

**A REVIEW OF THE VELD FIRES IN THE
WESTERN CAPE DURING 15 TO 25 JANUARY
2000**

**REPORT TO THE MINISTER OF WATER AFFAIRS AND
FORESTRY AND PREMIER OF THE WESTERN CAPE BY
THE TASK TEAM:**

**TOWARD IMPROVED VELDFIRE MANAGEMENT
IN SOUTH AFRICA**

FULL REPORT



**Department of Water Affairs and Forestry
2000**



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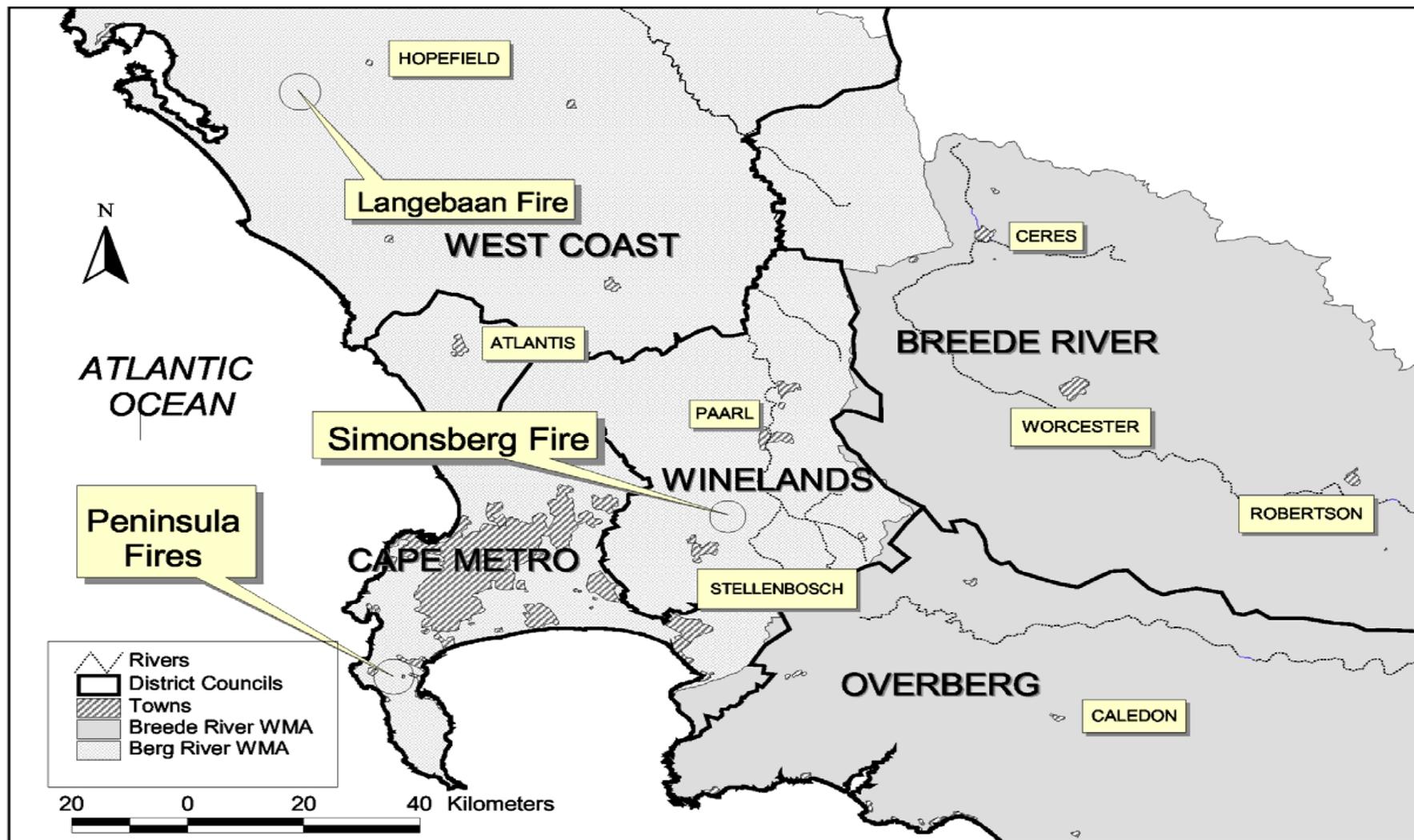
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CHAPTER 1

INTRODUCTION

1.1 Considerations that motivated the review

The large intense veldfires on the Cape Peninsula during January 2000 added to the concerns raised by several disastrous veldfires that occurred recently in South Africa. In the last year or so, these included veldfires that ran through the Tsitsikamma, through the foothills of the Drakensberg between the districts of Elliott and Maclear, and through the Kokstad area, resulting in loss of human life, stock, and the destruction of homesteads.

On 25 January 2000, Mr Ronnie Kasrils, Minister of Water Affairs and Forestry, addressed Parliament, during the snap debate on disaster management, on behalf of the Minister of Provincial and Local Government. In this speech he announced the intention to conduct an expert investigation of the underlying reasons for the severity of the veldfires and the lessons that can be learned for veldfire management. The emphasis is to be on "fire protection and not turf protection", and on coordination between different spheres of government. The report that follows arose from the investigation he envisaged.

1.2 The investigation by the Fire Task Team appointed by the Premier of the Western Cape

The Cabinet of the Western Cape government resolved on 26 January 2000 to appoint a task group to advise it on various aspects with regard to the veldfires in January 2000 in the Western Cape. This task group became known as the F.I.T.T., and delivered its first report in late March 2000. Table 6.1 in Chapter 6 summarises their recommendations. Thereafter the Premier agreed that further investigation should be assigned to the Task Team appointed by the Department of Water Affairs and Forestry.

General terms of reference for the F.I.T.T.

- Assess the management of the fires
- Recommend methods to heighten the state of preparedness during the current fire season as well as any other disaster that may have stemmed from the recent veldfires
- Evaluate the Disaster Management Bill
- Form an opinion on current fire-fighting resources and strategies
- Make recommendations on steps needed to deal with any other socio-economic impact that might have stemmed from this disaster
- Make recommendations on the formation of a specialist unit to combat veldfires in mountainous areas
- Investigate and report on the impact of development planning at municipalities, in particular the South Peninsula Municipality, on the ability to deliver emergency services
- Make recommendations on the prevention and methods to combat fires periodically breaking out at informal settlements
- Make recommendations on the management of periodic controlled veldfires, and
- Make recommendations on any statutory measure that may be necessary to improve the ability of public and private institutions to combat veldfires.

1.3 The brief to the Task Team

At the request of the Minister, the Department of Water Affairs and Forestry appointed the Task Team to review the events during the veldfires on the Cape Peninsula and elsewhere in the Western Cape that occurred between 15 and 25 January 2000. The geographical scope of the study was the Cape Peninsula and the areas within the Berg and Breede River Water Management Areas (see Map 1).

The objective of the review was to use the lessons from these veldfires to identify the strengths of current veldfire management systems, and to propose necessary improvements. The review was not a judicial enquiry, would not seek to assign blame or liability, and would preserve the anonymity of the individuals who were involved in the veldfires. Furthermore, the review would not repeat investigations of the same fires that had been recently completed, or were underway, but would use the findings of such investigations as sources of information.

From an analysis of all relevant information, the study was to derive the lessons relevant to the Western Cape itself, as well as for the veldfire management systems in South Africa generally, including the relevant elements of the National Disaster Management System as a whole.

The key questions to be addressed in the review included the following:

- What ecological conditions (e.g. weather, natural and alien vegetation) prompted the fires to occur and contributed to their intensity and spread?
- What institutional arrangements were in place for veldfire management and veldfire fighting, which of these proved effective, and what improvements may be needed?
- What strategies for veldfire management and veldfire fighting were adopted during the fires and how were resources (manpower and equipment) used; what proved effective, and what needs to be improved?
- How effective are the extant provisions of the Forest Act of 1984, the provisions of the National Veld and Forest Fires Act of 1998 that were in force at the time, and any other statutes that determine veldfire management?

The study was to generate a report that would include findings, the inferences from these findings, and recommendations for improvements in the legislative, institutional and ecosystem management regime that determines the veldfire management system.

Specifically, recommendations were to include:

- proposals for improvement to and guidelines for the effective implementation of the National Veld and Forest Fires Act, as well as recommendations for improved linkages between this Act and other relevant statutes
- recommendations for improvements in the organising and resourcing of coordination and cooperative governance arrangements between spheres of government responsible for and otherwise influencing management for the prevention of veldfires, the control of fires that do break out, and the mitigation of the consequences of fires that do occur
- improvements in the management for veldfire control of ecosystems as well as of the built and settled environments adjacent to natural or semi-natural ecosystems.

The final output would be feasible proposals for improvements in veldfire management in South Africa, including legislation, especially the National Veld and Forest Fires Act,

institutions and their cooperative governance arrangements, supporting systems and ecosystems management.

The Task Team was to use all available sources of information, as well as conducting its own investigations. Important examples included the report by the Western Cape Task Team that investigated the Peninsula veldfires of 15 to 25 January 2000, the veldfire management plan for the Peninsula National Park developed by the CSIR, as well as reports on invasive alien vegetation on the Peninsula and elsewhere. The Task Team could commission new studies to fill any important gaps in information.

The Task Team sourced local experts and consulted with officials of relevant bodies to obtain specific information required for the study and not immediately available otherwise. The Task Team was also empowered to call upon organisations and individuals for such written or oral information, but respected the anonymity of the individuals concerned.

The Task Team was responsible to the Department of Water Affairs and Forestry and for delivering its report finally to the Chief Director: Forestry. However, the Task Team was to report through its Chairperson at intervals of not less than one month to the Steering Committee, whose advice was duly noted and considered by the Task Team. In addition, the Task Team was to circulate their draft conclusions and recommendations to key stakeholders for comment prior to conclusion of the report, take such comment into consideration, and append the comment to the report.

The draft report was to be delivered to the Steering Committee for evaluation on 24 July 2000. The final report was to be submitted to the Department in mid-August 2000.

1.4 The approach followed in the review

1.4.1 General

This review focused upon veldfires, and not fires in structures or built-up areas. The goal of the Task Team was to contribute to organisational learning within all agencies involved in the management of veldfire in the Western Cape and South Africa as a whole. This contribution focused on improved service delivery and enhanced capacity among agencies and members of local communities to understand, prepare for, prevent and respond to veldfires. In addition, the findings should, wherever appropriate, relate to the newly established disaster management policy for South Africa, while taking account of current policies and institutions.

The Task Team addressed its terms of reference in two stages. The first was to use a questionnaire survey to collect information about all fires that occurred during the 10 days covered by the study, within the prescribed geographical region. The second involved on-site inspections, interviews with local roleplayers and stakeholders, and study of documents, focusing on three selected cases. This work was backed up by background specialist studies by local fire scientists, commissioned through the Stellenbosch office of the CSIR.

1.4.2 Questionnaire survey

The questionnaire sent to respondents addressed five topics, i.e.:

- The incidence, timing, extent and causes of veldfires in the area of jurisdiction, including a request for copies of the incident logs or fire reports for each of the fires.
- Risk factors affecting the incidence of the fires, such as the state of vegetation management and occurrence of alien invasive plants
- The state of preparedness of the relevant organisation

- Description of the sequence of events during the fires and of any problems encountered with fire-fighting resources and with communication during fire-fighting
- Estimates of the impacts of the veldfires.

Questions relating to Topics 2 to 5 were largely open-ended, allowing respondents to give their own descriptions of the situations and issues that they had encountered during the veldfires.

Appendix 2 contains a copy of the full questionnaire. Copies went to all fire services of local authorities within the region investigated, to all disaster management functionaries, and to major land management agencies, i.e. the Cape Nature Conservation Board, the SA National Parks Service, and to Safcol. Copies also went to the SA Navy and SA Air Force. Appendix 3 contains the full list of the 50 entities that received the questionnaire.

Analysis of the questionnaires involved statistical summaries for veldfires reported and content analysis of other responses. Fire incident logs and reports were used with other sources to formulate chronologies and descriptions of each fire in the case studies.

1.4.3 Case studies

The three cases were chosen on the advice of the Steering Committee, but also reflected the level of perceived threat that each gave rise to. The three cases were (1) the two veldfires on the Cape Peninsula, i.e. the Ou Kaapse Weg and the Red Hill veldfires (2) the West Coast veldfire, and (3) the Simonsberg veldfire.

For each of these cases the Task Team made site visits and interviewed roleplayers, to amplify the documented information received. The team members used the topics on which recommendations were required to guide the interviews (Appendix 5) but did not necessarily require each interviewee to respond to each topic. Team members compiled notes on each interview, which were in most cases transposed to word-processed text each day, for later reference.

1.5 Concepts and definitions

1.5.1 Veldfires

For the purposes of this review, veldfires were classified as a veldfire of any size that occurred in fynbos or other natural veld, plantations, crops, or invasive vegetation outside a built-up area. If the veldfire occurred within a built-up area then only fires that occurred within veld more than 10 hectares in size were to be included.

Veldfires in the Cape and other areas of South Africa are often caused by natural factors, such as lightning (see Chapter 2). Whatever the cause, however, veldfires are part of the natural ecological processes in most parts of the country. In many areas, large veldfires occur without necessarily posing a threat to life, property or the environment. In such cases, they are not real or potential disasters. However, more and more we have the situation where human settlement and development encroaches further into the natural environment, and veldfires therefore pose a growing threat to vulnerable properties and communities. In addition, environmental change such as the spread of alien invasive plants, a process that can be accelerated by fire, results in environmental hazard from veldfires. Thus overall the potential for disastrous veldfires grows.

1.5.2 Veldfire management

Veldfire management includes all the strategies, plans and measures needed and applied to control the origin and cause of veldfires, to prevent untimely and unwanted veldfires, to prevent disastrous fires, to respond to veldfires and to apply veldfires to achieve prescribed management objectives. Veldfire management includes such measures as ecologically prescribed burns, according to a scheduled plan, allowing fires to burn in natural veld where they pose no threat, preparing common firebreaks, and proper planning and resourcing for the control of veldfires. Sustainable veldfire management occurs when veldfire management is designed and implemented to achieve the goals of protecting both biodiversity and ecosystem processes, while simultaneously promoting fire prevention.

Veldfire management is the obligation of the landowner, as stipulated in the National Veld and Forest Fires Act. Major land management agencies must necessarily have the appropriate capacity to manage veldfires, and are therefore substantial roleplayers in regional veldfire management. However, even small landowners must have appropriate and reasonable veldfire management capacity.

Chapter 2 summarises salient environmental aspects of the management of veldfires in the Cape.

1.5.3 Disaster management

The White Paper on Disaster Management defines a disaster as a natural or human-caused event, occurring with or without warning, causing or threatening death, injury or disease, damage to property, infrastructure or the environment, which exceeds the ability of the affected society to cope using only its own resources.

The White Paper describes disaster management as a collective term encompassing all aspects of planning for and responding to disasters, including both pre- and post-disaster activities, namely prevention, mitigation, preparedness, response, recovery and rehabilitation. It may refer to the management of both the risks and consequences of disasters.

It emphasises that current perceptions of disasters need to change:

“Disasters are not primarily rare occurrences managed by emergency rescue services. Rather, there needs to be a common awareness and shared responsibility for risk reduction in every aspect of our lives.”

“A complicating factor is that disaster management has become increasingly complex, compared to previous limited responses to natural and human-made events. The field of disasters, emergencies and risks is a rapidly changing one. Today, the field of disaster management raises many questions of morality and principle. It entails operations of greatly varying scale and diversity.

Disaster management has become a focus area for scientific endeavours to achieve a better understanding of the hazards that shape our natural and built environments and to set standards to bring about a safer world. It encompasses, for example, interpreting the early warning signals of natural phenomena, such as too little or too much rainfall. Similarly, it involves contingency planning and response to emergency events triggered by both natural and non-natural (including technological) forces.

Disaster management seeks to reduce the vulnerability of communities most at risk through improved access to services, development opportunities, information, education and

empowerment. It embraces the body of knowledge, policy and practice associated with humanitarian responses to both natural and technological disasters.”

“A further fundamental purpose of the policy [for disaster management in South Africa] is to advocate an approach to disaster management that focuses on reducing risks - the risk of loss of life, economic loss, and damage to property, especially to those sections of the population who are most vulnerable due to poverty and a general lack of resources. It also aims to protect the environment.

This requires a significantly improved capacity to track, monitor and disseminate information on phenomena and activities that trigger disaster events. It needs the support of institutional emergency preparedness and response capacity at local, provincial and national levels. It also implies an increased commitment to strategies to prevent disasters and mitigate their severity.”

The policy also seeks to integrate this risk reduction strategy into existing and future policies, plans and projects of national, provincial and local government, as well as policies and practices of the private sector. In short, the policy aims to:

- provide an enabling environment for disaster management
- promote proactive disaster management through risk reduction programmes
- improve South Africa's ability to manage emergencies or disasters and their consequences in a coordinated, efficient and effective manner
- promote integrated and coordinated disaster management through partnerships between different stakeholders and through cooperative relations between all spheres of government
- ensure that adequate financial arrangements are in place, and
- promote disaster management training and community awareness.

The White Paper requires the establishment of a National Disaster Management Centre to:

- ensure that an effective disaster management strategy is established and implemented
- co-ordinate disaster management at various levels of government
- promote and assist the implementation of disaster management activities in all sectors of society
- establish a framework to enable communities to be informed, alert and self-reliant and capable of supporting and cooperating with government in disaster prevention and mitigation, and
- establish a framework for coordinating and strengthening the current fragmented training and community awareness initiatives.

The Disaster Management Bill is close to submission to Parliament. Among other things, it sets out the system by which disaster management will be deployed to local level. Deployment will be through disaster management centres in the different spheres of government, focusing upon the Disaster Management Centre at the level of the metropole, or the local district council in the case of extra-metropolitan areas. Representative advisory forums and requirements for consultation between the different spheres of government will govern the system. Figure 1.1 illustrates the relationships between disaster management entities and agencies involved with veldfire management as stipulated in the Disaster Management Bill.

The Bill thus requires a system of disaster management, administered by Centres at the different spheres of government, and governed by representative structures at the different levels. The elements of disaster management strategies consist of sectoral plans, also generated at the three different levels.

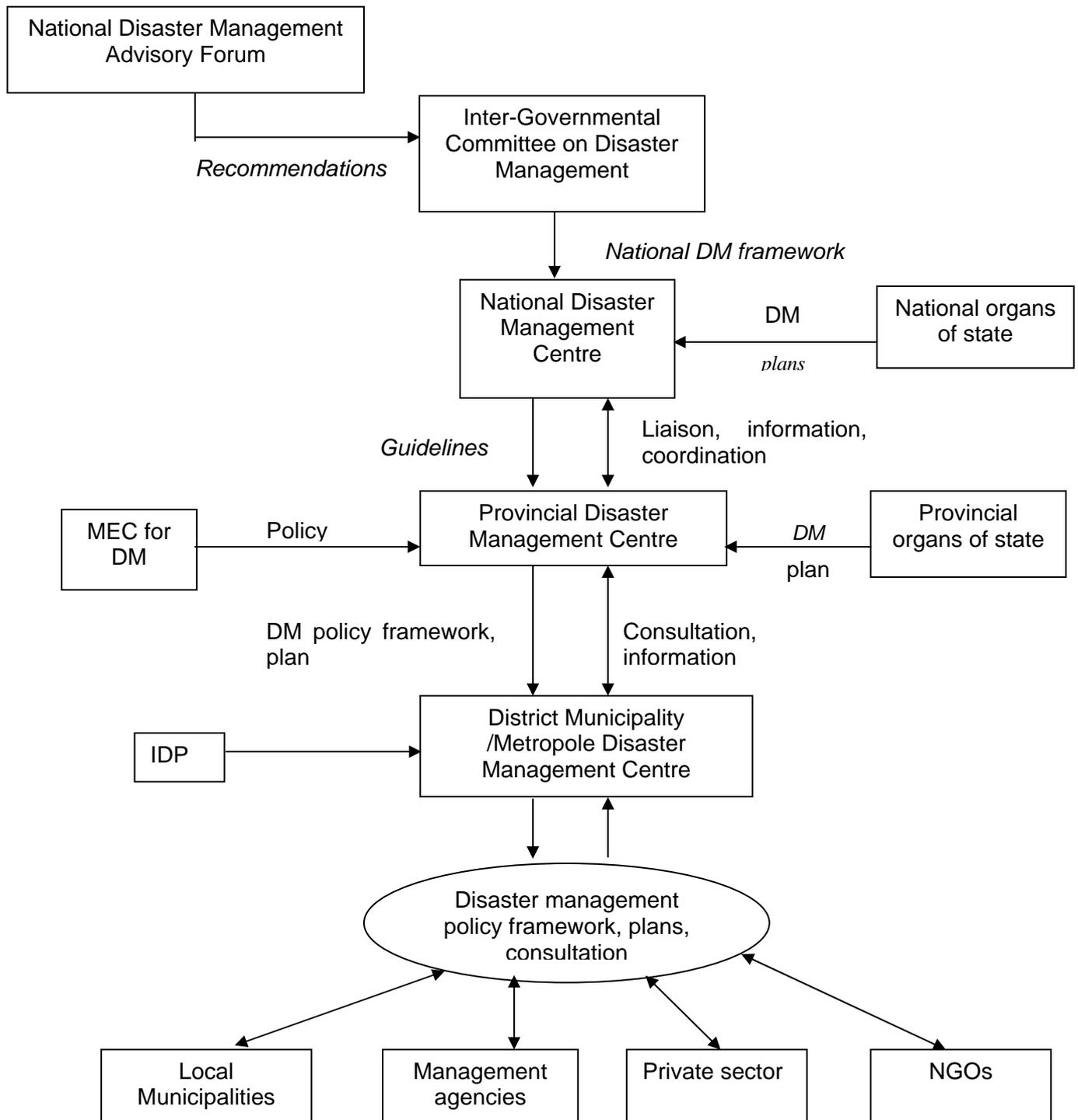


Figure 1.1: Outline of the principal elements of the South African Disaster Management (DM) System as stipulated in the Disaster Management Bill. The *national* organs of State involved in Disaster Management Plans for veldfires are DWAF (in terms of the National Veld and Forest Fire Act) and the Department of Provincial and Local Government (in terms of the Fire Brigade Services Act). At *provincial* level, organs of State required to deliver the veldfire elements of Disaster Management Plans would be the provincial Department of Local Government and Housing or its equivalent, as well as the provincial department responsible for environment. At the *District* level, the entities responsible for veldfire elements of Disaster Management Plans would be FPAs.

Figure 1.2 illustrates the veldfire management system that would be required to satisfy the Disaster Management Bill and the requirements of the Veld and Forest Fire Act. A District veldfire management plan would be needed as part of the overall disaster management plan. The District veldfire management plan would in turn consist of the collection of the veldfire management strategies required for each Fire Protection Association (FPA) within the District (or Metropole). Where FPAs do not exist, the municipal fire services would need to generate veldfire management plans, which would need to be based upon the primary responsibilities of landowners as set out in the Veld and Forest Fire Act.

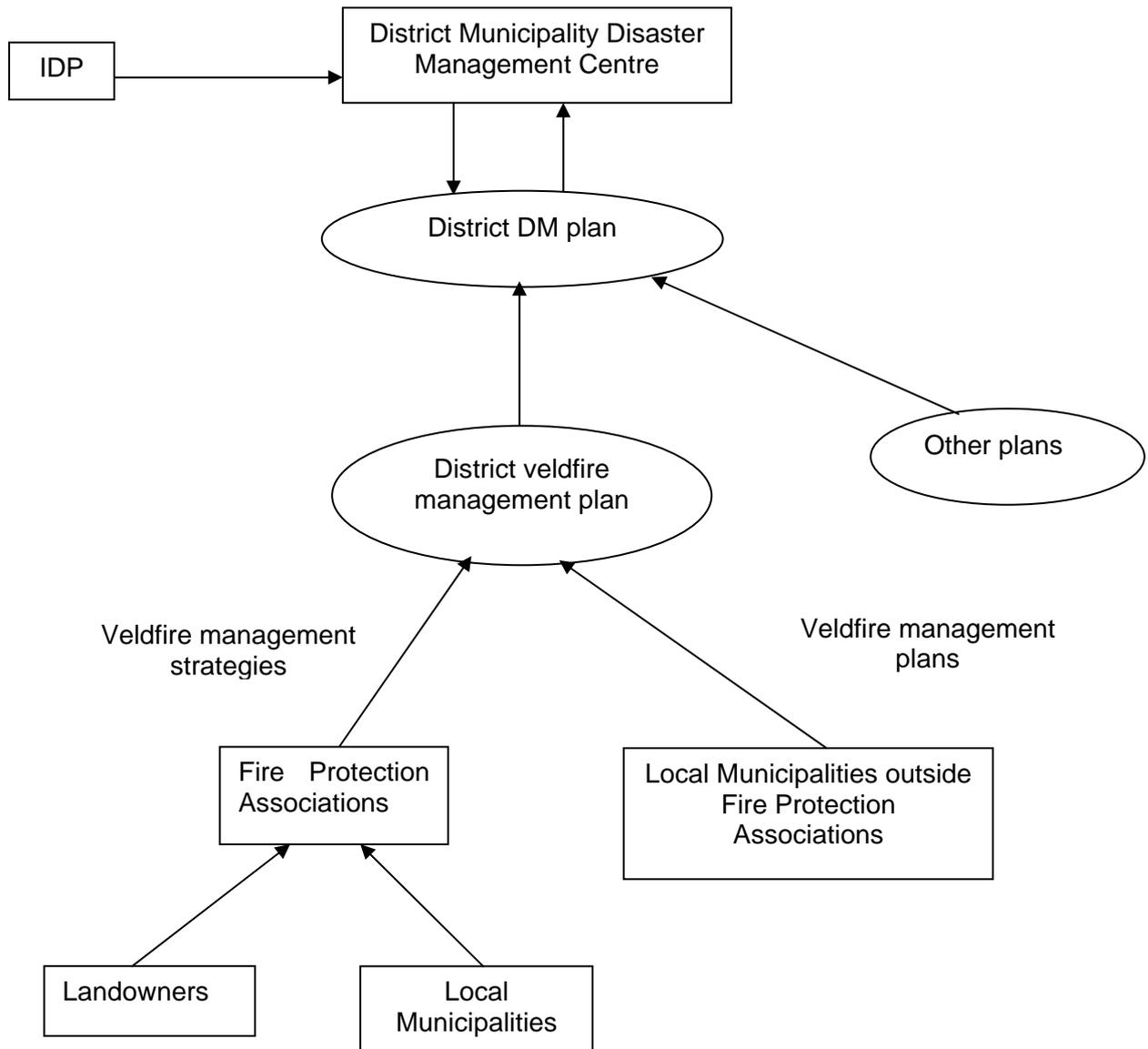


Figure 1.2: Outline of the relationship between veldfire management plans and the District Disaster Management Plan

Where FPAs are established in terms of the National Veld and Forest Fire Act they are required to produce veldfire management strategies. These strategies should form part of the District veldfire management plan, which in turn is part of the District Disaster Management Plan. Where FPAs do not exist, local fire services will need to develop veldfire management plans for their areas.

1.5.4 Relationship between disaster management and fire incident management

The management of veldfires, like the management of other emergency incidents, requires a planned and coordinated response to the incident. But in order to prevent or mitigate disasters, the response to the incident must take place in the disaster management framework, i.e. the inclusive system of policies and plans for prevention and mitigation of, preparedness for, response to, recovery from and rehabilitation after veldfires.

Obviously, for the goals of our new disaster management policy to be achieved, every veldfire incident needs to be addressed according to a comprehensive veldfire disaster management plan, (a) to give the best chance of preventing the incident from becoming a disaster, and (b) to ensure that a smooth progression of coordinating and contingency measures falls into place, if and as the incident escalates.

Response to a veldfire must begin with local incident management (see Section 1.5.5 below), a system that itself expands as the incident grows, and continue with higher-level coordination as soon as it becomes justified, or in anticipation of need. Thus there is no clear line between a small-scale veldfire emergency and an emerging disaster. The management arrangements to cope with disasters are not a separate set of arrangements to be applied only in the event of disaster. Figure 1.3 illustrates the relationships between the overlapping elements of the integrated disaster management system.

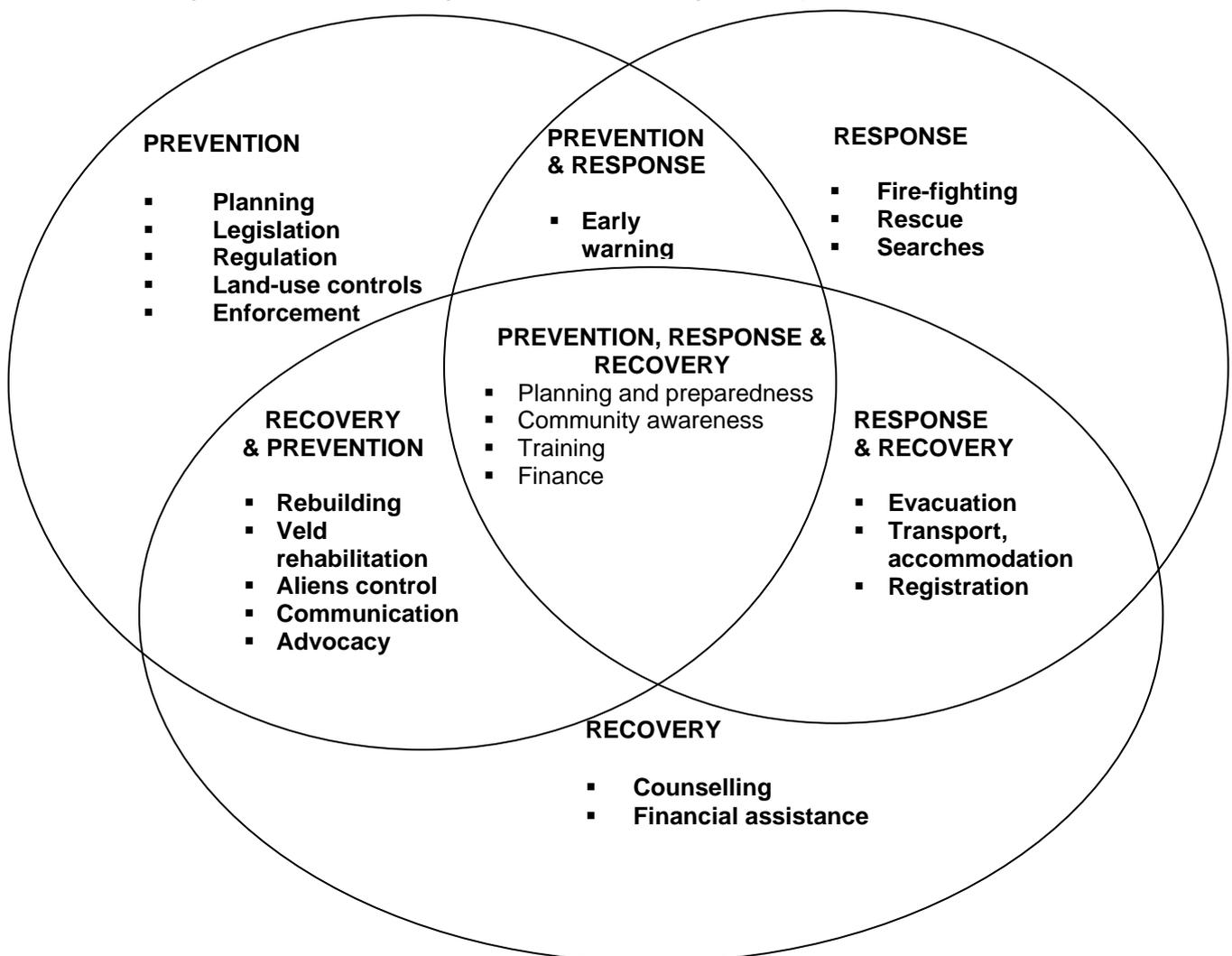


Figure 1.3: Relationships between the elements of the disaster management system (from Department of Justice, Victoria, 2000)

Thus, fire incident management through an ICS and disaster management through the Disaster Management Centre have complementary functions, but function at different levels of responsibility.

The on-scene ICP is responsible for all activities on the scene of the incident.

The Disaster Management Centre will be activated once an incident or several incidents has been identified as a local disaster, or is threatening to become a local disaster. The Centre co-ordinates the community-wide resources and initiatives to support the Incident Commander, and also co-ordinates initiatives such as evacuations, which lie beyond the jurisdiction of the Incident Commander.

The Centre exercises this function according to the disaster management policy and plan for the District or Metropole. The head of the Centre exercises this coordination role jointly with other roleplayers involved in the incident, or the several incidents that make up the disaster. The head may invoke ICS to manage the processes at the Centre, but does not replace the on-scene ICP.

1.5.5 Veldfire incident management

Many incidents require a response from a number of different agencies. Regardless of the size of the incident or the number of agencies involved in the response, all incidents require a coordinated effort to ensure an effective on-scene response to that incident and the efficient, safe use of resources.

Authorities in the USA developed a formal system of fire incident management in response to deficiencies found in fire-fighting systems after disastrous veldfires in the Los Angeles area of California in 1970, i.e. the California FIRESCOPE Incident Command System. This incident command system (ICS) was rapidly developed and taken up by different agencies to deal with all kinds of emergency incidents. Its essential features have since been adopted internationally, including by the UN Disaster Management Centre. The incident management system has become an "all-risk system", as the basic, everyday operating system for any incident within any agency. The command-and-control procedures documented by the Cape Metropolitan Area Fire Services conform in their essence to the generic ICS.

The description of the ICS that follows is based largely upon the FEMA - IS-195 Basic Incident Command System - Independent Study Module available on <http://www.fema.gov/emi/is195.htm>.

ICS is the model tool for command, control, and coordination of a response and provides a means to co-ordinate the efforts of individual agencies as they work toward the common goal of stabilising the incident and protecting life, property and the environment. ICS uses principles that have been proven to improve efficiency and effectiveness in a business setting and applies the principles to emergency response.

Much of the success of ICS has resulted directly from applying:

- a common organisational structure and
- key management principles, in a standardised way.

The ICS functions to co-ordinate the effective use of all of the available resources by giving agencies a formalised management structure that lends consistency, fosters efficiency and provides direction during a response.

The ICS organisation is built around five major components:

- Command
- Planning
- Operations
- Logistics
- Finance and administration.

Figure 1.4 illustrates the relationship among these components.

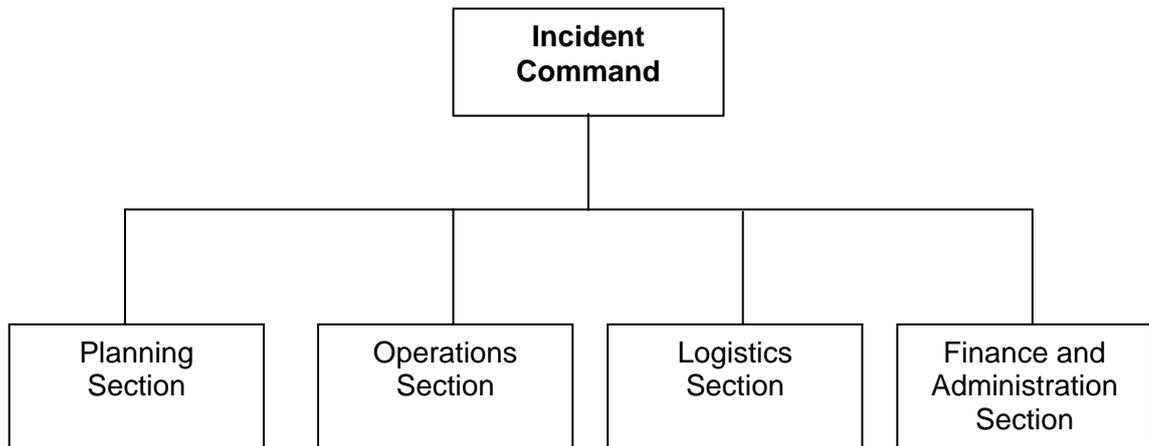


Figure 1.4. Components of the Incident Command System. (See text for explanation.)

In small-scale incidents, one person, the Incident Commander, may manage all of the components. A large-scale incident usually requires that each component, or section, is set up separately, and each of the primary ICS sections may be divided into smaller functions as needed. The ICS organisation has the capability to expand or contract to meet the needs of the incident, but all incidents, regardless of size or complexity, will have an Incident Commander.

A basic ICS operating guideline is that the Incident Commander is responsible for on-scene management until command authority is transferred to another person, who then becomes the Incident Commander. Thus effective transfer of command is assured as the situation changes.

The command function is directed by the Incident Commander, and includes:

- Performing command activities, such as establishing command and establishing the Incident Command Post (ICP)
- Protecting life and property
- Controlling personnel, equipment and other resources
- Maintaining accountability for responder and public safety, as well as for task accomplishment
- Establishing and maintaining an effective liaison with outside agencies and organisations, including the Emergency Operations Centre (EOC), when it is activated. In South Africa this would be the Disaster Management Centre.

Incident management encompasses the following on-scene activities:

- Establishing command
- Ensuring responder safety
- Assessing incident priorities
- Determining operational objectives
- Developing and implementing the Incident Action Plan (IAP)
- Developing an appropriate organisational structure
- Maintaining a manageable span of control
- Managing incident resources
- Coordinating overall emergency activities
- Coordinating the activities of outside agencies
- Authorising the release of information to the media
- Keeping track of costs.

Initially, the Incident Commander will be the senior first-responder to arrive at the scene. This should usually be the landowner, as required by the National Veld and Forest Fire Act. As additional responders arrive, command will transfer on the basis of who has primary jurisdiction over the incident. As incidents grow in size or become more complex, the responsible jurisdiction or agency may assign a more highly qualified Incident Commander. At transfer of command, the outgoing Incident Commander must give the incoming Incident Commander a full briefing and notify all staff of the change in command.

The Planning Section's function includes the collection, evaluation, dissemination, and use of information about the development of the incident and status of resources. This section's responsibilities can also include creation of the Incident Action Plan (IAP), which defines the response activities and resource utilisation for a specified time period.

The Operations Section carries out the response activities described in the IAP. The Operations Section Chief co-ordinates Operations Section activities and has primary responsibility for receiving and implementing the IAP. The Operations Section Chief reports to the Incident Commander and determines the required resources and organisational structure within the Operations Section.

The Logistics Section provides facilities, services, and materials, including personnel to operate the requested equipment for the incident. The Logistics Section functions are geared to support the incident responders. For example, the Medical Unit in the Logistics Section provides care for the incident responders not civilian victims.

The Finance and Administration Section is critical for tracking incident costs and reimbursement accounting. Unless costs and financial operations are carefully recorded and justified, reimbursement of costs is difficult, if not impossible.

Operating principles: An ICS structure should include the following:

- Common terminology: all agencies must use terms that mean the same thing; thus, for example, major organisational functions, facilities, and units are designated beforehand and given titles; ICS terminology is standard and consistent among all of the agencies involved; and each incident must be given a unique name
- A modular organisation: as outlined above, allowing the organisation to expand and contract according to needs

- Integrated communications: a system that uses a common communications plan, standard operating procedures, clear text, common frequencies, and common terminology
- Unity of command: the concept by which each person within an organisation reports to only one designated person
- A unified command structure: allows all agencies with responsibility for the incident, either geographic or functional, to manage an incident by establishing a common set of incident objectives and strategies.

Unified command does not mean losing or giving up agency authority, responsibility, or accountability. Rather, unified command means that all involved agencies contribute to the ICS by determining overall objectives, planning jointly for operational activities while conducting integrated operations, and so on, by:

- functioning under a single, coordinated IAP
- having one Operations Section Chief with responsibility for implementing the IAP
- having only one Incident Command Post

Consolidated IAPs, i.e. a single plan for the incident that covers all objectives and support activities that are needed during the entire operational period. A written plan is preferable to an oral plan because it clearly demonstrates responsibility, helps protect the community from liability suits, and provides documentation when requesting assistance from other agencies. A manageable span of control is defined as the number of individuals one supervisor can manage effectively. In ICS, the span of control for any supervisor falls within a range of three to seven resources, with five being the optimum.

Designated incident facilities include:

- An Incident Command Post (ICP) at which the Incident Commander, the Command Staff, and the General Staff oversee all incident operations
- Staging Areas at which resources are kept while awaiting incident assignment
- Comprehensive resource management serves such purposes as maximising resource use, consolidating control of single resources, providing accountability, and ensuring personnel safety. All resources are assigned to a status condition, i.e. assigned resources, available resources, and out-of-service resources (the State of Victoria in Australia uses a "T-card" system to document the management of resources).

The Department of Provincial and Local Government has adopted in principle the US NFPA Standard 1561 for the Fire Department Incident Management System, which will be adapted to suite South African standards. The SABS has also initiated a process for developing a standard for incident response in South Africa.

CHAPTER 2

VELDFIRES, FIRE ECOLOGY AND VELDFIRE MANAGEMENT IN THE WESTERN CAPE

2.1 Overview of the factors influencing the incidence and behaviour of veldfires

The manner in which fuels ignite and fire spreads is collectively referred to as fire behaviour. To manage veldfires we must understand fire behaviour. Weather conditions, the topography of the fire area, and the quantity and type of fuel present, influence fire behaviour in several ways.

2.1.1 Weather

Obviously weather, through its control of moisture in fuel and the ventilation of flames, has a fundamental effect on veldfires. Dry, hot and windy weather increases the probability of a major veldfire. These circumstances make ignition easier, allow fuels to burn more rapidly, and increase the intensity of the veldfire. High winds, in particular, can transform a small, easily controllable veldfire into a catastrophic event. High temperatures combined with low humidity cause fuels to dry out, making them burn more readily.

Large and intense veldfires can even create their own weather by increasing the velocity of winds near the fire. This phenomenon can dramatically increase the spread and intensity of the veldfire.

2.1.2 Topography

Steep slopes increase the rate of fire spread because the fire preheats up slope fuels and creates a chimney effect. North and northwest-facing slopes receive more solar radiation, which increases the temperature and dryness of the fuels, making them ignite easier and spread faster. The channelling effect of kloofs and ridges also impacts the fire's direction of spread. Geographic location, elevation, and aspect influence the types and quantity of fuels present.

