Federal, State and Local
levels. Once State expenditure exceeds a base of $7 m, under the
Natural Disaster Relief Agreement, the Commonwealth contributes
at a rate of $3 per $1 of State outlay for specified categories of
expenditure. In the 1982/83 financial year drought relief had
already exceed the $7 m mark.

Relief appeals, particularly based upon the initiative of local
commercial radio and television stations, stimulated an emotional
outpouring of donations. The magnitude of the promised sum, and
the speed with which it mounted up, showed the force of an appeal
for help when a major disaster occurs on one's doorstep. Though
it must be admitted that a considerable gap developed between the
cash received and that promised, demonstrating the waning of the
first flush of concern in the cold light of the next day.

Delivery of relief raises extremely controversial issues.
Should all 'victims' be equally eligible for relief or should
relief be directed to those who have few or no resources? Should
all relief from appeals be devoted to areas of assistance for
which government funds will not be available? Criticisms readily
surface which claim that appeal funds are being diverted to saving
government outlay. Should appeal money be concentrated upon the
immediate relief of distress due to disaster or devoted to longer
term rehabilitation and recovery?

The government relief housing measures are detailed in appendix
1. A generous provision of immediate financial aid as cash grants
was made available on the lines already described. A more elabor-
ate pattern of assistance was made available for longer term help
from government and appeal funding.

Almost every disaster that is documented brings to light similar problems or deficiencies despite the great accumulation of advice, explanation and highlighting of problems that has taken place in the literature on disaster management over the last decade or more. Well conceived plans on paper are not (or cannot be) tested prior to the possible disaster. The flaws and deficiencies surface only when the pressures and stresses of the disaster develop. It is not then the time to find satisfactory solutions. Voluntary organizations and their directing personnel particularly when stressed, overloaded or tired, when in the thick of a disaster situation, can all too easily become offended or sensitive about the roles and actions of others. Tensions develop and the smooth running of the counter-disaster operations is disturbed by conflict and even hostility. Criticisms, some justified, are voiced. In less hectic, calmer times these can normally be resolved and acceptable solutions found for the weaknesses. In the disaster itself the criticisms may generate situations which in the long run operate to impede the efficiency of the whole counter-disaster operation. Defensiveness and inflexibility, inappropriate attitudes when crucial decisions require whole hearted and rapid response become more common.

The Ash Wednesday fires produced the sorts of situation referred to above. Scapegoats were looked for. Different organizations wasted effort in conflicting with each other rather than pulling together. Lack of awareness that others may also be concerned with a decision resulted in failures to inform all those that should have been. Beliefs were established that 'others' operating in the emergency activities were impeding rather than helping. Hardening of attitudes militated against flexibility and adaptability. It would be inappropriate for the authors of this report, on the basis of the limited opportunity they had, to pass specific judgments on many of the situations. Given a thorough ongoing study of what transpired as time elapsed after the fires, and a dispassionate assessment of the beliefs, criticisms and complaints that prevailed at different times, a better and more effective delivery of relief and an even greater reduction of hardship and suffering may be achieved when the next disaster occurs. A revised, and as far as practical, tested, DISPLAN may provide an even more useful way to make a disaster less socially disturbing.

Those who donated money or goods sometimes gained an impression that the wrong people were getting the relief, or that there was a very tardy delivery of help to meet emergency needs. Others expressed views that relief funds were being diverted into directions aimed at saving normal governmental outlays. Conversely criticisms arose that the generosity was inadequately policed so that abuses were too easy and claims were being concocted or exaggerated. It is difficult to avoid adding to stress if bureaucratic checks are to be made rigorous. It is equally difficult to prevent abuse or misdirection of relief unless it is made available on a systematic basis. To find the compromise situation is equally difficult and complaints justified or otherwise will still occur.