2.1.3 Fuel

Fire requires fuel to burn. Fuels in veld consist of living vegetation (trees, shrubs and grasses) and dead plant material (e.g. dead branches, dried grass and plant litter). Usually, fuels are composed of a matrix of various plant species. Its moisture level, chemical makeup and density govern the flammability of fuel. Its moisture level is the most important factor. Live plants usually contain a great deal of moisture, while dead plants contain very little. The moisture content and distribution of these fuels define how quickly a veldfire can spread and how intense or hot a veldfire may become. High moisture content will slow the burning process, since heat from the fire must first eliminate moisture. Drought has a cumulative effect on the dryness of larger fuels causing veldfires to burn more intensely.

Some plants, such as many in fynbos, contain oils or resins that promote combustion, causing them to burn more easily, quickly or intensely. The density of fuel influences its flammability. If fuel particles are close together, they will ignite each other, causing the fuel

to burn readily. If fuel particles are so close that air cannot circulate easily, the fuel will not burn freely.

2.1.4 Factors affecting control

The control of a veldfire and its effect on the ecosystem and human infrastructure is influenced by several important characteristics. The most important of these are rate of spread and fire intensity, described in more detail below.

Rate of spread

The distance a fire travels in a given period of time is referred to as rate of spread. Veldfires advance along a flaming front, governed by the interaction of weather, fuel, and topographic factors. As the veldfire spreads the perimeter also increases, requiring more fire-fighting resources to control it. Once a fast-moving veldfire gets beyond a certain size, it becomes virtually impossible to stop its advance.

During extreme conditions, firebrands can be carried aloft and into unburned vegetation, setting new fires. This effect, known as “spotting”, can greatly increase the fire’s rate of spread and complicates its control.

Fire intensity

The rate at which a fire releases heat is referred to as fire intensity. A veldfire burning in a heavy concentration of dry fuels burns hotter than a veldfire burning in light grass, for example. Fighting an intense fire is difficult because personnel are not able to get close enough to establish control lines. Heat radiated from intense veldfires can ignite surrounding fuels, including buildings, increasing the difficulty of control and endangering fire fighters.

2.2 Weather, vegetation and fire in the Western Cape

2.2.1 Weather

The Western Cape has a Mediterranean climate with hot, relatively dry and windy summers and cool and wet winters. The winter rainfall regime is most pronounced in the west and becomes bimodal with spring and autumn peaks further east beyond the Breede River.

The summer climate is characterised by the dominance of mid-ocean high-pressure cells (anticyclones) in the atmosphere over the southern Atlantic and Indian oceans. A ridge of high pressure lying at 37°S and extending from the South Atlantic anticyclone to the Cape coast causes steep pressure gradients and thus strong and persistent onshore south-easterly winds. Fire hazard is typically associated with hot, dry and windy conditions and is highest from December to March. The synoptic weather maps for 15, 16 and 17 January 2000 (Figures 2.1, 2.2 and 2.3) illustrate this summer weather pattern.

The veldfires on the Cape Peninsula started on 16 January 2000. The maximum and minimum temperatures measured at Cape Town International Airport were 30,8°C and 14,2°C, 32,5°C and 16,6°C, and 33,7°C and 18,1°C for 15, 16 and 17 January 2000 respectively.

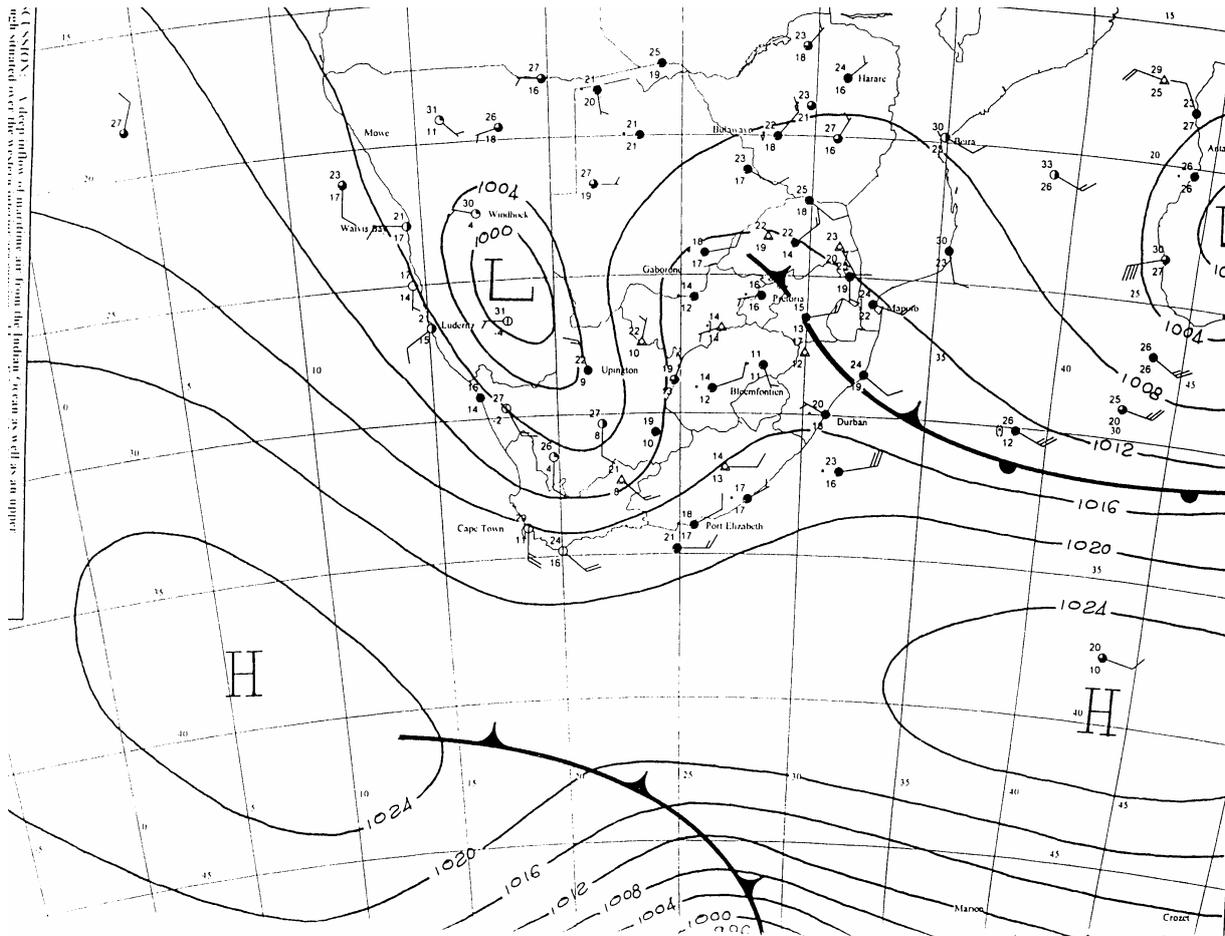


Figure 2.1: Synoptic weather map for 14h00 SAST on 15 January 2000 (Source: Daily Weather Bulletin for January 2000 - Weather Bureau)

Figure 2.1 shows a deep inflow of maritime air from the Indian Ocean as well as an upper trough situated over the western interior, causing cold conditions with widespread rain and thunderstorms over the central, northern and eastern parts of the country. Fine and warm weather persisted over the south-western area with a gale-force south-easterly wind blowing over the Cape Peninsula.

Figure 2.2 shows a deep, moist maritime air mass covering the eastern half of the country, where it was overcast and cold with widespread rain. Heavy falls and flooding occurred in places. Drier air was spreading across the western regions where it was fine with southerly winds over the south-west Cape.

Figure 2.3 shows the inflow of moist maritime air continuing to cause cool, overcast conditions with extensive rain showers in the north-eastern and eastern parts of the country. However, drier air was spreading eastwards and the weather was fine over the remainder of the country and hot in some areas.

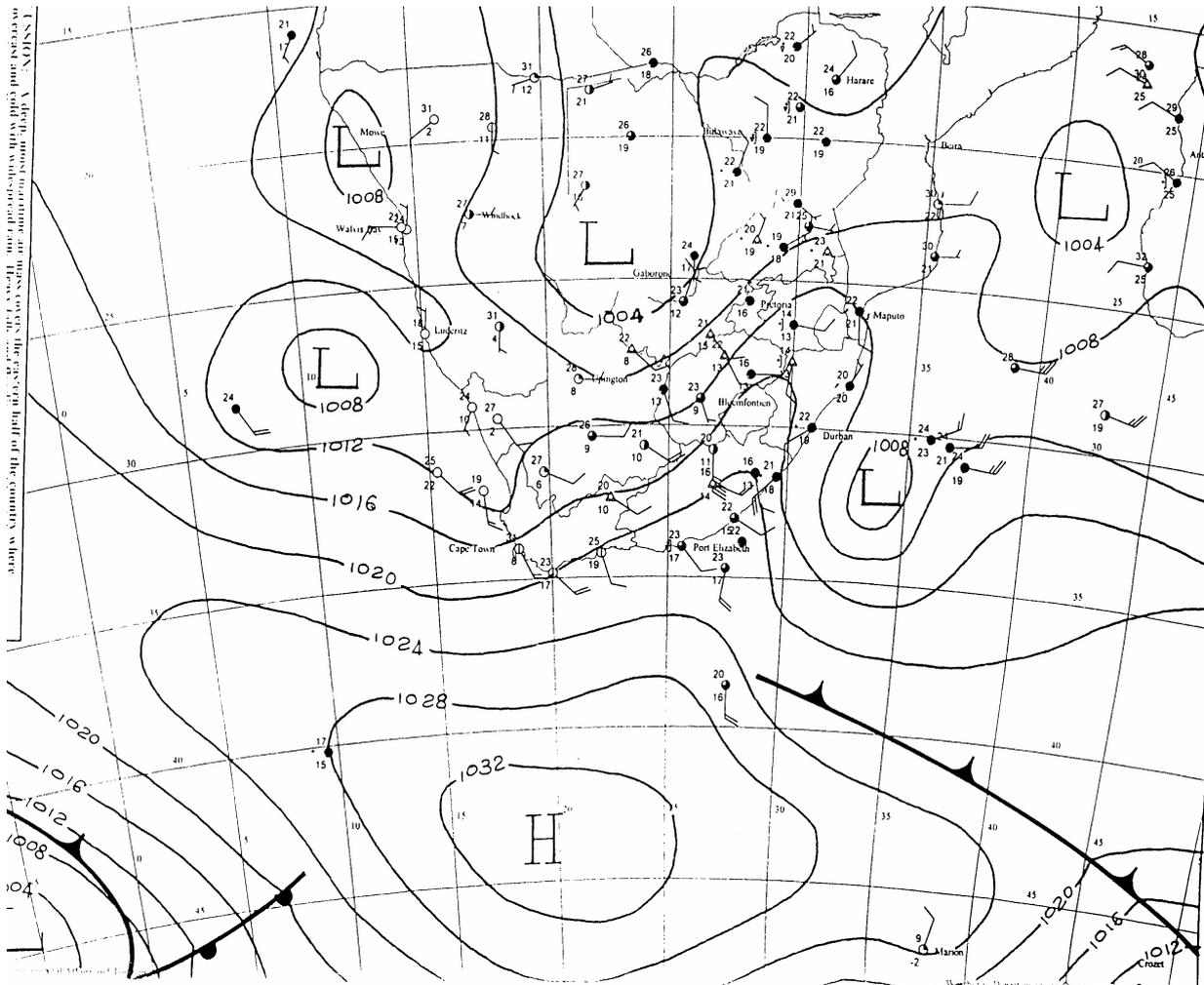


Figure 2.2: Synoptic weather map at 14h00 SAST for 16 January 2000 (Source: Daily Weather Bulletin for January 2000 - Weather Bureau)

In winter high-pressure cells move northwards, allowing the passage of westerly cold fronts to bring rain to the Western Cape. The winds back to the northwest, causing cold showery weather, often followed by a period of cool, calm and clear days and associated low fire hazard conditions. Most of the rain falls in May to September with rainfall in the mountains being substantially higher.

These cold fronts are preceded by off-shore flows of warm dry air from the interior plateau, called berg winds. They are accompanied by sudden increases in temperatures and decreases in humidity. Fire hazard rises when these winds are associated with high wind speeds for several days. Thus, periods of high fire hazard can occur in winter as well as summer.

The climate is locally influenced by the presence of rugged mountain ranges. For example, in summer orographic rain often occurs on the west – east running coastal ranges while annual rainfall varies from 250 mm on the coast to more than 3000 mm at higher altitudes on the coastal side of the mountains.

Campbell (1983) draws attention to four climatic gradients in the Western Cape. These gradients run from west to east (cooler), the coast to the interior (hotter), with increases in altitude (cooler) and changes in aspects from north to south (cooler). For example, summer drought is more pronounced in the west than the east of the region.

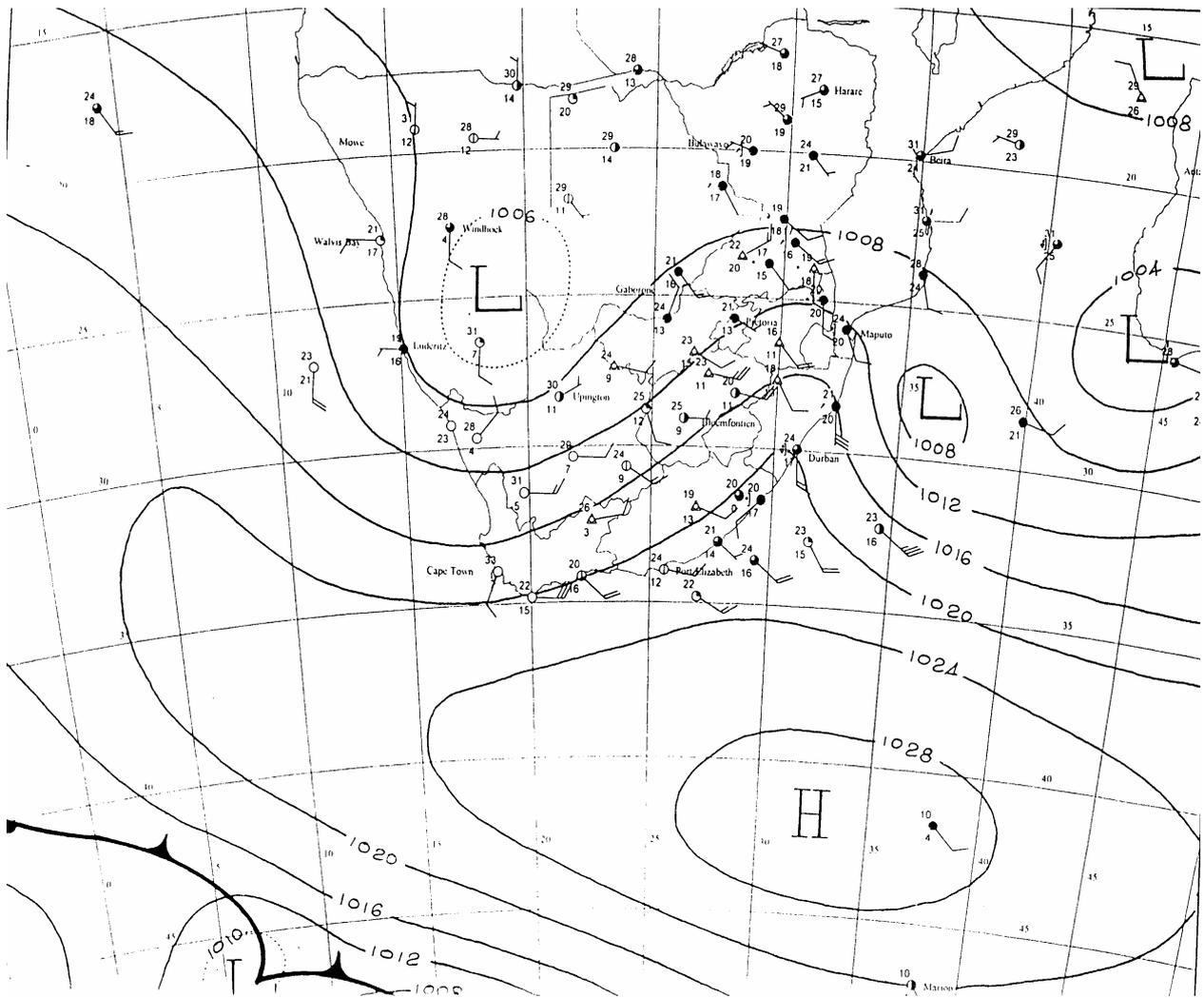


Figure 2.3: Synoptic weather map at 14h00 SAST for 17 January 2000 (Source: Daily Weather Bulletin for January 2000 - Weather Bureau)

On the basis of the effects of weather variables on fuel moisture, Van Wilgen (1984) identifies five distinct fire climate zones for the Western Cape that correlate well with the climate gradients described by Campbell (1983). These zones are:

- Western coastal zone: veldfires are most likely to occur under extreme conditions of high temperature, low relative humidity and high winds in summer.
- Western Cape inland zone north of Langeberg including Hex River and Breede River valleys: high mean potential for fire in summer.
- South-western coastal zone: veldfires most likely under extreme conditions in summer and occasionally in winter under berg wind conditions.
- Eastern inland zone: potential peak in summer.
- South-eastern coastal zone: veldfires under occasional suitable conditions in either summer or winter; winter berg winds are important.

Weather conditions characteristic of wildfires are persistent windy conditions coupled with high temperatures (> 30°C) and low mean relative humidity. Most large wildfires in the Western Cape are associated with southerly or south-easterly winds. Van Wilgen (1981) found in the case of wildfires that burnt less than 5 000 hectares, the average wind speed was 38,9 km per hour, mean minimum and maximum temperatures were 15,7°C and 30,9°C respectively, and relative humidity (RH) was a minimum of 32,9% and a mean of 48,3%. In the case of large veldfires (>5 000 hectares burnt) wind speeds averaged 46,7 km per hour, minimum and maximum temperatures were 16,2°C and 37,0°C, minimum RH was 17,8% and the mean was 37,2%.

Thus the hotter, drier and windier the weather (extreme fire danger), coupled with large volumes of dry vegetation, the more likely a large veldfire.

2.2.2 Vegetation

The dominant vegetation in the Western Cape is a mixture of evergreen shrublands and heathlands, with an understorey dominated by varying proportions of low, small-leaved shrubs, fine, reed-like restios, herbaceous plants and sedges. The relatively nutrient-rich soils, derived from shales, support renosterveld, which has a greater abundance of grasses and herbaceous plants compared with the fynbos. Fynbos occurs on granite-derived soils, where it has a greater abundance of sedges and grasses. However, most fynbos occurs on sandstone-derived soils, where shrubs and restios are more abundant. Tall shrubs (>2.0 m) rarely form dense stands in renosterveld but are common and often dominant in fynbos. Evergreen forest communities are found in areas protected from fire such as kloofs and scree areas.

Fynbos and renosterveld vegetation will burn easily at most times of the year but forest vegetation rarely burns, although the forest margins may burn (Van Wilgen and Van Hensbergen, 1992).

Strandveld or thicket vegetation occurs on the deep, calcium-rich sands of the coastal lowlands. This is an open to dense, evergreen scrub including large shrubs such as *Euclea racemosa*, *Olea exasperata* and *Rhus* species with low shrubs, coarse tall restios and herbaceous plants in the openings between the shrubs (Boucher and Le Roux, 1993). Very little is known about the fire ecology and dynamics of strandveld, although there are records of fires burning strandveld (Boucher, 1981a). The dominant shrubs all resprout readily from their stems and rootstocks and the other species recover from seeds or by sprouting.

Plant litter accumulates steadily in fynbos as its post-fire age increases (Figure 2.4). The restios, sedges and grasses often are most abundant in young fynbos, resulting in a relatively rapid accumulation of fine dead fuels (Kruger, 1977). Coarse litter fuel is found mainly in older stands, especially once the Proteaceae have become senescent (Van Wilgen and Van Hensbergen, 1992).

The combination of accumulated litter and fine plant material makes fynbos naturally fire-prone and able to burn at any time of the year (Van Wilgen, 1984). Rates of spread and flame lengths will increase as the fuel mass accumulates (Van Wilgen *et al.*, 1990). Even small experimental veldfires can reach high fire intensities during the typical hot, dry, summer conditions (Van Wilgen *et al.*, 1985; Van Wilgen, 1986).

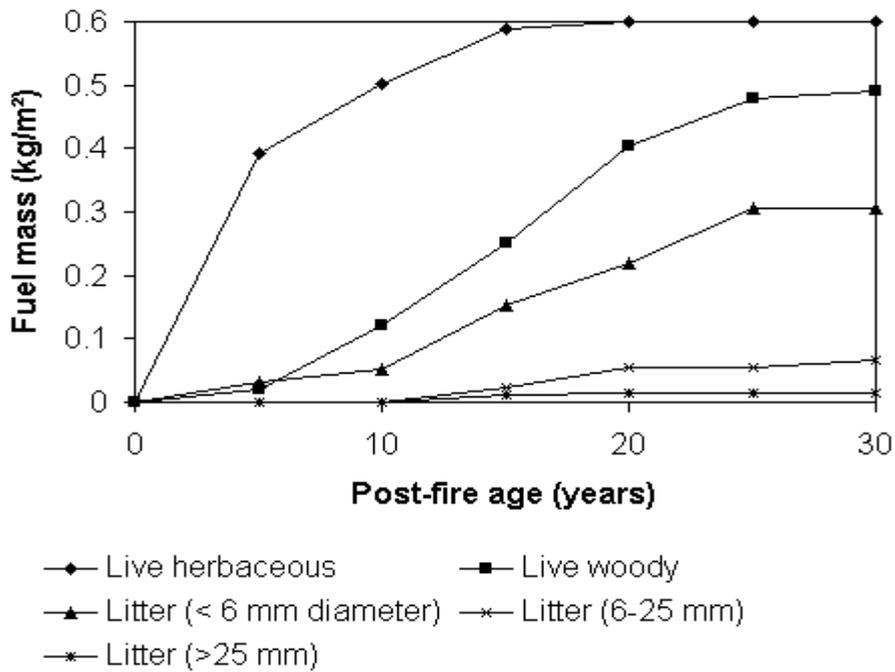


Figure 2.4: Accumulation of fuel in fynbos dominated by tall shrubs of the Proteaceae (from van Wilgen *et al.*, 1990)

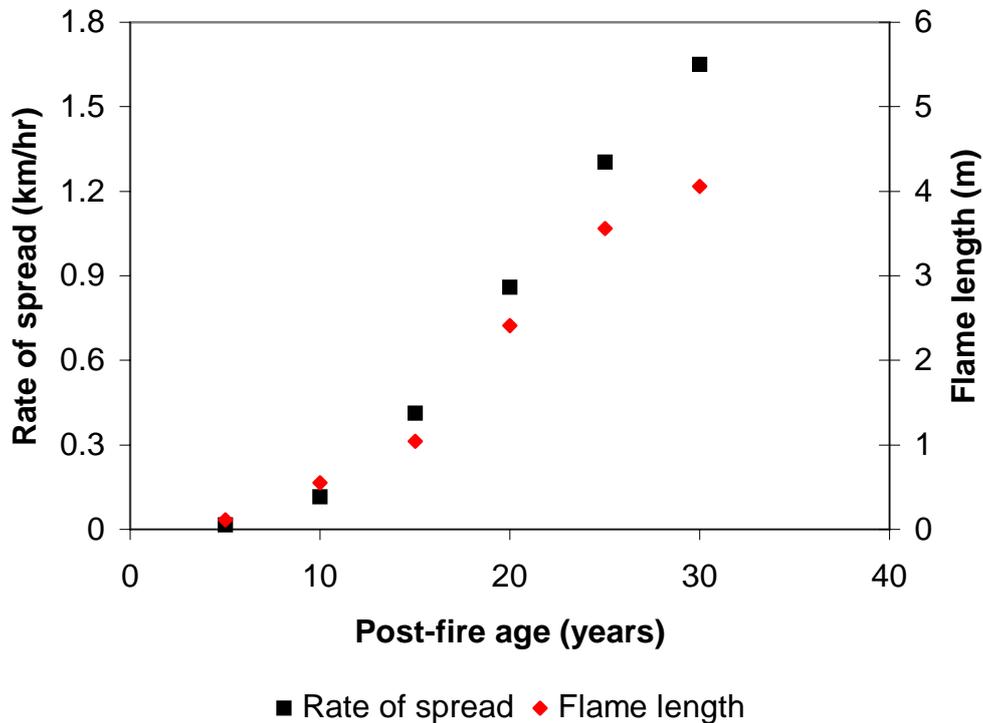


Figure 2.5: Predicted rates of spread and flame lengths for fynbos in summer weather (dry fuel moisture content 10%, live fuels 100%) and a light wind (10 km per hour) (from Van Wilgen *et al.*, 1990)

Given dry, hot weather and a typical south-easter, fynbos will burn as soon as four years after the last fire, even though the ecologically desirable minimum interval may be at least eight years (Van Wilgen and Van Hensbergen, 1992).

The fire regime, i.e. the frequency and seasonality of veldfires, varies from place to place. For example, an analysis of the veldfire records for the Cape Hangklip-Kogelberg area and for Table Mountain found some important differences (Table 2.1). Large areas on Table Mountain had been actively protected from fires for many years and almost all the recorded veldfires had occurred in January. As can be expected for a densely inhabited area, almost all the fires on Table Mountain were of human origin, compared with about half of those in the Kogelberg. When the prescribed fires in the Kogelberg are excluded, most veldfires are due to natural causes.

Table 2.1: Comparative statistics for fires on Table Mountain (north of Constantia Neck) and in the Kogelberg area (Gordon's Bay to Bot River) up to 1992. Based on Richardson *et al.* (1994) and unpublished data (Environmentek, CSIR, Stellenbosch).

Statistic	Table Mountain	Kogelberg
Dominant post-fire age classes (years) of the vegetation in 1991	20: 30% of the area 46: 10% 96: 16% (Orange Kloof)	2: 30% 3: 29% 20: 13
Seasonal distribution	January: 78% February: 9%	March: 36% February: 15% December: 13% January: 12%
Interval between fires (years)	Too few records	9-21, mode 18
Fire cause (on the basis of proportional area burnt)	Pre-dominantly human-caused	About 50% human-caused
Fire size	Most <5 hectares	Most > 100 hectares

2.2.3 Fire weather

The fynbos vegetation of the Western Cape contains much suitable fuel and the low average moisture content of this fuel provides the link between weather and potential fire hazard and behaviour.

To protect biodiversity, the desirable season to burn fynbos is late summer to mid-autumn. This is also when thunderstorms are most common in the Western Cape. Juhnke and Fuggle (1987) defined the weather parameters for controllable veld burning in the Western Cape as hourly wind speed (less than 16 km per hour), daily maximum temperature of 18°C to 28°C and a daily minimum relative humidity of between 15% and 45%.

2.2.4 Ignition

Lightning is the main natural source of ignition of vegetation in the Western Cape but sparks from rolling quartzite rocks also cause veldfires (Kruger and Bigalke, 1984). Depending on the season during which lightning occurs resultant veldfires may burn only small areas before being extinguished by rain. Often, "dry" electrical storms in late summer and autumn result in veldfires.

Horne (1981) analysed fire records spanning the period 1951 to 1977 for the Groot Swartberg mountain range in the southern Cape. A distinction is made between natural and human-caused veldfires, for which no change in the relative proportion is apparent over the period. Human-caused veldfires accounted for 33% of the fires. Van Wilgen (1981) listed

human activities as the definite cause of seven of a total of 16 wildfires analysed. Human action is the main cause of contemporary veldfires, and with increasing population levels, the relative importance of humans as a source of ignition will continue to increase (Bond and Van Wilgen, 1996).

2.3 An outline of the history of veldfires in the Western Cape

Veldfires have long been a natural phenomenon in the Western Cape. They have played a significant role in the evolution and species richness of the fynbos (Cowling, 1987). The first positive evidence of veldfires in the Western Cape is from burnt fossil bones found in the Langebaanweg area, which date from the early Pleistocene (3-5 million years ago) (Hendey, 1983). The vegetation at the time was open grassland with riverine forest and grasses, generally associated with frequent fires (Bond and Van Wilgen, 1996).

The early hominids in southern Africa are known to have used fire more than a million years ago (Brain and Sillen, 1988). Modern humans have used fire deliberately in the Western Cape from at least 125 000 years ago (Deacon, 1992). Similar burning practices were used by the Khoi to provide grazing for their domestic livestock. Human or naturally caused veldfires were so widespread that when Vasco Da Gama was at the Cape, he named the coast near Mossel Bay *Terra de Fume* (Wicht, 1945).

The largest area burnt in historical times was an estimated 8,5 million hectares - from Swellendam to Uitenhage - which was burnt in several concurrent veldfires in February 1869 (Brown, 1875). The weather had been exceptionally dry for at least six weeks before the fires and the fires were accompanied by strong berg winds. Many farms and farm buildings were completely burnt out and many lives were lost.

Several large veldfires, some caused by lightning, have been recorded since the 1940s (Table 2.2). Between 27 December and mid-January 1988, 12 veldfires were ignited by lightning and burnt a total area of 109 058 hectares (Thompson, 1992). These fires were all associated with hot, dry weather and single, sub-tropical thunderstorm systems that brought little or no rain. Large areas were also burnt in the 1998/99 and 1999/2000 fire seasons, many of them ignited by lightning. Veldfires larger than 5 000 hectares were typically associated with high fire danger ratings (Van Wilgen and Burgan, 1984).

Alien plants, particularly woody shrubs and trees, have also invaded many areas of the fynbos, mainly during the last 100 years (Richardson *et al.*, 1992). About 1,6 million hectares of primary catchment G (Berg to Agulhas) and 0,7 million hectares of catchment H (Breede R) have been invaded to some extent (Versfeld *et al.*, 1998). The mean cover canopy of invaders in these areas is 15% and 5% respectively. When dense, invasions by woody alien plants reduce biodiversity, decrease water yields and increase biomass, fuel loads and fire intensities (Richardson *et al.*, 1992).

Soil heating by intense fires in dense stands of alien plants can induce water repellence, damage the soil structure, increase soil erosion and reduce vegetation recovery (Scott *et al.*, 1991; Scott and Van Wyk, 1992; Holmes *et al.*, *in press*). An example of this is given in Table 2.3 from data collected after the January 2000 wildfires on the Cape Peninsula.

Table 2.2: Large veldfires (>10 000 hectares) that have occurred in fynbos based on data from Bands (1977), Brown *et al.* (1991), Thompson (1992) and unpublished records (Western Cape Nature Conservation)

Locality	Date of ignition	Duration (days)	Area (hectares)
Hottentots-Holland Mountains	14 December 1942	18	11 200
Hottentots Holland Mountains	20 January 1958	16	17 130
Cederberg*	1959	-	18 150
Du Toit's Kloof Mountains*	16 February 1971	17	18 000
Krakadouwpoort, Cederberg*	7 December 1972	4	27 000
Kouga Mountains	May 1975	10	18 700
Sneeuberg, Cederberg	12 December 1975	6	13 500
Heksberg, Kouebokkeveld	31 January 1976	10	30 000
Cederberg	1979	-	10 740
Nuweberg, Grabouw	21 January 1984	-	29 300
Cederberg*	November 1985	-	17 160
Southern Cederberg*	27 December 1988	-	57 752
Waterval, Tulbagh	27 December 1988	-	12 770
Hex River Mountains	27 December 1988	-	13 932
Kogelberg-Kleinmond	27 December 1988	-	16 362
Sonderend Mountains	27 December 1992	±10	16 839
Grootwinterhoek	March 1995	-	16 300
Bain's Kloof	15 February 1998	4	10 508
Zachariashoek-Wemmershoek	February 1999	4	13 838
Brandvlei Dam to Du Toit's Kloof and Franschhoek	25 February 1999	17	±30 000
Franschhoek, Groenland Mountains and Grabouw	24 March 1999	17	±70 000
Sonderend Mountains	29 November 1999	11	11 470
Bot River to Koeëlbay	29 November 1999	6	12 898
Central Langeberg* (multiple ignition, 3 main fires)	10 and 13 December 1999	13	±43 800

* - Veldfires ignited by natural causes: lightning fires or falling rocks

Table 2.3: Soil heating effects summarised by degree of invasion and/or fuel load (from Scott *et al.*, 2000). The heating index ranges from 0 (no effect) to 13 (maximum effect).

Vegetation type class	No. of sites	Soil heating severity index (average and/ or range)
Uninvaded fynbos	2	5, 6
Fynbos with scattered to moderate infestation of aliens (<50%), live or cleared	6	8,3 (4 - 12)
Fynbos cleared of heavy infestations with large amounts of dried fuels on site	2	11, 12
Heavily invaded (>25% cover of aliens)	10	12,1 (10 - 13)

Many veldfires have resulted in significant financial losses and the occasional loss of life. For example, a veldfire in February 1970 in Betty's Bay destroyed 21 houses with an

estimated total value of R500 000 (in 1970 Rands). Claims for lost wildflower production have run into millions of Rands. For example, during Easter 1991, a lightning fire that started in the Kogelberg State Forest burnt neighbouring farms that were used for wild flower harvesting. A claim for R 2,8 million was made against the State and eventually the State paid the landowners approximately R1,2 million in compensation for damages (Greville Ruddock, *pers. comm.*, 2000).

A fire on Devil's Peak on 8 February 1991 resulted in significant damage to adjacent urban infrastructure caused by post-fire flooding and soil erosion. The cost of post-fire mitigation such as gabions, contour fences to limit soil and water movement, road and drainage repairs has been estimated variously at R4,5 and R6,5 million (Paul Britton, CPNP, and David Daitz respectively, *pers. comm.*, 2000). The cost of the damage caused to private houses and other infrastructure is not available. Most of the damage was due to the high intensity and severity of this fire in fuel on the ground in areas that had been cleared of alien trees, mainly eucalypts, pine and wattles.

2.3.1 Global climate change

Global climate change will influence the occurrence of veldfires in two ways – increases in air temperature and faster plant growth caused by increased carbon dioxide (CO₂). Detailed predictions are not available for the Western Cape but the mean annual temperature in southern Africa is expected to rise by about 3,0°C by the year 2050 (Fairbanks and Scholes, 1999). The mean annual rainfall is expected to decrease by 4% and evaporation could increase by as much as 15%. These trends are supported by records for the SADC countries that indicate a rise of 0,5°C over the past 100 years (WWF Study). In addition, the increased CO₂ concentrations are likely to increase the production of woody plant material and thus, fuels for veldfires (Fairbanks and Scholes, 1999).

The net result is that the veldfire frequency will increase, the fire season will be longer and the intensity of veldfires may be higher due to the hot, dry conditions. Hot, dry summers like the one experienced in 1999/2000, are likely to become much more frequent in future.

2.4 An outline of the history of veldfire management and veldfire fighting in the Western Cape: changing roles and responsibilities

European settlers in the Cape soon became concerned about what they saw to be indiscriminate burning and the consequent “destruction” of the vegetation. Legislation was passed forbidding veld burning (Botha, 1924; Table 2.4). This seemed to have little effect but it reflected the view that veldfires were destructive and unnatural – a view that was to dominate for almost 300 years. Although the point that veldfires were a natural phenomenon and essential for the maintenance of fynbos was clearly articulated in 1945 (Wicht, 1945), another 17 years were to pass before this view gained wider acceptance and a further six years before it was experimentally tested.

The implementation of prescribed burning was the trigger for intensive research into how often and at what time of the year to burn, as well as basic ecological research (Huntley, 1987). Managers of State Forest land in the mountains, covered largely in fynbos, began to implement prescribed burning. They also used burning as part of the programme of integrated control of alien invasive plants.

Table 2.4: Milestones in the development of a veldfire management policy for fynbos ecosystems (adapted from Van Wilgen *et al.*, 1994)

Date	Event	Significance for veldfire management	Source
1652	European settlement	Severe penalties for indiscriminate burning	Botha (1924)
1924	Royal Society of South Africa meeting condemns veld burning	Ban on all fires and suppression of all wildfires	Levyans (1924) Marloth (1924) Pillans (1924)
1942	Initiation of hydrological research on effect of veldfires at Jonkershoek	Results showed that veldfires caused temporary increases in streamflow. No effect on erosion.	
1948	Initiation of ecological research on veldfires, Jonkershoek	Early understanding of regeneration mechanisms	
1945	Publication of report on the preservation of the vegetation of the south-western Cape	First formal proposal of prescribed burning of blocks on an 8-year cycle	Wicht (1945)
1949	Documentation of the minimum age for seed production in <i>Protea repens</i>	Understanding of the minimum interval between veldfires	Jordaan (1949)
1962	Wildfire sweeps through a senescent <i>Serruria florida</i> stand and there is profuse regeneration	Renewed realisation that species need fire	Worth and van Wilgen (1988)
1968	Concern about the senescence and loss of <i>Orothamnus zeyheri</i> populations – decision taken to set deliberate fires	First prescribed fire in a fynbos catchment	Boucher (1981b)
1970	Mountain Catchment Act passed by parliament	Private land to be managed by prescribed burning for catchment protection, with alien control	Bands (1985)
1970	Fire interval of 8-years proposed for the Marloth Nature Reserve near Swellendam	First guidelines for implementing prescribed burning	Van Wilgen (1980)
1974	Department of Forestry steps up research into fynbos fire ecology	Increased understanding of the role of fire	Huntley (1987)
1978	Initiation of the Fynbos Biome Project	Increased understanding of fynbos ecology	Huntley (1987), Huntley (1992)
1979	Report on the conservation of the Kogelberg State Forest	First “rule of thumb” for assessing the minimum fire interval for fynbos	Kruger and Lamb (1979)
1980	Introduction of “natural fire zone” management in the southern Cape	Departure from a rigid approach to prescribed burning	Seydack and Odendaal (1980)
1992	Development of a computer-based system for managing fynbos catchment areas	Facilitation of objective decision making based on rules that incorporate ecological and practical considerations	Richardson <i>et al.</i> (1994), Van Wilgen <i>et al.</i> (1994)

Promulgation of the Mountain Catchment Areas Act in 1970 led to integrated management of veld on State Forests and adjoining private land, to protect catchment values. This involved veldfire management programmes that included prescribed burning.

Concern about the inflexibility and the cost of prescribed burning, especially in remote areas, resulted in the adoption of the more flexible approaches to veldfire management during the 1980s and 1990s (Raal and Le Maitre, 1996; Van Wilgen *et al.*, 1994). This involved a combination of prescribed burning and the practice of allowing veldfires that arose otherwise to burn out within designated areas if they posed no threat.

An important event in veldfire management was the devolution of large areas of State Forest and the function of mountain catchment management from the national government (Department of Water Affairs and Forestry) to provincial nature conservation departments in 1987. Up to that time DWAF had pursued an active programme of invasive plant control in association with prescribed burning.

Many skilled DWAF fire managers did not transfer to the provincial departments and managers who were already in the nature conservation departments were unfamiliar with the use of fire on the scale practised by DWAF as a veld management tool. The result was that over time fewer and fewer prescribed burns took place, with a corresponding build-up of vegetation age, and today most veldfires are wildfires.

The loss of veldfire management skills available to the Western Cape Nature Conservation Board, as it is now, was further compounded by the voluntary retrenchment packages offered to staff members during the late 1990s. Many of the remaining experienced veldfire managers accepted these packages and left the organisation.

2.5 New influences: urbanisation and invasive plants

The urbanisation of natural areas is an accelerating trend in many areas of the Western Cape. Many people are moving into natural areas in order to live in more scenic and less densely populated areas. Others, without the resources to purchase land, are increasingly finding shelter in informal settlements in the veld.

Where this occurs, a dangerous mix of fire-prone vegetation and development exists, and veldfires can quickly spread from adjacent vegetation to nearby structures. This situation is referred to as the urban-wildland interface and wildland intermix, or collectively as the *urban fringe*. The wildland interface is an area where the boundary between the natural vegetation is distinct, with structures on one side and veld on the other. The intermix does not have a clearly defined boundary, and structures are often completely surrounded by vegetation.

Each of these situations presents different fire protection challenges, but they represent a single trend toward wildland urbanisation. For example, the Simonsberg veldfire in January 2000 took on emergency dimensions because of the need to protect homesteads, such as those at Thelema, and tourist facilities. New expensive developments high on the slopes will aggravate the problem.

The effects of this trend on veldfire management and the management of both natural areas and communities are as follows:

- the risk of loss of life and property is greatly increased as exposure to recurring veldfires is greatly increased
- fire fighters and emergency services personnel are often put in dangerous situations as they are compelled to protect life and property on difficult terrain

- fire fighters must shift tactics and resources toward structure protection and public safety, and away from controlling the main fire
- potential conflicts with veldfire management policy, such as prescribed burning, result where public and private lands meet (such as the Cape Peninsula National Park)
- differences in tactics and capabilities between structural and wildland fire fighters can lead to disadvantages for each in interface/intermix areas; responsibilities between governmental organisations in these areas are often blurred, leading to confusion.

2.5.1 Effect of alien invasions and post-fire fuel load development

The energy released in a veldfire depends on the:

- fuel load (approximately the above-ground biomass on the site)
- structure of the fuel, such as its packing density
- water content of the different fuel classes at the time of the fire, and
- fraction of fuel consumed.