It cannot be denied that disputes broke out early on amongst the different relief organizations including between the staff of the Community Welfare Services (though the Premier minimised their extent in his statement) and other volunteer personnel, even to the extent of conflicting or countermanding directions. This certainly added to the problems of fire victims who were not sure to whom to turn for advice or help. In several cases people sought aid from emergency aid agencies rather than the Department of Social Security or Community Welfare Services. The present authors do not feel in the position to make any other comment than to emphasize the need to reduce as far as possible such situations. The fact that they did occur leads to the supposition that some improvements in the details of relief delivery should be devised for any future possible disaster. Even perhaps the over-supply of relief food or clothing, as at Berwick, should be avoided for any future possible disaster. On the other hand in some cases unilateral but well meaning attempts by individuals or organizations to help resulted in the wrong type of relief in kind or excessive amounts of it being provided. This in turn produced major problems for the SES or others trying to resolve transport, distribution or other difficulties.

The biggest problem was the difficulty of establishing a community structure. People had moved back into a wasteland environment with little constructive activity to take their attention. They were surviving on social welfare handouts. The original feeling of trauma

and then depression was being replaced by either frustration or boredom - just the situation which encourages complaint and criticism. Such a situation in perhaps decreasing degree can be expected to last for several months and would have well repaid detailed survey as time passes.

CHAPTER 7

PRE-DISASTER PLANNING AND POST-DISASTER
LAND-USE STRATEGIES

7.1 LIVING IN THE FOREST

Suburban dwellers have increasingly sought more attractive
semi-rural conditions as their capacity to commute has increased.
As Melbourne has grown and radial road connections have speeded up
and facilitated links with surrounding areas suburbia has expanded
into scenically attractive areas for new settlement, in such areas
as the Western Dandenongs. Other areas such as the Gisborne-Mt
Macedon area or the coastal stretch of the south-west from Torquay,
extending to the west and into the Otway Ranges, have seen a con-
siderable growth of new housing sited often on steep slopes in rel-
atively difficult of access situations or on secluded sites within
the forest. There is often a strong inclination for house owners
to restore the woodland environment if it had been cleared or deter-
iorated. Reflecting one of the reasons for people moving into such
locations - the attractiveness of a natural setting - local author-
ities have taken seriously their responsibilities of maintaining the
aesthetic qualities and ecological balance in the natural setting as
well as watching that major disturbance of the natural conditions
should not affect water quality downstream. This has expressed
itself in quite strict regulations on the form of acceptable land-
scaping or vegetation clearance in different types of land use regions.

7.2 CONSERVATION VERSUS FIRE SAFETY

A growing support for conservation of the visual qualities of the
natural landscape and for the protection of native flora and fauna
has strengthened the resolve of the planners to maintain a strict
control of land management, particularly in residential areas. In
general this policy has received support from those in the community
who enjoyed the tree adorned landscape. Some have noted the advice

from the CFA and that given in pamphlets such as that issued on
bushfires by the Insurance Council of Australia about keeping the
ground vegetation cleared and seeing that trees do not overhang
roofs and gutters or that flammable bushes or trees do not grow
close to buildings or up against fences. The attitude has changed
drastically since the experiences of Ash Wednesday. A tide of
criticism has developed against Shire authorities who have imposed
restrictions upon tree clearance and demanded specific applicat-
ions for the cutting of vegetation. Conservation suddenly changed
locally from a respected to a maligned word.

Disasters generate an urge to find scapegoats. One form that
such attacks took was to claim that a new look was necessary at the
policies followed by local authorities. A particularly strong
campaign, culminating in a public meeting, was directed against
the Shire of Sherbrooke in the Dandenongs. Criticisms were voiced
about lack of water supplies, the need for fire-breaks and access
roads to facilitate fire-fighting and a revision of the conservat-
ion policies, which, it was claimed, prevented many from adequately
clearing their properties of trees. As the editorial in The Austral-
ian put it (18 February) "We must learn, as we should have learned
in the past, not to take the bush for granted". Responsible
officials emphasized their view that the prevention of fire in the
long run is the responsibility of the property holder.

The Shire of Pakenham's Planning Scheme identified the fire
danger in the associated Planning Ordinances and for a number of
the listed zones (Agriculture Zones 2 and 3, Conservations Zones 1
and 2, Landscape Zone, Highway Zones 1 and 2, Residential Zones 3
and 4, Country Residential Zones 1 and 2, Special Study Zone) incl-
uded the requirement "save with the permission of the Responsible
Authority that no vegetation should be destroyed, felled, lopped
or uprooted on the subject land except on the actual site of
buildings". Applications for permission to change were to take
into consideration the vulnerability of the development to fire-hazard
and the views of the CFA in this regard. In the case of Pakenham the
Ordinances later included the statement "Not withstanding anything
to the contrary in the Ordinance the permission of the Responsible

Authority should not be required for and nothing herein shall prevent the destruction or removal of vegetation including the lopping, topping and felling of trees or clearing of bushland for any purposes given hereunder:

38.2.1 fire-fighting purposes when authorized by an officer of the CFA in accordance with the provisions of the CFA Act 1958 during the course of fighting a fire.

28.2.3 the purpose of forming or clearing a fire-break authorised by the CFA or the Council of the Shire of Pakenham.

38.2.7 removal of vegetation required in writing by some other Public Authority pursuant to the provisions of any other act.

38.2.8 clearing of a site - the area cleared not to be greater than necessary to ensure the safety and proper access to the development.

The Shire recognised that "in areas of high fire risk the density of residential development must be limited to reduce potential damage and ensure that the road network can facilitate evacuation and fire control".

A conflict of interest becomes apparent, "Much of the charm of driving through the scenic area is due to the winding local roads, related to both topography and vegetation. This factor should be considered when improving road standards in the area" (Shire of Pakenham Planning Scheme).

Much depends upon the extent to which a commonsense flexibility has been allowed to soften the rigorous control of bye-laws. Undoubtedly some of the public attitude is coloured by assuming that the wording of bye-laws make any tree clearance impossible. Nevertheless some of the actual experiences have shown that requests for tree removal or pruning have been turned down. In Sherbrooke after the fires the deputy Shire president reported that 94 per cent of all applications for tree clearing had been approved by the council. It is difficult to assess whether many or any were discouraged from even applying because of their belief that strict tree removal regulations would make this application pointless.

Local authorities do not take a single stand. The town planning scheme for Lorne requires property owners to obtain special permits before pruning or lopping native trees over 3 m high. Barrabool Shire in the Otways, however, issued 1 800 notices in the summer before Christmas 1982 to property owners in coastal towns to cut long grass and dispose of material that could sustain a fire. In some cases houses, where clearance had been effectively undertaken, were unaffected by the fires, whilst others well away from trees (eg Upper Beaconsfield) were burnt down. The maximum amount of ground trash that can accumulate without generating too fierce a fire has been estimated at a level of 5 tonnes per acre. As previously indicated estimates for some of the areas burnt considerably exceeded this threshold. In most cases a clearing routine repeated at intervals between 4 and 7 years will ensure the necessary control. Victorian Councils in general have the authority to instruct their staff to remove undergrowth from a property if it constitutes a fire-hazard and to bill the owner. In the case of Sherbrooke the rules governing the management of native trees, it was claimed, did not differ substantially from those of most Melbourne municipalities. If differences have arisen it could be that the perception of those controls rather than the controls themselves is what differs between municipalities.

It is the CFA that has the responsibility to see that freehold land and property is cleared and accessible. Somewhat defensively perhaps responses to critics indicated that the CFA had the power to override town planning regulations and to order the removal of a fire-hazard, so that those who had complaints about vegetation close to their house could complain to the CFA. Undoubtedly this rather cumbersome procedure must discourage the initiation of sensible fire precautions to some degree. The evidence is not available to the authors to judge the rights and wrongs of the case, but there are clearly signs of disagreement demonstrated by the remark reported to have been made by the CFA Regional Fire Officer for the Dandenongs: "We've been constantly knocked back by the Shire of Sherbrooke on fire access roads that are absolutely

essential not only to get fire trucks in but to let residents
get out of the fire". An opinion was also expressed that the
Council had ignored CFA warnings over the years that its conserv-
ation policies were hampering fire safety and preventing many
people from clearing their properties of trees.