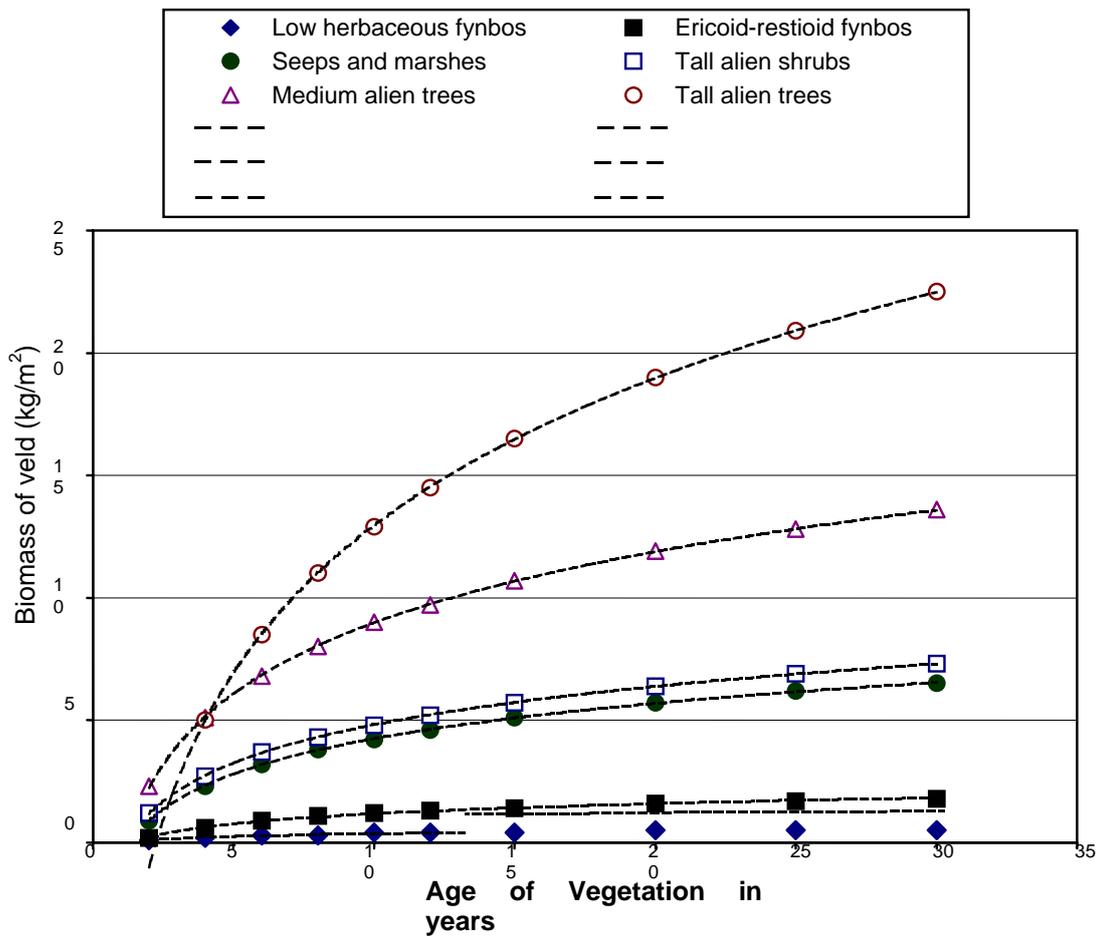
Under hot dry conditions, such as prevailed during the January veldfires in the Cape Peninsula, all dead fuels responsible for initially carrying a fire would be very dry. When dead fuel moisture is low (5 – 10%), veldfires burn with higher intensity and are able to drive the moisture from live fuels, thus allowing the fire to carry readily. The moisture contents of live fuels would also be somewhat lower in a dry summer (around 100%).

The most important factor therefore is the fuel load of the different vegetation types, their fuel (biomass) accumulation with increasing post-fire age and the characteristics of their fuels. However, under extreme conditions of fire hazard, the total amount of biomass is the most important factor because virtually all fuels are consumed.

Biomass accumulation in veld invaded by alien vegetation is primarily influenced by two factors: the degree of invasion and the age of vegetation. Figure 2.6 shows the expected biomass development with age for different kinds of fynbos and dense stands of common alien invader communities in the Western Cape. This is based on relationships developed by Le Maitre *et al.* (1996).

Figure 2.6 shows that sites densely invaded by alien shrubs and trees will develop much higher biomass than do uninvaded sites of the same age. Biomass, and hence fuel load, increases with the growth rate and density of the alien plants. Secondly, it is clear that as all communities age, so biomass increases. Thus, regardless of vegetation type, fuel loads will tend to accumulate with time. In particular, dead fuel mass increases as the fynbos vegetation ages, and this increase becomes more marked as the vegetation becomes senescent 25 to 30 years after the last veldfire. This in turn, increases the amount of live vegetation that can be considered as “fuel”, in other words the proportion of live plant material that will be consumed in a veldfire.

Figure 2.6: Fuel load estimated for some vegetation types that burnt in the Peninsula fire based on relationships given in Le Maitre *et al.* (1996). Fynbos types have solid symbols, invasive alien types are shown with open symbols. Curves for aliens are for dense infestations. From Scott *et al.* (2000).



CHAPTER 3

THE CONDITIONS THAT SET THE SCENE FOR THE FIRES IN JANUARY 2000

3.1 Vegetation and fuels and their state of management

3.1.1 Cape Peninsula

Fynbos fire records have been maintained since 1960 and, together with the Task Team's observations and local verbal accounts, indicate that fynbos in several of the areas was about two years old (i.e. age since last fire), while others were 6-8 years old and older, with little fynbos more than 20 years old. Initial estimates of the total area burned in the two veldfires on the Cape Peninsula in January 2000 were 8 067 ha, but after field verification this total was revised to 8 370 ha (James Jackelman, *pers. comm.*, 2000).

Table 3.1, derived from a geographical information system (GIS) analysis based on the earlier total of 8 067 ha for the burnt area, shows that less than 10% was uninvaded and roughly 64% of the area burned was still infested with alien plants, of which 37% was heavily infested (i.e. greater than 25% cover under aliens). The remaining 26% of the total burned area had been subject to clearing activity in the two years prior to the veldfire. Here the cleared woody vegetation was down on the ground, mostly in stacks. These stacks were hotspots during the fire because of the concentrated and packed dry fuels. After the fire the positions of the burned stacks were clearly visible as white ash spots, evidence of the severe soil heating at these points.

The veldfires of January 2000 took place in the ecologically correct season. Van Wilgen (1985) estimated that in pre-European settlement times with no active efforts to contain veldfires it would have been theoretically possible for an area as large as 100 000 ha to burn at a time. Huge late-summer veldfires are rather infrequent but such fires of relatively high severity would have been part of the environment in which the fynbos evolved. Therefore they should not have had any adverse impacts on fynbos biodiversity and community dynamics in uninvaded areas.

3.1.2 Simonsberg

The Western Cape Nature Conservation Board manages the upper slopes of the Simonsberg as mountain catchment. The fynbos veld on this part of the mountain is actively managed and at the time of the veldfire was about 8 to 9 years old. Invasive pine species were present in isolated localities in very rough terrain.

On the lower slopes the situation was quite different. This is the interface between the natural vegetation and neighbouring wine farms. Many fingers of unmanaged natural veld run out between the vineyards. It is estimated that much of this veld was in excess of 25 years post-fire age and was heavily invaded by pine species. Once the fire reached this veld it became totally unmanageable (Greville Ruddock, *pers. comm.*, 2000).

Table 3.1: Estimated areas of land burned in the Red Hill and Silvermine veldfires, by different classes of invasion and clearing. Determined by overlaying two different geographical information system (GIS) coverages supplied by the Cape Peninsula National Park.

VELDFIRE	STATUS	DENSITY CLASS	AREA (HA)	PROPORTION OF EACH VELDFIRE (%)	
RED HILL	Cleared 1998	Sparse <5%	77	19.25	
		Light 5-25%	0.00		
		Medium 26-50%	33		
		Dense 51-75%	26		
	Cleared 1999	Sparse <5%	275		
		Light 5-25%	93		
		Medium 26-50%	70		
		Dense 51-75%	200		
	Sub-total		774		
	Not cleared	Sparse <5%	1294		64.42
		Light 5-25%	308		
		Medium 26-50%	407		
		Dense 51-75%	577		
		Closed >75%	4		
Sub-total		2590			
Not invaded		657	16.33		
Total		4020	100		
SILVERMINE	Cleared 1998	Sparse <5%	602	33.16	
		Light 5-25%	92		
		Medium 26-50%	51		
		Dense 51-75%	15		
		Closed >75%	7		
	Cleared 1999	Sparse <5%	459		
		Light 5-25%	43		
		Medium 26-50%	1		
		Dense 51-75%	54		
		Closed >75%	19		
	Sub-total		1342		
	Not cleared	Sparse <5%	1509		63.71
		Light 5-25%	130		
		Medium 26-50%	270		
		Dense 51-75%	337		
		Closed >75%	332		
	Sub-total		2579		
Not invaded		126	3.12		
Total		4047	100		

3.1.3 Langebaan

The Task Team's observations on site were that almost all of the Strandveld within the West Coast National Park was probably greater than 20 years old (post-fire). At the time of the January 2000 fire, scattered shrubs such as *Euclea racemosa* and *Rhus* spp, about 1,5 m to 2,0 m tall, were interspersed with tall coarse Restionaceae, which were concentrated principally in the hollows between dunes. Alien infestation was sparse. Vegetation outside the Park was similar, except that some dense infestations of aliens occurred in places.

Smaller fires had been quite frequent in this area during recent years. However, it required the combination of very dry, hot weather with strong winds to carry the large fire that occurred in January.

3.2 Climate and weather

A measure called the burning index (BI) integrates fire weather and fuel moisture content into a single index of fire risk. Figure 3.1 is the result of an analysis of the maximum values of burning index in each individual year of a thirty-four year record from the weather station at Cape Town International Airport. From Figure 3.1 it is possible to estimate the probability of a certain one-day, 3-day or 7-day peak value of BI occurring in an individual year. For instance, the peak one-day BI of 100 that occurred on 19 January 2000 (fourth day of the Peninsula veldfires), though very high would have been the peak value reached in roughly 65 years in every 100. However, the peak three-day run average BI of 77 during the same veldfire would occur in 25 years in every 100. To put this in another way, the conditions during the January veldfire on the Peninsula were unusual but not especially extreme, and have occurred before.

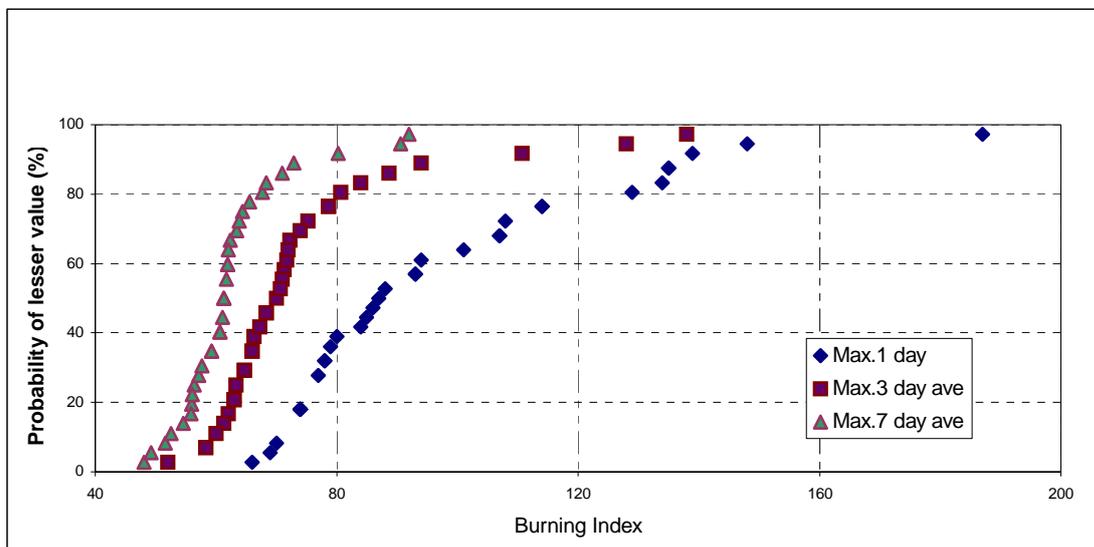


Figure 3.1: The probability distribution of maximum annual burning index values for individual years based on 34 years of weather data from Cape Town Airport, for one-day, two-day and three-day average values. The probability that the peak BI in an individual year will be less than a specific value can be read off the vertical axis.

Figures 3.2, 3.3 and 3.4 indicate the variability in BI values over a long period of record. Mostly BI values during the cooler months and over much of the rest of the year, are below 40 (Figures 3.2 and 3.3). Extremely dangerous conditions usually only prevail for a handful

of days in an average year. Thus, for example, days with a BI of 80 or more occur only once every 200 days on average (Figure 3.2).

Within every year there is a clear seasonal pattern in burning index, with only the three-or-four-month summer season producing high-risk conditions (Figure 3.4). However, there are clearly clusters of years when the BI tends to generally be higher (for example, the 1970s) and we are currently in a period when BIs are similarly high during the summer months (Figure 3.4).

It is also clear that the last six years (summers starting in 1994 to 1999) have produced an unusually high incidence of extreme burning conditions, with the 1999/2000 summer season apparently one of the worst on record.

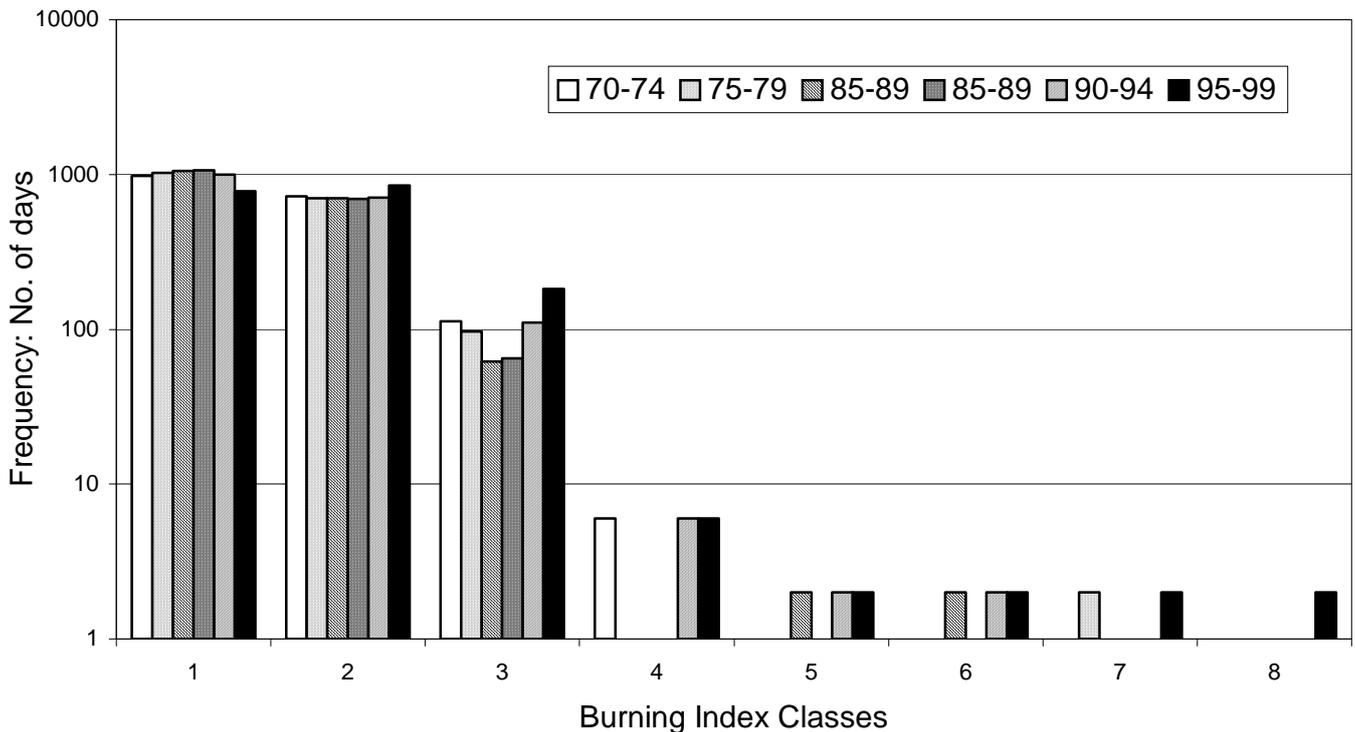


Figure 3.2: The frequency of one-day burning index (BI) values in five-year periods from 1970 to 1999. Class 1 is BI<40, class 2 is 40<BI<60, class 3 is 60<BI<80, class 4 is 80<BI<90, class 5 is 90<BI<100, class 6 is 100<BI<120, class 7 is 120<BI<140, & class 8 is BI>140. Note the logarithmic vertical scale.

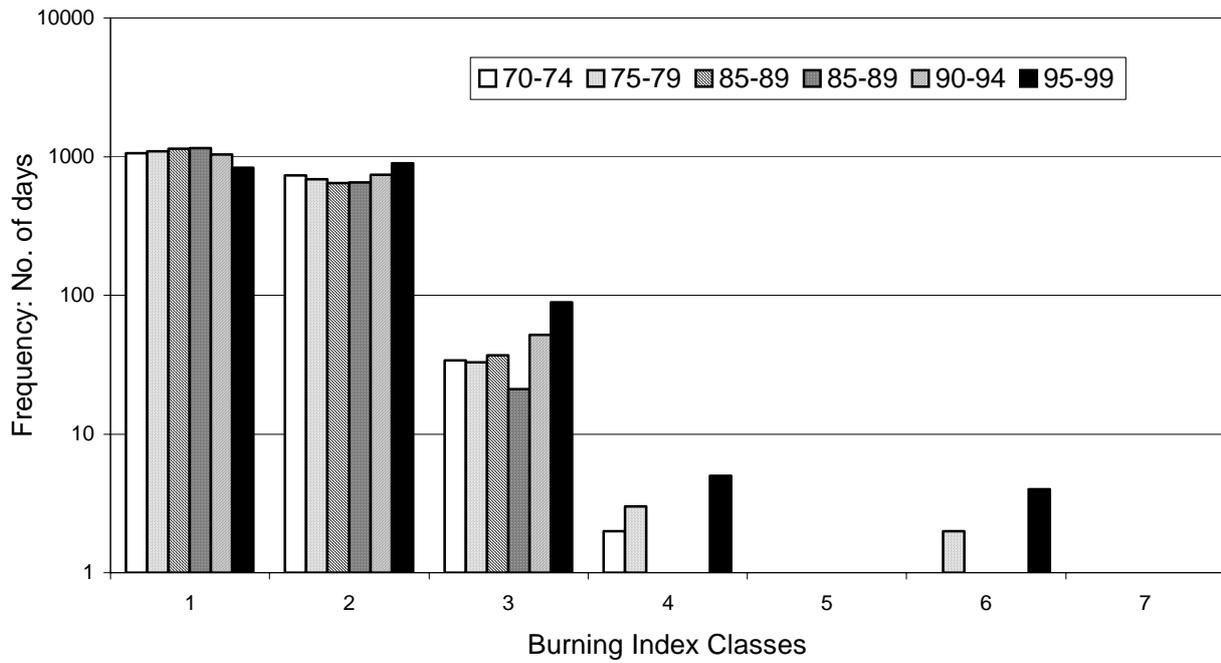


Figure 3.3: The frequency of three-day running average index (BI) values in five-year periods from 1970 to 1999. Class 1 is BI<40, class 2 is 40<BI<60, class 3 is 60<BI<80, class 4 is 80<BI<90, class 5 is 90<BI<100, class 6 is 100<BI<120, class 7 is BI>120. Note the logarithmic vertical scale.

Peak seven-day Burning Index in each month, Cape Town airport

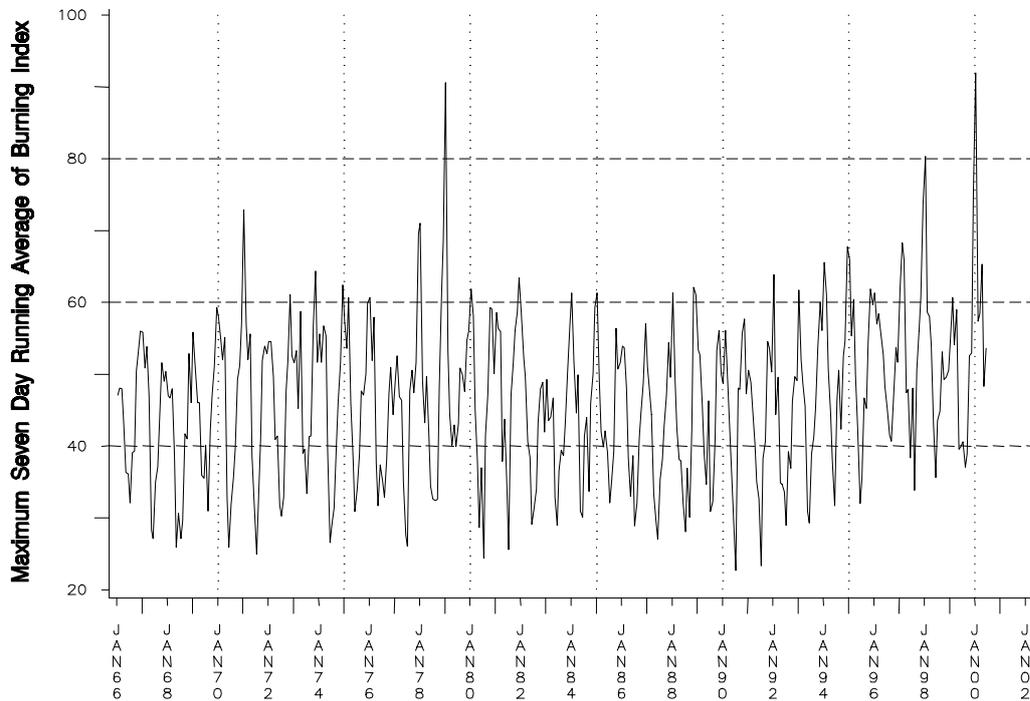


Figure 3.4: Time plot of the maximum monthly value of the seven-day running mean of burning index (BI) calculated from 34 years of weather data from the Cape Town International Airport

3.3 Fire danger conditions

3.3.1 General analysis of fire behaviour and weather graphs

The fire behaviour conditions in the Western Cape were very high to extreme across the entire region before and during the veldfires. Most of the large veldfires in the western Cape were wind-driven events enhanced by drought conditions, high temperatures, low humidity, and low fuel moistures. The veldfires were immediately preceded by two to five days of strong south-east winds accompanied by moderate to low humidity and temperatures (8 to 17 January 2000). Veldfires starting during this period would present serious control problems. Spotting from fire brands and major fire runs were likely, creating a dangerous situation for fire personnel.

Midway through the fire episode the winds changed to the north and northwest and dropped in velocity (18 to 20 January 2000). This shift brought with it record high temperatures and very low humidity. Fine fuel moistures (1 and 10 hour) also reached their lowest point at this time. Veldfires became less driven by wind and more influenced by local topography and conditions. This change caused previously inactive and unburned areas to flare up, causing new control problems. While the rate of spread dropped, extremely low fuel moistures and humidity created the potential for localised instances of extreme fire behaviour. These conditions peaked on 19 January.

Eventually, the wind shifted to a more westerly flow, bringing with it lower temperatures, higher humidity and higher fine fuel moistures (24 to 25 January 2000). Fire spread and intensity was reduced to controllable levels. Most veldfires were declared under control and the episode ended.

3.3.2 Fire behaviour graphs

Because there were no records of actual fire behaviour or on-site weather, various methods were used to simulate fire conditions for the life span of each veldfire. The Rothermel fire prediction model (Rothermel, 1972) and Behave system module (Andrews, 1986) were used to create daily fire behaviour sets for each veldfire. The model predicts rate of forward spread of the fire front, flame length and fire intensity in a straight line through a uniform fuel bed. These attributes are normally used by the fire fighter to predict where a veldfire will be at some future point and to determine suppression strategy.

For this report the model outputs are used to recreate probable fire conditions in order to help the reader understand why certain events occurred and the conditions faced by fire fighters.

Figures representing fire behaviour conditions that existed during the South Peninsula, Simonsberg, and West Coast veldfires are given in Figures 3.5 – 3.8, Figures 3.9 – 3.12 and Figures 3.13 – 3.16 respectively.

The fire prediction model requires classification of the vegetation present, fuel moisture content of live and dead fuel, topography and weather inputs. Fuel classification data for three fynbos fuels were used: SA1 – pristine fynbos, SA2 – fynbos/hakea invaded, and SA3 – fynbos/acacia invaded (after Van Wilgen, 1984). Actual fuel moisture data were not available and were calculated by the United States' National Fire Danger Rating System (NFDRS), using weather observations from the representative stations.

The following describes the process used:

- 1) A representative weather station was selected for each fire based on its geographic and climatic affinity with the fire. These are indicated in Table 3.2.

Table 3.2: Weather stations chosen to represent fire weather conditions at each of the fires studied

FIRE	WEATHER STATION	LOCATION
South Peninsula Fires	Cape Town Airport	33° 50' S, 18° 36' E (42m a.s.l)
West Coast Fires	Langebaan	32° 58' S, 18° 10' E (31m a.s.l)
Simonsberg Fires	Elsenburg	33° 51' S, 18° 50' E (177m a.s.l)
	Bien Donne	33° 50' S, 18° 59' E (138m a.s.l)

- 2) Daily observations of the state of the weather, dry bulb temperature, relative humidity, wind speed, wind direction, and precipitation for 14h00 were acquired for each station for the month of January, 2000. The 14h00 time was chosen in order to approximate the maximum expected fire behaviour conditions.
- 3) The data were then processed by the United States' National Fire Danger Rating (NFDRS) module in order to produce daily fuel moistures for dead and herbaceous fuels. Live woody fuel moistures from research done by van Wilgen were used to replace those produced by NFDRS in order to more accurately reflect values in the three fynbos models.
- 4) A customised computer program version of the fire prediction system, using the data from Step 3, was used to produce daily approximations of fire behaviour for each fuel classification at each fire site.
- 5) The data were then plotted.

The fireline intensity is the product of the available heat of combustion per unit of ground and the rate of spread of the veldfire, interpreted as the heat release per unit of time for each unit length of the fire edge. The primary unit is kilojoules per second per metre of fire front.

The flame length is the distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface), an indicator of fire intensity.

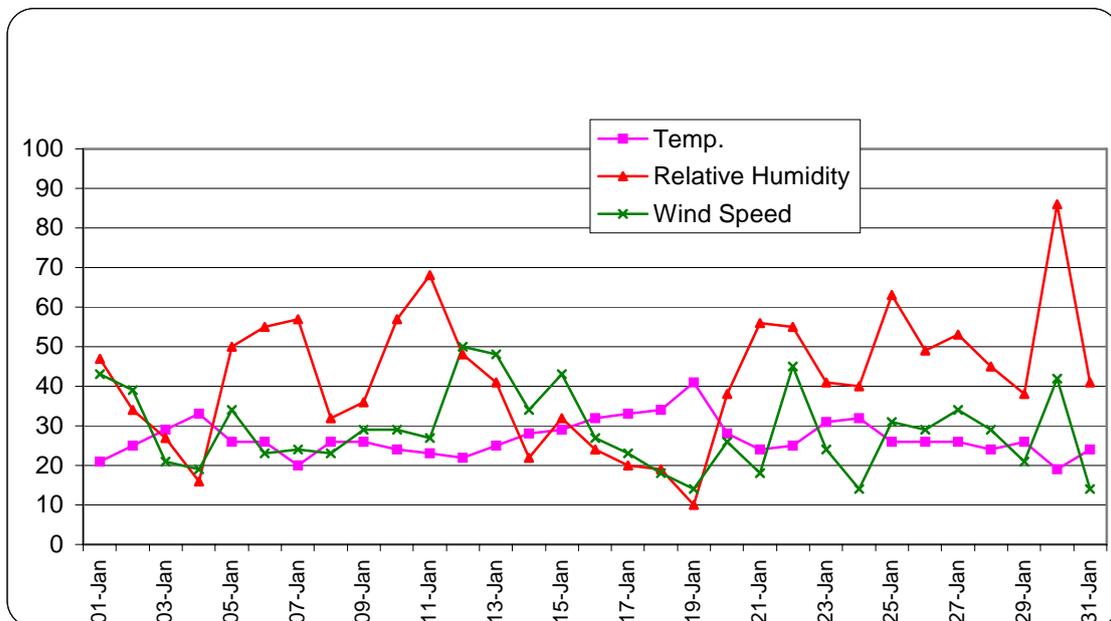


Figure 3.5: South Peninsula weather conditions – 1-31 January 2000. Measured at Cape Town Airport weather station

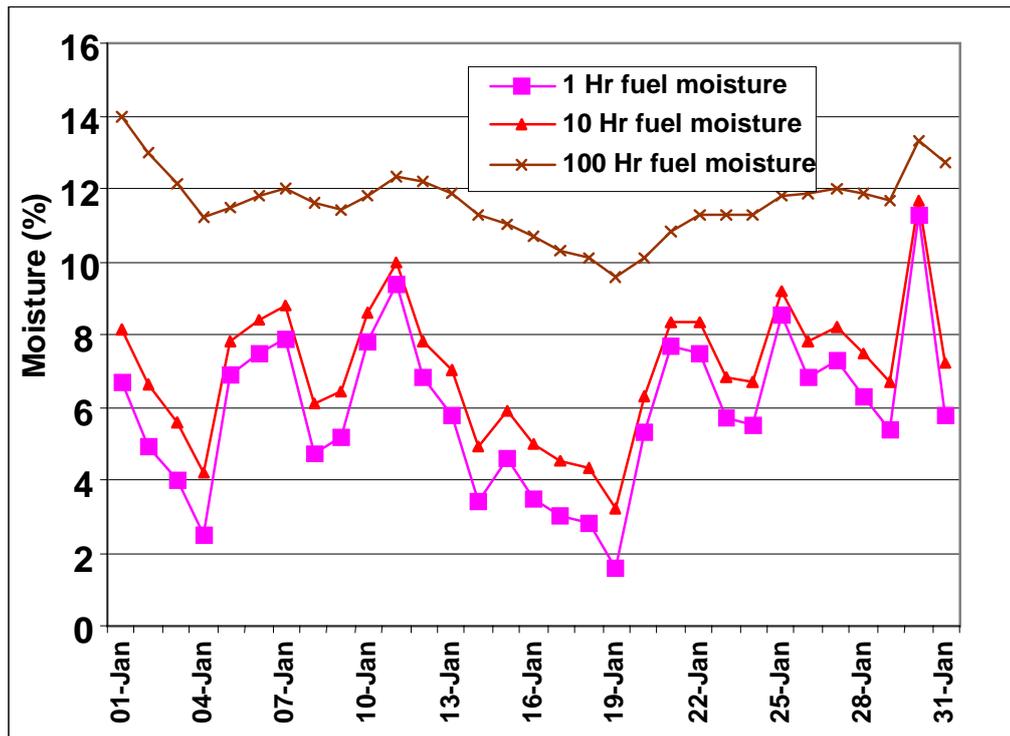


Figure 3.6: South Peninsula - fuel moistures and Burning Index 1-31 January 2000. Calculated from 14:00 weather observations at Cape Town Airport weather station

The Burning Index (BI) is an estimate of the potential difficulty of veldfire containment as it relates to the flame length at the head of the fire. It is a relative number related to the contribution that fire behaviour makes to the amount of effort needed to contain a fire in a specified fuel type. Doubling the BI indicates that twice the effort will be required to contain a veldfire in that fuel type as was previously required, providing all other parameters are held constant.

Table 3.3: Interpretation of the values of the Burning Index

Burning Index	Interpretations
Less than 40	Persons using hand tools can generally attack veldfires at the front or flanks. This hand-held line should hold the fire.
40 to 80	Veldfires are too intense for direct attack on the front by persons using hand tools. A hand-held line cannot be relied on to hold fire. Equipment such as bulldozers, fire tenders, and helicopters can be used effectively.
80 to 110	Veldfires may present serious control problems (e.g. spotting, flaring and crowning). Control efforts at the fire front will probably be ineffective.
Greater than 110	Crowning, spotting and major fire runs are probable. Control efforts at the fire front are ineffective.

Historically, large multiple-day veldfires in the western Cape are associated with daily BI values of 95 or greater (Van Wilgen and Burgan, 1984.)

The fuel moisture is the quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 100°C. Fuel moisture is the primary factor that influences the ease of ignition (how easy a veldfire will start) and the rate of combustion (how fast it will burn). The more moisture a fuel contains, the more heat is required to ignite it. Moisture within the fuel must first be vaporised and driven from the fuel before it can be raised to its ignition point (fire start).

Fuel moisture is measured for live and dead vegetation classified by their rates of moisture loss. For dead plant material, which is the primary carrier of veldfire, there are five classes based on the time the fuel takes to respond to changes in atmospheric moisture. The classes are:

- 1-hour: fuel with a diameter of 0-6 mm
- 10-hour: fuel with a diameter of 6-25 mm
- 100-hour: fuel with a diameter of 25-75 mm
- 1000-hour: fuel with a diameter of 75 mm and above.

Dead fuel can have fuel moistures that range from 1% (extremely dry) to a value that ranges from 25-40% where the fire will not spread.

Live fuels are classified into two categories:

- Herbaceous: the live portion of the plant consisting of foliage and small stems, and
- woody: the live woody portion of the plant's main stem and branches.

Live fuel's moisture varies from 30% (very dry) to over 300%. For example, new foliage is about 300%, mature growth 100% and cured fuels, such as grass, about 30%. Fynbos species of live fuel moistures vary from 51%-119% for *Erica plukenetii* to 118%-189% for *Protea neriifolia* (van Wilgen, 1990.)

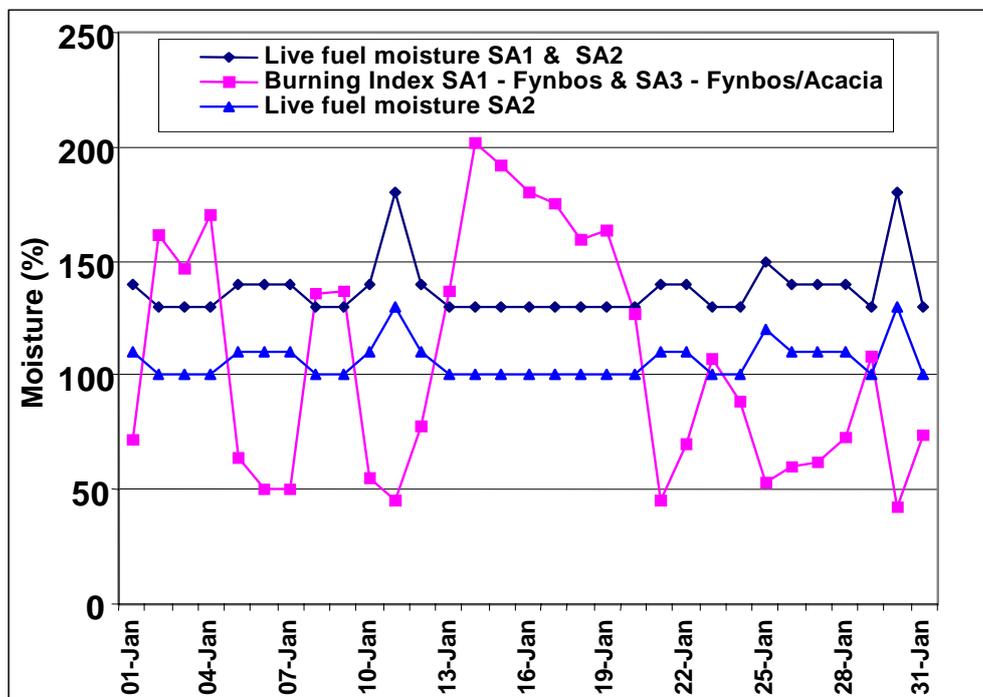


Figure 3.7: South Peninsula - fuel moistures and Burning Index 1-31 January 2000. Calculated from 14:00 weather observations at Cape Town Airport weather station

The rate of spread is the relative activity of a veldfire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in metres per second for a specific period in the fire's history.

Rate of spread can be classified as follows:

- Low - very little spread; spread of no consequence
- Moderate – forward rate of spread is 0,5 metres per second (less than 1,8 km per hour)
- Dangerous – forward rate of spread is 0,5 metres to 1,5 metres per second (1,8 to 5,5 km per hour)
- Critical – forward rate of spread is greater than 1,5 metres per second (5,4 km per hour).

For comparison, a 15-person team can build 140 metres (0,14 km) of fire line per hour in medium brush and a bulldozer can build 1 000 metres (1 km) of fire line per hour.

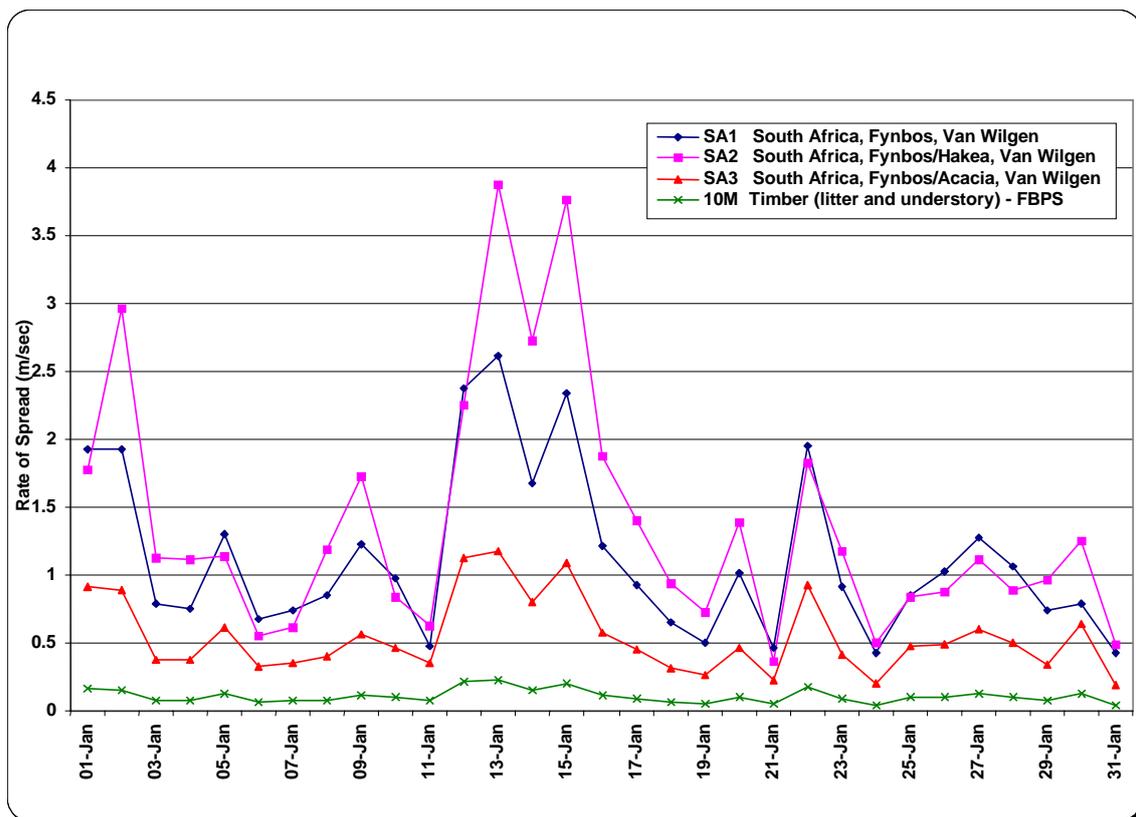


Figure 3.8: Maximum predicted rate of spread, South Peninsula Fires, 16 - 23 January 2000. Calculated from 14:00 weather observations at Cape Town Airport weather station.

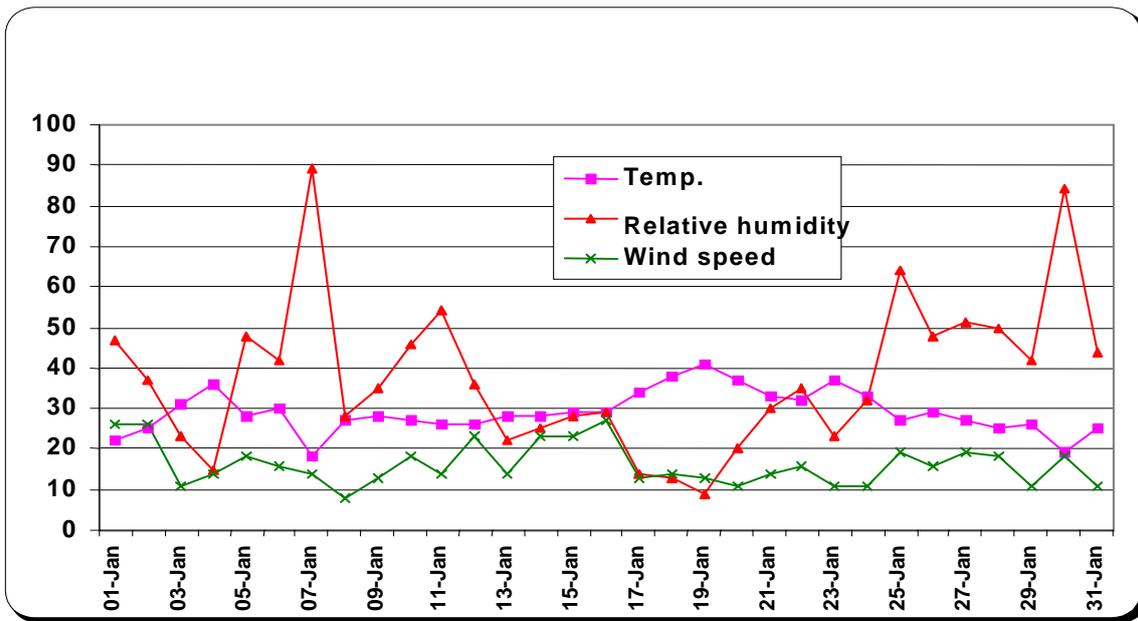


Figure 3.9: Simonsberg fires– weather conditions 1-31 January 2000. Calculated from 14:00 weather observations at Elsenburg weather station.