Preventive planning in the Insurance Council of Australia's
pamphlet (Appendix 2) for urban fringe dwellers emphasizes the
value of low flammability windbreaks and special landscaping
around houses. Trees such as eucalypts, paper barks, resinous
pines, bottle brush and tea-tree which are highly volatile should
be avoided. Such trees burn fiercely, especially when dry, and
in so doing radiate great heat. Some of these tree species, euc-
alypts in particular, produce large quantities of ground litter
which can be highly susceptible to spot-fire ignition. Eucalypts
provide a plentiful source of burning debris that can be driven
considerable distance by high winds. European exotic trees, with
a high leaf moisture content and slow burning foliage provided good
protection against wind driven flames and in the Macedon-Mt Macedon
area seemed to have helped save some houses. The value of differ-
ent tree species and different patterns of distributions merits
study and establishment of a general advice which is widely known
to the public. Working on known fire-behaviour, planners have an
opportunity to reduce fire-risk by taking a positive action to
ensure the use of the best mix of trees and shrubs in settled areas
to discourage fire-spread. A number of viewpoints put more blame
on long grass and dried leaves close to buildings on the ground
than on trees.

Some observers both in the Macedon and the Anglesea areas
were of the opinion that white-painted houses survived better
than those of a darker colour. This view is based on the belief
that the higher reflectivity of the white surface gives a greater
resistance to radiated heat. The lack of data on the colour of
houses before the fires prevented any testing of this hypothesis.

At least two houses in the Macedon area were saved by roof sprinkler systems. Past information has demonstrated that such systems are not infallible especially when reliance is placed on the reticulated water supply which may lose pressure or even fail completely. Greater reliability can be provided with the installation of a petrol driven pump and a local water supply.

In addition to some hazardous aspects of house design and of land management immediately around buildings two specific problems - LP gas cylinders and the storage of petrol in drums may be mentioned. Experience showed that LP gas cylinders generally vented and did not explode when the fire passed through. A few cylinders exploded with bomb-like force. One problem occurred when the vented burning gas was directed towards a building from a nearby cylinder. A more serious problem was caused when petrol stored on domestic premises (as a stand-by to combat the inconvenience of petrol strikes) caught fire and drums exploded and added seriously to the fire intensity.

7.3 RECONSTRUCTION AND REBUILDING

The rebuilding of fire-damaged or destroyed houses raises another issue. It is understandable that many are anxious to commence the process of reconstruction as soon as they are in the financial position to do so. The Emergency Services of the Insurance Council of Australia were put into rapid operation and teams of assessors and loss adjusters were quickly at work. Inevitably rumours about payment of claims and conditions that might affect the amounts due surfaced. One quite incorrect rumour that had wide currency was that where chimneys remained standing the value of these remains would be deducted from the payment. Proof of ownership, where deeds and other documents had been destroyed, lack of understanding of just how much the full value of the building was covered, and under-insurance were situations that generated in a number of instances. Despite the great efforts made to facilitate the progress of claims some reports suggest about one fifth of the

claimants experienced some form of problem. Some perhaps settled
for their repayments a little prematurely before ascertaining their
full rights. One precaution that was necessasry was to ensure that
the impatience to get reconstruction underway did not lead to the
site clearance before the assessors had been able to form a fair
impression of the nature of the destroyed premises.

The ideal reconstruction sequence is for careful planning to
precede any construction so that the end result is not just a
return to the status quo but an improvement on it. A number of
questions should be answered. Is the new design fire-prone, are
the materials safer, is the site adequately accessible or is it
acceptable at all? Too often the buildings regulations are the
same in both the country and suburbia. Yet in fire terms the
threat may have very different characteristics. Planning and
building codes need to be re-evaluated to accommodate the special
risks of particular sites. Some sites, it might be argued, should
not be re-occupied at all. New building designs and special siting
requirements may demand more time to achieve or cost more. These
additional demands can impose additional stresses on a community
or individual already under pressure.

Social objectives may require as rapid as possible return
to the pre-fire community structure and life-style. It is notable
that, with remarkably few exceptions, the expressed intention of
the very great majority of the residents of the fire-ravaged areas
indicated their firm intention to rebuild in those areas and re-
establish their community. Many even, within a week or so of the
fires, were living in caravans or tents, beside their destroyed
house or perhaps on a cleared part of the foundation slab. Emerg-
ency volunteer plumbing services had re-established the water
supplies replacing the heat-destroyed pipes and fixtures within
days, Telecom was rigging up telephones and electricity supplies
were being re-connected. Temporary toilet facilities were also
being installed. Events took place too quickly to permit that nec-
essary calm and unhurried appraisal of the situation that the ideal
reconstruction programme requires.

Knowledge of how to build a house that will resist fire and what trees and shrubs should be planted to slow down or stop a fire is well established. However, people still buy bush blocks on which they construct brick veneer fire traps with surrounding highly flammable eucalypts and teatrees right up to the forest edge.

People are still required, by planning conditions, to ventilate below floor and the roof space. Where houses are raised on stumps precautions to prevent fire getting under the house are not mandatory. A number of potential strategies could be implemented, a solid brick or masonry house on a concrete slab and without large picture windows (or alternatively shutters that can be used to prevent fire breakage of glass) presents fewer risks than a weatherboard house. Where slopes are involved it is probably safer to build a house into the hillside and to avoid elevation on stumps. Other aids would be the provision of an underground water tank of sufficient capacity (say 1 000 gallons or more) with a petrol powered pump to operate a roof sprinkler system for fire-fighting and the exclusion of debris from gutters by the use of leaf guards. Fire retardant wood finishes can also help. Perhaps there are arguments in support of insurance deductibles designed to favour the adoption of safety measures.

The Royal Australian Institute of Architects was expressing concern that many whose homes had been destroyed had already begun to build the same sort of vulnerable houses as they had before the fires. Indeed building permits were being issued for replacement of burnt-out homes according to the original specifications. Although there would be time to consider and introduce new building regulations preceding the rebuilding of the fire-destroyed houses, there was more inclination to facilitate a quick return to their normal life style by enabling rebuilding to take place as soon as possible and thereby reduce the stresses on the people rather than to implement longer-term actions.

CHAPTER 8

CONCLUSIONS

Since Ash Wednesday there have been numerous investigations and
enquiries carried out by those authorities who were directly involved
with the disaster, by State or Commonwealth bodies, by a State Body
of Enquiry, in the coronial enquiries into the fatalities and by
individual researchers. Despite the normal rapid fall off in reg-
ular media reporting within two or three weeks of the disaster, the
press has picked up some of the criticisms that have erupted from
different quarters from time to time over the ensuing weeks. There is
always a need to follow up each disaster with a longitudinal survey.
Only by this technique can attention be focussed properly upon the
critical aspects of disaster impact and response. Rarely do research-
ers or official bodies achieve such an investigation. For the general
public and for far too many decision-makers even serious disasters
have an ephemeral place in their thoughts. Other problems and events
all too rapidly take the prime place for people's attention. These
circumstances mean that there is a considerable risk that many of
the aspects of disaster prevention, mitigation or preparedness that
may appear at fault are inadequately analysed. A further outcome of
this inadquate analysis is that, where deficiencies or weakness might
otherwise have been confirmed, they may go unnoticed or unattended to.
It is in this situation that, when inevitably sooner or later a similar
disaster reoccurs, too many of the same errors are repeated.

A survey undertaken over a few days and very soon after the dis-
aster occurred cannot legitimately identify all the problems that
arose in the whole sequence of events leading up to and following from
Ash Wednesday. Nevertheless material in this report can take its
place in the accumulation of evidence and information from many differ-
ent sources, which it is to be hoped will be made readily available in
a published form and which can form the basis of more detailed and
extensive surveys.

A number of points have been introduced in the course of this report. For the reasons mentioned above few of these can have the weight of firm recommendations and hence are not repeated in summary form in this concluding section. None-the-less several of the points made, it is argued, need to be examined in the light of later knowledge and refuted, modified or confirmed.

APPENDIX 1

HOUSING ASSISTANCE

In addition to the Ministry of Housing's normal program assist-
ing with the provision of accommodation a number of early actions
were instituted for those whose principal residence had been destroyed
by fire. These were widely publicised in the press in full page
advertisements.

Three forms of help were offered: a) for those planning to
rebuild; b) for those requiring short-term accommodation; and
c) for those requiring long-term accommodation.

a) Rebuilding

1   Accommodation on-site, for those whose sole residence
had been destroyed, while awaiting building. Provided in
order of application.

i)   100 Granny flats are being made available. These
are demountable units with 40 sq m floor area and inclu-
ding a living room with kitchen, a bedroom with ensuite
bathroom, with heater, stove, hot water and full insul-
ation. Suitable for couples or families with one or
two children. Some 2 bedroom units are also available.

ii)   5 fully furnished mobile homes are available for
extremely needy cases.