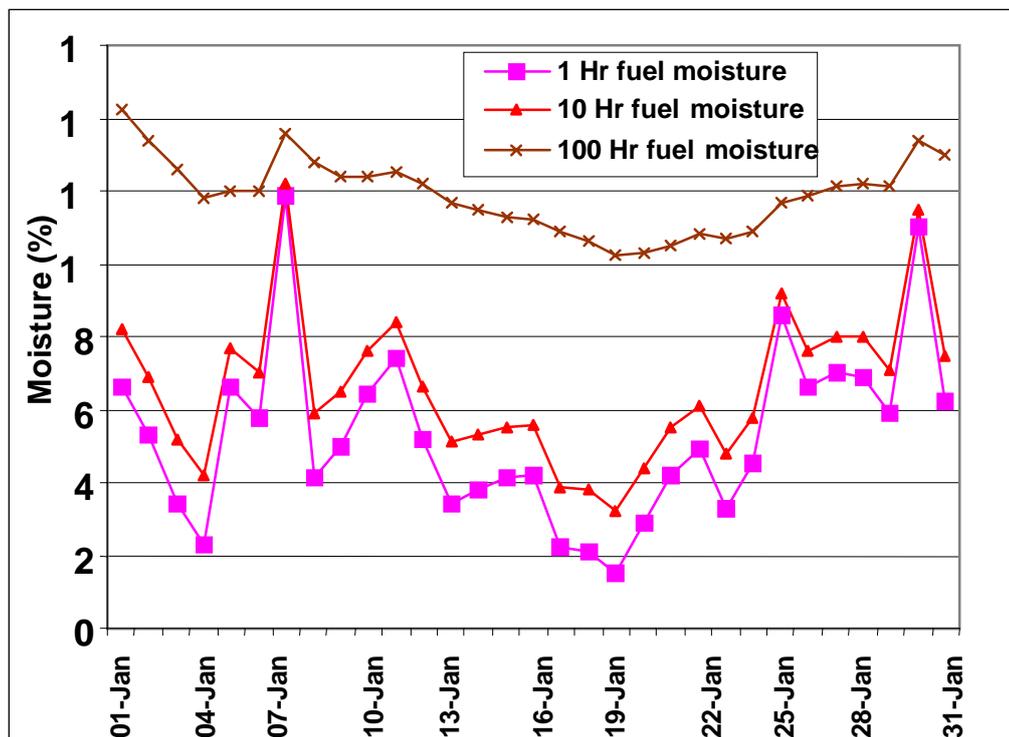


Figure 3.10: Elsenburg - fuel moistures and Burning Index 1-31 January 2000. Calculated from 14:00 weather observations at Elsenburg weather station.

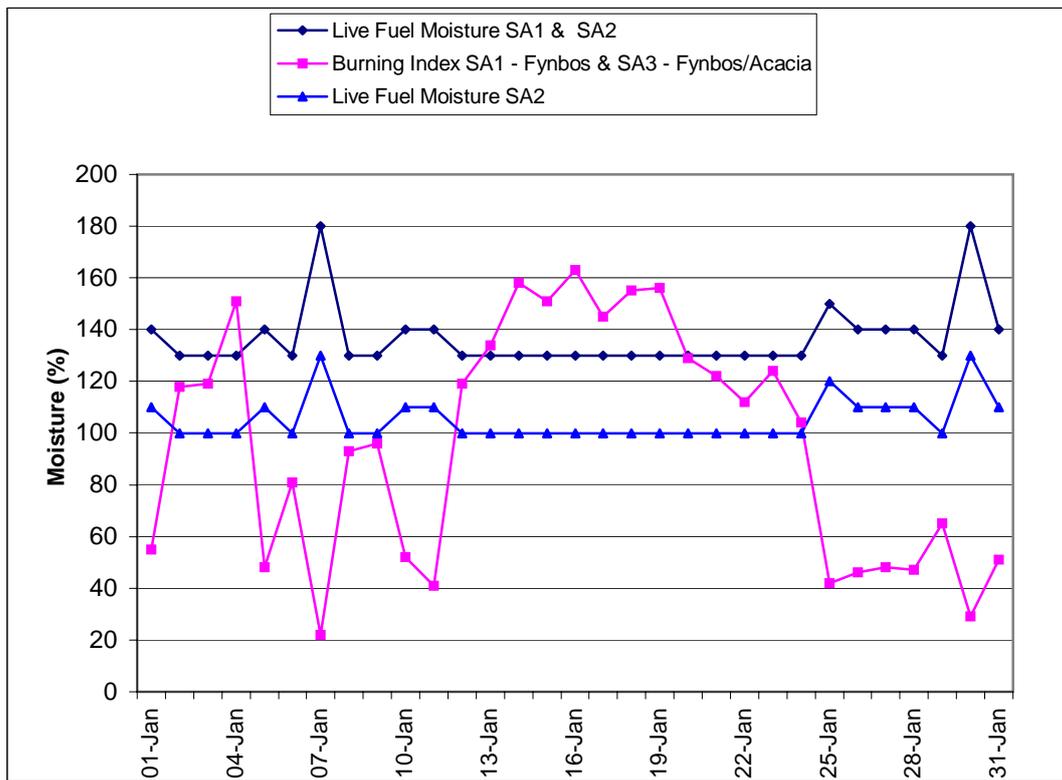


Figure 3.11: Simonsberg fires - fuel moistures and Burning Index 1-31 January 2000. Calculated from 14:00 weather observations at Elsenburg weather station.

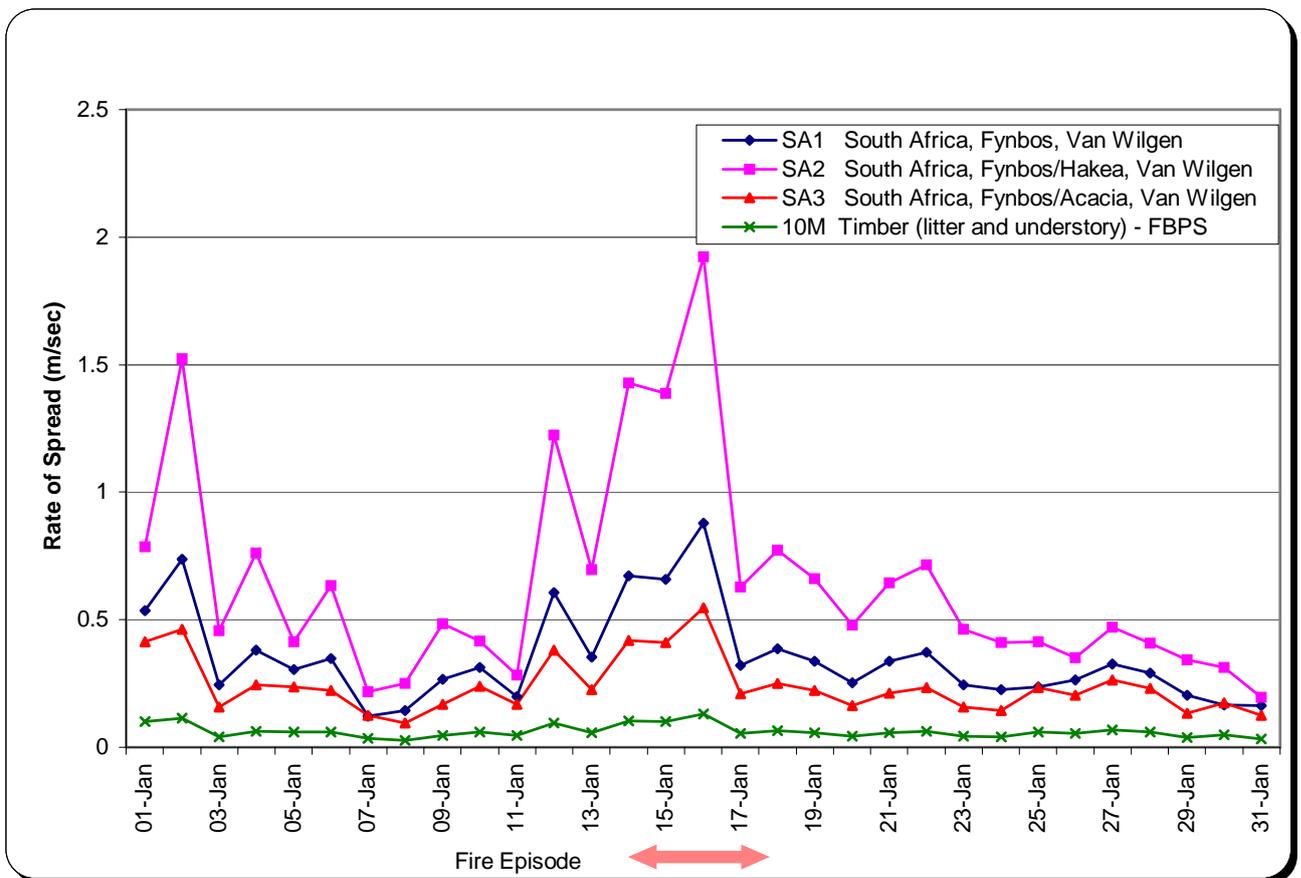


Figure 3.12: Maximum predicted rate of spread – Simonsberg Area Fires 15-18 January 2000. Calculated from 14:00 observations at Elsenburg weather station.

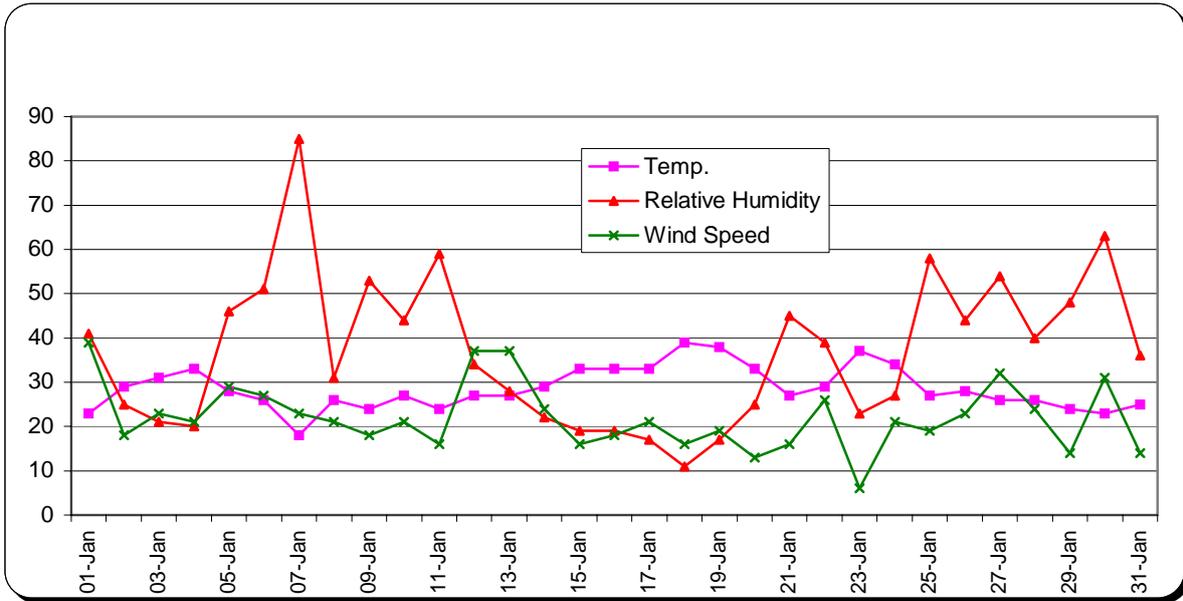


Figure 3.13: West Coast weather conditions 1-31 January 2000. Calculated from 14:00 weather observations at Langebaan weather station.

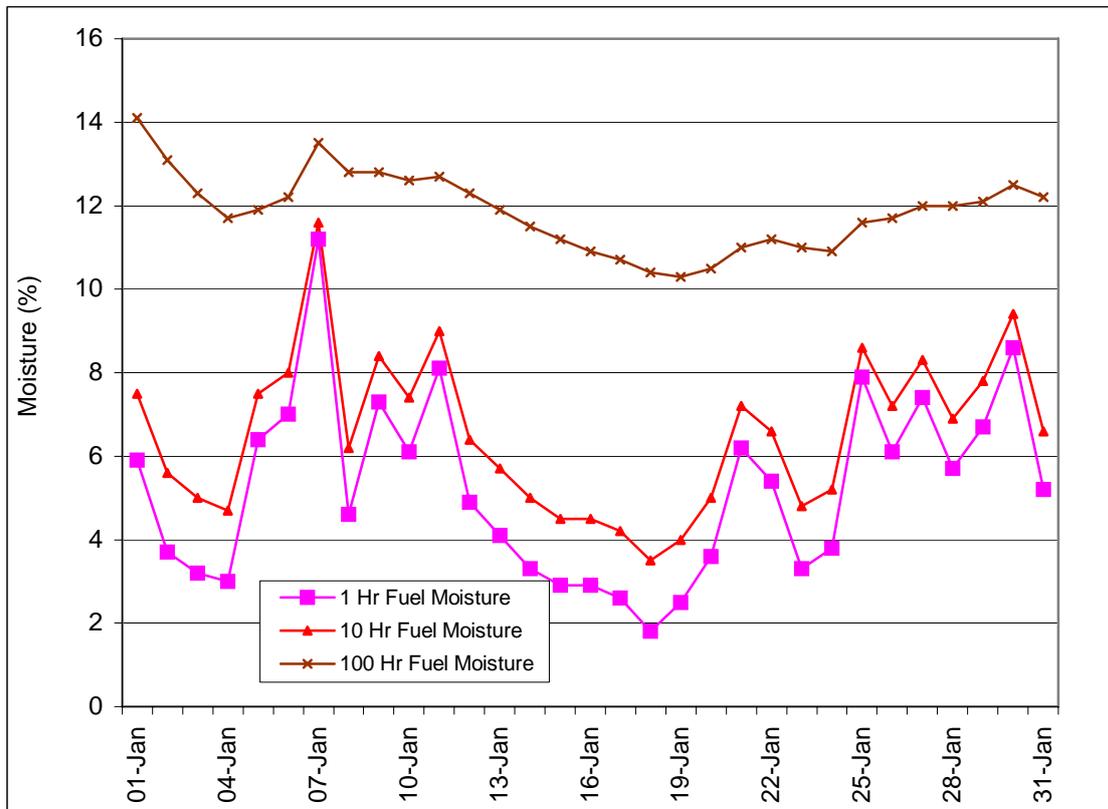


Figure 3.14: West Coast - fuel moistures and Burning Index 1–31 January 2000. Calculated from 14:00 weather observations at Langebaan weather station.

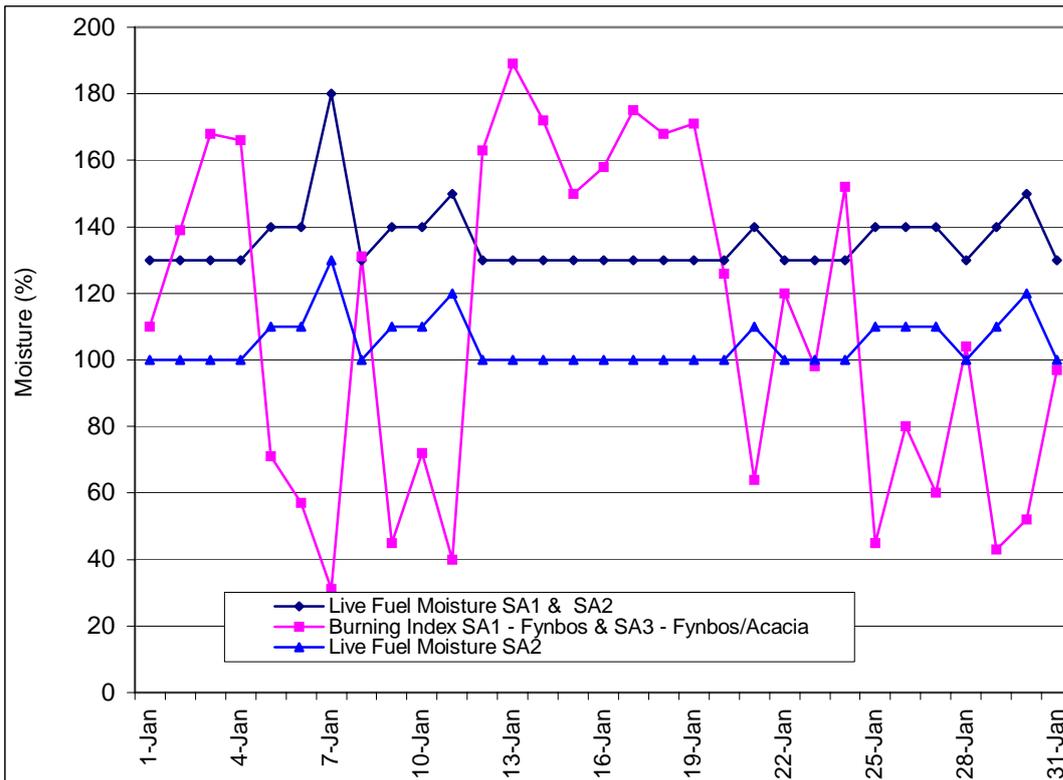


Figure 3.15: West Coast - fuel moistures and Burning Index 1–31 January 2000. Calculated from 14:00 weather observations at Langebaan weather station.

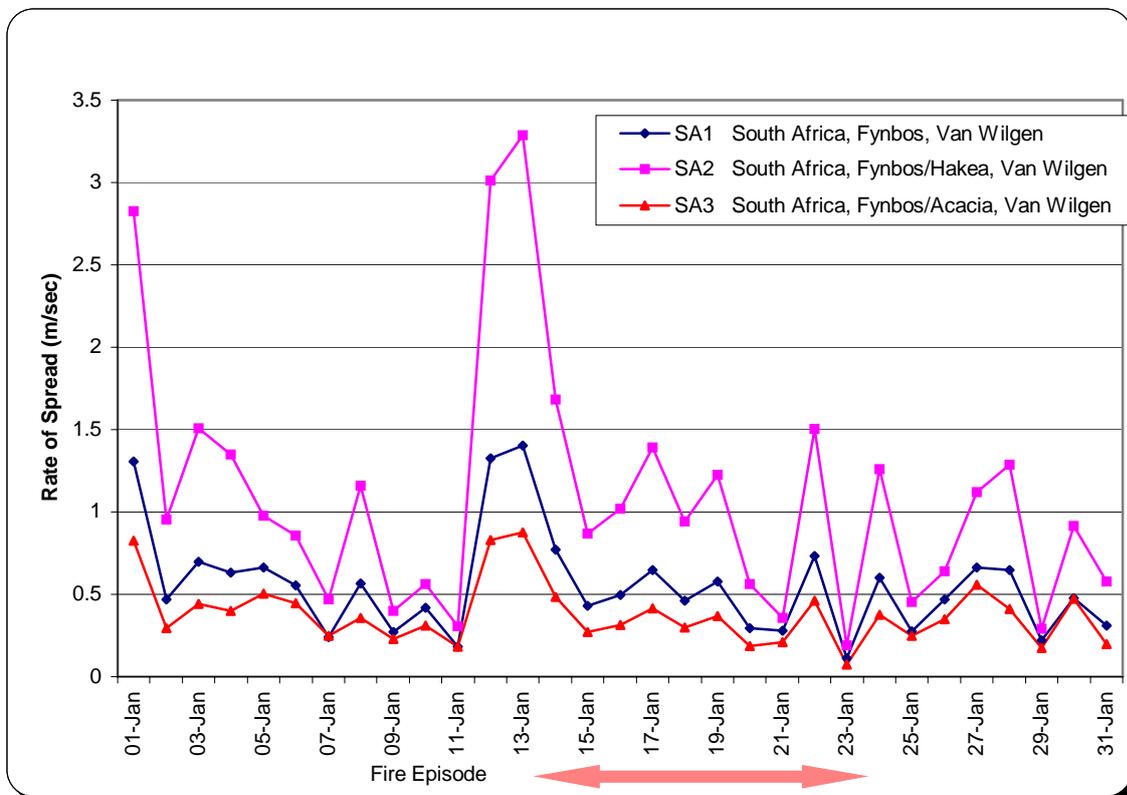


Figure 3.16: Maximum predicted rate of spread, West Coast Area Fires, 14-24 January 2000. Calculated from 14:00 weather observations at Langebaan weather station.

3.4 Analysis of veldfire behaviour and weather graphs for selected veldfires

Table 3.4: Summary description of fire weather and predicted fire behaviour for the South Peninsula veldfires

Date	Weather/Fuel	Fire Behaviour
12 – 16 January 2000	<u>Winds:</u> Southeast, 25 to 50 kph. <u>Temperature:</u> 20 to 30°C <u>Humidity:</u> 80 to 60% <u>1-Hour FM:</u> 10 to 4,5%	<u>Burning Index:</u> 50 to 200 Wind causes considerable drying of dead fuels. High potential rates of spread and fire spotting. Critical conditions exist. Veldfires start 16 January.
17 – 19 January 2000	<u>Winds:</u> Switching from southeast to northwest, 15 to 30 kph. <u>Temperature:</u> 32 to 40°C <u>Humidity:</u> 20 to 9% <u>1-Hour FM:</u> 4,5 to 1,8%	<u>Burning Index:</u> 170 to 160 Changing wind direction on 18 January changes course of veldfire. Flare-ups in new areas. Slower wind speed allows more upslope fire spread. Fuel moistures reach extremely critical levels. Localised extreme fire behaviour is experienced.
20 – 23 January 2000	<u>Winds:</u> Switching to the southwest, 12 to 16 kph. <u>Temperature:</u> 24 to 28°C <u>Humidity:</u> 39 to 56% <u>1-Hour FM:</u> 5 to 8,5%	<u>Burning Index:</u> 120 to 40 Changing wind direction brings in marine air, lowering temperatures and increasing humidity and fuel moistures. There are few areas of active veldfires toward the end of the period.

Table 3.5: Summary description of fire weather and predicted fire behaviour for the Simonsberg veldfire

Date	Weather/Fuel	Fire Behaviour
12 – 15 January 2000	<u>Winds:</u> southeast, 15 to 24 kph <u>Temperature:</u> 25 to 30°C <u>Humidity:</u> 20 to 30% <u>1-Hour FM:</u> 6 to 5%	<u>Burning Index:</u> 120 to 160 Wind causes considerable drying of dead fuels. High potential rates of spread and fire spotting. Critical conditions exist. Veldfires start 15 January.
16 – 19 January 2000	<u>Winds:</u> switching from southeast to northwest, 15 to 26 kph <u>Temperature:</u> 30 to 40°C <u>Humidity:</u> 20 to 9% <u>1-Hour FM:</u> 3,5 to 2%	<u>Burning Index:</u> 120 to 140 Changing wind direction on 18/1 changes course of veldfires. Flare ups in new areas. Slower wind speed allows more up slope fire spread. Fuel moistures reach extremely critical levels. Localised extreme fire behaviour is experienced. Potential rates of spread reach their peaks on 16 January.
20 – 23 January 2000	<u>Winds:</u> switching to the west and southwest, 12 to 16 kph <u>Temperature:</u> 38 to 30°C <u>Humidity:</u> 25 to 35% <u>1-Hour FM:</u> 3 to 5%	<u>Burning Index:</u> 100 to 120 Fire behaviour conditions although lower remain very high. Serious fire control problems remain for active veldfires.

Table 3.6: Summary description of fire weather and predicted fire behaviour for the West Coast veldfires

Date	Weather/Fuel	Veldfire Behaviour
8 – 11 January 2000	<u>Winds:</u> Northwest to west, 18 to 25 kph <u>Temperature:</u> 25 to 27°C <u>Humidity:</u> 85 to 30% <u>1-Hour FM:</u> 8 to 4,5%	<u>Burning Index:</u> 40 to 140 Variable fire behaviour conditions existed along the coastal strip ranging from moderate to very high. Low fuel moistures for coastal zone exist.
12 – 14 January 2000	<u>Winds:</u> Southeast, 20 to 38 kph <u>Temperature:</u> 32 to 40°C <u>Humidity:</u> 30 to 20% <u>1-Hour FM:</u> 4,5 to 3%	<u>Burning Index:</u> 160 to 180 Increase in wind speed and low humidity cause marked increase in potential fire behaviour. Fine fuel moistures are at critical levels. Fire spread potential peaks on 13 January. Atlantis veldfire starts on 14 January.
15 – 23 January 2000	<u>Winds:</u> Switching from southeast to northwest and north, 14 to 26 kph <u>Temperature:</u> 30 to 40°C <u>Humidity:</u> 20 to 10% <u>1-Hour FM:</u> 3 to 2%	<u>Burning Index:</u> 170 to 190 Variable and changing wind direction changes course of fire spread. Fuel moistures reach extremely low levels along the coastal plain, peaking on 19 January. Veldfires are easily ignited with spotting and other extreme behaviour probable. The veldfire in the West Coast National Park starts on 19 January.
24 – 26 January 2000	<u>Winds:</u> variable south to north, 6 to 20 kph <u>Temperature:</u> 28 to 30°C <u>Humidity:</u> 30 to 58% <u>1-Hour FM:</u> 4 to 8%	<u>Burning Index:</u> 120 to 40 Although the fire potential remains high, changing wind direction brings in marine air, lowering temperatures and increasing humidity and fuel moistures. Few areas of active veldfires toward the end of the period.

3.5 Overview of applicable policies and legislation

3.5.1 Applicable policies

There are several national policies that impact on veldfire management.

The White Paper on Environmental Management Policy for South Africa sets sustainable development as a national goal, to be achieved by: addressing the total environment and all human activities impacting on it; and ensuring that all aspects of environmental governance including norms, standards, legislation, administration and enforcement are dealt with uniformly across departments and in all spheres of government.

It includes several principles of environmental management that government has committed itself to applying in developing policy, legislation and regulation and decision-making and enforcement.

The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity is the first step towards implementing its obligations under the Convention on Biological Diversity (CBD), which South Africa ratified in 1996. Government is preparing legislation to give effect to the requirements in this policy, to support the three main objectives of the CBD, namely the conservation of biological diversity, the sustainable use of biological diversity, and the fair and equitable sharing of benefits arising from the use of genetic resources.

The White Paper on Sustainable Forest Development in South Africa establishes the principles of sustainable forest development. The policy goals are embodied in the National Forests Act 84 of 1998.

The White Paper on Disaster Management is pivotal to the current review (see Section 1.5.3 in this report). It established an approach to disaster management that moves away from perceiving disasters as rare occurrences to an appreciation that disasters can result from environmental, technological and natural risks associated with unplanned and poorly planned urbanisation. Its focus is on reducing the risk of loss of life, economic loss, damage to property and protection of the environment. The policy requires that a new Disaster Management Act oblige government to develop risk reduction strategies focused on reducing vulnerabilities and to integrate such strategies into development policies, plans and projects.

3.5.2 Legislative framework

There are several categories of legislation pertaining to the veldfires that occurred in the Western Cape:

- (a) *Legislation directing and regulating veldfires and veldfire management (mostly within an emergency management context)*
- Forest Act (No. 122 of 1984)
 - Fire Brigade Services Act (No. 99 of 1987)
 - National Environmental Management Act (No. 107 of 1998)

(b) *Towards integrated disaster management regulation*

- Disaster Management Bill
- National Veld and Forest Fire Act (No. 101 of 1998)

(c) *Resource management regulation*

- National Parks Act (No. 57 of 1976 – as amended)
- Cape Nature Conservation Ordinance
- Conservation of Agricultural Resources Act (No. 43 of 1983)
- National Water Act (No. 36 of 1998)
- Mountain Catchment Areas Act (No. 63 of 1970)

(d) *Land-use planning legislation*

- Physical Planning Act (No. 125 of 1991)
- Development Facilitation Act (No. 67 of 1995)
- Local Government Transition Act (No. 209 of 1993)
- Environment Conservation Act (No. 73 of 1989)
- National Environmental Management Act (No. 107 of 1998)

(e) *Air quality control legislation*

- Atmospheric Pollution Prevention Act (No. 45 of 1965)
- Local Authority Legislation

(f) *General environmental management*

- National Environmental Management Act (No. 107 of 1998)

3.5.2.1 Legislation directing the regulation of veldfires and veldfire management (within a mostly emergency management context)

Forest Act No. 122 of 1984

Sections of the Act relating to veldfires are currently still in force because of a savings clause in the National Veld and Forest Fire Act. This Act requires landowners to prevent and control the spread of veldfires by maintaining firebreaks on their common boundaries, and by taking other appropriate precautions.

The Act empowers the Director-General to declare a prohibition on fires in the open air when required as an extraordinary precaution. Government declared a prohibition on fires for a scheduled part of the Cape Peninsula (GN No. 1181 in Government Gazette 20506 dated 8 October 1999). The general prohibition provides that between 1 December 1999 and 30 November 2000, no person is entitled to make a fire in the open air except within a demarcated picnic or camping area or caravan park or holiday resort, with the further proviso that this type of fire must be properly extinguished with water and/or sand. Residential and

industrial stands within proclaimed townships are excluded from this prohibition, because local authorities have their own permit systems and rules within these areas.

This prohibition has caused a serious problem for those who wished to undertake controlled burning such as the South Peninsula National Park (SPNP). However, the legal status of this blanket prohibition is clear because of the existence of the savings clause of the National Veld and Forest Fire Act.

Fire Brigade Services Act No. 99 of 1987

The Act confers broad powers in order to protect life and property. It does not deal with environmental protection imperatives, nor does it address risk reduction or fire prevention. The Act is therefore generally regarded by many as being dated and in need of reform in order to embrace the risk reduction and developmental focus articulated in the Disaster Management White Paper. However, the Fire Brigade Board established by the Act under the auspices of the Department of Provincial and Local Government is currently reviewing the Act.

The Fire Brigade Services Act provides for the establishment, co-ordination and standardisation of fire brigade services. Local authorities are allowed to establish and maintain a fire brigade service, intended to be employed for the following different purposes:

- (a) preventing the outbreak or spread of a fire;
- (b) fighting or extinguishing a fire;
- (c) the protection of life or property against a fire or other threatening danger;
- (d) the rescue of life or property from a fire or other danger;
- (e) subject to the provisions of the Health Act, the rendering of an ambulance service as an integral part of the fire brigade service;
- (f) the performance of any function connected with any of the matters referred to in paragraphs (a) to (e).

Each fire brigade service must only be employed inside the area of jurisdiction of the local authority concerned, unless the local authority is requested or in terms of a co-operation agreement has agreed to perform those services outside its area.

The powers of members of a service set out in Section 8 of the Act are typically emergency management powers that may be exercised when a fire has occurred. Detailed provisions are also set out in Section 9 dealing with the salvaging of movable property.

Section 12 deals with entering into mutual co-operation agreements between controlling authorities, in terms of which the parties co-operate on conditions agreed upon, including the rendering of its service inside or outside its area or inside or outside the province in which its area is situated. A controlling authority may also enter into an agreement with other persons in terms of which the controlling authority undertakes to make available its service to that person, or in terms of which that person undertakes to make available material or equipment to the controlling authority.

This Act enables local authorities, after consultation with the Board, to make by-laws or regulations for its area of jurisdiction regarding any matter which that local authority deems necessary or expedient to the effective employment of its service.

National Environmental Management Act No. 107 of 1998

Section 30 of the National Environmental Management Act (NEMA) deals with emergency incidents, which are defined as “an unexpected sudden occurrence...including a fire... leading to serious danger to the public...” The Act imposes certain obligations on the person responsible for an incident and he/she is strictly liable for taking measures to contain or minimise the effects of the incident, undertaking clean-up procedures and remedying the effects of the incident.

It obliges public authorities to authorise or oblige the taking of specific measures to reduce, minimise or rehabilitate harm caused. It provides for a hierarchy of persons who can act to respond to an emergency. A Director-General of a national department may only take steps if the Director-General of the Department of Environmental Affairs and Tourism or the relevant municipal authority or provincial government has not taken them. Therefore, NEMA charges the municipality with jurisdiction as the principal public agency responsible for directing measures to remedy the effects of an emergency incident, such as a fire. This is subject to two provisos: first, that the local authority has jurisdiction over that area and second, if it is necessary to do so in the circumstances and no other public agency has yet taken such steps to avoid jurisdictional conflict.

However, the relevant authority may remedy the effects of the incident only under certain circumstances. These include failure of the responsible person to comply with a directive ordering him or her to do so, or if there is uncertainty as to who the responsible person is or if any immediate risk of serious danger to the public or of potentially serious detriment to the environment arises because of the incident. In these circumstances, the relevant authority is entitled to claim reimbursement of all reasonable costs incurred. Relevant authorities are also required to prepare comprehensive reports on the incident and these must be made available to several roleplayers, including the relevant fire prevention service and the provincial Head of Department or municipality.

3.5.2.2 Towards integrated disaster management regulation

Disaster Management Bill

The Disaster Management Bill provides for an Intergovernmental Committee on Disaster Management to spearhead the crafting of a national disaster management framework for the country (see Section 1.5.3 of this report). In addition, it provides for the establishment of a National Disaster Management Centre. It requires the preparation of a national disaster management framework. Each province is required to establish and implement a policy for disaster management for its province that conforms to the national framework, and to establish provincial Disaster Management Offices.

Similarly, each metropolitan and each district municipality must establish and implement a policy framework for disaster management in the municipality, prepare a disaster management plan for its area and establish a Disaster Management Office for its municipality. The powers and functions of these offices are also provided for.

The Bill also provides for the funding of post-disaster recovery and rehabilitation.

It also provides for classifying and declaring disasters, i.e. local, provincial and national disasters. This is the responsibility of clearly defined roleplayers at national, provincial and local government level who exercise special powers in the event of a disaster. It also provides for the measures that provinces are required to take when a disaster occurs or threatens to occur in their jurisdictions. It includes similar provisions for municipalities when a disastrous event occurs or is threatening in a municipality.

National Veld and Forest Fire Act No. 101 of 1998

For the present purposes, this Act is perhaps the most important, inasmuch as it intends bringing about integrated wildfire management through the prevention and combating of veld, forest and mountain fires, as well as providing for the procedures that should be adopted once these fires occur.

The Act has to date not been fully implemented because certain key sections still need to be promulgated in order to give effect to the Act.

The purpose of the Act is to reform the law with regard to veld and forest fires. To this end, the Act amends the Forest Act by deleting reference to the institutional arrangements that preceded those contained in the new Act (Section 35). Although the Act came into being on 1 April 1999, Chapter 2, which deals with Fire Protection Associations, and Chapter 3, on the Fire Danger Rating System, will only come into operation once the Act is amended (see below) and regulations have been promulgated.

Establishment of FPAs

One of the outstanding features of the Act is the provision for the establishment of Fire Protection Associations (FPAs). These FPAs may be voluntarily formed by owners who wish to co-operate in veldfire control and management. A powerful incentive for owners to join an FPA is provided by a presumption of negligence on the part of the owner in a civil action for damages as a result of loss suffered from a forest fire. This presumption does not apply if the owner is a member of a FPA.

The Act provides that where an FPA has been registered in an area wholly or partly controlled by a municipality having a fire service, or where a designated service has been constituted, the municipality or designated service must become a member of the FPA. In instances where the State is the owner of land, it is obliged to join the FPAs in their area in which the land is situated.

The Act also recognises that other institutions that are primarily concerned with fire control or management may be registered as FPAs. Such institutions include committees or regional committees established under the Forest Act and the Mountain Catchment Areas Act, Catchment Management Agencies established under the National Water Act and Fire Protection Committees established under the Mountain Catchment Areas Act.

Veldfire management strategy of the Fire Protection Association

Once an FPA has been registered various obligations must be complied with, the most important being the development and application of a veldfire management strategy for its area of jurisdiction. Such strategy must provide for agreed mechanisms for co-ordinating actions with adjoining FPAs in the event of a fire crossing boundaries. In addition, in order to foster and obtain intersectoral co-operative management, the Act requires that where a municipality is a member of the FPA, the FPA must consult with it in developing and applying the strategy.

Rules of the Fire Protection Association

The FPA must also make rules, and these are binding on the members, regarding in particular:

- the minimum standards to be maintained by members in relation to all aspects of veldfire prevention and readiness for fire fighting, and
- controlled burning to conserve ecosystems and reduce the fire danger.

The content of these rules must deal with risk reduction, emergency management and the link between controlled burning and the protection of biodiversity. These are the very cornerstones for an effective integrated fire management approach. This system relies on voluntary participation by landowners, such as the CPNP, to participate fully in formulating appropriate rules to undertake veldfire management. However, the effective implementation of rules governing controlled burning requires the coming into operation of the Fire Danger Rating System.

The rules of the FPA must be lodged with the Minister, which means that DWAF is in a position to play a monitoring role in regard to the rules.

Fire Protection Officers

The FPA is obliged to appoint a Fire Protection Officer, except where a municipality is a member and has a fire service, or where a designated service is a member. In these circumstances, the Chief Fire Officer of the municipality is deemed to be appointed as the Fire Protection Officer. However, this provision will be amended in future in order to give the Chief Fire Officer discretion in assuming the powers and duties of a Fire Protection Officer.

The Act further provides that where a FPA has members of more than one entity having a Chief Fire Officer, the Fire Protection Officer must be elected as prescribed. This provision will also be amended so as to clarify that such appointment must be made among those Chief Fire Officers.

The proposed amendments to the Act are motivated by the need to take into consideration the potential conflict of interests that may arise from the Chief Fire Officer having to serve both the municipality employing him or her, and the FPA. Moreover, the appointment of the Chief Fire Officer as Fire Protection Officer of the FPA has significant funding and capacity implications.

The role and function of the Fire Protection Officer is pivotal to the sound functioning of the FPA, in whom responsibility is vested and vests accountability in a single person. The Fire Protection Officer is obliged, among other things, to:

- perform the function of the Chief Executive Officer of the FPA;
- take control of any fire fighting in the area of the FPA if the veldfire threatens life or property and he or she is reasonably able to do so;
- enforce the rules of the FPA;
- monitor and report to the FPA and the Minister on compliance with the Act;
- train the members of the FPA; and
- inspect members' land to ensure compliance with the rules and the Act.

National Fire Danger Rating System

Chapter 3 of the Act provides for a National Fire Danger Rating System to serve as an effective early warning system and fire prevention and mitigation tool. The Minister sets up and maintains the system, although he or she may delegate these powers to an organisation having the necessary expertise, such as the Council for Scientific and Industrial Research (CSIR). It is anticipated that DWAF will identify between 10 and 20 fire regions in the country within which the Fire Danger Rating System will operate.

The Act requires that communication of the fire danger for each region must be regularly communicated to the FPAs in that region. When the fire danger in an area is rated as high, the Minister is obliged to publish a warning at the earliest possible opportunity via the media. Once such warning is published, an absolute prohibition on the lighting, use or maintenance of an open-air fire comes into operation. The rationale for this system is that it would replace the blanket prohibition on open-air fires. The blanket provision has been left unaffected until such time as the Fire Danger Rating System has been properly implemented, at which time the blanket prohibition would be repealed. (See discussion on savings clause below.)

Firebreaks

Chapter 4 confirms the risk reduction approach to fire management through the use of firebreaks, as contained in the old Forest Act. It places the primary responsibility on a landowner to prepare and maintain firebreaks on his or her side of the boundary between his or her land and adjoining land.

The obligation to prepare and maintain firebreaks is therefore clear. The Act does not explicitly require the consideration of alternative appropriate methods to be used in preparing and maintaining such firebreaks, although nothing precludes a landowner from using alternative appropriate methods. The Act goes into great detail regarding the preparation and maintenance of firebreaks by burning, and the overall impression created is that burning is the preferred method. However, the timing for burning a firebreak is subject to conditions. If the FPA raises an objection, or a warning has been issued as a result of the fire danger being high in the region, or conditions are not conducive, then burning the firebreaks is prohibited.

The Act requires that when preparing and maintaining a firebreak, the owner must ensure that, with due regard to weather, climate, terrain and vegetation of the area:

- it is wide enough and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land;
- it does not cause soil erosion; and
- it is reasonably free of inflammable material capable of carrying a veldfire across it.

In terms of the Act, the Minister may for good reason grant any owner or a group of owners an exemption from the duty to prepare and maintain a firebreak. The Minister must, however, consult with the FPA in the area, if one exists. Concern has been expressed that this provision may open the floodgates for the granting of exemptions, thereby undermining the rationale for the firebreak provisions in the first place. However, consultation with the FPA means that exemptions would be subject to the requirement of the agreed veldfire management strategy for the area.

Further, the Minister may exercise his or her discretion to grant exemptions only on good reason and it allows the Minister to impose conditions in granting such exemptions.

In order to bring about a measure of certainty, it may be necessary for appropriate regulations to be promulgated to guide the granting of exemptions. The regulations, among other things, could set out the factors the Minister should take into account when granting exemptions as well as the requirements that the owner or group of owners should meet.

Fire fighting

Chapter 5 of the Act deals with fire fighting, and sets out detailed provisions relating to the preparedness for fire fighting, actions to fight fires and agreements for mutual assistance (Sections 17, 18 and 19 respectively). The primary responsibility for preparing for and fighting fires is placed on the landowner on whose land a veldfire may start or burn or from whose land it may spread. However, an owner who has reason to believe that a fire on his or her land or the land of an adjoining owner may endanger life, property or the environment must notify the Fire Protection Officer.

The owner is identified as the first person who must take control over the fire until the Fire Protection Officer is on the scene, at which time that responsibility will pass over to the Fire Protection Officer. If a Fire Protection Officer is not in a position to take control of the fire fighting, then a forest officer may do so. Whenever the fire spreads or appears likely to spread across an FPA's boundary, the Fire Protection Officer must inform the Fire Protection Officer of the adjoining FPA. In addition, there is an obligation to take all steps needed to co-ordinate the fire-fighting operation in accordance with the fire management strategy of both FPAs.

In terms of Mutual Assistance Agreements, the Minister has a discretion to enter into an agreement with any persons or FPA to provide mutual assistance in fighting fires. Two or more FPAs may enter into an agreement to provide mutual assistance in fighting and extinguishing fires on the land of or constituting a threat to their respective members.

Offences and penalties

The Act delineates penalties by reference to different categories of offences. First-category offences attract the heaviest penalties, with third-category offences attracting the least onerous penalties. A first-category offence is the lighting, use or maintenance of open-air fires in contravention of a Ministerial directive forbidding fires in a region where the fire danger is high.