The premises are to be available within one month of
application. Building permits are to be arranged on behalf
of the applicants with the Municipality and advice can be
given on the site to the applicant for determining the loc-
ation of the unit.

Conditions involve rental for a minimum of one year and a maximum of three years at a rental of $30 per week. At the end of the rental period the Ministry will remove the units.

2   Advice on rebuilding from the Home Advisory Service is to be increased to provide expert specially resourced technical services. The Ministry is able to introduce those who want to purchase their own home or caravan to the manufacturers.

3   The Royal Australian Institute of Architects is providing copies of standard house plans at substantially reduced rates. At local relief centres in the fire-areas free rebuilding advice is being made available.

4   Financial support for rebuilding

i)   Loans up to $22 000 at concessional interest rates are to be made available through the Rural Finance Commission to those who have lost their principal residence and are seeking to rebuild or relocate within Victoria. The basis for the loan is the need to bridge the gap between the insurance payment and the cost of rebuilding or relocation.

ii)   Priority consideration for approving government home finance assistance through the Ministry of Housing to eligible applicants who are seeking to purchase a property.

b)   Help for Those Seeking Short-term Accommodation

Rent free accommodation for a maximum of four months in up to 100 houses purchased under the Spot Purchase Scheme, together with other houses made available by builders rent-free for periods up to a maximum of 18 months. These premises are located throughout the metropolitan area. Some are immediately available. Upgrading works, where needed, have been or are about to be started and will continue around the occupier with as little inconvenience as possible.

c)   <u>For Those Seeking Long-term Accommodation</u>

Priority will be given to applications for permanent accommodation in Ministry housing in other Victorian locations from people eligible under the normal Ministry guidelines.

The Ministry is arranging immediately the letting of additional contracts for the construction of 20 houses under the Ministry program in locations as close as possible to fire-affected areas.

Tenders for the provision of a further 80 houses in these areas recently being sought by separate advertisement in the press are being given early and separate assessment. Construction should commence within the next 6 to 8 weeks.

Those eligible and on the Ministry's waiting list or made eligible because of the fires would pay normal Ministry rents.

APPENDIX 2

INSURANCE COUNCIL'S ADVISORY PAMPHLET, MARCH 1981

Recognising the spread of residences into semi-rural or former farming areas on city fringes and the lack of experience of the bush-fire threat of many of the new residents, the pamphlet differentiates the desirable types of action under four headings.

1 Long-term Protective Measures

i)   Landscaping to keep a clear area around the house and possibly the establishment of a windbreak on the side from which prevailing summer winds blow, as a screen against flying embers.

ii)   Tree selection and planting. Smooth-barked species are less prone to catch fire and to generate spotting material. Removal of lower branches decreases the risk of fire extending vertically from burning ground vegetation or litter. Avoid trees so close to the building that branches overhang the eaves and fill the gutters with leaves. Prune trees that grow too close. Nearer the house plant small shrubs and ground cover selected so that highly flammable species such as Melaleuca, Leptospermum, Banksia and Hakea are avoided. Avoid clumps of bushes and keep ground clear of vegetation litter below them.

Trees serve to reduce wind velocities through friction. A random planting of trees is preferable to a completely cleared area and helps to supplement the effects of any wind break.

iii)   Steps to limit fire access into buildings. Cover access under eaves or roof vents with a fine wire (not plastic) mesh. Block gaps in the end of corrugated roofing with non-combustible material (cement, plaster etc). Instal wire screens over windows and door openings. Prevent fire entry under the house floor by bricking or asbestos screening (less usefully wire

mesh). Whilst not transgressing building regulations concerning under-floor ventilation, cover vents with wire mesh. Avoid wood piles close to the house or unprotected below the house. Locate LP gas cylinders with safety vents facing away from the building. Store the minimum amount of flammable liquids in well sealed metal containers and in a place as safe from fire access as possible.

iv)   Locate external water taps in strategic position, preferably some distance from the house with at least one fitted with a long hose able to reach all sides of the house. If possible have a back-up petrol or diesel (not electric because of possible power loss) high-pressure pump, in case reticulated water pressure is lost, with a long hose and a pick-up to reach the bottom of any local water source (swimming pool, creek etc).

2   Action Prior to the Start of the Summer Fire Season

i)   Check potential fire areas that could threaten a property. Clear ground and low level sources of fire fuel. Check all fire-fighting equipment.

ii)   Check the house surrounds. Keep lawns short and well watered. Clear undergrowth or long grass along the fence lines. Clear scrub at least 30 metres (60 metres if dense scrub) from the hosue. Ensure that a spark arrestor is fitted to any incinerator. Check that a fire-fighting vehicle can gain access to the yard and can manoeuvre therein.

iii)   Check the house. Deal with the overhang of any vegetation, clear debris from roof and gutters. Repair or replace broken tiles. Ensure entry points for fire under eaves, corrugated roof sheets, through ventilation openings are attended to. Check, and repair if necessary, door and window screens. Ensure that exterior woodwork is protected from flying embers by a good coat of paint or lacquer.

3   As the Fire Approaches

i)   Be calm.

ii)   Inform the local fire brigade of the existence of the
        fire. Have readily available the appropriate telephone
        number.

iii)   Fill all available buckets, handbasins, bath and
        knapsacks with water. Place a ladder against roof on the
        outside of the house with a bucket or hose close to it.
        If available also have ladder giving access to ceiling
        manhole, placing a bucket of water on the ceiling close
        to the manhole.

iv)   Attach hoses to taps, assemble fire-fighting tools
        at a central point. If possessed check the auxiliary
        water pump pressure.

v)   Close all windows and doors. Move car into a clear
        space but close windows and doors (leaving these unlocked).

vi)   Block downpipes with tennis balls or drink cans wrapped
        in cloth. Fill gutters with water.

vii)   Ascertain plans of education authorities for evacu-
        ation of children in time of major fires and know what
        children will be doing.

viii)   Hold a 'roll-call' of the whole family.

ix)   Dress in overalls or long pants, wollen sweaters with
        sturdy shoes or boots and headgear if available. Avoid
        synthetic materials which burn or melt causing severe
        burns.

4   Imminent Danger - The Fire at the Edge of the Property

i)   Remain calm and co-operate with fire-fighting
        officers if in your area.

ii)   Do not evacuate unless advised by police or fire
        brigade officers.

iii)   Nervous people, small children together with house-
hold pets should keep inside the house on the side away
from the fire. Other responsible children over the age
of about 12, provided they are correctly dressed, can be
of great practical assistance to the rest of the family
if fighting the fire.

iv)   Hose roof to refill gutters. Wet shrubs and grass
close to the house if possible.

v)   If there is thick smoke use a damp handkerchief (kept
wet) as a mask.

vi)   Check that fire does not creep up to the house across
dried up lawns. Douse or beat out such fires.

vii)   Watch the roof and under-roof covering. If any sign
of fire tackle with hose or knapsack spray.

viii)   Watch for heat exhaustion. If feeling effects of
heat get indoors, drink plenty of slightly saline water.
Do not drink from brigade tanks or knapsacks, the water
may have fire-retardant chemicals in it.

ix)   In very severe conditions only trained fire-fighters
should be involved outside.

x)   After passage of the fire-front check house thoroughly
inside and out for any small fires or smouldering material,
starting inside with the roof then rooms and contents, then
the outside roof, walls and under-floor. Next check the
garage and shed and extinguish any small vegetation or fence
fires that may still be burning outside.

xi)   Check neighbours' houses, windward side first. Exting-
uish small fires around the property.

xii)   Help neighbours if necessary with fire-fighting once
own property is safe.

The pamphlet also gave brief advice on evacuation, should it
be necessary, covering loading of the vehicle, choice of route,
remaining in the car if caught in the fire, registration at
evacuee reception centres.

A check list of the above points with a diagrammatic picture to remind the household of the appropriate procedures also formed part of a very comprehensive leaflet.

APPENDIX 3

SOME MAJOR FIRE EXPERIENCES IN VICTORIA TO 1979

6.12.1851   Black Thursday. First major recorded fire. Dandenongs,
            Mt Macedon and the coastline Barwon Heads to Mr Gambier. Sev-
            ere drought, long period of hot northerly winds. Melbourne
            maximum 47.1°C. 10 deaths.