Any person guilty of a second-category offence (leaving fires unattended or lighting a fire which spreads and causes injury or damage) and a third-category offence (failing to comply with the requirements regarding firebreaks) can, upon a second conviction for that offence, be sentenced as if he or she committed an offence in the category higher than the category in which he or she would ordinarily be convicted or sentenced.

The penalties provided for appear to be commensurate with the gravity of the offence.

Savings clause

The Act provides that anything done in terms of a law repealed by this Act, such as the declaration made by the Director-General prohibiting open-air fires under the Forest Act, remains valid if it is consistent with the Fire Act, until repealed or overridden **and** becomes an action in terms of the corresponding provision of this Act. It may be argued that the general prohibition is not consistent with the provisions relating to the Fire Danger Rating System in that the prohibition to make open-air fires is declared by the Minister once a fire danger is rated as being high, as opposed to a blanket prohibition.

In order for the blanket prohibition to meet the second requirement, it must be a corresponding provision in terms of the Act. This requirement appears not to have been met when one considers that Section 10(2) of the Act authorises the Minister to prohibit open-air fires only when the fire danger is rated as high. The problem is that the Minister is not in a position to invoke Section 10(2) at this point in time because the Fire Danger Rating System has not yet been implemented. However, the blanket prohibition is consistent with the Act as a whole, the purpose of which is to prevent and combat veld, forest and mountain fires. It is also made by regulation, and therefore carries through as a regulation under the new Act. It is safe, therefore, to conclude that blanket prohibitions remain in force until repealed.

3.5.2.3 Resource management regulation

Conservation of Agricultural Resources Act No. 43 of 1983

The Act is the principal piece of legislation regulating the conservation and use of soil, vegetation and to some extent, water, outside declared mountain catchment areas and urban areas. The most relevant provisions, for the purpose of this report, are those pertaining to veld management and invader plants and weeds.

The Act contains specific provisions dealing with the prevention and control of veld fires. In this regard, land users are prohibited from burning or grazing burnt veld without the written authorisation of the executive officer. An application for such permission must set out the burning or grazing motivation and be accompanied by an acceptable management plan.

The Act deals with control of weeds on the basis of a list of areas being identified, in respect of which weeds must either be controlled or eradicated. Burning of weeds is one of the methods prescribed for weed control, whereas the eradication of weeds requires just that – eradication - and not mere control.

Various plants have been declared invader plants. These plants are listed. In addition, areas are listed in which invader plants must be controlled. The methods for control include, *inter alia*, burning. Government is currently drafting new regulations for the control of invasive alien plants.

Mountain Catchment Areas Act No. 63 of 1970

This Act is the principal piece of legislation regulating the conservation, use and management of soil, vegetation and water within land declared as a mountain catchment area. The Minister may establish fire protection committees for any mountain catchment area. The Director-General may establish a fire protection plan for any mountain catchment area. These plans must contain, *inter alia*, provisions relating to the regulation or prohibition of veld burning, the prevention, control and extinguishing of veld and forest fires and the powers and functions of the fire protection committee in relation to the execution of the fire protection plan.

Several areas in the Cape have been declared Catchment Areas and are administered by the Cape Nature Conservation Board.

National Water Act No. 36 of 1998

The National Water Act provides among other things for the establishment of Water Management Areas, their administration by Catchment Management Agencies (CMAs), and development and implementation by these CMAs of catchment management strategies. Reasonably, these catchment management strategies would need to deal with the protection of catchment areas and hence veldfires, in some way.

3.5.2.4 Air quality control

The Atmospheric Pollution Prevention Act No. 45 of 1965

Different local authorities have declared smoke control zones in terms of Section 20 of this Act, including the Western Cape. They include the erstwhile Cape Town Municipality as well as the Cape Divisional Council. Although the Act does not apply to the emission of smoke caused by veldfires, it will potentially have application (as will the relevant by-laws and regulations) when that smoke is caused by the use of fire as a management practice.

If any occupier of premises makes representations to a local authority regarding smoke emissions that cause a nuisance, the local authority is obliged to serve an abatement notice on the person responsible for that nuisance. Failure to comply with the provisions of the notice constitutes an offence.

3.5.2.5 Local authority legislation

There are many by-laws administered by local authorities that have a bearing on veldfire management. For instance, the South Peninsula Municipality (SPM) administers smoke control regulations, fire by-laws for the local areas and nuisance by-laws insofar as it deals with the lighting of fires. The City of Cape Town municipality administers smoke control by-laws, Fire Regulations and Nuisance Regulations.

CHAPTER 4

OVERVIEW OF EVENTS AND ROLES

4.1 Fires throughout the region

Respondents to the questionnaire reported 18 fires within the area under review during the period 15 to 25 January. These ranged up to fires that exceeded 20 000 hectares in area.

Organisations responded to many more calls to fires. A scan of the logs from the Winelands District fire service indicates that it received reports of many other small fires than those they reported on. Small fires within urban areas were not tallied, but the Cape Metropolitan Council stated that it had been called to 261 smaller fires in the period, and Tygerberg Municipality despatched units to 206. Even smaller fires drew heavily on resources, as organisations usually committed at least one crew plus appropriate appliances to each fire.

Table 4.1 lists the organisations that were involved in the fires, indicating where they conducted fire fighting.

From Table 4.1 it is clear that several major fires ran concurrently or partly so. Large fires were burning at any time between 14 and 28 January. The result was that resources were becoming overstretched from the beginning of this period. For example, by 16 January the SAAF could no longer respond to all justifiable calls for assistance. By 16 January, SAFCOL had called on resources from outside the province. Major emergency interventions were also required very early. By 15 January, Blaauwberg Municipality was evacuating holiday-makers from the resort at Silverstrand on the West Coast.

In the case of areas managed by the Western Cape Nature Conservation Board and SAFCOL, well-formulated fire management plans exist, and in many instances firebreaks and veld management assisted fire control. The same applies in certain municipal nature reserves such as Paarl Mountain. However, in mountain catchment areas, much of the land is not managed directly and no firebreaks are prepared. This is mostly for reasons of economy, but also due to biodiversity management policies, which attempt to mimic natural fire regimes.

Almost every organisation responding to the questionnaire cited reduced staffing levels and vehicle and equipment problems, arising from budgetary constraints, as current problems in veldfire management.

Another pervasive problem reported was that of communication during fires owing to (a) incompatible radio frequencies and (b) to gaps in the coverage from radio repeater stations in the mountainous terrain. There were also frequent problems with ground-to-air communication where aerial support was used. Those in charge of fires also frequently reported directly or by implication the difficulty of developing fire-fighting strategies because of the inability to obtain adequate intelligence about larger fires. Finally, respondents often cited the lack of adequate overall coordination of strategy and resources as a major problem.

Table 4.1: Summary of involvement of various organisations in veldfires in the Western Cape during 15 to 25 January 2000. (WCNCB: Western Cape Nature Conservation Board; DC: District Council; Mun: Municipality; SAAF: SA Air Force; CPNP: Cape Peninsula National Park; WCNP: West Coast National Park). In addition to the veldfires listed in the table, CPNP fought three fires on the Peninsula, one at Clifton and two on Devil's Peak, each 5 hectares in area or smaller, on 15 and 16 January.

Organisation	Fire (with dates and area in hectares)																
	Oude Tol, Tulbagh (14-16 Jan)	West Coast Road (14 -19 Jan)	Simons-berg (15-17 Jan)	Meerlust, Fransch-hoek (15-16 Jan)	Grabouw # 1 (16 Jan)	Grabouw # 2 (16 Jan)	Oude Tol, Tulbagh (16-17 Jan)	Silver-mine (14-17 Jan)	Ou Kaapse Weg (16-20 Jan)	Red Hill (16-20 Jan)	De Heuwel, Tulbagh (17-25 Jan)	Langebaan (18 – 22 Jan)	Leipzig, Worces-ter (19-24 Jan)	Protea, Koo (24 Jan)	Naudes-berg, Nuy (24 – 28 Jan)	Sandhoek De Doorns (25 – 26 Jan)	Various small
	(787)	(20000)	(1 000)	(15)	(5)	(1)	(2 000)	(?)	(4000)	(4000)	(3500)	(> 5000)	(7700)	(15)	(156)	(380)	
WCNCB	xxx		xxx				xxx						xxx		xxx	xxx	
Brede R DC	xxx									xxx			xxx				
Blaauw-berg Mun.		xxx															xxx
Cape Town Mun.		xxx						xxx	xxx								xxx
West Coast DC		xxx										xxx					
Winelands DC			xxx	xxx													xxx
SAFCOL			xxx	xxx	xxx	xxx		xxx		xxx							
Tygerberg Mun.			xxx					xxx									xxx
Paarl Mun.			xxx	xxx				xxx				xxx					
Heyns Helicopters								xxx	xxx								xxx
SAAF			xxx					xxx	xxx	xxx	xxx	xxx	xxx				
Stellen-bosch Mun.			xxx														
Grabouw Mun.					xxx	xxx											
S. Peninsula Mun.								xxx	xxx	Xxx							
CPNP									xxx	xxx							xxx
SA Navy								xxx		xxx		xxx					
WCNP												xxx					
Farmers	xxx	xxx	xxx								xxx	xxx	xxx		xxx	xxx	
Working for Water Prog.	xxx																

Fire (with dates and area in hectares)																	
Organi- sation	Oude Tol, Tulbagh (14-16 Jan)	West Coast Road (14 -19 Jan)	Simons- berg (15-17 Jan)	Meerlust, Fransch- hoek (15-16 Jan)	Grabouw # 1 (16 Jan)	Grabouw # 2 (16 Jan)	Oude Tol, Tulbagh (16-17 Jan)	Silver- mine (14-17 Jan)	Ou Kaapse Weg (16-20 Jan)	Red Hill (16-20 Jan)	De Heuwel, Tulbagh (17-25 Jan)	Langebaan (18 – 22 Jan)	Leipzig, Worces- ter (19-24 Jan)	Protea, Koo (24 Jan)	Naudes- berg, Nuy (24 – 28 Jan)	Sandhoek De Dooms (25 – 26 Jan)	Various small
	(787)	(20000)	(1 000)	(15)	(5)	(1)	(2 000)	(?)	(4000)	(4000)	(3500)	(> 5000)	(7700)	(15)	(156)	(380)	
CPNP Volunteers									xxx	xxx							
Volunteer fire fighters from Gauteng												xxx					

4.2 Institutional roles and responsibilities

4.2.1 Western Cape Province Disaster Management Office

The provincial Disaster Management Office operates under the provisions of the current Civil Protection Act but is in the process of implementing the changes required by the new Disaster Management Office. The Disaster Management Office assigned a person to the Disaster Management Centre in the offices of the Cape Metropolitan Council on 19 January 2000. This enabled the Cape Metropolitan facility to coordinate at the provincial level.

4.2.2 Cape Metropolitan Council

The Disaster Management Office established a Disaster Management Centre (“JOC”) in the offices of the Cape Metropolitan Council on 19 January 2000 at 14:00 in response to the declaration of a provincial disaster by the Premier of the Western Cape. The JOC was closed Friday 21 January. The centre was expanded to address province-wide coordination by adding a member of the provincial office as noted above.

4.2.3 Rural District Councils

Fire services from three District Councils mobilised their fire services in this period, i.e. Breede River, West Coast and Winelands. Between them they were involved in seven major fires (Table 4.1). At least three of these, the West Coast Road, the Simonsberg and the Langebaan fires, amounted to local disasters, since each exceeded local capacity and threatened lives and property. Together, these fires extended over eight consecutive days.

The Breede River District Council has 12 permanent fire fighters and 20 reservists, and four fire tenders. They are able to mobilise up to 100 trained volunteers. The West Coast District Council relies on fire-fighting capacity in other institutions within its area, such as the West Coast Transitional Local Council, as well as maintaining a small group of reservists. The Winelands District Council has about 20 fire fighters, but did not specify what equipment is available to them.

4.2.4 Municipalities

Seven municipal fire services were involved in the fires (Table 4.1). The urban fire services and those of major towns such as Paarl and Stellenbosch are well equipped overall. For example, the Cape Town Fire and Emergency Service maintains 72 fire fighters, supported with 10 conventional fire engines, four rescue vehicles, one aerial platform, three water tankers, one foam and water tanker, and one breathing apparatus unit.

The South Peninsula Municipality has six qualified foresters in service, each with specialist knowledge and training in combating veldfires. They can mobilise up to 420 people in the event of emergency fires, and have a well-equipped organisation and infrastructure (but report that fire-fighting vehicles of some services are often old and unreliable). They also maintain a veldfire management plan for the South Peninsula. The urban fire services also have relatively good communications systems, and well-developed computer-based systems for capturing information about the incidents that they handle.

Smaller rural municipal fire services have few resources. They may have six to 12 persons available in the event of fire, but these are often members of their other services, with training in fire fighting. Very little equipment is available to them.

4.2.5 Western Cape Nature Conservation Board (WCNCB)

The Western Cape Nature Conservation Board manages several hundred thousand hectares of protected areas in the Western Cape. It employs 650 people directly, while the Working for Water Programme employs another 4 500 in projects on areas managed by the Board. Its own employees are trained and experienced in fire fighting, many of the managers being foresters. The Board has formal fire management plans for all its areas, and a detailed method of recording fires.

Despite the large number of employees, however, the size of staff available at any one station for fire fighting is quite small, typically about 30, of whom one to three would be managers and three to seven would be field supervisors and the rest workers. Fire fighters are individually well equipped, but suitable vehicles and fire appliances are few. In one case, staff of this size are employed in managing about 137 000 hectares of protected area.

During the period under review, the Board was involved in fighting five fires, mostly in relatively remote areas (Table 4.1).

4.2.6 South African National Defence Force (SANDF)

In respect of veldfires, the SANDF has a primary responsibility to protect its own property and has fire-fighting units equipped for this purpose. For the sake of precaution and good neighbourliness, SANDF fire-fighting units will intervene in fires before they reach their property. The SA Air Force (SAAF) is available to assist in fighting veldfires (and in other emergencies) if there is a threat to life and limb.

The **SAAF** helicopter squadron (Task Force West) provided aerial support to fires in several locations, beginning on 15 January (Table 4.1). It mobilised two Alouette and five Oryx helicopters, the former for reconnaissance and command-and-control, and the latter for water bombing, as well as a fixed-wing reconnaissance aircraft at times. By 17 January SAAF had to draw upon extra crews from Gauteng. Additional craft were placed on standby in Durban but were not called upon. These craft played a crucial role in the operations, but experienced many difficulties due to a lack of coordination in the demand for their assistance, as well as proper communication with and coordination of ground support while water bombing. For the fires on the West Coast SAAF had problems locating sources of water for water bombing.

In addition, SAAF fire-fighting units from Silvermine Base and Langebaanweg were involved in the Silvermine and Langebaan fires. In the case of Langebaan, this was principally to protect the SAAF base at Langebaanweg, Hopefield but also to assist the West Coast National Park, farmers and District Council crews.

The **SA Navy Simon's Town Naval Base** mobilised about 500 members with fire tenders and other equipment during 16 to 21 January to fight the Silvermine and Red Hill fires. Many if not all of these members had had training in fire fighting and experience with veldfires. The Navy played the principal role in the Red Hill fire. They were also assigned to assist evacuations from the San Michel area near Noordhoek on 17 January (an evacuation that later did not eventuate). **SAS Saldanha** assisted in the Langebaan fire, principally to protect the SAAF base at Langebaanweg, Hopefield but also the West Coast National Park, farmers, and District Council crews.

The **SA Army (4 Special Forces Regiment)** provided 120 members with fire tenders to assist in the fires at West Coast Road and Langebaan from 16 January onward. **Group 1** supplied about 340 members, mainly to assist with the evacuation of houses and the prevention of looting. They deployed from 16 January at the West Coast Road, Silvermine, Red Hill and Langebaan fires.

In their own assessment of events, the SANDF noted not only that there should have been much better arrangements for overall coordination and incident command in the fire fighting, but also that the SANDF itself should in retrospect have centralised operational command of resources during the fires.

4.2.7 National Parks Board

Staff of the Cape Peninsula National Park (CPNP) were involved in fighting the Ou Kaapse Weg and Red Hill fires, as well as three other small fires at the northern end of the Peninsula. Their efforts were focused on the Ou Kaapse Weg fire.

The CPNP was established in 1998. It has commissioned an integrated environmental management study of the Park, which will generate a fire management plan for the Park.

The CPNP outsources its fire-fighting services and, through this means, has about 40 trained fire fighters at its disposal. The Park has also engaged, equipped and trained about 30 volunteer fire fighters. It has substantial equipment at its disposal, including three four-wheel-drive fire tenders and four fully equipped water tankers. In addition, it has a contract with Heyns Helicopters which ensures that one helicopter with a water bucket is fully available on standby during the period from the beginning of December to the end of April every year. The CPNP has a close though informal collaboration with South Peninsula Municipality, which responds to fires inside as well as outside the Park.

Staff of the West Coast National Park (WCNP) responded to the Langebaan fire as reported below. They mobilised about 29 people, who were assisted by SANDF members.

The WCNP is new and still expanding by acquisition of neighbouring properties. The land area now amounts to about 30 000 hectares. Fire management is in its early stages, and the Park has limited fire-fighting equipment. Field staff skills in fire management are still limited.

4.2.8 SAFCOL

SAFCOL responded to seven fires during the period of review (Table 4.1). Their principal objectives were to protect their plantations, but they also assisted neighbours.

SAFCOL mobilised crews from their various stations in the Western Cape, as well as the Southern Cape (see below). They report that they had 50 to 100 people in the field at the Ou Kaapse Weg fire at any one time. They mobilised about 60 people in the Simonsberg fire. SAFCOL staff are well trained and well equipped for forest fires, each receiving formal training in a graded curriculum at the Concordia Training Centre, and experienced in fighting fires as well as in preparing firebreaks. They are supported with four-wheel-drive fire tenders and trooping vehicles.

SAFCOL has well-developed and implemented fire protection plans, including firebreaks. This assisted them in limiting damage to their assets. They have disciplined fire-fighting planning procedures (though evidently not written) and detailed incident logs and fire reports.

4.2.9 Working for Water Programme (Department of Water Affairs and Forestry)

The Working for Water Programme responded to one fire (Table 4.1). The Programme has large numbers of employees in the field, supervised by capable managers.

4.2.10 Farmers

Farmers assisted at most of the fires outside the Cape Peninsula (Table 4.1), providing their own crews and vehicles, and in the Sandhoek fire, two crop-spraying aircraft. Their efforts

were mostly focused on protecting their own property, and sometimes they were incorporated into joint fire-fighting forces.

4.2.11 Volunteers

Volunteers were most conspicuous in the Cape Peninsula fires, mostly in response to the broadcast call by South Peninsula Municipality. There they played a valuable role in support of fire fighters, less so in direct attack on fires although some were involved in that way. In fire fighting, however, most volunteers were ill-equipped and lacked fire-fighting skills, and evidently were exposed to unreasonable risk.

Organised and trained volunteers and reservists are available to and were deployed by the CPNP, the Breede River District Council (up to 100 volunteers), the West Coast District Council, and the Paarl Municipality.

4.2.12 Heyns Helicopters

Heyns Helicopters is retained by the CPNP during the fire season. Their helicopter was fully occupied in the Peninsula fires, flying water-bombing sorties (later jointly with SAAF).

4.3 Statistical summaries for the case studies

Table 4.2 includes statistical summaries for the cases evaluated on the Peninsula, Simonsberg, and at Langebaan.

Table 4.2: Statistical summary for detailed cases

Descriptors	Fire			
	Ou Kaapse Weg, Cape Peninsula	Red Hill, Cape Peninsula	Simonsberg	Langebaan
General area	From the verge of the M64 (Ou Kaapse Weg) just above the Silvermine Marine Base, to the M6 (Chapmans Peak Drive), the M63 (Hout Bay Main Rd) and Constantia Nek, including all the mountainous terrain between these routes; about 4 000 ha in all.	The area bounded by the roads between Simon's Town, Scarborough, Kommetjie and Glencairn; about 4 000 ha in all.	From the town of Pniel on the NE slopes of Simonsberg, SW up the slopes of the mountain, along the crest of the mountain and SE to the R44, across the R44 and NE to Klappmuts.	From near the intersection of the R307 and the R27 east of Yzerfontein, northward along the western side of the R27 to a point just north of the southernmost extremity of Langebaan lagoon, then NE across the R27 to the outskirts of the town of Hopefield.
Point of origin	From the road reserve on the M64 just above the Silvermine Marine Base near Gate 1 entrance to Silvermine Reserve.	Supposedly from an informal settlement on the slopes about 2 km above Simon's Town.	Empty plot on the outskirts of Pniel.	Lay-bye on the E side of the R27, adjacent farm Suurfontein.
Time and date of origin	Sunday 16 January 15:20	Sunday 16 January about 22:20	Saturday 15 January, about 15:00.	Tuesday 18 January reported 09:00 that day.
Suspected cause	Unknown	Escape from fire in settlement	Passers by	Escape from picnic fire

Descriptors	Fire			
	Ou Kaapse Weg, Cape Peninsula	Red Hill, Cape Peninsula	Simonsberg	Langebaan
Date and time contained	Friday 21 January	Friday 21 January	Friday 21 January	Saturday 22 January
State of vegetation	See Chapter 3	See Chapter 3	See Chapter 3	See Chapter 3
Fire weather	See Chapter 3	See Chapter 3	See Chapter 3	See Chapter 3
Forward rate of spread, km per hour	Maximums between 1,67 and 3,67 km per hour, the latter reflecting advance by spotting rather than actual front advance.	-	-	-
Approx. final extent, hectares	4 000	4 000	1 000	20 000?

4.4 The Ou Kaapse Weg fire, Cape Peninsula

4.4.1 Origin and cause

The Ou Kaapse Weg fire started a little before 15:20 on Sunday 16 January, from the picnic site near the junction of the access road to the Silvermine reserve and the M64 (Ou Kaapse Weg) just above the Silvermine Marine Base. The cause has not been established, although CPNP officials found a spent flare on site that they thought could have ignited the fire. One or more eye-witnesses also reported seeing a burning object thrown from a car in the vicinity.

4.4.2 Legal action

An official of the Cape Peninsula National Park reported the fire to the SAPS at Kirstenhof on 1 February 2000. The SAPS however did not open a docket for the case because of a lack of evidence. South Peninsula Municipality has also laid a charge against two landowners in the Noordhoek valley for starting unauthorised counterfires during the fire.

4.4.3 Fire spread and behaviour

This fire eventually spread northwest from its origin through the mountainous terrain between the M64 (Ou Kaapse Weg) just above the Silvermine Marine Base, to the M6 (Chapmans Peak Drive), the M63 (Hout Bay Main Rd) and Constantia Nek. Broadly, the sectors involved were Silvermine (i.e. along the M64 from the Marine Base to the road to Noordhoek), along the urban fringe at Noordhoek, Chapmans Peak Drive, the Pipe Track from Hout Bay to Constantia Nek, and Vlakkenberg (from Constantia Nek, along the ridge above Tokai, to the plateau above the Marine Base).

The spread and behaviour of the fire were strongly influenced by pronounced wind switches. On Sunday 16 January, the wind was still in the southeast, after blowing SE for about a week at about 25 to 50 km per hour average hourly speed (see Chapter 3). At 12:52 on Monday 17 January, the wind switched to the northwest, with average speed of 15 to 30 km per hour. On Thursday 20 January the wind switched to the southwest. Because of changes in temperature and humidity, estimated dry fine (1-hr response) fuel moisture content fell to 4,8% on 16 January, and 1,8% in the period 17-19 January, but increased to 5,0 to 8,5% in

the following period (see Chapter 3). These were the changes in wind predictable from synoptic weather forecasts (see Chapter 2).

Dense infestations of alien plants also influenced fire behaviour around the fringe of the burn. Under the conditions of extreme desiccation, crown fires were common in the dense aliens, which also contributed to spot fires and hence rapid advance of fire fronts. Stacks of cleared aliens also aggravated fire-control problems, according to several reports.

Within 15 minutes of the fire being sighted, spotting carried the front to the boundary of the SAFCOL plantation on Tokai State Forest. Already, fire fighters described it as being out of control.

Thus, the fire spread rapidly from its origin toward Noordhoek, Chapmans Peak Drive, and Hout Bay. By 17:14 the front was within about 400 m of Chapmans Peak Drive, having traversed about 3,5 km in two hours. It had reached the outskirts of Hout Bay (Skaife St) by (at latest) 01:20 on Monday 17 January, but was reported as threatening Hout Bay much earlier. The proprietor of the Hout Bay Hotel evacuated restaurant guests as early as the Sunday afternoon (*Cape Argus* report).

Reports are not clear about how the fire behaved from the early hours of Monday until the switch to a northwesterly wind that evening. The front appears to have continued northward and slowly veered to the northeast, proceeding toward and parallel with the Pipe Track sector on the SE boundary of Hout Bay. At the same time, the front advanced more or less westward on Noordhoek, over 6 km south of the Pipe Track. Throughout Tuesday 18 January the front continued to threaten the outskirts of Hout Bay but toward 08:00 on the Wednesday, had proceeded toward Constantia Nek and upslope toward Vlakkenberg. During this time the front at Noordhoek had advanced on the homes in that area.

By noon on Wednesday the front threatened homes in Constantia, crossing the fireline at Vlakkenberg at 12:52 p.m. Around this time it threatened to cross the road at Constantia Nek but fire fighters prevented this.

The front did not extend much beyond the perimeter that it had reached by Wednesday afternoon.

4.4.4 Response

A unit from South Peninsula Municipality was at the fire almost immediately, followed by a second unit about 5 minutes later, and a CPNP crew, delivered by helicopter from another fire on the Peninsula, at 16:05. Two other SPM units arrived at the fire in the following 20 minutes. By 17:00 the helicopter under contract to the CPNP was water bombing the front.

SAFCOL received a report from their lookout at about 16:00 on Sunday 16 January and deployed their standby team into the upper level of the Tokai plantation by 16:45. By 17:35 two SAFCOL crews had been diverted to Tokai from the fire on Simonsberg; these crews arrived at 19:33. They requested additional crews from SAFCOL in the Southern Cape, as well as additional foresters to manage the fire fighting; Southern Cape despatched three crews. Southern Cape crews arrived between 08:00 and 09:00 on Wednesday 19 January.

Once the Code Red classification applied, SPM invoked their mutual assistance agreement and called in resources from Cape Town and Tygerberg Municipalities, and at 18:45 they requested additional resources from Constantia Fire Station and the SA Navy. By 07:00 on Monday 17 January the SAAF had two Alouette reconnaissance helicopters and two Oryx water bombers in operation, and added two more Oryx on Wednesday 19 January.

4.4.5 Strategy and tactics

SPM adopted an initial strategy of combining direct attack with counterfires. This proved effective along the urban fringe, especially counterfiring from firebreaks on roads at Glencairn, Capri, Noordhoek and Chapmans Peak Drive.

SAFCOL initially adopted the strategy of direct attack once the fire entered the plantation and burnt as a ground fire beneath the trees, but combined this with preparation of firelines and counterfiring. However, spot fires overcame these efforts and the difficulty presented by the steep and unstable slopes. They therefore fell back to roads within the plantation and continued with the strategy of direct attack and counterfiring. SAFCOL finally contained the fire advancing from Vlakkenberg by counterfiring along a firebreak.

Tactically, fire fighters tackled this fire mainly by direct attack and by counterfiring. Direct attack was principally along access routes, with assistance of helicopter water bombing. Counterfires were conducted in many places, mainly along firebreaks and access tracks.

Helicopter bombing was also employed without ground support.

4.4.6 Incident command and fire-fighting coordination

SPM was the incident commanding organisation in this fire. They report that they maintained four Incident Command Posts, i.e. at Silvermine, Hout Bay, Fish Hoek and Simon's Town.

Roleplayers report that they followed incident command systems but it is evident from several sources, e.g. lack of ground-to-air coordination, that the systems were wanting in several respects. There appears to be no case in which fire-fighting strategies were formally documented, and in only a few reports, such as those from SAFCOL, were the strategies accompanied by formal joint advance planning by on-scene combined forces.

SPM set up a "mobile JOC" at 20:30 on Sunday 16 January. The earliest evacuations, by the manager of the hotel of guests in the restaurant at the Hout Bay Hotel, began on the afternoon of that day, indicating an early requirement for coordinated planning. Houses were evacuated in Hout Bay from about 20:00 on Sunday. SPM later set up two "sub-JOCs", one at Simon's Town Fire Station and the other at Hout Bay Forestry Station, at 16:30 on Wednesday 19 January.

SAFCOL experienced problems in attempting to communicate and coordinate with other organisations at times.

There are several reports indicating shortcomings in overall strategy and planning beyond the jurisdiction of SPM, communication and coordination of strategy, tactics and resources, and lack of common knowledge of veldfire contingency plans. Reports indicate that some if not all roleplayers suffered in their planning from the lack of overall current intelligence about the fires and the terrain. Once the CMC established a disaster management centre (JOC) coordination on the Peninsula improved, though reports indicate that the situation demanded this step earlier than it was executed.

4.4.7 Communications

Although radio and cellular phone communication obviously proved very useful during the fires, every report cites problems with radio communication as a limiting factor, e.g. because of the absence of common radio frequencies.

4.4.8 Resource management

SPM has a total staff complement of 420 for fire fighting, including six qualified foresters. It is not clear from the reports how these staff were deployed during the fire, except that they were fully deployed, and crews were relieved every 12 hours. Foresters, however, appear to have been on duty for longer periods. SPM employed their two senior foresters jointly in the role of Fire Manager while the other four foresters managed the incidents in different sectors.

SPM deployed six specialist four-wheel fire-fighting tenders, one two-wheel-drive tender, three water tenders, and a fleet including a front-end loader, tractors, tenders, light trucks, and motor cars.

SAFCOL reported that they had 50 to 100 people fighting the fire at Tokai at any one time, working in 24-hour shifts.

4.4.9 Aircraft

See Section 4.2.8.

4.4.10 Equipment performance

There are several reports of vehicle failure, and incompatible hose connections. Fire fighters could not gain access to much of the terrain in which the fire burnt, since the lack of access roads made it inaccessible to their vehicles.

4.4.11 Public response

See Section 4.2.11.

4.5 The Red Hill fire, Cape Peninsula

4.5.1 Origin and cause

SPM received a report of the fire in the Red Hill area at approximately 22:30 on Sunday 16 January. It arose near an informal settlement on the outskirts of Simon's Town, but the cause is unknown.

4.5.2 Legal action

No legal action has been taken.

4.5.3 Fire spread and behaviour

The prevailing gale force southeasterly wind drove the fire rapidly towards Scarborough, Misty Cliffs, Soetwater and Kommetjie. It reached Scarborough by 02:00 on 16 January. Large areas were covered in piles of slashed alien vegetation, providing further fuel for the rapidly spreading fire. Control was virtually impossible once these piles ignited.

The fire spread rapidly through the fire-prone, mature stands of fynbos. It was reported that a two-year-old firebreak saved the villages of Scarborough and Misty Cliffs.

On Monday 17 January fire fighters struggled to contain the fires on the fringe of Scarborough and Misty Cliffs. Three helicopters, 40 fire fighters and volunteers battled to prevent the fire from spreading to the houses. The fires were contained and the fire spread to the east towards Cape Point Nature Reserve and to the west, towards Kommetjie and

Capri Village. Roads leading from Kommetjie were blocked and Soetwater was badly affected, with the flames spreading towards Crayfish Factory.

On Tuesday 18 January fires continue to flare up in the Cape Point Nature Reserve, and at Kommetjie and Scarborough.

On Wednesday 19 January a midday change of wind from SE to NW resulted in a number of flare-ups in the Red Hill area, and the fire spread to Glencairn, Da Gama Park and Simon's Town.

By 12:00 the fires was threatening houses within Simon's Town. Twenty houses were either severely damaged or destroyed. Three naval houses and a hostel were damaged or destroyed. Furthermore, Navy Logistics lost two prefabricated buildings, while the Navy Publications Unit lost one building. A combination of back burning and a change in wind direction saved Glencairn. By nightfall reports indicated that the fire was contained. Reported injuries were slight: smoke inhalation, blistered feet and asthma.

The fire spread to the naval base atop Red Hill. At about 15:00 the fire surrounded the base and naval personnel were evacuated. A building in the base was destroyed.

A number of private properties and industrial complexes were damaged in the residential areas of Da Gama Park and Glencairn. Excessive fuel loads resulting from years of unmanaged growth and accumulation of alien vegetation, particularly in the close vicinity of Glen Cairn and Da Gama Park, made control of the fire particularly difficult. The Fish Oil Refinery was damaged in the fire. Helicopters were called in and within an hour the fire had been contained. Homeowners, along with fire-fighting personnel, SANDF personnel and volunteers, fought to save their houses.

By the afternoon, the fire had also spread to the southeast into Cape Point Nature Reserve and further west and northwest into the Capri Village area.

By the following morning, Thursday 20 January, fire-fighting efforts, supported by water bombing, were concentrated in the greater Simon's Town area and Capri Village. By the afternoon the fires had settled down substantially and fire crews were primarily dealing with flare-ups in Red Hill and Capri Village areas.

Friday and Saturday were spent monitoring and attending to flare-ups throughout the regions. At 14:30 on Friday afternoon, the status of the fire area was declared "Green" and the Mutual Aid Agreement was dissolved.

4.5.4 Response

Naval fire-fighting crews responded to the incident, since SPM had no or few resources to spare. Additional support in the form of further helicopters from SAAF and additional personnel from affiliated organisations and volunteers were called upon to assist with the fire fighting. Volunteer homeowners fought the fire from at least 02:00 on Monday 17 January.

Residents in Red Hill, Scarborough and Kommetjie were on standby to evacuate their homes. During the night, the local fire department started to evacuate residents.

4.5.5 Incident command and resource coordination

It appears that the SA Navy was the effective incident command structure in this fire. No further information is available.

4.5.6 Communications

No information is available.

4.5.7 Aircraft

See above.

4.5.8 Equipment performance

Problems reported included non-standard couplings on fire hydrants and loss of water pressure in hydrants.

4.5.9 Public response

There appears to have been no concerted or organised public response in this fire, but there are many newspaper reports of members of the public assisting in fire fighting and evacuation.

4.6 The Simonsberg fire, Winelands District

4.6.1 Origin and cause

This fire started near the verge of the main road on the outskirts of Johannesdal, near Pniel, on Saturday 15 January at about 15:00. A Stellenbosch Municipal Fire Brigade unit inspected the site and reported the fire at 17:26. A SAFCOL forester noticed the fire from a distance at about 16:30, while fighting another fire in the vicinity.

Fire services officials suspect that passers-by ignited it.

4.6.2 Legal action

A SAFCOL forester reported the fire to the SAPS at Drakenstein on 20 January 2000 but no further action was taken.

4.6.3 Fire spread and behaviour

By about 17:30 on Saturday 15 January the fire was still small and confined to an area near the road. Conditions were relatively calm. A weather record for 17:30 indicated air temperature of 31°C, relative humidity of 34%, and SE wind of 5 km per hour. However, windspeeds increased in the following 30 minutes to about 50 km per hour, so that the rate of spread uphill accelerated rapidly, and by 21:07 the fire had progressed to the crest of Simonsberg, having crossed an eight-metre-wide dirt road.

By 12:00 on Sunday 16 January the fire had reached the farm Wiesenhof on the northwest slopes of the mountain. By 12:39 that day it crossed the R44 and burnt towards Klapmuts near Paarl.

Although reports are not clear, there are records that indicate that occupants evacuated various homesteads and the holiday resort at Wiesenhof during the course of Sunday.

The fire began to die down from the early hours of Monday 17 January, but continued toward the SAFCOL plantations on the northern slopes of the mountain at Wolwekloof.

4.6.4 Response

The Stellenbosch Municipality unit left the site of the fire at 17:29 to continue to a fire at Simondium, their original assignment. A second Stellenbosch unit arrived at 17:33, called for additional help, and began to attack the fire. Three additional Stellenbosch vehicles arrived by 18:01. SAFCOL and Western Cape Nature Conservation Board reconnaissance teams were on site by 17:40.

The Western Cape Nature Conservation Board reported the fire to the Winelands Fire Service at about 18:40, who despatched all available staff and vehicles to the site. Their first vehicle arrived at about 18:51. By 19:21 the fire was out of reach of the fire services units, i.e. had advanced beyond vehicular access, and the service decided to warn landowners of the danger after about 21:00.

Winelands called on Tygerberg at about 00:56 on Sunday 16 January, and later called on Paarl and Oostenberg, all of whom despatched units to the site.

It seems that some homesteads were evacuated from about midnight onwards.

A SAFCOL reconnaissance team was on site near the Wolwekloof plantation at 02:00 on Sunday. Their first crew arrived at this site at about 05:30 the same morning. Additional crews were called during the morning but by later that day some had to be diverted to Tokai. SAFCOL crews waited for the fire to descend from the steep mountain crest and approach a line along which it could be fought. They began counterfiring along a hand-made fireline from about 02:00 on Monday 17 January. By 16:00 the fire was judged under control. SAFCOL continued to patrol until 23 January.

The SAAF was called in at 11:08 on Sunday initially for reconnaissance, and later for water bombing. The SAAF assigned one Alouette and two Oryx craft, which arrived at 13:10 and 13:50 respectively. SAAF withdrew at about 20:00 that evening, when Winelands judged the fire to be stable.

A Western Cape Nature Conservation Board crew was fighting the fire at Wiesenhof by 12:00 on Sunday.

4.6.5 Strategy and tactics

The overall strategy of the fire services was direct attack, organised mainly to protect farmsteads as and when they were threatened. It appears that difficulties in obtaining intelligence about the fire prevented effective prioritisation.

SAFCOL protected its plantation at Wolwekloof by counterfiring from a common boundary with assistance from neighbouring farms.

4.6.6 Incident command and coordination of fire fighting resources

Little information is available on incident command. SAFCOL commanded its operations at the Wolwekloof plantation, which they executed jointly with neighbouring farmers according to a formal counterfiring plan.

The Winelands Fire Chief coordinated operations. Decisions by landowners to evacuate farms and resorts appear to have been taken individually.

4.6.7 Communications

Operators reported difficulty in coordinating aerial attack with ground operations because of failure in radio communications.

4.6.8 Aircraft

The SAAF assigned one Alouette for command-and-control and two Oryx to the fire. A Winelands fire officer accompanied the Alouette but experienced continuous difficulty in communicating with ground crews. Priorities for aerial attack were often decided in the air.

4.6.9 Equipment performance

Reports contain nothing on equipment performance. The principal difficulty was that the fire burnt through a large area of steep and inaccessible terrain.

4.6.10 Public response

Farmers responded to protect their properties. Farmers and SAFCOL joined forces to fight the front at Wolwekloof.

4.7 The Langebaan fire, West Coast District

4.7.1 Origin and cause

The Langebaan fire was reported to the West Coast District Council at 09:00 on Tuesday 18 January, having apparently started some short time before this. It originated in or near the road reserve on the R27 near its intersection with the R307, east of Yzerfontein. An eyewitness ascribed the fire to picnickers at a lay-bye, but although the SAPS were informed at the time, no definite evidence of the cause has emerged.

4.7.2 Fire spread and behaviour

The Langebaan fire spread northwards on either side of the R27 to the southern boundary of the West Coast National Park (WCNP), which it reached at about 02:00 on Wednesday 19 January. It spread at a rate of about 0,5 km per hour at this stage, driven by SW-SE winds.

Rate of advance and behaviour of the fire was strongly influenced by variable winds, which the WCNP reported to range from light north-easterly at night, through westerly and then strong southerly or south-westerly during the day. The terrain is relatively flat, and fuel sparse. Thus there were times when the front was almost stationary, and had almost died down, only to flare up again and advance rapidly during the day.

Fire fighters lit counterfires on or near the WCNP boundary to prevent the fire from entering the Park. However, the advancing front outflanked these lines and the fire crossed the R27, proceeding northeast toward Hopefield across private farms. The fire continued until Saturday 22 January, and was regarded as extinguished on Sunday 23 January.

4.7.3 Response

The West Coast District Council despatched a unit to the fire immediately on receiving the report. The unit arrived in about an hour, and began direct attack by pumping water onto the front, about 30 minutes later.

The Naval Fire Department at SAS Saldanha received news that the fire was advancing toward the SANDF installation at Langefontein at about 15:45 the same day. Their officer in charge made reconnaissance immediately, and despatched a SAMAG 4x4 fire tender from the base simultaneously. One or more units responded at more or less the same time from

the SAAF base near Hopefield, and the two parties met and joined forces. Soon after this livestock from a farm needed evacuation.

WCNP personnel waited for the fire front on the boundary of the Park. SAS Saldanha Fire Service, SAAF fire service, SANPS and Divisional Council personnel met and coordinated their plans that afternoon, and distributed resources west and east of the R27, near the entrance to the Park. Counterfires were unsuccessful due to changes in wind direction, which caused the fire to spot ahead or to outflank the counterfires.

WCNP personnel decided that night to evacuate their facilities at Geelbek and Duinefontein. They evidently advised Churchhaven residents to do the same, but the residents chose not to. Evacuations began at about 01:00 on Tuesday 19 January. Soon after, the wind died and the fire front slowed to a halt.

The 4 Special Forces Unit of the SANDF established an incident command post at Geelbek at first light on 19 January and took command of the fire, with WCNP, WCNCB and other Defence services participating. A formal strategy and plans were developed and implemented. A new counterfire within the Park succeeded in preventing the front from advancing further into the Park, but the front crossed the R27 and proceeded toward Hopefield. The incident command post was stood down at 19:00 that day.

Farmers acted on their own, in collaboration among themselves, and in collaboration with the other roleplayers, from the afternoon of Tuesday 19 January.

By 13:30 on Wednesday 19 January the fire was threatening the SANDF installation at Langfontein. Counterfiring failed again and the fire fighters resorted to direct attack, and mechanical cutting of fire breaks around the arials. The fire also threatened one or more farm homesteads in the vicinity.

A further 120 fire fighters from Gauteng arrived in the afternoon of Wednesday 19 January. They were assigned to various sectors of the fire, but evidently because they were not well fitted with safety clothing and equipment, could play only a limited role.