1.2.1898   Red Tuesday. Fires burnt in south Gippsland for several
            days. 12 deaths.

11.1919 to 4.1920. Many areas in south and north-east Victoria
            burnt. 3 deaths.

1925-1926 season. Many bad fires. In January Healesville had its
            worst fires since 1919. Large area of Gippsland suffered badly
            in February/early March (worst since 1898). Much property
            burnt. 60 deaths.

1931-1932 season. Many fires over period December to February.
            Gippsland again suffered most considerable property losses.
            20 deaths.

13.1.1939 Black Friday. Described as Australia's worst natural
            disaster. Many towns gutted. Melbourne maximum 46°C, relat-
            ive humidity down to 8%, winds 30-60 km h^{-1}. Large areas of
            forest devastated. Grasslands too drought affected for ser-
            ious fires. 71 deaths.

1943-1944 season. Godd winter rains produced prolific grass growth
            followed by a dry spring. 14 January 1944 hot, low humidity and
            winds 35-55 km h^{-1}. Victoria's worst grass fires, perhaps 1 m
            hectares burnt. 500 homes destroyed. Pastoral industry espec-
            ially Western Highlands and Western Districts suffered severe
            losses. 51 deaths. Resulted in the establishment of the CFA.

5.2.1952   100 000 hectares burnt near Benall. Several deaths.

1961-1962 season.   167 major fires.   14-17 January severe fires in
    Dandenong Ranges and Melbourne outskirts.   454 houses destroyed.
    14 deaths.

January/March 1965   Longwood area major grass fire in January.
    Several deaths. Several forest fires in Gippsland in March.

8.1.1969   Geelong to Melbourne Road near Lara major grass fire.
    Other fires burnt out of control north of the Great Divide.
    Total death roll 8 January, 23.

12.2.1977   Streatham township (Western District) destroyed. Large
    losses of sheep and cattle. 5 deaths.

15.1.1978   East Gippsland. Bairnsdale threatened. Property
    losses. 2 deaths.

REFERENCES

Bureau of Meteorology   (1983)   <u>Preliminary Report on the Ash Wed-</u>
<u>nesday Fires - 16 February 1983</u>, Department of Science and
Technology, Bureau of Meteorology, Melbourne, March.

CSIRO   (1983)   Bushfire disaster, C.B.R. Acts, <u>Rebuild</u>, Vol 8,
No 2, April, Division of Building Research.

Cain, Hon. John   (1983)   <u>The Ash Wednesday Bushfires</u>, Ministerial
Statement by the Hon John Cain, MP, Premier of Victoria,
16th March 1983.

Douglas, Neil   (1983)   After Ash Wednesday, <u>Habitat</u>, Vol 11, No 3,
12-16.

Land, W.   (1981)   <u>Simulation of Evacuation in the Event of a</u>
<u>Disaster</u>, B.E. Thesis, James Cook University of North
Queensland, Townsville.

Luke, R.J. and A.G. McArthur   (1978)   <u>Bushfires in Australia</u>,
Department of Primary Industry, Forestry and Timber Bur-
eau, CSIRO, Division of Forest Research, Australian
Government Publishing Service, Canberra.

McArthur, A.G., Cheney, N.P. and J. Barber   (1982)   <u>The Fires of</u>
<u>12 February 1977 in the Western District of Victoria</u>.
A joint report by CSIRO, Division of Forest Research, Can-
berra, ACT and the Country Fire Authority, Melbourne, Vic-
toria, CSIRO.

Morris, W. and J.R. Barber   (undated)   <u>Design and Siting Guidelines:</u>
<u>Bushfire Protection for Rural Houses</u>.   A joint research report
of the Country Planning Board and the Country Fire Authority,
Victoria.

Perry, R.W., Lindell, M.K. and M.R. Greene (1981) Evacuation
Planning in Emergency Management, Lexington Books, Toronto.

Turner, B.J. (1984) Computerised geographic data bases, Proceed-
ings of the Workshop on Resource Management, Department of
Civil and Systems Engineering, James Cook University of North
Queensland, Townsville, July 1981, James Cook University, 149-156.

Victoria State Disaster Plan, DISPLAN (1980) Ministry for Police
and Emergency Services, Melbourne, Victoria.