The fire continued on a course toward Hopefield. By 15:00 on Friday 21 January the SAS Saldanha FS received a report that the fire threatened the town. SANDF and Divisional Council units deployed to protect the town, and three SAAF helicopters assisted. The fire was stopped on the boundary of the town.

The fire was evidently finally contained on Sunday 23 January, when the Navy Fire Service returned at about 19:30 after putting out final hot spots at the aerial station on Langfontein.

4.7.4 Strategy and tactics

The overall strategy on Wednesday 19 January within the Park was to prepare firebreaks and firelines along roads in advance of the front, and counterfire from there (see below).

Thereafter, it seems that fire fighters employed direct attack as the front advanced into accessible areas, while counterfiring was used around buildings and installations.

4.7.5 Incident command and coordination

Roleplayers differ in regard to the perceived success in establishing incident command structures. The SAS Saldanha officer in charge convened a coordinating group on the afternoon of Tuesday 18 January, which jointly planned fire fighting in the vicinity of the entrance to the Park. The West Coast District Council established a coordinating structure around the same time, which met an unspecified number of times during the fire. However,

the records indicate that effective coordination could not be achieved even in the final stages of fire fighting.

Clearly, the 4 Special Forces Regiment maintained an effective incident command on Wednesday 19 January. However, it seems that this did not encompass all roleplayers that day. Thereafter, incident command was apparently unclear. Several observers complained of the lack of coordination and strategy.

4.7.6 Communications

Different roleplayers communicated within their organisations by radio, but radio communication between organisations was not possible. Cell phones or Telkom lines were used instead.

4.7.7 Aircraft

Reports on the use of aircraft are cryptic. SAS Saldanha reports that three helicopters were used in protecting Hopefield, but did not state how they were used.

4.7.8 Equipment performance

Much of the area burnt is on coastal sands, with few hardened roads available. Mops fire units could not traverse these sands, and many got stuck. Evidently, assigning other units to extract the units stuck in sand must have diverted substantial resources.

4.7.9 Public response

Farmers responded with vehicles and workers, apparently mainly to protect their own property, but also to contribute to the joint effort. Members of the public volunteered their services to the WCNP, but the Park managers judged that they would be unable to manage volunteers as well as their own operations and declined the offers.

CHAPTER 5

IMPACTS OF THE FIRES

5.1 Introduction

This assessment is confined to the four cases analysed in detail, i.e. the two fires on the Peninsula and the fires at Simonsberg and Langebaan, although costs elsewhere were significant, e.g. Tygerberg Municipality estimates total fire-fighting costs in the West Coast Road fire and smaller incidents at about R640 000. There is no complete inventory in the cases analysed and the information here is no more than indicative of impacts. They are clearly underestimated.

Table 5.1 summarises the available information.

Damage was significant, especially on the Cape Peninsula. Nevertheless, given the severe conditions and the way fire-fighting roleplayers were overstretched, the fires caused remarkably little damage. However the degree of threat was very high, causing evacuation of people and animals in every case. Press reports at the time overstated the damage.

5.2 Property

Ottery Fire Service has reported that eight structures were destroyed, and 51 damaged. Total costs are estimated at R10,4 million. The insurance industry reports claims to the value of R40 million for insured property losses. This in turn is much less than the R3 billion mentioned in press reports. Four buildings were destroyed at Langebaan, and none at Simonsberg.

5.3 Forest plantations

Forest plantations were destroyed on the Peninsula and the Simonsberg. South Peninsula Municipality places the monetary value lost at about R1 million. On the Delheim farm on the Simonsberg, the fire burnt about 120 hectares of *Pinus radiata* plantation. These plantations would have a standing value of about R7 000 per hectare, hence the total value affected would have been about R840 000, but since much timber was salvaged the losses would not have been great. SAFCOL and SPM have not yet estimated timber losses in their plantations.

5.4 Vineyards

Vineyards were scorched on the Simonsberg, and possibly also on the Peninsula. It appears that all or most scorched vines have recovered. One estate lost eight hectares of one to three-year-old vineyard, which will need to be replanted at a cost of about R10 000 per hectare. Another lost about 12 hectares, of which about half the vines have already died, while the state of the rest is uncertain. A third lost about three to four hectares, but estimated that about 12 000 litres of the annual wine production has been spoilt through the scorching of grapes on the vine, and the effects of smoke on the grapes. Windbreaks were lost.

No overall estimates of monetary damage are available, but the Stellenbosch Farmers' Association suggests a loss of about R1 million. The press reported substantial long-term losses to South Africa's red wine production as a result of the Simonsberg fire, but this seems to have been an exaggeration.

5.5 Pastures, livestock and other assets

Large areas of pasture were lost in the Langebaan fire, and smaller areas on the Peninsula and the Simonsberg. There were apparently no losses of livestock, although many animals needed evacuation during the Langebaan fire. Farmers lost long lengths of fences in the Langebaan fire.

Reporters claim an impact on tourist use of the Peninsula, especially because of the closure of Chapmans Peak Drive. SA National Parks does not expect impacts on tourism at Langebaan, principally because most visitors there visit the coast.

5.6 Environmental

The fires burnt many thousands of hectares of fynbos and strandveld. However, these vegetation types are fire-driven and the fires as such would not have caused lasting environmental damage. Even the loss of tortoises and other wildlife at Langebaan will not be permanent, and recovery is already underway.

The principal hazard is from the regeneration and multiplication of alien invasive plants, which will occur at varying densities in almost all habitats burnt. On the Peninsula, areas burnt with dense invasive plants suffered severe soil damage (CSIR, 2000). Costs of rehabilitation have already exceeded R2,5 million, but the rehabilitation, combined with the fact that winter rains were late and slight, has prevented damaging erosion.

5.7 Costs of control

South Peninsula Municipality estimates its costs of fire fighting at R1,9 million. They also lost one fire tender and one front-end loader in the fire. SAFCOL estimated its cost of fire fighting at Tokai in the Ou Kaapse Weg fire at R347 270. For Simonsberg their estimate was R54 354. The Western Cape Nature Conservation Board estimates its cost for fighting the Simonsberg fire at R257 588. No other accurate costs of control are available. SPM estimated the cost of the Heyns and SAAF helicopters at about R300 000 for the whole period.

Table 5.1. Summary of reported impacts of fires in the cases studied in detail

Case	Damage to buildings	Other assets damaged					Environmental damage
		Forest plantations	Vineyards	Pastures	Livestock	Other	
Red Hill and Ou Kaapse Weg	8 structures destroyed, 51 damaged, estimated cost R10,4 million	About R1 million losses in SAFCOL Tokai plantation and in Municipal plantations, some salvaged.	Some, unspecified	Some, unspecified	?	Tourist facilities, e.g. access to Chapmans Peak Drive	Most natural veld and habitat will recover (some under-aged veld will probably suffer species loss), but where the fire was untimely alien plants will proliferate. Areas with dense aliens have suffered intense soil damage.
Simonsberg	None	120 ha or more of pine plantation burnt, and liquidated or salvaged subsequently. loss of value unknown.	Several hectares, crop lost, but vines have recovered in some cases. Loss of value unknown.	Some, unspecified	?	?	Where the fire was untimely alien plants will proliferate, but most natural veld and habitat will recover. Young veld (less than 8 years) that burnt before able to produce seeds will not be able to regenerate. Areas with dense aliens have suffered intense soil damage.
Langebaan	1 shed, 3 houses in Hopefield	None	None	Possibly 1 000 ha or more.	Evacuations	Fencing	Where the fire was untimely alien plants will proliferate, but most natural veld and habitat will recover.

CHAPTER 6

ASSESSMENT AND RECOMMENDATIONS

6.1 General

The veldfires in the Western Cape from 15 to 25 January 2000 occurred in extreme weather conditions and tested the community to the limit. Professional fire fighters in the fire services, the SANDF, landowners such as the National Parks Service, Cape Nature Conservation Board, SAFCOL and farmers responded with great courage and succeeded in limiting the damage greatly. However, the veldfires stretched resources to the limit and eventually exceeded the capacity of fire-fighting roleplayers in the Peninsula at least. Shortcomings in the state of veld management, including poor maintenance of firebreaks and the incidence of invasive plants, and weaknesses in the control and coordination of fire-fighting efforts contributed substantially to the magnitude of the disasters.

Fire conditions were severe but not unprecedented. The weather conditions immediately preceding this period were even more severe, and large veldfires burnt then in areas along the West Coast Road. Such conditions have also occurred before in the Western Cape.

If we apply the definition of a disaster as provided in the Disaster Management Bill, then six fires would qualify as local disasters, since they threatened life, property and the environment. Those were the West Coast Road, Simonsberg, Ou Kaapse Weg, Red Hill, De Heuwel and Langebaan fires. A provincial disaster situation prevailed in effect from 14 January to 28 January 2000.

The natural environmental conditions that prevail in the Western Cape make such veldfires virtually inevitable at intervals. All aspects of veldfire management must take this into account. However, many large veldfires in the Western Cape at this time, such as the Liepzig fire in the district of Worcester, do not really count as disasters, since they burn in relatively remote mountain veld, and constitute relatively little threat to life, property and the environment. But the steady encroachment of urban areas, rural homesteads (including expensive country homes) and new vineyards and orchards into the natural landscape, together with informal settlements in many places, all increase the potential that veldfires that previously could be taken as a part of the natural ecosystem process now more and more constitute a threat of disaster.

This threat is aggravated in most Cape environments by the progressive transformation of the landscape by invasive alien plants, which add to the problems of veldfire control, and result in major impacts on soil and biological diversity when they do burn. Added to this are the possible effects of global climate change, which include higher temperatures that increase fire hazard, and general disturbance of the weather, effects that are becoming more apparent everywhere though difficult to discern in the Cape.

Programmes to manage veld fires in the Cape have had a long history (Chapter 2). However, the institutions responsible for managing veldfires of this kind have been in flux for the past decade. Institutional arrangements have changed substantially, beginning with the devolution of national government functions, such as the management of catchment areas and certain State forests, to provincial government in 1986, and continuing with the constitutional changes following 1994. Public land management agencies such as the Western Cape Nature Conservation Board have been deeply affected. Local authorities obviously have also been affected through constitutional change, but also through the establishment of the Cape Peninsula National Park with its accompanying changes in roles

and responsibilities. This ongoing process of change has caused many weaknesses in the capacity to manage veldfires. Ongoing change management is needed to rebuild and extend necessary capacity.

However, the public institutions will probably never have the capacity alone to handle disastrous veld fires when they occur; the role of private landowners and the public at large is therefore of increasing importance in preventing disastrous veldfires and controlling them when they do. The contents of new National Disaster Management Policy and the provisions of the National Veld and Forest Fire Act are especially important since they provide a secure enabling framework to mobilise all stakeholders in veldfire management. But increasing urbanisation and migration, and relatively weak dissemination of educational information, are resulting in a public that knows less and less of the fire-prone environment in which they live. On the other hand, the public shares a growing concern about the incidence of veldfires.

All major veldfires require action by several roleplayers, from both the public and the private sectors. Currently, a lack of uniform command systems, standard terminology and common minimum standards of training hamper coordination between these roleplayers.

6.2 The need for improvement

The veldfires on the Peninsula, at Langebaan and on the Simonsberg all caused substantial damage and threatened life and property beyond this. People rather than nature ignited the veldfires, and therefore each could have been prevented. In most cases, earlier and/or more effective response could have limited the spread of the fire, and better fire prevention strategies and operations, especially from the point of view of incident command resource allocation and coordination, could have reduced the ultimate extent of and consequences of the fires.

Fire fighters did well under very difficult circumstances, but better prevention planning, incident command and coordination would have increased their efficacy and reduced costs and risks. Organisations can make better use of modern technology to predict fire behaviour and develop fire-fighting strategies. This report contains recommendations for improvements to address shortcomings identified. However, because the improvements needed are fundamental, the recommendations address systemic problems, such as skills and command systems, rather than operational needs.

6.3 The new approach to disaster management

All of the circumstances associated with the fires in the Cape support the thrust of the new national policy on disaster management, with its emphasis on the community and on foresight, prevention, mitigation and rehabilitation.

Nevertheless deployment of this policy presents its own challenges, as indicated later in this chapter. It requires:

- an unprecedented degree of co-operation between all parties, public and private, and strong integration of their planning and preparedness
- that the disaster managers command all the tools of old and modern technology to predict impending disasters, and
- that they identify and respond to events that threaten to become disastrous and mobilise the system before the disaster occurs.

Implementing this approach cannot be achieved simply by the normal routine process of planning, but requires deep changes in the attitudes and behaviour of everyone.

6.4 Statutory framework and the need to promote compliance

Many parties are uncertain about the status and implications of current and new legislation. They need the clarity that will come from the finalisation of current legislation and proper communication around that.

The report of the Western Cape Premier's Task Team (the F.I.T.T. report) and all parties consulted strongly supported the rapid passage of the Disaster Management Bill, in order to achieve clarity on the new system for coordination, to consolidate planning processes for disaster management, and to remove current uncertainties at all levels about legal roles and responsibilities. This includes removing legal uncertainties around the declaration of disasters.

The F.I.T.T., as well as a few of the parties interviewed, stated that the Bill is unconstitutional. These opinions appear to relate largely to the fact that the Bill identifies District Municipalities and Metropoles, as well as provincial and national government, as having a statutory role in Disaster Management, whereas the Constitution determines disaster management to be provincial.

Parties were concerned that the Bill would place an unfunded mandate on local government. However, all parties interviewed agreed that local government is key in effective disaster management. Furthermore the Parliamentary process will treat the Bill according to the rules for concurrent legislation and these procedures will resolve any concerns about the contents of the Bill. The constitutional requirements to be met in resolving the local government mandate are set out in Section 5(5) of the Disaster Management White Paper.

For these reasons the Task Team does not regard the concerns about constitutionality to be material.

RECOMMENDATIONS:

- 1. The Minister of Provincial and Local Government should ensure that Parliament passes the Disaster Management Bill as soon as possible, and the Department of Provincial and Local Government should draft supporting regulations to be gazetted at the same time.**
- 2. With regard to funding the mandate of District Municipalities and Metropoles, these bodies should follow the budgeting requirement in the White Paper for Disaster Management. National government must allocate the required funding by means of a conditional grant to provincial government so that the funding requirements for the District or Metropole governments are met with regard to Disaster Management.**

There was unanimous support among the interviewees for the provisions of the National Veld and Forest Fire Act. The current blanket prohibition on open-air fires under the Forest Act constrains the owners of land, such as the Cape Peninsula National Park (CPNP), from doing necessary control burning, and creates other uncertainties. The provisions of the National Veld and Forest Fire Act need to be fully implemented to resolve these constraints and uncertainties.

RECOMMENDATION:

- 3. The Department of Water Affairs and Forestry must ensure that the National Veld and Forest Fire Act is promulgated in full as soon as possible, together with supporting regulations, as a matter of urgency.**

Several parties are concerned that the Act makes the Chief Fire Officer the automatic Fire Protection Officer of any Fire Protection Association that includes a municipality as a member. This is because managers of protected natural areas are concerned that the Fire Protection Officer must be competent in veldfire management as part of sustainable veld management. In this respect, the amendments to the Act now provide for suitable alternative arrangements. Nevertheless, the general concern that fire-fighting authorities should share common competencies in veldfires remains valid.

The Fire Brigade Services Act (Section 6) provides for appointment of any person as a member of service, and subsequent assignment by the Chief Fire Officer of functions to that person. Such a person, as well as the Chief Fire Officer, must meet certain prescribed minimum standards of qualifications and experience.

The National Veld and Forest Fire Act (Section 6(6)) requires that the Director-General will register a Fire Protection Officer if satisfied that the person is able, on the basis of a prescribed application. The Amendment Bill published recently would allow for some discretion in appointing a Fire Protection Officer.

The Fire Brigade Services Board has in principle adopted the US National Fire Protection Association (NFPA) standards for adaptation and implementation in South Africa. These standards include a standard for wildland fire fighting.

The Task Team concludes that the best solution to this issue in the short term is to require minimum standards of competence in veldfire management among candidates for Fire Protection Officer.

RECOMMENDATIONS:

- 4. The Department of Water Affairs and Forestry (DWAF) should convene a meeting of experts to establish the standards of competence required for the role of Fire Protection Officer, for approval by the Fire Brigade Services Board and the Director-General of DWAF.**
- 5. These requirements should be prescribed in terms of both Section 6 of the Fire Brigade Services Act and Section 6(6) of the National Veld and Forest Fire Act, and should be included in the NFPA (South African) standard.**
- 6. Any person appointed as Fire Protection Officer in terms of the National Veld and Forest Fire Act, whether he or she is the Chief Fire Officer in terms of the Fire Brigade Services Act or not, should meet these prescribed requirements by 1 January 2002, on the basis of existing expertise and experience, or competency-based, accredited training.**

Some landowners are concerned about the provisions for firebreaks in the National Veld and Forest Fire Act, which they have interpreted to mean that firebreaks should follow cadastral

boundaries within their properties. However, this concern is not material, because Section 12(1) of the National Veld and Forest Fire Act makes it plain that firebreaks are required on the common boundary between the owner's and his or her neighbour's land, or aligned by agreement.

Many parties have difficulty in interpreting the provisions of the Act. There is considerable debate about the extent of any single Fire Protection Association, for example whether or not the Cape Peninsula should have one or more Associations. There is also uncertainty about the content of veldfire management strategies. However, there is substantial expertise available in the country for developing these strategies. For example, the Forest Fires Association and the KwaZulu-Natal Fire Protection Association have made substantial progress in developing the principal elements of veldfire management strategies. The same applies to the Cape Peninsula National Park.

RECOMMENDATIONS:

- 7. The Inter-Governmental Committee on Disaster Management should adopt the veldfire management strategies required by the National Veld and Forest Fire Act as the appropriate components of the veldfire plans required for Disaster Management Plans to be compiled by municipal disaster management centres. Where Fire Protection Associations do not exist, these strategies should be compiled by the relevant Chief Fire Officer.**
- 8. The Department of Water Affairs and Forestry must develop and prescribe minimum standards for the contents of veldfire management strategies and advise widely on Fire Protection Associations, veldfire management strategies, and rules of Associations, for example by arranging expert workshops throughout the country. The Department should engage available experts to support this process.**
- 9. Veldfire management strategies for Fire Protection Associations should serve as the veldfire elements of Disaster Management Plans for municipalities, as provided for in the Disaster Management Bill (Section 44(1)). They should furthermore take account of any fire protection plans existing in terms of the Mountain Catchment Areas Act.**
- 10. The prescribed training for Chief Fire Officers and members of the service, as well as the curricula for conservation managers and disaster managers, must include a common minimum standard for veldfire management strategies.**

Some parties argued that the current Fire Brigade Services Act and National Veld and Forest Fire Act should be repealed and replaced by a single "omnibus" Fire Services statute. They felt that this would clarify the role of the Fire Services. Furthermore, these parties argued that this would promote the necessary integration between urban fire services and veldfire management.

However, the Task Team is satisfied that the National Veld and Forest Fire Act provides well for the development of integrated veldfire management strategies. There is no conflict between the National Veld and Forest Fire Act and the Fire Brigade Services Act. The coordinating framework for the different fire management plans will be realised through the National Disaster Management Policy. The delays in implementing effective veldfire management that would come from drafting "omnibus" legislation would conflict with the need expressed by parties interviewed for a speedy resolution of the legal uncertainties.

RECOMMENDATIONS:

- 11. The National Veld and Forest Fire Act should be retained, with its amendments.**
- 12. The Fire Protection Association's (FPA) rules and local government by-laws should be harmonised in order to give effect to the rules of the FPA. In this regard DWAF should draft model FPA rules as regulations under the National Veld and Forest Fire Act.**

Effective fire fighting requires effective incident command as well as effective, higher-level coordination – the DISPLAN element (see Chapter 2). Regulation is needed to establish standards for DISPLAN and incident command. Deployment of these systems will need training, regular on-the-job practice, and monitoring and evaluation of their adoption by fire-fighting roleplayers.

RECOMMENDATIONS:

- 13. The Department of Provincial and Local Government should publish regulations under the Disaster Management Bill to establish a standard for DISPLAN and Incident Command, and the standard should be based upon the USA Federal Emergency Management Agency (FEMA) standards.**
- 14. The same standard/s should be incorporated in the National Qualifications Framework.**

Some major landowners are apparently prevented from implementing best practice in prescribed burning because of air quality regulations. Also, some roleplayers noted that the Chief Fire Officer is empowered in terms of the Fire Brigade Services Act to override a burning permit issued in terms of the Conservation of Agricultural Resources Act, thus creating the potential for conflict about management objectives.

RECOMMENDATIONS:

- 15. The Department of Water Affairs and Forestry should initiate collaboration between fire and atmospheric scientists to determine prescriptions for veld burning that will avoid conditions when pollution is problematic.**
- 16. Furthermore, DWAF should consult with the Department of Environmental Affairs and Tourism (DEAT) on new air quality legislation, so that DEAT makes provision for these prescriptions, and DWAF should develop, through the steps outlined in Recommendations 8-9, the basis for managing conflict between statutory requirements for veldfire management.**

The Steering Committee requested a review of penalties provided for each of the relevant statutes. The Task Team focused on those in the National Veld and Forest Fire Act and the Fire Brigade Services Act.

RECOMMENDATION:

- 17. The Task Team finds the provisions for penalties in the National Veld and Forest Fire Act to be reasonable. The provisions for penalties in Section 21 of the Fire Brigade Services Act are similarly reasonable. The Task Team therefore recommends no change to these penalties.**

6.5 Mutual Assistance Agreements

Parties frequently cited the need for Mutual Assistance Agreements, and claimed that their absence contributed to problems with managing veldfires of this nature and extent. The standard operating procedures contained in these agreements are an important part of establishing effective coordination. In at least one case, agreed assistance was not delivered, nor was the required operating procedure followed, despite the existence of such an agreement between the authorities involved.

In the case of the veldfires in the Western Cape, the extent of implementation or use of the Mutual Assistance Agreements varied. Certain leading agencies, such as the Cape Town Fire and Emergency Services, SAFCOL, the South African Air Force (SAAF) and Blaauwberg Fire and Rescue and Disaster Management Services reported the existence of several agreements. On the other hand, some of these agencies delivered assistance in that period to others with which they had no such agreements. Furthermore, there are evidently many draft agreements that have not yet been concluded.

The SAAF, at least, has problems recovering costs after an incident, because those who have received assistance dispute the invoices.

The Task Team has, however, not been able to analyse this issue in detail. The Team senses that the question of the existence or not of these agreements contains other issues, such as, perhaps, the question of cost sharing and other details of stipulations in agreements that may be contributing to the perceived problems.

RECOMMENDATIONS:

- 18. The Department of Provincial and Local Government should investigate the underlying problems in current Mutual Assistance Agreements and develop guidelines to overcome any fundamental problems that may exist.**
- 19. In future, all Mutual Assistance Agreements should be formulated according to the approved Disaster Management Plan for a municipal area, specifically regarding its contingency plans and emergency procedures, and which, in complying with the requirements of the Bill, provide for contingencies that arise when the veldfire spreads beyond the municipal area.**
- 20. Mutual Assistance Agreements should, in every case, conform to the requirements of the municipal Disaster Management Plan.**

6.6 Veldfire prevention planning: managing veldfire risk and vulnerability

6.6.1 Management of veld

It is true in South Africa that veld, in regions where fires occur, tends to be adapted to fire. For this reason, sustainable veld management for biodiversity protection usually involves the application of prescribed burning. The integrated control of alien invasive plants often requires the use of fire. Furthermore, prescribed burning is used to mitigate the risk of very large and intense veldfires. Prescribed burning is thus an integral part of environmental management and managing fire risk.

In the Western Cape, landowners vary in their ability to maintain adequate programmes of prescribed burning. The Western Cape Nature Conservation Board has management plans, including fire action plans, for all its areas, but is severely constrained by a limited budget. SAFCOL maintains detailed fire protection plans. The Cape Peninsula National Park is currently developing an integrated veldfire management plan.

The Western Cape Nature Conservation Board recognises that its capacity for managing veldfires has weakened considerably, and that it is a priority for the Board to rebuild this capacity, to ensure adequate control of the veldfire regime with respect to biodiversity conservation objectives.

The ability of landowners to practise prescribed burning is constrained by several factors:

- the cost in relation to budget
- the risk of a prescribed burn spreading onto neighbouring land
- public resistance to prescribed burning, especially in the Cape Peninsula
- the impacts of prescribed burning on air quality in urban and peri-urban areas
- narrow prescriptions to meet the requirements for biodiversity management
- a decline in the competence and capacity of the landowners to do this work.

RECOMMENDATIONS:

- 21. The veldfire management elements of Disaster Management Plans should provide adequately for prescribed burning, as is required in the veldfire management strategies in Section 5 of the National Veld and Forest Fire Act.**
- 22. The Department of Water Affairs and Forestry should design and implement, in consultation with provincial authorities, a public awareness programme that enables the average member of the public to understand sustainable veldfire management. Close links should also be made with public emergency warnings, such as Fire Danger Rating warnings.**
- 23. The Minister should establish National Fire Ecology Day to educate the public about firebreaks and fire management – on public and private land – as part of the public awareness campaign.**
- 24. Because of the risks associated with prescribed burning, all operations of that kind should be managed by appropriately certified people; veldfire management strategies and rules in FPAs or by-laws outside FPAs would determine what permission is needed.**

6.6.2 Firebreaks

It is common knowledge that firebreaks do not always provide effective barriers to veldfires under extreme conditions. Their principal purpose is to prevent an average veldfire from spreading across the common boundary between neighbours, as well as providing a ready-made line from which to start counterfires. Firebreaks frequently proved useful in this way during the veldfires on the Peninsula and prevented fires from advancing to buildings and plantations in many places.

Section 12 of the National Veld and Forest Fire Act, which places a statutory obligation on landowners to develop firebreaks, must be read together with Sections 17 and 18, which place an onus on landowners to be ready for fire fighting and to take all reasonable steps to stop the spread of fire. In other words, firebreaks do not replace the obligation to fight fires.

Some landowners are concerned that the law does not specify the required width of firebreaks, while others are concerned because they interpret the law to mean that very wide firebreaks are needed. The law leaves these issues open because local experience and precedent must determine these standards. Several parties expressed concern that various organs of State are failing to comply with these requirements of the Act, e.g. the SANDF and national and provincial road agencies, as well as local authorities and conservation agencies. This includes the managers of public roads, where fire control is needed in road reserves.

The National Veld and Forest Fire Act provides for flexibility in using firebreaks, (a) by leaving standards to local decision (b) by allowing give-and-take on boundaries (Section 12(7)) (c) by allowing the Minister to make exemptions (Section 15(1)) - and the Minister may delegate this - (d) by allowing the Fire Protection Associations to make their own strategies and rules, which would include fire prevention planning through measures such as firebreaks, and (e) by requiring firebreaks only where there is a risk of fire spreading from a property.

RECOMMENDATION:

- 25. The Minister of Water Affairs and Forestry should not grant exemptions from firebreak requirements, except according to agreed, prescribed considerations that reflect the rules of FPAs.**

6.6.3 The Fire Danger Rating System

The F.I.T.T. and several respondents emphasised the importance of fire danger index predictions, proper communication of these, and appropriate response among fire-fighting roleplayers and the public.

The National Veld and Forest Fire Act provides for the development of the National Fire Danger Rating System. This will be an early warning tool for preventing and mitigating veldfires. Currently in the Cape, some authorities use a Fire Danger Index similar to the Forest Fires Association Index, which in turn is based on the MacArthur System used in Australia. The Task Team understands that the MacArthur System is being considered as the basis for the National Fire Danger Rating System.

Predictions of fire danger rating are important for managing landowners' and other agencies' readiness to prevent and combat wildfires. These predictions are also essential for preparing the public and creating the necessary state of alertness.

RECOMMENDATIONS:

- 26. The Department of Water Affairs and Forestry must conclude its investigations and implement the National Fire Danger Rating System as soon as possible.**
- 27. The Department of Water Affairs and Forestry should proceed with its intention to engage experts and consult with the relevant parties on a way of communicating fire danger rating so that the public is properly informed and able to adjust their behaviour according to anticipated conditions of fire danger.**

6.6.4 Alien invasive plants

The veldfires in the Cape were not caused by the presence of alien invasive plants. Furthermore, infestations in large areas were too low for the veldfires to be affected by the presence or absence of alien invasive plants.

Rather, alien plants exacerbated the problem of fire control and fire impact where they occurred in dense infestations. In the Cape Peninsula, dense infestations of alien invasive plants occurred on the fringes between the urban areas and the natural veld. Under the severe weather conditions that prevailed at the time, these dense infestations had two important effects:

fire intensities were much higher and fire behaviour more extreme than would have been the case if the infestations had been absent: this aggravated the problem of controlling the veldfires and contributed to property damage

the high intensity of fires in the densely invaded places, together with the fact that the density of the invasions suppressed the fire-adapted fynbos, caused intense soil damage, which is likely to result in erosion and involves costly rehabilitation measures.

For sound environmental reasons, alien invasives must in any event be controlled, irrespective of their effects on fire. We commend the Working for Water programme in this regard. However, it is not yet clear that the necessary follow-up clearing has been properly incorporated into landowners' programmes and budgets, despite government's commitment to follow up at the cost of the landowner by default. It is a matter of concern that the control programmes should be integrated into public and private land management to ensure control in the long run.

The National Department of Agriculture is now drafting regulations for the control of alien invasive plants. The Task Team understands that these will confer adequate powers of enforcement on government.

RECOMMENDATION:

- 28. The Department of Water Affairs and Forestry should convene a workshop of roleplayers to establish guidelines for landowners to implement affordable and sustainable alien invasive programmes in future.**

Operations to clear invasive plants have sometimes aggravated the veldfire management problem. This is because currently the clearing operations involve stacking the killed plants and this provides fuels for intense and destructive veldfires.

RECOMMENDATION:

- 29. The Working for Water Programme and the landowners must adopt methods of clearing to avoid the accumulation of fuel on the ground, for example by burning the stacks under mild conditions.**

6.6.5 Preventing veldfires

In general, preventing unwanted veldfires requires that landowners should implement appropriate veld management plans, which in turn should be part of the veldfire management strategies of Fire Protection Associations (see Recommendation No. 8 above).

Effective veldfire prevention is impossible without knowledge of the causes of fire. Information on the causes of fire is essential for proper enforcement of veldfire prevention regulations, planning of prevention measures and creating public awareness.

There is no case in which respondents identified the causes of the veldfires in the period under review with certainty. Parties inferred that members of the public had lit many of these veldfires, some deliberately. Of these inferred causes, several, if not the majority, were ascribed to children from disadvantaged communities and to vagrants. If that is so, it highlights the importance of public awareness and education programmes around veldfires taking account of the need to reach all members of society.

Very few people have been prosecuted for causing veldfires in the Cape in the past several years, and even less convicted.

There are sound procedures for investigating the causes of structural fires in urban areas in South Africa, and these are routinely implemented. However, judging from the information for the fires under review, there are no similar effective procedures for veldfires. Examples of policies, protocols and procedures for the investigation of the origins and causes of such veldfires are available, such as those for the State of Victoria in Australia.

RECOMMENDATION:

- 30. The Department of Provincial and Local Government must convene an expert group to develop a standard protocol for the investigation of the causes of veldfires, which should then be enforceable by prescription through the appropriate statute. Fire Protection Officers (or Chief Fire Officers where appropriate) should support the SAPS and State Prosecutors through evidence gathered according to these protocols.**

6.6.6 Rapid response

Although the Ou Kaapse Weg fire developed rapidly despite the fact that fire fighters were on the scene almost immediately, most large fires could probably have been extinguished when they were still small, if initial responses had been rapid and adequate. An obvious example is the Simonsberg fire.

In the case of fires in remote mountains, where there is little risk of disaster, rapid initial response may not be needed (e.g. The Leipzig fire), and a different strategy would be appropriate, e.g. containment by counterfires. However, all responses should be planned in advance, according to need.

RECOMMENDATIONS:

- 31. In developing guidelines for veldfire management strategies (Recommendation 8), the Department of Water Affairs and Forestry should ensure that the need for rapid response is adequately addressed.**
- 32. Where aerial attack is the most appropriate rapid response, the Department should promote a mechanism that enables Fire Protection Associations each to maintain a fund that allows immediate engagement of aircraft and avoids hesitancy among veldfire incident managers to incur the cost of aircraft.**

6.6.7 Preventing fires at the interface between urban areas and the open veld

Both in the Peninsula and in rural areas such as the fringes of Simonsberg, the expansion of development is progressively increasing the vulnerability of lives and properties to veldfires, as well as increasing the potential for veldfires to start. As a result, the threat of disaster grows continuously. Preventing fires at the interface between the veld and urban zone tended to dominate fire-fighting activities during the period under review.

Many property owners are not sensitive to these risks because they are insured and able to take proper precautions to protect life and property. On the other hand, especially (but not only) in the Cape Peninsula, more and more communities who are highly vulnerable to these veldfires are exposed to this risk.

In the first case, the major onus for risk reduction must rest with the property owner. Having chosen to live on the fringe of these natural areas, these property owners have also accepted the risk of exposure to veldfires. These property owners, however, are often the most influential and articulate, and tend to draw disproportionately on the services of fire fighting organisations, one consequence of which is to divert these resources from the principal tasks of fighting the fires. In the poorer communities, there is nevertheless substantial capacity that can be mobilised which will enable the communities to manage their risks better.

Authorities in the USA, Australia and elsewhere have developed guidelines for improving the fire safety of homes in the urban-veld interface, which are useful sources of information for similar guidelines in South Africa. An example is the Australian Standard AS 3959-1999, Construction of buildings in bushfire-prone areas (see <http://www.standards.com.au>).

RECOMMENDATIONS:

- 33. The Department of Provincial and Local Government should initiate a process to set building standards that take account of the special requirements applicable to the structures at the interface with the open veld, and ensure that SABS 0400 is amended accordingly. The standards should provide for such aspects as the sealing of eaves, the restrictions on the utilisation of combustible material and other measures necessary to protect buildings against fire.**
- 34. The Department of Provincial and Local Government should ensure that the Integrated development Plans and land-use planning by-laws of both local and district municipalities are designed to promote densification instead of urban sprawl, and to identify this urban-veld interface and place prohibitions on growing within properties those plants that lend themselves to rapid combustion.**
- 35. Provincial environment and planning authorities must ensure that the regulations requiring EIAs for land-use change are strictly enforced where land is to be rezoned for urban development, and no exemptions should be granted in cases where the development is in a fire-prone area. Alternatively, they should advise their MECs to make appropriate new regulations in terms of Section 24 of the National Environmental Management Act.**

In the Cape, Ukuvuka has a business plan that provides among other things for the development of competent teams of fire fighters within informal settlements. Ukuvuka intends to also employ its available funding to equip these teams. Elsewhere in the country, the Children of Fire Project in Gauteng and the Disaster Management teams in communities at risk in the Eastern Cape have made substantial progress in capacitating these communities to manage fire better.

RECOMMENDATIONS:

- 36. The Department of Provincial and Local Government, in collaboration with all sectors of the disaster management system, should draw upon the NFPA standard to establish common minimum standards of training for community volunteers, reservists and any other voluntary or semi-voluntary groups, including Fire Protection Associations.**
- 37. Ukuvuka and any other agencies involved in community initiatives for fire-fighting in informal settlements should establish a network with other organisations involved in fire issues, such as the local Disaster Management Centre, Children of Fire Project and others.**

As noted earlier, firebreaks serve a particular though limited purpose and have proved effective at both protecting property in this urban-veld interface, as well as preventing the spread of fires from the built-up area. In the Cape Peninsula, some important firebreaks along this interface have been neglected.

RECOMMENDATIONS:

- 38. The Fire Protection Officer, in the case of Fire Protection Associations, or where there is no FPA, the Chief Fire Officer, should ensure that veldfire management strategies require that firebreaks be routinely employed along urban property boundaries.**
- 39. Municipalities should work actively with community leaders in informal settlements to optimise the design and maintenance of firebreaks around and within the settlements.**

6.7 Veldfires and disaster management

In the case of the veldfires in the Cape there was a consistent failure to escalate their management in an effective way and to achieve effective coordination of strategies and resource allocation. Effective escalation of command and control in fire fighting requires that incident management and the coordination of resources should progress rapidly and smoothly to the most appropriate level.

6.7.1 Veldfire incident management

The first element of effective and emergency disaster management is an appropriate Incident Command System. Proper disaster management provides further for coordination of support to the incident managers from the required resources.

Within the Cape Metropole, all municipalities subscribe to the standard CMC procedures ("Standard Procedures for Command and Control Incidents"). However, this is not necessarily so outside the metropole. During the January veldfires, many roleplayers found the command, control and coordination to be inadequate. As a result (for example), resources were not deployed optimally, and confusion and miscommunication occurred.

Parties reported many shortcomings in incident command. Those interviewed expressed strong support for rigorous implementation of a uniform, consistent and appropriate Incident Command System. The F.I.T.T. report found the same, and recommended adoption of the CMC standard. However, the Task Team recommends a generic standard instead.

RECOMMENDATIONS:

- 40. See Recommendations 13 and 14.**
- 41. Fire Protection Officers in FPAs and authorised Fire Brigade Services personnel (Category of Authorised Persons - CAPS) must evaluate the implementation of these command and coordination systems and include their assessments in their reports, as required by Section 6 of the National Veld and Forest Fire Act and the regulations under the Fire Brigade Services Act. The Inter-Governmental Committee on Disaster Management should regularly assess the implementation.**

Important requirements in incident command are that:

- there are clear rules by which the commander is identified
- the rules for escalation of management of the incident are clear
- there is effective transfer of command as the incident escalates.

In respect of veldfires, the general rule is that the initial incident commander will be the owner of the property or his/her agent, because the National Veld and Forest Fire Act (Sections 17 and 18) places the primary responsibility for fire fighting on the owner. However, the owner is obliged to alert the Fire Protection Association in the event of a fire occurring (Section 17(1)(b)(ii)) and to report to the Fire Protection Officer if the fire may endanger life, property or the environment (Section 18(1)(a)(i)).

The Fire Protection Officer must take control of fire fighting if the veldfire is a threat to life and property (Section 6(1)(c)). In Fire Protection Areas, therefore, the escalation or transfer of command will be directly from landowner to the Fire Protection Officer (who might be the Chief Fire Officer), if the latter regards it to be necessary. Rules and standard operating procedures must be developed to allow sound judgement when identifying threatening conditions. This approach should be followed in other cases, through the statutory role of the Chief Fire Officer.

In addition, it is essential that the Incident Command System should be common for any kind of emergency or disaster, so that all involved know what to do in each case and roles, responsibilities and terms are consistently known.

Although the Task Team did not get enough information on how Incident Command Systems are operating, there was enough information to indicate that these are not efficient. The F.I.T.T. report confirms this. Clear rules for escalation and transfer of command will make it easier for any incident commander to make the right decision about relinquishing command in the first place.

RECOMMENDATION:

- 42. Rules for escalation of veldfire incidents should be resolved in the process set out in Recommendation 8.**

Veldfires require special expertise and knowledge of wildland conditions. In the Cape fires, several incident commanders indicated that their planning was limited by lack of knowledge of the terrain and of veldfire behaviour. Similarly at the coordination level, co-ordinated planning was hampered by lack of adequate expertise in this regard. In addition, available experts in the Cape Peninsula were overstretched because they were involved in the veldfires for too long.

In the Cape, as elsewhere in the country, there are several individuals with substantial expertise in veldfire fighting. In the Simonsberg area one such individual was called in by local farmers to assist with fire fighting.

In the State of Victoria, Australia, the Country Fires Authority, i.e. the rural fire fighting institution, has employed an expert team of fire assessors profitably to improve incident command and coordination. This team is drawn from a variety of agencies on the basis of the members' expertise. One or more of the members is employed in threatening veldfire

situations to support the incident commanders and agency coordinators by guiding them in their planning and decisions.

The Department of Water Affairs and Forestry presented a draft proposal to the Team that incorporates the concept of a fire assessment team, i.e. the "National Fire Reaction System".

RECOMMENDATION:

- 43. The Department of Water Affairs and Forestry, through its role on the Inter-Governmental Committee on Disaster Management, should develop the proposal for veldfire assessment teams, i.e. to use teams of experts in veldfires (including bush, plantations and forest fires). However, similar initiatives are required at provincial level and a similar approach is needed for other types of disasters.**

Experts of this kind should be identified and assigned to specialist assessment teams. The terms of reference for such assessors should be developed through consultation, with reference to the analogous teams in Australia, and in congruence with the fire Incident Command System and DISPLAN. The costs of their time in this role should be borne by their employers as a contribution to overall mitigation of the economic cost of disasters. In some cases these experts are self-employed and appropriate arrangements for remuneration will be necessary.

6.7.2 Coordination of the fighting of veldfires

The current mechanism for achieving coordination in the fighting of fires is through a so-called Joint Operations Centre (JOC). The JOC is a facility at which the representatives of different municipal services and other roleplayers, including landowners (perhaps mainly major landowners or their representatives) convene to consider the overall strategy for fire fighting and the coordination of resources for fire fighting.

The outcome of the work of the JOC will often be to provide guidance for the incident commander. However, the way JOCs are set up and conduct their business appears to vary markedly from case to case. In addition, the effectiveness of the JOCs in the Cape was highly variable and in some cases parties considered them to be ineffective. Lack of coordination and inadequate information flow were identified as serious concerns in the Cape fires by every interviewee, and in the F.I.T.T. report.

The Task Team is clear that, if the event reaches the proportions of a disaster or threatens to do so, the appropriate institution for the coordination of veldfire management and veldfire fighting is, in the first instance, the District Disaster Management Centre or Metropolitan Disaster Management Centre. Effective coordination will depend on the quality of the Disaster Management Plans for a given district or metropole, including the veldfire management plan.

In the interim, until Disaster Management Centres are established, Fire Protection Associations will obviously fulfil this coordinating role. The FPAs will also fulfil this coordinating role if the veldfires have not yet reached the proportions of a disaster. Coordination must follow the DISPLAN standards established for each metropole, district or province.

RECOMMENDATIONS:

- 44. In order for the local Disaster Management Centres to implement the measures envisaged in the Bill, such as emergency procedures and contingency plans, the Fire Protection Officer or Chief Fire Officer must report on the veldfire situation once conditions are reached where disaster threatens. These conditions should be set in the rules and procedures of the veldfire management strategy that applies to the district or metropole, so that it provides for proactive risk assessment and is based on objective measures such as the Fire Danger Rating System. (Refer also to Recommendations 7 to 10).**
- 45. The coordination role should be assumed by the provincial Disaster Management Centre in cases where fires qualify as a provincial disaster.**
- 46. For the Disaster Management Centre to be alert to impending veldfire management disasters, it should use the National Fire Danger Rating System as an early warning system.**
- 47. The current term “Joint Operating Centre (JOC)” should be replaced with the terms “Incident Command Post (ICP)” for incidents and “Disaster Management Centre (DMC)” in the case of disasters. Coordination must be according to DISPLAN.**

Since disaster management policy is to focus on reducing risk, it follows that the Disaster Management Centre cannot be reactive in its coordinating role. The Centre must operate according to the Disaster Management Plan and the concept and principles of disaster management, as well as anticipate the disasters, while facilitating maximum emergency preparedness. In the case of the veldfires in the Cape, the provincial authorities did not convene a process for the coordination of fire-fighting actions.

RECOMMENDATION:

- 48. The provincial Disaster Management Centres should take urgent measures to:**
 - a) ensure that they exploit modern technology for information gathering, including low-cost satellite remote sensing, GIS and other forms of information technology for early warnings**
 - b) ensure efficient communication networks that provide adequately for mobilising roleplayers relevant to an emerging provincial disaster**
 - c) obtain prescribed commitments from municipal Disaster Management Offices to communicate promptly and adequately on what is happening in their jurisdictions**
 - d) proactively alert and communicate with District Centres on the basis of early warnings obtained through systems such as the National Fire Danger Rating System.**

6.7.3 Pre-disaster contingency planning for veldfires

The models in the integrated veldfire management strategies will need to be refined and enhanced so as to satisfy the requirements for Disaster Management Planning.

RECOMMENDATION:

- 49. The Department of Water Affairs and Forestry should convene a workshop to evaluate current integrated fire management plans, as mentioned earlier, and to develop standards that will ensure conformance to veldfire management strategies as required by the National Veld and Forest Fire Act, and to the requirements for Disaster Management Plans. These standards should be prescribed through the provisions of the National Veld and Forest Fire Act within Fire Protection Areas, and through the Fire Brigade Services Act where Fire Protection Associations do not exist.**
- 50. Provincial Disaster Management Centres should develop equivalent veldfire management strategies for areas outside Fire Protection Areas through their working groups.**

6.7.4 Human resources for veldfire fighting and control

In general all agencies involved in veldfires report a decline in the number of employees available to them for this purpose, e.g. the West Coast National Park has about 29 people available for the approximately 30 000 ha that they manage. The Winelands Fire and Rescue Service has about 20 people for this purpose across the area of its jurisdiction. SAFCOL had to call upon its teams as far away as Riversdale and Knysna within hours of the veldfires having started at Silvermine.

The level of fire-fighting skills among these employees is highly variable, although there is a substantial body of experience in organisations such as SAFCOL and the Cape Nature Conservation Board.

The first important requirement is to retain the current competent employees and to transfer the competence to new employees. SAFCOL, at its Platorand and Concordia centres, has a detailed curriculum for the training of workers in fire fighting. They intend further to develop three levels of curricula for fire boss training. All SAFCOL workers are ultimately trained in this fashion.

On the other hand, for example, rangers in the SA National Parks Service who would be involved with veldfire control and management, although they receive sound ranger training, receive little if any training in fire fighting and veldfire management. The transfer of skills in fire fighting appears to be most effective in the case of the SAFCOL training.

RECOMMENDATION:

- 51. DWAF should convene a workshop to assess and agree upon competence standards for crews that fight veldfires, using the SAFCOL curriculum as a base, for adoption by the relevant SETA (Sector Education and Training Authority) in the National Qualifications Framework and prescribe these as provided for in Section 17(1)(a) of the National Veld and Forest Fire Act.**
- 52. Current and new employees in all land-owning organisations should then receive training to this or similar standards.**

There were several cases in which employees were sent ill-equipped to fight veldfires, without proper safety equipment and clothing, and were therefore vulnerable. It is clearly illegal to deploy employees in fire fighting when they are not properly equipped with safety clothing and other necessary equipment, or without training. This is not only a requirement of labour legislation but also of the National Veld and Forest Fire Act.

RECOMMENDATION:

- 53. The Department of Water Affairs and Forestry should consult with employers and organised labour to establish agreed minimum standards for safety and prescribe these as provided for in Sections 6(1)(f) and 17(1)(a) of the National Veld and Forest Fire Act.**

The Task Team does not believe that the number of employees among major land-owning agencies can be increased in future, nor would this be the case among fire services. Therefore the solution to manpower shortages for fire fighting must include the rationalisation, improved coordination and mobilisation of trained volunteers.

6.7.5 Fire-fighting equipment

Major equipment is of less importance in veldfire control than in the control of major structural fires. Appropriate four-wheel-drive vehicles do allow fire fighters better access to fires than otherwise. However, in the Western Cape and elsewhere some areas are inaccessible even to vehicles such as these. Water tanks of an appropriate size with the appropriate pressure pumps are clearly useful within the operating range of the four-wheel-drive vehicles. Generally speaking, every major landowner and rural fire emergency service should have several such vehicles with water tanks and pumps available to them. However, the effectiveness of fire-fighting teams depends to a large degree on their being equipped with the appropriate tools that they can carry to the fire. These include beaters, rakes, hoses, backpack sprayers and drip torches.

RECOMMENDATION:

- 54. The Departments of Water Affairs and Forestry should establish guidelines for minimum equipment and skills that landowners should maintain, in line with the requirements of the National Veld and Forest Fire Act, and appropriate to his or her size of land and level of fire hazard, and promote a situation where every land-owning employer ensures that his or her crews are adequately equipped in that respect.**

The South African Insurance Association report on the "State of the Fire Function of the Emergency Services in South Africa" (1999) concluded that a major contributory factor in the significant increases in value losses owing to fires in South Africa generally is the "...decline in the ability of the fire services to fight fires and contain losses". Further: "none of the services audited were able to meet the appliance, manning or response times of the model [standard] against which the services were measured." Fire services interviewed in the

Cape complained about outdated, unreliable and otherwise inadequate fire-fighting appliances.

In response to the general deficiencies in the capacities of fire services the Department of Provincial and Local Government is currently conducting a risk-based needs analysis with respect to vehicles, equipment and training in all municipalities, in which the expert work is being done by the CAPS (Category of Authorised Persons).

RECOMMENDATION:

55. The Department of Provincial and Local Government should prescribe in the Fire Brigade Services Act, appliance standards for fire services involved with major veldfires, and the CAPS should monitor progress toward achievement of standards by means of the data that come from the annual Fire Brigade Services survey of the rendering of fire services.

Innovations in fire hoses and intermediate pumps which can be deployed by helicopter over several kilometres of hills and mountains are proving effective in some countries, for example in the south of France.

RECOMMENDATION:

56. The Department of Water Affairs and Forestry, in consultation with other agencies, should investigate the value of such innovations and where appropriate find ways of diffusing these.

Cost-savings opportunities and improved utilisation of assets can be achieved by rationalising the current structures. For this reason the shift towards consolidating fire emergency services at the district, municipality or metropole level is a measure that could effectively contribute to alleviating problems with equipment. This would simultaneously reduce the problems arising from the implementation of Mutual Aid Agreements. Consolidation of these services on the Cape Peninsula is already underway and has been supported by the Premier's Fire Task Team. This trend will also be favoured by the establishment of the newly demarcated local governments.

RECOMMENDATION:

57. The National Disaster Management Centre and the Provincial Disaster Management Centres should continue to promote the ongoing rationalisation of resources within districts and metropolises.

Maximum utilisation of pooled equipment is also currently constrained by the fact that there is often no common standard for such equipment. For example, hose fittings are not always interchangeable between the equipment of different fire-fighting agencies. In one case the fire log indicates that a fire boss had to leave the scene to return to base to collect coupling

adapters. Insurance losses have also been incurred due to a lack of compatibility between fittings.

RECOMMENDATION:

- 58. The proposed standards should be extended to include such organisations as SAFCOL and the Western Cape Nature Conservation Board.**

The Extra-Metropolitan Fires Working Group suggested that their vehicle problems (shortage of vehicles suited to rough terrain) could be alleviated if surplus four-wheel drive vehicles from the SANDF, e.g. "Samils", could be made available to them on favourable terms. Provincial government in Gauteng has succeeded in acquiring and refurbishing Samils for the local services.

RECOMMENDATION:

- 59. The National Disaster Management Centre should investigate ways and means by which such surplus could be acquired and advise Provincial Centres accordingly.**
- 60. The Department of Provincial and Local Government, through its Needs Analysis, should monitor progress in the rationalisation and improvement of fire service resources.**

6.7.6 Communications

An important first line of communication in incident control is the initial reporting of the incident. Members of the public are often the first to detect a veldfire, but mostly do not know where or how to report such incidents. In some districts, such as the Cape Metropole and Western Gauteng Services Council (in Krugersdorp), emergency centres have established facilities to respond to emergency calls on the Telkom number 107. These "107 Reporting Centres" are able to forward incoming calls from the public or others to deal with various situations, including emergencies.

The Department of Communications has commissioned a report on a National Emergency Telephone Number as a basis for amendment of the 107 Act, also called the Emergency Telephone Number Act. The report is currently with the Minister of Communications.

RECOMMENDATIONS:

- 61. The Minister of Communication should amend the Emergency Telephone Number Act as soon as possible to facilitate the speedy establishment of a national emergency telephone number.**
- 62. These National Emergency Telephone Number Centres should advertise and promote this telephone number among the general public by way of signage and other appropriate methods.**

Radio communications are essential for coordinating and directing veldfire operations and safety in the field. Without effective communication in the field no Incident Command System can work. Every report received by the Task Team emphasised failure of radio communications. This was usually because parties involved in fighting a given veldfire could not communicate with each other because of differing radio frequencies.

This problem has proved difficult to solve despite efforts over the last several decades. Parties involved in veldfire fighting will find it difficult to replace their current radio systems with a single uniform system.

The option exists to establish a trunked radio communication system nationwide and have all emergency services convert or replace their radio systems to operate within the trunked system. The South African Telecommunications Regulatory Authority (SATRA) has recently released a report on a feasibility study into this trunked system. However, a major barrier to introducing a trunked radio system is the cost of establishing the backbone throughout the country. The Cape Metropolitan Council already plans to invest R15 million in such a system.

A second alternative is to employ the National Emergency Alarm Radio Network (NEARNET). The backbone for this system already exists. Although the NEARNET radio systems to date have been mainly fixed base stations, some emergency services have converted the base sets to portable sets and employed them on the scene of emergencies. Some emergency services have radio systems that can be programmed to the frequency of NEARNET, or already operate within its range. It is also possible for emergency services to issue NEARNET radio kits to incident commanders whenever necessary.

Large numbers of base sets have become available as surplus, having been used in the 1994 elections. Once converted these can be and have been issued as part of the standard kit for emergency scene commanders, for example in the Eastern Cape.

RECOMMENDATION:

63. The Department of Provincial and Local Government, working through the Interdepartmental Disaster Management Committee, should establish a task team to evaluate the feasibility of these two alternatives and the implementation of either one or both of them to overcome the problem of radio communications during veldfires, as well as other emergencies.

6.7.7 Aerial support

Aerial support in veldfire fighting can often make the difference between success and failure in the control of a fire. Helicopters or fixed-wing aircraft can save millions of Rands in fire-fighting costs and damage avoided by supporting very rapid initial response. Aerial support plays its role in command and control, reconnaissance, transporting fire fighters and resources, and water bombing.

In the Cape Fires substantial aerial support was available from the service contractor to SA National Parks, and the SANDF. Helicopters from SA National Parks and the SANDF were deployed in the Peninsula. However, their deployment would have been more effective if a number of problems had not arisen.

These problems arose from:

- lack of adequate incident command-and-control systems and coordination of fire fighting resources, and
- lack of support from ground teams when helicopters dropped water on the fire front.

In addition, the number of aircraft available was small, and local aircrews became overstretched. Another constraint arose from the fact that the SANDF cannot be mobilised for fire fighting or other emergency purposes until the Defence Force authorities are satisfied that there is a real danger to life.

Furthermore, the current Defence budgets provide for very limited flying hours. Fees paid to the SANDF for the use of the aircraft pass to the fiscus and are not used to increase the available flying hours. This means that the opportunity of using SAAF helicopters in controlling a veldfire before it has grown to costly proportions will always be lost.

A company in the Cape, Floats Aviation, has developed a proposal to acquire three seaplanes equipped for water bombing at a very low price. This company is currently seeking financial and other guarantees that would allow them to conduct the transaction that would enable them to set up an airborne fire-fighting service in the Cape that would also be available for other emergencies.

The government of Canada has also proposed a scheme through which modern water bomber aircraft would be stationed in the Cape for periods of the year when they are not needed in Canada. Other countries have studied the optimum combination of aerial support and ground fire forces, and developed standards for these (e.g. Loane and Gould, 1986. *Aerial suppression of bushfires – cost-benefit study for Victoria*, CSIRO, Australia).

The limited human resources available for fire fighting, together with other resource constraints, dictate the need for an optimum use of aerial support in veldfire fighting. Because of the high cost of standby, aerial support requires a combination of civil and SAAF resources. Ideally the SAAF should be available for every impending disastrous veldfire. Cost considerations dictate a balance between fixed-wing aircraft and helicopters.

The Cape Metropole Disaster Management Centre is currently developing a plan for aerial support to fire fighting, but needs support from the national level.

RECOMMENDATIONS:

- 64. The Department of Provincial and Local Government should ensure that the Department of Finance creates a fund in which the revenues received by the SAAF for services during veldfires can be accumulated and utilised further for those services.**
- 65. DWAF, through its role on the Inter-Governmental Committee on Disaster Management, should initiate the development of a national framework for aerial support to veldfire fighting as a matter of urgency. This should address a needs analysis in different regions, most cost-effective configuration of aerial support, the roles of the private sector and the SAAF, and the financing of the service.**
- 66. DWAF should ensure that the guidelines for veldfire management strategies (see Recommendation 8) provide for the standard operating procedures that will determine how aerial support is to be provided within the jurisdiction of any Fire Protection Association.**

6.7.8 Controlling fires at the interface between the urban areas and the open veld

See Section 6.6.7.

6.8 Providing for the effects of global climate change

The Task Team notes that there is a real probability that fire behaviour will be progressively influenced by global change, but that this influence is difficult to predict. The Task Team regards the institutionalisation of veldfire management, as outlined elsewhere in these recommendations, to be the most important road to follow at this stage. The progressive adaptation of veldfire management strategies will be the best approach to dealing with global change.

6.9 Institutional capacity and organising arrangements

6.9.1 Veldfires and disaster management organisations

In the Cape and elsewhere veldfires must be managed by a variety of fire-fighting agencies, including landowners. The local fire services play one role among several. Coordination functions must be organised so that they span the entire range of fire-fighting agencies.

Shortcomings encountered in the coordination of efforts during the veldfires in the Western Cape are symptomatic of a deeper problem, in that disaster management capacity has been slow to develop in many places, or is absent. The scope of work of Disaster Management Centres will therefore be comprehensive and includes the coordination of the planning by a wide variety of agencies involved in fire fighting and management. Some persons charged with Disaster Management indicated they were unable to make the necessary progress because of wide and conflicting responsibilities.

The policy and Bill for Disaster Management require local disaster management to be managed at the district or metropolitan level, in consultation with local municipalities. Similarly the Municipal Structures Act (117 of 1998) requires fire services to be organised at the district level.

RECOMMENDATION:

- 67. The Department of Provincial and Local Government should ensure that in future Disaster Management Centres are staffed by one or more dedicated members competent to deal with the requirements of the Bill, e.g. in terms of the standards currently being generated through the relevant Standards Generating Body (SGB), the Institute of Public Management and others, and for which courses are delivered through the Technikon SA.**

6.10 Change management

This review has shown that many individuals and organisations are unable to respond sufficiently quickly to the comprehensive changes demanded by new policies. Institutions need to reorganise, refocus and replan, and individuals need to reorientate their competencies and performance to the new requirements.

Organisational and institutional change needs to be facilitated by clear directional leadership. Parties in this review indicated that improvement is needed in the leadership and guidance given by national government. For example, parties complained of recent interactions with national government in which they received vacillatory or no guidance regarding the implementation of the National Veld and Forest Fire Act.

RECOMMENDATION:

- 68. The Department of Water Affairs and Forestry, as well as the Department of Provincial and Local Government, should ensure that all officials assigned to liaison with the province and district agencies, as well as the private sector in districts, should be sufficiently knowledgeable of new policies and their implementation, and have sufficient communication skills, to interact effectively with people who are seeking their guidance. Provincial authorities need to assure that their officials are similarly empowered.**
- 69. These Departments should develop and disseminate effective written briefing materials to implementing agencies and the contents of these materials should be consistent with the contents of training curricula employed in tertiary and other institutions, or *vice versa*.**

The Disaster Management Bill is widely accepted among all the parties who will implement it. Nonetheless a level of organisational planning and skills will be needed to implement it. It is not clear that current mechanisms such as sectoral working groups are proving effective in facilitating the necessary change.

The Task Team is aware that DWAF has employed specially developed training materials and workshops to mobilise its employees to implement its new Forest Policy. In addition, the Task Team is aware of the work that is underway in the Eastern Cape Province to train and mobilise local communities in disaster management. The Eastern Cape has an incipient programme to roll out the implementation of the Disaster Management Policy. In both cases, the programmes are evidently very effective.

RECOMMENDATION:

- 70. The National Disaster Management Centre should adapt the strategy and materials employed by the Department of Water Affairs and Forestry in its training on the National Veld and Forest Fire Act, including the training and mobilisation programme from the National Veld and Forest Fire Act, to build a strategy that will encompass the new Disaster Management Policy.**

6.11 Skills, education and training

See Sections 6.7.4 and 6.12.1.

6.12 Managing public involvement

6.12.1 Fire-fighting volunteers and their organisation and training

In general, agencies involved with veldfires have mobilised few volunteers in fire fighting. However, the future staffing levels in South African agencies will not be able to handle large or otherwise potentially disastrous veldfires.

The upwelling of public interest during the Cape fires is an indication of potential in this regard. The Cape Peninsula National Park has an active volunteer programme, and the Western Cape Nature Conservation Board has similar intentions. In South Africa volunteers have proved very effective in such organisations as the National Sea Rescue Institute, NGO initiatives such as Trees for Africa, Mountain Rescue Services, and civics organisations. The Mountain Bike Forum has also proposed a concept called bike patrol, to identify a select group of honorary rangers from its members, clearly identified, and with some / limited authority to act against transgressors. Their intention is to help to identify fires at an early stage, and discourage the setting of fires. Overseas, fire-fighting volunteers are the backbone of rural fire management in several states in Australia.

Many volunteers came forward during the veldfires in the Cape Peninsula. Their effectiveness in fighting the veldfires was at best limited and their presence sometimes a nuisance, despite the best intentions. Volunteers were apparently mostly unskilled in fire fighting, and almost invariably ill-equipped. In most situations, deploying such volunteers would have exposed them to unwarranted and probably illegal levels of hazard.

The opportunity to use volunteers in fighting veldfires is under-utilised. The voluntary organisations for veldfire fighting could be built around a broad public interest in environmental conservation and be structured through Fire Protection Associations as part of the overall veldfire management strategy.

As noted earlier, veldfire management has an important ecological and conservation context. In addition, farmers, as landowners, and their employees are in effect regular volunteers in fire fighting. Experience in the Eastern Cape and elsewhere indicates that in poorer communities volunteerism has proved highly attractive, with volunteers seeking the benefits that come from skills development, which in turn confers esteem within the communities and could contribute to future employability. Prerequisites are properly organised and documented volunteer structures and individuals, adequate training, and proper direction and safety equipment during fires.

RECOMMENDATION:

- 71. The Department of Water Affairs and Forestry should commission a study of fire-fighting volunteers in Australia, the United States and Europe, as well as analogous initiatives in South Africa, to determine:**
- a) the motivating factors among volunteers**
 - b) appropriate organising arrangements**
 - c) a strategy for volunteerism,**

and promote an appropriate approach of volunteerism through the Fire Protection Associations.

6.12.2 Promoting public awareness and knowledge

Several issues have arisen as a result of a lack of public awareness and knowledge of veldfires and their management. These include constraints on managers' options for veldfire management, e.g. resistance to prescribed burning. They include lack of adequate precaution among land and house-owners, as well as careless behaviour during conditions of high fire danger. Finally, most members of the public do not know how to respond when fires do break out.

The public includes a wide range of audiences, from well-educated nature-lovers, who are well informed about their environment, to children from disadvantaged communities.

RECOMMENDATION:

72. The Department of Provincial and Local Government, together with DWAF, should consult with the Department of National Education to ensure that appropriate outcomes on veldfire ecology and management are achieved through Curriculum 2005. See also Recommendations 22 and 23 in this regard.

6.12.3 Developing and managing information about veldfires

Sound information about veldfires is vital. Such information is needed for many purposes. It is the foundation for planning for veldfire management, including all aspects of it, such as risk and vulnerability assessment, resource planning, and contingency planning, as well as the improvement of early warning systems such as the Fire Danger Rating System.

South Africa is falling behind international standards in the exploitation of information technology for support to veldfire management. This includes the use of various forms of satellite data, local remote sensing and monitoring for fire detection, and Internet facilities. Low-cost NOAA satellite imagery is also now routinely processed on cheap local computer stations for semi-realtime veldfire monitoring, e.g. by the Natural Resources Institute in the UK.

The Department of Water Affairs and Forestry is currently investigating options for information management to meet the requirements of the Veld and Forest Fire Act.

Some current problems encountered by the Task Team are the following:

- Some agencies involved in fire-fighting did not maintain fire logs
- Fire logs often did not contain sufficient information to reconstruct the progress of a fire nor (adequately) the events associated with it (standards for recording information are set in incident command standards)
- Incident commanders sometimes did not know what resources were available and how they were deployed
- Where information is recorded it is not enough to validate a Fire Danger Rating System
- There are no databases on fires (though the University of Cape Town has developed a database for urban fires and other incidents in collaboration with stakeholders, which is being deployed for the Cape Peninsula)
- There is very little current research on veldfire behaviour and control.

RECOMMENDATION:

- 73. The Department of Water Affairs and Forestry must convene a meeting of experts to establish the standards of incident logging and reporting for veldfires, for approval by the Fire Brigade Services Board and the Director-General of DWAF and incorporation in the NFPA (SA) standard. The Department should prescribe minimum standards for reporting.**
- 74. The Department of Water Affairs and Forestry must incorporate appropriate elements of research on fire science in its strategy for research and development, as indicated in the National Forestry Action Programme.**
- 75. The Department of Water Affairs and Forestry must conclude its investigation into a veldfire information system as soon as possible and, with the Department of Provincial and Local Government, should ensure the implementation of an appropriate information system for veldfires. The system should provide for all aspects of the requirements of the National Disaster Management System in respect of veldfires. The information system should take account of international developments, such as embodied in the Global Fire Monitoring Centre, as well as opportunities for international support and collaboration. Exploitation of low-cost satellite remote sensing needs to be investigated.**
- 76. The Department of Water Affairs and Forestry should investigate the “T” card system used in the State of Victoria (Australia) to track fire-fighting resources.**

6.13 The findings of the Fire Task Team appointed by the Premier of the Western Cape

The Premier's Task Team has reported findings on its term of reference. These are summarised in Table 6.1. The table also summarises that recommendations of this, the Department's Task Team in relation to each. In general, we concur with most of their findings. However, most of our recommendations have focused on improvements to the overall system of fire fighting, and we have tended to focus on the institutions required by the National Veld and Forest Fire Act and the Disaster Management Bill. The Premier's Task Team report addresses several local issues.

Table 6.1. Summary of the findings of the Fire Task Team appointed by the Premier of the Western Cape, and the findings in this report

Topic	Recommendations of the Premier's Task Team	Response from the Cape Fires Task Team (this report)
The management of the veldfires	<ol style="list-style-type: none"> 1. More rigid application/adherence to existing approved standard operating procedures such as in the Fire Mutual Aid Agreement and the fire Command and Control of Incidents 2. Extend the Cape Metropolitan Area procedures to the rest of the Province 3. Speed up process and system of radio trunking 4. Establish standard terminology within various emergency service agreements/ procedures 5. Circulate and workshop the various agreements and standard operating procedures; establish standard terminology 6. Fast track the establishment of a single urban fire service for the Cape Metropolitan Area 7. Establish a permanent metropolitan emergency control centre [also in each District Council Area] 8. Re-introduce fire control committees, etc. 9. Accelerate the process to get all public conservation land within the Peninsula under the control of a single authority 10. Timeously advise the SANDF of high danger levels 11. Manage alien vegetation, fireproof the urban edge and assign specific responsibilities 12. Increase public awareness 13. Develop a GIS to monitor hotspots 	<ol style="list-style-type: none"> 1. The Task Team supports an approach where these would be part of veldfire management strategies (See Recommendations 7-10) 2. Task Team supports the principle, but based upon more generic ICM standards (Recommendations 13 & 14). 3. Support: see Recommendation 61. 4. Support: see 1 and 2 above. 5. Support: see Recommendations 1-10 6. Support: see Recommendation 55 7. Support in principle: see Sections 6.3 and 6.7.2 8. Fire Protection Associations preferred. 9. Establishment of an FPA should accommodate all landowners 10. Support in principle: see Sections 6.6.3 and 6.6.6 11. Support: see Sections 6.6.4 and 6.6.7 12. Support: see Recommendations 61 and 62 and Section 6.12.2 13. Not addressed specifically
Heighten the state of preparedness during the current fire season as well as any other disaster that may stem from the recent veldfires	<ol style="list-style-type: none"> 1. SANDF to be approached to adjust their conditions of providing helicopters 2. Increase pre-determined attendance (overkill) to strategic areas and institute an immediate planned backup procedure 	<ol style="list-style-type: none"> 1. Support in principle: see Section 6.7.7 2. Not addressed specifically: should be set out in operating procedures in veldfire management strategies

Topic	Recommendations of the Premier's Task Team	Response from the Cape Fires Task Team (this report)
Heighten the state of preparedness during the current fire season as well as any other disaster that may stem from the recent veldfires (cont.)	<ol style="list-style-type: none"> 3. Compile an inventory of available equipment at metro municipalities/ district councils, SANDF, SAAF and private institutions together with mountain fire managers and fire fighters 4. Widely distribute information on daily fire rating index and place resources of other sections (water and wastewater tanks) on standby for the duration of the danger period 5. Fire departments to communicate high-risk areas and high-risk fires to one another on a regular basis 6. A person with experience in the appropriate types of fires should fly regular reconnaissance 7. Establish and integrate awareness and preparedness programme 	<ol style="list-style-type: none"> 3. To be part of veldfire management strategies (Recommendations 7-10) 4. Support in part (Recommendations 26-27). 5. Not addressed specifically: should be part of veldfire management strategies 6. Not addressed specifically: should be part of veldfire management strategies 7. Support: see Recommendation 27 and Section 6.11.2
Evaluate the draft Disaster Management Bill	<ol style="list-style-type: none"> 1. The Premier's Task Team supported the Bill as "an improvement on what is in place at present" but questioned its constitutionality 	<ol style="list-style-type: none"> 1. Support: see Recommendations 1-2.
Form an opinion on current veldfire fighting resources and strategies	<ol style="list-style-type: none"> 1. The Premier's Task Team noted the 1999 investigation by the Fire Protection Association of SA 	<ol style="list-style-type: none"> 1. Support: see Section 6.7.5
Recommendations and steps to deal with any other socio-economic impact	<ol style="list-style-type: none"> 1. Rehabilitate destroyed/damaged recreation areas, thereby creating jobs 	<ol style="list-style-type: none"> 1. Not addressed specifically.
Recommendations of a specialist unit to combat veldfires in mountain areas	<ol style="list-style-type: none"> 1. It is recommended that a specialist unit not be formed but instead co-ordinate the resources of current urban and forest fire services and standardise their wildlands fires training up to an acceptable level 2. Training of suitable "fire bosses" and ground area officers is essential to the successful termination of wildland fires 3. All fire fighters should receive basic training in helicopter safety procedures 	<ol style="list-style-type: none"> 1. Task Team recommends a specialist group: see Recommendation 41. 2. Support: see Recommendations 49-50. 3. Support: see Recommendations 49-50.
Impact of development planning (emphasis on the urban edge)	<ol style="list-style-type: none"> 1. All Local Authorities should have overarching documents which set out goals and principles for development planning 	<ol style="list-style-type: none"> 1. Not addressed specifically.
Impact of		

Topic	Recommendations of the Premier's Task Team	Response from the Cape Fires Task Team (this report)
development planning (emphasis on the urban edge) (cont.)	<ol style="list-style-type: none"> 2. Planning departments of local authorities should work in collaboration with their fire, engineering and environment departments and adjacent authorities when considering development applications for the urban edge, steep slopes, etc. 3. Local Authorities must ensure that the capacity of services (access roads, water supply and pressure) in these areas is sufficient 4. Clearing and removal of alien vegetation should be compulsory around the urban edge 5. Manage the stacking of cleared alien vegetation higher up the mountain 6. Very low or no residential development should be permitted in steep or sensitive areas 7. Veldfire detection in general needs to be addressed. A camera surveillance system, which is already in use in Mpumalanga, should be considered for certain areas 	<ol style="list-style-type: none"> 2. Support in principle: see Section 6.6.7. 3. Not addressed specifically 4. Support: see Section 6.6.7. 5. Support: see Section 6.6.4. 6. Not addressed specifically. 7. Support in principle
Recommendations on prevention and methods to combat veldfires in informal settlements	<ol style="list-style-type: none"> 1. Local Authorities to implement a continuous awareness campaign 2. Fire safety education for residents 3. Train and equip the volunteer teams in these settlements 4. Increase the number of panic poles 5. Increase pre-determined attendance of fire appliances 6. Establish as system of accountability at community level 7. Monitor the erection of shacks in all roads into and inside these settlements and ensure firebreaks are in place between shacks 8. Issue fire prevention kits to residents (with necessary education) 9. Adapt helicopters with time-release mechanisms so that they may be used in informal settlements as well 	<ol style="list-style-type: none"> 1. Support in principle 2. Support in principle: see Section 6.12.2 3. Support 4. Not addressed specifically. 5. Not addressed specifically. 6. Not addressed specifically. 7. Not addressed specifically. 8. Not addressed specifically. 9. Not addressed specifically.
Make recommendations on the management of periodic controlled veldfires Make	<ol style="list-style-type: none"> 1. Under no circumstances should controlled veldfires be started without the approval of the local Chief Fire Officer 	<ol style="list-style-type: none"> 1. Provided for in the National Veld and Forest Fire Act, in the case of Fire Protection Associations.

Topic	Recommendations of the Premier's Task Team	Response from the Cape Fires Task Team (this report)
recommendations on the management of periodic controlled veldfires (cont.)	2. Launch an education campaign targeted at the farming community and other landowners	2. Support in principle.
Recommendations on any other statutory measures	<ol style="list-style-type: none"> 1. Municipal Law Enforcement Staff, Traffic Police and SAPS should assist the emergency services by policing the declaration of prohibition of the making of fires in the open, where this applies 2. This declaration should be made known to the public more vigorously 3. Establish a Provincial Fire Advisory Committee i.t.o. the Fire Brigade Services Act 4. Fire Brigade Services Amendment Bill 1999 must be expedited 5. The complete promulgation of the Veld and Forest Fire Act 6. The promulgation of the Province of Western Cape Community Fire Regulations 7. Legislation to introduce school programmes/youth preparedness programmes 8. Expansion of Disaster Management volunteers for integration with fire service volunteers 	<ol style="list-style-type: none"> 1. Not addressed specifically. 2. Replaced in the Veld and Forest Fire Act by prohibitions during conditions of high fire danger (Section 10(2)), and by rules of Associations. 3. Task Team regards this to be part of the structures advising the Provincial Disaster Management Centre (Section 29(1)(d)). 4. Not addressed specifically. 5. Supported: see Recommendation 3. 6. Not addressed specifically. 7. Not addressed specifically, but see Recommendation 22. 8. See Section 6.12.1

CHAPTER 7

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The Task Team believes firmly that the recommendations in this report are those that, if implemented correctly, will lead to the following improvements:

- more cost-effective use of scarce fire-fighting resources
- better veldfire prevention and quicker suppression when veldfires do occur, than in the past
- reduced damage to property and other assets, and less financial loss
- reduced vulnerability among communities to veldfires.

These would be achieved through:

- earlier and timely coordination of veld fire management through the continuum of measures endorsed in new policies
- improved and more cost-effective coordination of fire-fighting efforts during conditions of high veldfire hazard
- improved veldfire prevention and management
- improved veldfire incident command
- cultural change, toward cooperative governance and integrated veldfire management, with clarified institutional roles and responsibilities: “fire protection, not turf protection”
- Improved mobilisation of the public through better communication and education.

The Task Team believes further that some of the underlying causes of the pervasive problem in veldfire management is that the existing Civil Protection Act is in no way adequate for dealing with incidents of this magnitude. Secondly, the National Veld and Forest Fire Act has not yet been properly implemented. Thus the Task Team believes that a prerequisite for progress is the full implementation of the disaster management policy and the National Veld and Forest Fire Act.

This chapter is a summary of the Task Team's essential conclusions with an outline of our recommendations. It includes a plan of action, formulated by summarising the principal recommendations according to proposed responsibilities and priority. Priorities for implementation fall in three categories:

- Actions that are underway or that should and could be initiated immediately
- Actions that should and could be initiated within six months
- Actions that should and could be initiated within 12-18 months.

Our recommendations have been chosen to address needed improvements in the overall system of veldfire management in South Africa as well as the Western Cape, rather than to address the needs of single organisations, or detailed operational requirements.

Because we have cast these recommendations within the systematic framework provided by new policy and statutes, and the Fire Brigade Services Act, as well as other instruments such as the National Qualifications Framework, they will incur no redundancy. Although there are capacity problems in all institutions involved in veldfires, the integrated approach adopted in these recommendations places no additional burden on institutions identified as being responsible for implementation, beyond what current policy demands. Ongoing implementation of the actions identified will steadily address underlying problems where they exist of direction, capacity and competence shortfalls, and deficiencies in systems and equipment.

7.2 General conclusions

The veldfires in January 2000 in the Western Cape occurred under conditions of exceptional, but not unprecedented, fire danger. There is little to suggest that the fire regime has changed much over the past 50 years or more. However, what has changed is the magnitude of risk associated with veldfires, and the vulnerability of communities exposed to fire. This is principally because of the growing extent of "urban fringe" exposed to the fynbos ecosystem, an ecosystem in which recurrent fire is natural. In the countryside, expansion of vineyards and orchards onto the mid-slopes of mountains, and the increase in the number of expensive country homes, also aggravate the risk and vulnerability of impact of veldfires.

Invasive alien plants, where dense, affect risk and vulnerability. Under conditions of high fire danger these infestations increase the intensity of veldfires when they do occur. They do not evidently increase the risk of fire breaking out, nor do they pose a hazard under mild conditions, because their fuel structure is such that it burns only when very dry, and ignites with difficulty otherwise. Their effect on risk and vulnerability is firstly environmental, largely through the damage done to soil directly by heat during the fire, and indirectly by suppressing the regenerative capacity of the native fynbos. Dense stands of invasive plants thus increase the difficulty and cost of rehabilitation, a process that would occur naturally otherwise. A second effect is to hinder fire fighting simply because of their density and the high fire intensities that prevail when they do burn.

Another factor aggravating the management of veldfires is the state of institutions and individuals involved in fire fighting, including landowners. Generally, a number of factors have combined to weaken the state of management of the environment in which these fires occur. First is the sweeping change in policy and institutions that has occurred in the past decade or more, invariably accompanied by decreased financial resources. These changes have not yet been fully internalised in implementing organisations, nor fully realised in terms of the redistribution of resources and development of capacity that is needed. However, in the Cape, changes in institutional roles beginning with the devolution of national government responsibilities for mountain catchment areas in 1986, and continuing with the corporatisation of SAFCOL, the new role for the National Parks Service in the Peninsula, and the emergence of the Working for Water Programme, all contributed to a fluid state of institutional responsibility in veldfire management.

Concerted efforts are needed to direct the change process. These include the provision of leadership and development of capacity and supporting information. Implementing key new policies, such as the National Disaster Management System and the policies embodied in the National Veld and Forest Fire Act, is crucial in this respect.

The causes of the fires are largely unknown. Agents mentioned, such as motorists throwing lit cigarettes from their cars, vandals, arsonists, naughty children, and even the fire fighters themselves, are all speculative. Procedures for investigating causes are evidently not properly applied, neither by the police nor by other fire-fighting roleplayers.

Prosecution is rare, much less conviction. This is a situation that needs to be rectified urgently. Authorities feel that the very large number of fires observed in urban and peri-urban areas in the period under review must reflect a high incidence of deliberate fires, indicating a disconcerting degree of disregard for fire safety and the law.

Fire fighters in the municipal fire services and in land management agencies such as the Cape Nature Conservation Board, the National Parks Service, SANDF and SAFCOL all performed admirably and with great courage and endurance. These efforts undoubtedly contributed to limiting the impacts of the fires.

Home-owners and volunteer members of the public played very important roles, the latter especially in providing meals and other support to the fire fighters. However, these volunteer efforts would have been much more productive with better communication and organisation in the system.

On the Simonsberg people began evacuating homes on Sunday 16 January and on the Peninsula in the evening of the same day. The evacuations were either voluntary or in response to announcements by the authorities. However in no case does it seem that a predetermined evacuation plan or procedures were followed. This omission has serious implications in terms of legal requirements, security and the safety of citizens, and should not in future be repeated in the same fashion.

Furthermore, it is clear that fire-fighting strategies, coordination of efforts and allocation of resources were often poor. The coordination achieved by the several Joint Operation Centres established at different times developed late in the process, and then were incomplete. At no point was a single authority fully accountable for proper coordination in the Province. The Province did not yet have a Disaster Management Centre. The delay was partly due at least to the fact that roleplayers waited for a disaster to be declared, but there were also other factors at play.

The questionnaire survey of the Western Cape shows clearly that, as well as individual roleplayers may have performed, their overall effort was uncoordinated and disorganised. Hundred of fires broke out in this period. The hazard was severe. Fire-fighting units travelled to and from one fire to the next but there was no central coordinating organisation and no overall strategy. It is obvious that this was needed even before 16 January. The fires at Simonsberg and Langebaan could both have been stopped at the beginning before they developed, if services and resources had been better organised. Urgent efforts are needed to improve incident command and disaster coordination.

The information maintained on the progress with fire fighting in each case, though often detailed, did not contain enough for proper evaluation of efforts and as a basis for future improvements. For example, it is not possible from the written fire logs to reconstruct the allocation of resources at any one time. Nor are many important incidents, for example as captured in the press or by other eyewitnesses, included in the fire logs. In some cases, there are no fire logs. Improvements in this kind of information are urgently needed. There is also inadequate use of various available tools for early warning and monitoring of fires, which could have contributed to much more effective early response as well as better fire-fighting strategies.

Against this background, we conclude that substantial improvements in veldfire management can be achieved within a year or less by implementing a variety of measures that:

- a) address improved integrated planning and organisation through the implementation of current policy and its supporting legislation, of which the principal requirement is for coordinated, integrated application of the National Veld and Forest Fire Act and the new Disaster Management policy, together with proper implementation of the Fire Brigade Services Act

- b) achieve the deployment of coordinated veldfire management strategies in Fire Protection Areas, which should become the veldfire plans in the local disaster management plans, and include coordinated responses
- c) support improved veldfire management through effective information, focusing on a national Veldfire Information System to support the development of veldfire strategies at all levels
- d) assure adequate competence, capacity and standards among veldfire roleplayers, and
- e) gain the support of the general public.

The following section stipulates the actions and responsibilities needed to achieve these objectives. The list of actions includes cross-references to relevant recommendations in Chapter 6. These actions can be readily captured in project plans by implementing agencies.

7.3 Priority recommendations and responsibilities

7.3.1 Implement current policy and its supporting legislation

In order to overcome obstacles stemming from slow implementation of policy and law,

the **Department of Water Affairs and Forestry** should:

- 1. ensure that the National Veld and Forest Fire Act (as amended) is promulgated in full as soon as possible, together with supporting regulations, as a matter of urgency (A; Recommendation 3)
- 2. facilitate a process to develop regulations, criteria, rules and procedures that will help overcome potential conflicts about the regulation of veld burning (C; Recommendations 15 and 16), while

the **Department of Provincial and Local Government or the Minister** should:

- 3. ensure that Parliament passes the Disaster Management Bill as soon as possible, and draft supporting regulations to be gazetted at the same time; the constitutional requirements to be met in resolving the local government mandate are set out in Section 5(5) of the Disaster Management White Paper (A; Recommendation 1)
- 4. convene an expert group to develop a standard protocol for the investigation of the causes of any given veldfire (with technical support from DWAF), which should then be enforceable by prescription through the appropriate statute; Fire Protection Officers (or Chief Fire Officers where appropriate) should support the SAPS and State Prosecutors through evidence gathered according to these protocols. (A; Recommendation 30)
- 5. ensure that the funding required to develop disaster management capacity in district and metropole governments is met by means of a conditional grant to provincial government (A; Recommendation 2), and

with regard to funding their mandates, **District Municipalities and Metropoles** should:

- 6. follow the budgeting requirement in the White Paper for Disaster Management (A; Recommendation 2).

7.3.2 Achieve the effective deployment of coordinated veldfire management strategies, including veldfire prevention planning and response

In order to ensure that Fire Protection Associations are able to develop effective veldfire management strategies that conform to requirements for disaster management plans,

the **Inter-Governmental Committee on Disaster Management** should:

1. adopt the veldfire management strategies required by the National Veld and Forest Fire Act as the appropriate components of the veldfire plans required for disaster management plans to be compiled by municipal disaster management centres; veldfire management strategies for Fire Protection Associations should serve as the veldfire elements of Disaster Management Plans for municipalities, as provided for in the Disaster Management Bill (Section 44(1)); they should furthermore take account of any fire protection plans existing in terms of the Mountain Catchment Areas Act (A; Recommendations 7 and 9), and

the **Department of Water Affairs and Forestry** should:

2. facilitate the establishment of Fire Protection Associations in all areas requiring veldfire management strategies (A)
3. develop and prescribe minimum standards for veldfire management strategies and advise widely on the organising of Fire Protection Associations and development of veldfire management strategies, and engage available experts to support this process (A; Recommendation 8)
4. conclude its investigations and implement the National Fire Danger Rating System, and engage experts and consult with the relevant parties on a way of communicating fire danger rating so that the public is properly informed and able to adjust their behaviour according to anticipated conditions of fire danger (A; Recommendations 26 and 27)
5. ensure that veldfire management elements of Disaster Management Plans provide adequately for prescribed burning, as is required in the veldfire management strategies in Section 5 of the National Veld and Forest Fire Act (A; Recommendation 21)
6. provide guidelines by which the Fire Protection Associations (FPAs) may harmonise their rules with local government by-laws in order to give effect to the rules of the FPA; it should draft model FPA rules as regulations under the National Veld and Forest Fire Act (C; Recommendation 12)
7. convene a workshop to evaluate current integrated fire management plans, as mentioned earlier, and to develop standards that will ensure conformance to veldfire management strategies as required by the National Veld and Forest Fire Act, as well as to the requirements for disaster management plans; these standards should be prescribed through the provisions of the National Veld and Forest Fire Act within Fire Protection Areas (A; Recommendation 49).

In order to promote effective and uniform procedures for fire incident command and coordinated veldfire fighting, the **Department of Provincial and Local Government** should:

1. pass regulations under the Disaster Management Bill to establish a standard for DISPLAN and Incident Command, and the standard should be based upon the USA Federal Emergency Management Agency (FEMA) standards (A; Recommendation 13).

In order to integrate methods of managing invasive plants with veldfire management, the **Department of Water Affairs and Forestry** should:

1. work with landowners to establish affordable and sustainable alien invasive programmes in future (B; recommendation 28)
2. promote among the Working for Water Programme and landowners the adoption of methods of clearing to avoid the accumulation of fuel on the ground (B; Recommendation 29).

In order to minimise the risks of veldfire at the urban fringe, the **Department of Provincial and Local Government** should:

1. initiate a process to set appropriate building standards that take account of the special requirements applicable to all structures at the interface with the open veld ("urban fringe"), and ensure that SABS 0400 is amended accordingly. The standards should provide for such aspects as the sealing of eaves, restrictions on the use of combustible material and other measures necessary to protect buildings against fire (A; Recommendation 33)
2. ensure that the Integrated Development Plans and land-use planning by-laws of both local and district municipalities are designed to promote densification instead of urban sprawl, and to identify the urban-veld interface and place prohibitions on the planting within properties of plants that lend themselves to rapid combustion (B; Recommendation 34), and

Provincial environment and planning authorities should:

3. ensure that the regulations requiring EIAs for land-use change are strictly enforced, where land is to be rezoned for urban development, and no exemptions should be granted in cases where the development is in a fire-prone area, or advise their MECs to make appropriate regulations for this purpose in terms of Section 24 of the National Environmental Management Act (A; Recommendation 35), and

the **Fire Protection Officer**, in the case of Fire Protection Associations, or where there is no FPA, the **Chief Fire Officer**, should:

4. ensure that fire management plans require that firebreaks be routinely employed along urban property boundaries where there is a risk of veldfires (A; Recommendation 38), and

Municipalities should:

5. work actively with communities in informal settlements to optimise the design of fire protection measures, promote and capacitate fire-fighting volunteers, and disseminate fire prevention education materials (A; Recommendation 39), and collaborate with NGOs in these initiatives.

In order to achieve the necessary minimum standards of veldfire incident management and the coordination of efforts (DISPLAN) at large or multiple fires, **Fire Protection Officers** in FPAs and authorised **Fire Brigade Services personnel** (Category of Authorised Persons - CAPS) should:

1. evaluate the implementation of these command and coordination systems and include their assessments in their reports, as required by Section 6 of the National Veld and Forest Fire Act and the regulations under the Fire Brigade Services Act. The Inter-Governmental Committee on Disaster Management

should regularly assess their implementation (B; Recommendation 40; see also Recommendations 13 and 14).

In order for the local Disaster Management Centres to implement the measures envisaged in the Bill for threatening disasters, such as emergency procedures and contingency plans, the **Fire Protection Officer or Chief Fire Officer** should:

1. report to the Disaster Management Centre on the veldfire situation once conditions are reached where disaster threatens or at any time when the fire danger rating is high. These conditions should be set in the rules and procedures of the veldfire management strategy that applies to the district or metropole so that it provides for proactive risk assessment (A; Recommendation 44; refer also to Recommendations 7 to 9).

For improved coordination in the case of disastrous veldfires or veldfires that threaten disaster, the **Disaster Management Centre** should:

1. be alert to impending veldfire management disasters by using as an early warning system the National Fire Danger Rating System (A; Recommendation 46)
2. pass the coordination role to the provincial Disaster Management Centre in cases where veldfires threaten to qualify as a provincial disaster (A; Recommendation 45)
3. replace the current terms "Joint Operating Centre (JOC)", Forward Command Post (FCP), etc. with the terms "Incident Command Post (ICP)" for incidents and "Disaster Management Centre (DMC)" as appropriate in the case of disasters. Coordination must be according to DISPLAN (A; Recommendation 47), and

Disaster Management Centres, local and provincial, should take urgent measures to:

- a) ensure that they exploit modern technology for information gathering, including low-cost satellite remote sensing, GIS and other forms of information technology for early warnings
- b) ensure efficient communication networks that provide adequately for mobilising roleplayers relevant to an emerging provincial disaster
- c) in the case of *municipal* Disaster Management Centres, ensure prompt and adequate communication on what is happening in their jurisdictions to *provincial* Disaster Management Centres
- d) provincial Disaster Management Centres should proactively alert and communicate with municipal Disaster Management Centres on the basis of early warnings obtained through systems such as the National Fire Danger Rating System (A; Recommendation 48).

7.3.3 Support improved veldfire management through effective information systems

To meet the requirements for information in veldfires set out in the National Veld and Forest Fire Act and the Disaster Management Bill, and thus support ongoing improvement in veldfire management strategies the **Department of Water Affairs and Forestry** should:

1. conclude its investigation into a veldfire information system as soon as possible and with the Department of Provincial and Local Government ensure the implementation of an appropriate information system for veldfires (A; Recommendation 74)
2. convene a meeting of experts to establish the standards of incident logging and reporting for veldfires, for approval by the Fire Brigade Services Board and the Director-General of DWAF and incorporation in the NFPA (SA) standard. The

- Department should prescribe minimum standards for reporting (B; Recommendation 73)
3. incorporate appropriate elements of research on fire science in its strategy for research and development, as indicated in the National Forestry Action Programme (B; Recommendation 74)
 4. investigate the "T" card system used in the State of Victoria to track fire-fighting resources (B; Recommendation 76).

In order to exploit new veldfire-fighting technologies applied in Australia, France and elsewhere, the **Department of Water Affairs and Forestry, in consultation with other agencies**, should:

1. commission an investigation into the value of such innovations and where appropriate find ways of diffusing these into South Africa (C; Recommendation 54).

7.3.4 Assure adequate competence, capacity and standards among veldfire roleplayers

In order to provide necessary guidance and leadership to institutions in respect of their responses to new policies, the **Department of Water Affairs and Forestry**, as well as the **Department of Provincial and Local Government**, should:

1. ensure that all officials assigned to liaison with the province and district agencies, as well as the private sector in districts, should be sufficiently knowledgeable of new policies and their implementation, and have sufficient communication skills to interact effectively with people who are seeking their guidance (provincial authorities need to ensure that their officials are similarly empowered) (A; Recommendation 68)
2. develop and disseminate effective written briefing materials to implementing agencies; the contents of these materials should be consistent with the contents of training curricula employed in tertiary and other institutions or vice versa (A; Recommendation 69).

In order to promote minimum standards of skills among persons involved with the management of veldfires, the **Department of Water Affairs and Forestry** should:

1. convene a meeting of experts to establish the standards of experience and qualification required for the role of Fire Protection Officer, for approval by the Fire Brigade Services Board and the Director-General of DWAF, which must include a minimum standard for veldfire management strategies (B; Recommendations 4, 10) and prescribe these requirements (B; Recommendations 5, 6).

In order to achieve a common understanding among roleplayers of the ecological principles of and techniques for sustainable veldfire management, the **Department of Water Affairs and Forestry in collaboration with the Department of Provincial and Local Government** should:

1. ensure that the prescribed competence-based training for Chief Fire Officers and members of the service, as well as the curricula for conservation managers and disaster managers, includes a common minimum standard for veldfire management strategies (B; Recommendation 5).

In order to improve the competence of roleplayers to manage veldfire incidents and the coordination of responses, the **Department of Provincial and Local Government** should:

1. pass regulations under the Disaster Management Bill to prescribe the standards for DISPLAN and Incident Command, and the standard should be based upon the USA Federal Emergency Management Agency (FEMA) standards (B; Recommendation 14)
2. ensure that these same standards and all other skills standards are incorporated in the National Qualifications Framework (B; Recommendation 15).

In order to make optimum use of the country's experts in the management of disastrous veldfires, the **Department of Water Affairs and Forestry**, through its role on the Inter-Governmental Committee on Disaster Management, should:

1. develop the proposal for fire assessment teams, i.e. to use teams of experts in veldfires, recognising that similar initiatives are required at provincial level. Experts of this kind should be identified and assigned to specialist assessment teams. The terms of reference for such assessors should be developed through consultation, with reference to the analogous teams in Australia, and in congruence with the fire Incident Command System and DISPLAN. The costs of their time in this role should be borne by their employers as a contribution to overall mitigation of the economic cost of disasters (C; Recommendation 43).

In order to promote minimum competence levels among veldfire crews, the **Department of Water Affairs and Forestry** should:

1. convene a workshop to assess and agree upon competence standards for crews that fight veldfires, using the SAFCOL curriculum as a base, as provided for in Section 17(1)(a) of the National Veld and Forest Fire Act. Current and new employees in all land-owning organisations should then receive training to this or similar standards (B; Recommendations 51 and 52).

In order to promote adequate levels of capacity among landowners for fighting veldfires, the **Department of Water Affairs and Forestry** should:

1. consult with employers and organised labour to establish agreed minimum standards for safety and prescribe these as provided for in Sections 6(1)(f) and 17(1)(a) of the National Veld and Forest Fire Act (B; Recommendation 53)
2. establish guidelines for minimum equipment and skills that landowners should maintain, in line with the requirements of the National Veld and Forest Fire Act, and appropriate to his or her size of land and level of fire hazard, and promote a situation where every land-owning employer ensures that his or her crews are adequately equipped in that respect (C; Recommendation 54).

In order to support optimum use of available equipment, the the **National Disaster Management Centre and the Provincial Disaster Management Centres** should:

1. continue to promote the ongoing rationalisation of resources within districts and metropolises (A; Recommendation 57).

In order to support the development of adequate equipment among roleplayers in veldfire management, the **Department of Provincial and Local Government** should:

1. prescribe in the Fire Brigade Services Act appliance standards for fire services involved with major veldfires, and the CAPS (Category of Authorised Persons) should monitor progress toward achievement of standards by means of the data

that come from the annual Fire Brigade Services survey of the rendering of fire services (B; Recommendation 55); the proposed standards should be extended to include such organisations as SAFCOL and the Cape Nature Conservation Board (Recommendation 58)

2. through its Needs Analysis, monitor progress in the rationalisation and improvement of fire service resources (Recommendation 55).

In order to facilitate improvements in the availability of aerial support, the **Department of Provincial and Local Government** should:

1. ensure that the Department of Finance creates a fund in which the revenues received by the SAAF for services during fires can be accumulated and utilised further for those services (A; Recommendation 64), and

the **Department of Water Affairs and Forestry**, through its role on the **Inter-Governmental Committee on Disaster Management**, should:

2. as part of the national veldfire management framework required in terms of the Disaster Management Bill, initiate the development of a national framework for aerial support to veldfire fighting as a matter of urgency. This should address a needs analysis in different regions, most cost-effective configuration of aerial support, the respective roles of the private sector and the SAAF, and the financing of the service (B; Recommendation 65)
3. ensure that the guidelines for veldfire management strategies (see Recommendation 8) adequately address the need for rapid response and provide for the standard operating procedures that will determine how aerial support is to be provided within the jurisdiction of any Fire Protection Association (B; Recommendation 66).

To promote ongoing improvement in radio communication during veldfires, the **Department of Provincial and Local Government**, working through the **Inter-Governmental Disaster Management Committee**, should:

1. establish a task team to evaluate the feasibility of radio trunking and NEARNET as alternative solutions, and the implementation of either one or both of them to overcome the problem of radio communications during veldfires, as well as other emergencies (A; Recommendation 63).

In order to secure an effective role for reservists and volunteers, the **Department of Provincial and Local Government**, in collaboration with all sectors of the disaster management system, should:

1. draw upon the NFPA standard to establish common minimum standards of training for community volunteers, reservists and any other voluntary or semi-voluntary groups, including Fire Protection Associations (see also Section 6.12.1) (B; Recommendation 36), and

Ukuvuka and any other agencies involved in community initiatives for fire fighting in informal settlements should:

2. establish a network with other organisations involved in fire issues, such as the Western District Disaster Management Centre in the Eastern Cape, the Children of Fire Project and others (A; Recommendation 37).

7.3.5 Gain the support of the general public

In order to cultivate a well-informed public, whose members are able to respond properly to conditions of fire hazard and the requirements for fire safety, the **Department of Water Affairs and Forestry in consultation with provincial authorities**, should:

1. engage experts and consult with the relevant parties on a way of communicating fire danger rating so that the public is properly informed and able to respond to anticipated conditions of fire danger (A; Recommendation 27)
2. design and implement a public awareness programme that enables the average member of the public to understand sustainable veldfire management. This should be closely linked with public emergency warnings, such as Fire Danger Rating warnings (A; Recommendation 22, 27)
3. establish National Fire Ecology Day to educate the public about fire ecology and fire management – on public and private land – as part of the public awareness campaign (A; Recommendation 23), and

the **Department of Provincial and Local Government**, in compliance with the White Paper on Disaster Management should, together with the **Department of Water Affairs and Forestry**:

4. ensure that appropriate modules on veld fire ecology and veldfire management are included in Curriculum 2000 (C; Recommendation 76).

In order to promote reporting of veldfires by members of the public, the **Minister of Communication** should:

1. amend the Emergency Telephone Number Act as soon as possible to facilitate the speedy establishment of a national emergency telephone number (A; Recommendation 61) and ensure that National Emergency Telephone Number Centres advertise and promote this telephone number among the general public by way of signage and other appropriate methods (A; Recommendation 62).

In order to facilitate the development of a general strategy for volunteerism in the management of veld fires, the **Department of Water Affairs and Forestry** should:

1. commission a study of fire-fighting volunteers in Australia, the United States and Europe, as well as analogous initiatives in South Africa, to determine:
 - a) the motivating factors among volunteers
 - b) appropriate organising arrangements
 - c) a strategy for volunteerism (C; Recommendation 71).

APPENDIX 1: ORIGINAL TERMS OF REFERENCE

TERMS OF REFERENCE FOR A TASK TEAM TO REVIEW THE WESTERN CAPE FIRES OF JANUARY 2000

A Task Team is to be appointed by the Department of Water Affairs and Forestry to review the events during the veld fires on the Cape Peninsula and elsewhere in the Western Cape during the period between 15 and 25 January 2000. The geographical scope of the study is to be the Cape Peninsula and the areas within the Berg and Breede River Water Management Areas.

The objective of the review is to use the lessons from these fires to identify the strengths of current fire management systems, and to propose necessary improvements. The review is not a judicial enquiry, will not seek to assign blame or liability, and will preserve the anonymity of the individuals who were involved in the fires. Furthermore, the review will not repeat investigations of the same fires that have been recently completed, or are under way, but will use the findings of such investigations as sources of information.

From an analysis of all relevant information, the study would derive the lessons relevant to the Western Cape itself, as well as for the fire management systems in South Africa generally, including the relevant elements of the National Disaster Management System as a whole.

The key questions to be addressed in the review include:

- what ecological conditions (e.g. weather, natural and alien vegetation) prompted the fires to occur and contributed to their intensity and spread?
- what institutional arrangements were in place for fire management and fire fighting, which of these proved effective, and what improvements may be needed?
- what strategies for fire management and fire fighting were adopted during the fires and how were resources (manpower and equipment) used; what proved effective, and what needs to be improved?
- how effective were the extant provisions of the Forest Act of 1984, the provisions of the Veld and Forest Fires Act of 1998 that were in force at the time, and any other statutes that determine fire management?

The study will generate a report that would include findings, the inferences from these findings, and recommendations for improvements in the legislative, institutional, and ecosystem management regime that determines the fire management system.

Specifically, recommendations will include:

- proposals for improvement to and guidelines for the effective implementation of the National Veld and Forest Fires Act, as well as recommendations for improved linkages between this Act and other relevant statutes
- recommendations for improvements in the organising and resourcing of and co-ordination and co-operative governance arrangements between spheres of government responsible for and otherwise influencing management for the prevention of veld fires, the control of fires that do break out, and the mitigation of the consequences of fires that do occur

- improvements in the management for fire control of ecosystems as well as of the built and settled environments adjacent to natural or semi-natural ecosystems.

The final output would be feasible proposals for improvements in fire management in South Africa, including legislation, especially the National Veld and Forest Fires Act, institutions and their co-operative governance arrangements, supporting systems, and ecosystems management.

The Task Team will use all available sources of information, as well as conducting its own investigations. Important examples include the report by the Western Cape Task Team that investigated the Peninsula fires of 15 to 25 January 2000, the fire management plan for the Peninsula National Park developed by the CSIR, as well as reports on invasive alien vegetation on the Peninsula and elsewhere.

The Task Team may commission new studies to fill any important gaps in information.

The Task Team will source local experts and consult with officials of relevant bodies to obtain specific information required for the study and not immediately available otherwise. The Task Team will be empowered to call upon organisations and individuals for such written or oral information, but will respect the anonymity of the individuals concerned.

The Task Team is responsible to the Department of Water Affairs and Forestry and will deliver its report finally to the Chief Director: Forestry. However, the Task Team will report through its Chairperson at intervals of not less than one month to the Steering Committee, whose advice will be duly noted and considered by the Team. In addition, the Task Team will circulate their draft conclusions and recommendations to key stakeholders for comment prior to conclusion of the report, take such comment into consideration, and append the comment to the report.

The draft report will be delivered to the Steering Committee for evaluation on 9 June 2000. The final report will be submitted to the Minister on 30 June 2000.

APPENDIX 2: QUESTIONNAIRE

The following questionnaire was sent to 50 recipients. A list of the organisations to which the questionnaire was sent is provided in Appendix 3.

MINISTERIAL REVIEW OF THE VELD FIRES IN THE WESTERN CAPE BETWEEN 15 AND 25 JANUARY 2000

CONFIDENTIAL QUESTIONNAIRE ON THE INCIDENCE OF VELD FIRES AND FIRE FIGHTING DURING THAT PERIOD

Dear Colleague

Mr Ronnie Kasrils, Minister of Water Affairs and Forestry, has requested a review of the veld fires that occurred in the Western Cape during the period from 15 to 25 January 2000, in order to determine what should be improved in our legislation, fire management systems, and anything else that would help to prevent or control such events in future. This questionnaire is an important step to gather information on these fires. Your assistance in completing this will be highly valued.

*Fred Kruger, Task Team Leader
11 May 2000*

IMPORTANT

1. The geographical scope of the study includes the Berg and Breede River Water Management Areas. Your organisation's area of jurisdiction falls within one of these areas.
2. This questionnaire has been sent to all relevant local authorities and management agencies (e.g. SA National Parks Service, and Provincial Conservation area managers).
3. For this review we have defined a veld fire to be a fire of any size that occurred in fynbos or other natural veld, plantations, crops, or invasive vegetation outside a built-up area. If the fire occurred within a built-up area then only fires that occurred within veld more than 10 hectares in size should be included.
4. Please complete every question that is relevant to your organisation.
5. The time to complete this review is very short. Please return your completed questionnaires to the following address (details given)
6. You may complete the questionnaire as an electronic file (it has been processed in Microsoft Word 98/2000 and Word 95 versions) and return it by e-mail to the above email address.

A. YOUR ORGANISATION

1. Name of organisation	
2. Magisterial District	
3. Name of contact person	
4. Physical address	
5. Telephone number	
6. Fax number	
7. E-mail address	

B. INCIDENCE OF VELD FIRES IN THE AREA OF YOUR JURISDICTION

1. Did any veld fires occur within your area of jurisdiction between 15 and 25 January 2000, inclusive?

Yes/No

If not, please complete the questions in Section D and return this form without providing further information.

2. Please list the veld fires that you recorded in this period. Indicate the source of ignition as "unknown" if you do not have direct evidence of the source.

Date started	Date extinguished	Location (e.g. name of property)	Estimated area (hectares)	<u>Source of ignition</u>

3. Please attach the incident logs or fire reports for each of these fires. Identify each document by the name of the location of the fire. These logs or reports must please indicate, at least, for each incident, the date, time, location, and nature of the incident. The nature of the incident can include: report received of whatever kind, resources despatched, resources deployed, emergency event, or anything else relevant to the control of the fire.
4. For each fire, please describe in your own words the intensity, rate of spread and other relevant aspects of the fire (fire behaviour) over its full duration. Use no more than 100 words for each description, and identify the location for each case. Use extra sheets for the descriptions for additional locations if necessary.

DESCRIPTIONS OF FIRE BEHAVIOUR

Fire location

Fire location

C: RISK FACTORS AFFECTING THE INCIDENCE OF THE FIRES

[Please note that we will obtain information on weather conditions from the Weather Bureau. However, if you have relevant weather records available, please feel free to include these with the questionnaire.]

1. If your organisation manages the land on which the fire(s) occurred, and if the veld within the relevant area(s) was managed according to a formal plan, please include a copy of the relevant management plan(s). If there was no formal plan, please use your own words to describe how management or lack of management affected the occurrence of the fires reported. Describe this for each location listed in A.2. Please use a separate sheet to make these descriptions, headed "Question C.1: State of veld management", and name the location(s). Use no more than 200 words for the description for each area.
2. If a management plan was available for one or more of the areas affected, please outline on a separate sheet, headed "Question C.2: State of veld management", with the name of the location(s), your assessment of the degree to which the plan has been implemented and how this affected the occurrence of the fires reported, noting strengths, as well as improvements needed. Please comment on the presence or absence of firebreaks, and the role that these did play or might have played in fire fighting. Use no more than 200 words for the description for each area.

E: DESCRIPTION OF THE SEQUENCE OF EVENTS DURING THE FIRES

1. If you have anything to add to the information in the incident logs or fire reports requested in A.1 above, please provide information in your own words on separate sheets, each headed "Response to Question E.1", with the location named on each sheet, or:

"Nothing further to add".

2. In your own words, describe any problems that arose in fire fighting from a lack of adequate resources, and indicate what kind and magnitude of resource would have been needed instead. Use no more than 150 words for each location.

PROBLEMS ENCOUNTERED WITH FIRE-FIGHTING RESOURCES

3. In your own words, describe any problems that arose in fire fighting from the means of communication available to you, and indicate what kind of improvement may be needed. Use no more than 100 words.

PROBLEMS ENCOUNTERED WITH COMMUNICATION DURING FIRE-FIGHTING

4. In your own words, describe how the public influenced fire-fighting. Note positive and negative contributions. Indicate whether you called upon the public to assist, and if so by what means. Use no more than 150 words.

THE ROLE OF THE PUBLIC DURING FIRE-FIGHTING

F: ESTIMATES OF THE IMPACTS OF THE FIRES

1. Please attach copies of any documents that describe the environmental or economic impact of the fires that you have reported on.

.....
NAME OF RESPONDENT

.....
SIGNATURE

DATE.....

APPENDIX 3: QUESTIONNAIRE RECIPIENTS

Copies of the questionnaire were sent to the following organisations:

- South Peninsula Protection Services
- South Peninsula Fire & Rescue Service
- South Peninsula Disaster Management
- South Peninsula Nature Conservation (Parks & Forestry)
- South Peninsula Nature Conservation
- South African National Parks
- South African Navy Services
- South African Police Services
- Cape Town Fire & Emergency Services
- Tygerberg Fire & Disaster Management Services
- Blaauwberg Fire & Rescue Service
- Helderberg Fire & Rescue Service
- Oostenberg Fire & Rescue Service
- Paarl Fire & Rescue Service
- Winelands Fire & Rescue Service
- West Coast District Council
- CMC Fire Service
- CMC Disaster Management
- CMC Protection Services
- Blaauwberg Community Services
- Cape Town Disaster Management
- Helderberg Disaster Management
- South African National Defence Force (Task Force West)
- Provincial Administration Western Cape (PAWC)
- Metro Rescue Services
- Breë Rivier District Council

- SAFCOL
- Breërivier District Council (Worcester)
- Overberg District Council (Bredasdorp)
- West Coast District Council (Moorreesburg)
- Wynland District Council (Stellenbosch)
- Ashton Municipality
- Barrydale Municipality
- Bonnivale Municipality
- Bredasdorp Municipality
- Ceres Municipality
- Heidelberg Municipality
- Helderburg Municipality
- Hermanus Municipality
- Hopefield Municipality
- Cape Town Municipality
- Montagu Municipality
- Moorreesburg Municipality
- Paarl Municipality
- Rawsonville Municipality
- Stellenbosch Municipality
- Tulbagh Municipality
- Tygerberg Municipality
- Wellington Municipality
- Worcester Municipality

APPENDIX 4: PERSONAL INTERVIEWS

The following organisations and individuals were interviewed during the site visit by the Task Team in June 2000. A Prompt Sheet of basic questions was used as a guideline for most of the interviews, and is provided in Appendix 5.

- South Peninsula Protection Services : Mr R Bosman
- South Peninsula Fire & Rescue Service : Mr. PV Muller
- South Peninsula Disaster Management: Mr. L Labuschagne
- South Peninsula Nature Conservation (Parks & Forestry): Mr. J Schmidt; Mr. C Theunissen; Mr D. Ferreira
- South African National Parks: Mr James Jackalman; Mr Cas Theron; Mr Philip Prins
- South African Navy Services: Commander M Newman
- Cape Town Fire & Emergency Services: Mr. DC Sparks; Mr A Weston
- CMC Fire Service: Mr P Smith
- CMC Disaster Management: Mr G Laskey
- CMC Protection Services: Mr W Wessels
- Metro Rescue Services: Dr C Robertson
- Extra-Metropolitan Fires Working Group: Mr Hermie Visser (Breede River District Council)
- Winelands District Council: Mr Ian Ross
- Winelands Fire and Rescue Services: Mr Graham Roberts
- Tygerberg Fire & Disaster Management Services: Mr M Hutchinson; Mr F Mostert
- Blaauwberg Fire & Rescue Service: Mr Bob Farrant; Mr Steve Abrahamse; Mr Frances van der Bijl
- Helderberg Fire & Rescue Service: Mr GD Cilliers
- Oostenberg Fire & Rescue Service: Mr L Otto
- Paarl Fire & Rescue Service: Mr H Fouché
- SAFCOL: Mr B du Preez
- West Coast District Council: Mr FJW Herbig
- West Coast National Park: Mr P. Sieben; Mr Pierre Nel
- South African National Defence Force (Task Force West): General Monster Wilkins, Lt. Colonel D Sloane
- PAWC: Mr Schalk Carstens; Mr S Steenkamp; Mr. H Munnik

- Cape Nature Conservation: Mr David Daitz
- Scientists' Forum:
 - Mr Brian van Wilgen - Fire Danger Rating System
 - Dr Ailsa Holloway - Processes & risk factors for mitigation
 - Mr Keith Moir – SA Weather Bureau – weather conditions at the time of the fires
 - Mr Neels de Ronde – prescribed burning, fuels classification, anticipating the outbreak of fires.
- Commercial Forum:
 - Ms Bernadette Tebrugge-Goldberg
 - Floats Aviation: Msrs Chris and Gideon Langeberg
- Public Forum: No individuals attended to make presentations, although written representations were received.

APPENDIX 5: INTERVIEW PROMPT SHEET

The following Prompt Sheet questions were used as a guideline for the interviews, but questions were not limited to those on the prompt sheet.

GENERAL POINTS FOR DISCUSSION DURING INTERVIEWS WITH ROLE-PLAYERS DURING ON-SITE VISITS

1. LEGISLATION

Please raise any issues about legislation that arose as a result of your experience with veld fires.

What are your views on the provisions of the National Veld and Forest Fires Act, e.g. with respect to the provisions on firebreaks, fire preparedness, and Fire Protection Associations?

2. MANAGING FIRE RISK AND VULNERABILITY

a. Management of veld and other predisposing factors

Views on the state of veld management within your area of jurisdiction, and neighbouring it. Identify main issues affecting veld management, e.g. the preparation of firebreaks.

Are recreation and tourism a problem, and if so how can these activities be better managed?

b. Fire prevention in the open veld

Identify and discuss issues relating to preventing the ignition of veld fires.

c. Fire prevention at the interface between urban areas and the veld

Other than firebreaks, what measures would assist in (a) preventing fires from spreading from built-up areas into the veld and (b) prevent property from being damaged by veld fires. What are your organisation's intentions in this respect?

d. Managing the public

What issues arose as a result of the actions of members of the public? What measures would help to create a greater sense of fire safety among members of the public? What measures would assist the public to have a more effective role during disastrous veld fires?

3. VELD FIRES AND DISASTER MANAGEMENT

3.1 Overall disaster management strategy

To what extent, and how, does your strategy provide for the following:

1. Preventing or reducing the risk of ignition of veld fires
2. Mitigating the severity and consequences of veld fires
3. Emergency preparedness
4. Rapid and effective response to disasters
5. Post-disaster recovery and rehabilitation?

3.2 Pre-disaster contingency planning

3.3 Fire incident command system

In what way does your incident command system, as applied to veld fires, provide for the following concepts and systems:

1. Organising around the five principal components of: (1) incident command (including transfer of command), (2) planning (Incident Application Plans), (3) operations (execution of IAP), (4) logistics and (5) finance and administration
2. Common terminology
3. A modular organisation
4. Integrated communications
5. Unity of command
6. A unified command structure
7. Consolidated IAPs
8. A manageable span of control
9. Designated incident facilities
10. Comprehensive resource management?

3.4 Controlling fires at the interface between urban areas and the veld

- What conditions made it easier to protect property?
- What conditions made it more difficult?

4. OVERALL DISASTER MANAGEMENT POLICY

What are your recommendations regarding:

- The National Disaster Management Framework
- The Provincial Disaster Management Plan
- The Municipal Disaster Management Plan

5. ORGANISATIONAL RESOURCES AND CAPACITY

5.1 Employees

What are the strengths of your employees in regard to the management and control of the fires of January 2000?

What needs improvement?

What are the most important areas for training and capacity building?

5.2 Stores

What were the strengths of your situation regarding stores?

What most needed improvement?

5.3 Equipment

What were the strengths of your situation regarding equipment?

What most needed improvement?

5.4 Vehicles

What were the strengths of your situation regarding vehicles?
What most needed improvement?

5.5 Communications

What were the strengths of your situation regarding communications?
What most needed improvement?

5.6 Mutual assistance

What worked best regarding mutual assistance?
What most needed improvement?

5.7 Role of the public during fires

What was the most helpful role of the public?
What caused the most problems?

5.8 Community organisations

What were the strengths of your situation regarding community organisations?
What most needed improvement?

APPENDIX 6: PUBLIC STAKEHOLDERS

Written submissions were received from the following public and commercial stakeholders:

- Mr Charles Maxwell, Tokai
- Mr Tony Marriner, Durbanville
- Ms Margie Cochrane, Vredehoek
- Mr Keith Gottschalk, University of the Western Cape
- Mr John Robert, Tamboerskloof
- Mr SP Harries, Somerset West
- Mr Willem de Waal, Moorreesburg
- Mr SM Fisk, Muldersvlei
- Mr Charles Rickens, HM Leers & Co.
- Mr Johann Joubert, Juba Inc. (UK)
- Messrs Langeberg, Floats Aviation
- Ms Tebrugge-Goldberg, Paarl

The following members of the farming community provided information to the Task Team:

- Ms Anne Huchon, Morgenhof
- Mr Kobus van der Merwe, Stellenbosch Farmers' Association
- Mr Paul Krige, Kanonkop
- Ms Norma Ratcliffe, Warwick
- Mr Sakkie Kotze, Le Bonheur
- Mr Paul Benade, Lievland

APPENDIX 7: SUMMARY OF COMMENTS FROM PUBLIC STAKEHOLDERS

A summary of the key comments made by members of the public is provided below, followed by summary proposals by commercial stakeholders.

1. SUMMARY OF PUBLIC INPUTS

1.1 Problems indicated

- Delayed response from the authorities
- Lack of an efficient central control point, and poor coordination between responsible officials/bodies
- Slow response by helicopter crews
- Shortage of suitable helicopters, trained pilots and the inability to fly at night
- The presence of large areas of alien vegetation, including pine, especially in the Table Mountain area, and the practice of leaving felled alien vegetation in place
- Uncontrolled development in Fynbos areas leads to environmental degradation and increases fire risks
- Proliferation of alien vegetation
- Fire services operating below their potential, due to fragmentation, lack of national guidance, poor fire ground tactics, poor training and leadership, virtually non-existent large incident procedures, poor service coordination at emergencies, together with poor mobilisation and fire ground communications.
- Vagrants are responsible for fires, aided by local authorities who fail to take action against them.

1.2. SUGGESTED SOLUTIONS

1.2.1 *Financial support*

- Additional financing of fire control and prevention. Savings from manufacturing military armaments and equipment locally, rather than sourcing them from overseas, could be used to purchase additional fire-fighting helicopters and ground vehicles and to train pilots, technicians and fire-fighters. These helicopters and ground vehicles must be put to work the whole year around.
- Review the funding of fire and emergency services, together with a long overdue review of fire charges levied following certain incidents.

1.2.2 *Operational and resource issues*

- A well-managed central control centre is required with the authority to call manpower or equipment from anywhere in the country immediately, by short-cutting bureaucracy. Mobile Operations Centres are also required that can be moved closer to a disaster area or a possible disaster area.
- Establish a Voluntary Fire Fighting Service, (VFFS) deeply embedded in the local communities, based on the American system or the structure of South Africa's

National Sea Rescue Institute, regularly trained and easily reached by means of beeper.

- Take pre-emptive measures to activate international resources, particularly fire-bombing aircraft. At least four of the largest Russian helicopters that can be bought or hired should be obtained, at least during every fire season. While it might be most economic to physically base them together, two should be nominally assigned to cover the Cape Peninsula National Park, one nominally to cover Boland mountain fires, the fourth nominally to cover Cape Flats veld fires, and extreme shanty town fires where fire engines cannot drive.
- Encourage and support local initiatives to develop unique fire-fighting methods in the Western Cape, e.g. mortars to establish a back-fire line, perforated hoses fired by rockets to reach in-accessible spots, airburst shells with chemical retardant, etc.
- Inspect designated fire and emergency services annually, and where they fail to meet laid down standards bring firm pressure to bear on the services concerned, such as the withholding of subsidies.

1.2.3 *Fire prevention measures*

- Strict control of all alien vegetation including the enforcement of new legislation in this respect. Clearing should be done on a far larger scale, drawing on the unemployed.
- The use of helicopters in fire prevention and not only fire control, e.g. to remove felled alien material.
- Closer supervision of Parks Board workers so they do not neglect their duties in order to smoke out bees, start their own pyromaniac programmes, etc.
- Improved planning for controlled burns.
- The Mountain Bike Forum (22 000 members) has proposed a concept called bike patrol, to make a select group of honorary rangers, clearly identified, and with some / limited authority to act against transgressors. This would help to identify fires at an early stage, and discourage the setting of fires.

1.2.4 *Legislation and enforcement*

- Heavy fines should be imposed for arson, the setting of illegal or uncontrolled fires and the disposal of burning cigarettes or matches, and rewards for whistle-blowing that results in convictions.
- Legislation must be enacted that will empower all participating entities to operate within a legal framework and clarify the chain of command to prevent "turf battles".
- Burning of rubbish and firebreaks in the dry season should not be permitted without the permission and (in the latter case) supervision of the city council.

1.2.5 *Education, training and awareness*

- An extensive public awareness campaign is required to educate the public at all levels, especially at schools.
- Set up training schools (under the control of the local services) and a National Fire and Emergency College (under its own control), to raise, standardise and coordinate all aspects of development and training.
- The Parks Board should avoid misleading publicity about fires. For the head of Parks Board to continually brush fires aside as "blessings in disguise" (as in news reports in 1999) is very misleading. This type of comment is open to misinterpretation by both

Parks Board workers and the public and could create the wrong attitude to fire prevention and control.\

- Warnings about conditions being conducive to runaway veld fires alert arsonists who then know precisely when to strike.

1.2.6 *Social and development issues*

- All uncontrolled development (squatter camps) in Fynbos and renosterbos areas should be banned, e.g. just before Grabouw and in the Villiersdorp/ Bredasdorp areas.
- Access to Table Mountain and Signal Hill should be controlled, with paid access through gates for vehicles. (Gate entry can be refunded if a cableway ticket is purchased).

1.2.7 *Roles and responsibilities*

- Review, re-visit and strengthen the role of the local professional services, Fire Service, Medical Support, Traffic Control, Logistic Support, the SAPS and the SANDF, in particular the reserve forces.
- Emergency services must be large-area based (even national) and certainly nationally directed in order to be operationally effective and cost efficient.
- Set up a Fire and Emergency services Directorate within a government Department to be responsible for the set-up, coordination and general direction of the emergency services. This Directorate should examine such services countrywide, put together a suitable model for South Africa, and draw up and present the necessary legislation.
- Large companies and government departments should be required to manage their properties for fire safety. Although farmers in Moorreesburg, who grow wheat along the N7 and railway line, burn firebreaks and control weeds along their side of the fence, Spoornet and the Provincial Administration neglect to do so on the other side. Most of the fires that started between Malmesbury and Moorreesburg along the N7 were extinguished by farmers and their staff.
- Unless landowners and authorities work out a mutual strategy for fire prevention, management and compensation, these large fires will be repeated annually, resulting in huge losses for all concerned.

1.2.8 *General*

- To refer to natural fires in the Western Cape as veld fires, is perhaps misleading. The more accurate term is bush fires - the technique and degree of difficulty in combating bush fires is very different from the classic SA veld fires.

3. SUMMARY OF COMMERCIAL PROPOSALS

3.1 Floats Aviation

Floats Aviation is a light aircraft hire and fly business. It proposes to purchase three Catalina fixed-wing fire bombers and operate them for three years from 35 Squadron at Cape Town International Airport using Air Force and volunteer pilots. An alternate is to purchase and operate two Canadair CL215 or CL415 Fire Bombers. The planes are capable of landing on water and/or scooping up water in a fly-by approach, and then dropping the water where required in a fire emergency. The company requires funding for the proposal.

3.2 H.M. Leers & Co.

The company wishes to import an internationally recognised fire-fighting blast extinguisher device known as “Baextin”. The product is successful at cutting off the head of the fire”. The product contains a small amount of gunpowder, which by law means that a special storage facility should be provided for the product, i.e. an explosive magazine. However, the product was recently excluded internationally as a “Class I” product, i.e. it is not dangerous and can be shipped by normal airfreight without special permission. The company currently requires special permission from the Minister of Water Affairs and Forestry to waive the requirement for special storage facilities so that the company and its clients can store these devices on their properties.

3.3 Ms Tebrugge-Goldberg

Ms Goldberg presented a broad proposal for a device currently under design, which would prevent fires starting from cigarette butts thrown from vehicles, promote the education and discipline of the public in this regard and also generate employment. Little detail was provided, as the development of the product is in a sensitive stage.

3.4 Juba Inc. (UK)

The company has access to the following aircraft/crews and backup services, for assistance with large-scale veldfires and other emergencies:

- MI 26 Heavy Lift Helicopter used for firebombing / casevac / re-supply. This helicopter has the ability to carry 20 tons of water / equipment (depending on height/temperature).
- MI 8 MTV Medium Lift Helicopters.
- Fixed-wing aircraft for command and control and reconnaissance purposes.
- The manpower and capacity to man a central Command and Control Centre.

APPENDIX 8: STEERING COMMITTEE COMMENTS ON THE FIRST DRAFT

As requested by the Steering Committee, this appendix contains the written comments they provided on the first draft of this report, presented in late July 2000. The comments are those received up to 9 August 2000.

1. Commentator: Mr Fritz von Krosigk, Director: Community Forestry (DAAF)

Recommendations

7: Government must not be prescriptive. This is a fundamental principle of the new NV & FFA. Government could set guidelines.

27: Other Government Departments (DOA) and Research agencies (ARC, etc.) must develop programmes. The Department could really only include these messages in national awareness campaigns. Working For Water and for Ukuvuka could assist with both programme development and dissemination.

46 - 53: Too many tasks are listed for the Department. I'm afraid that too much is put into National Government's lap again.

Paragraph 6.9: Change Management

The recent complaint about national government's lack of guidance is out of context. The incident referred to requires predominantly guidance around legal issues and interpretations. Legal assistance is necessary from the Department's Legal Section.

2. Commentators: Mr CM Theunissen and Mr J K Schmidt, South Peninsula Municipality, Parks and Forests Division

Having read the draft we agree in principle with the recommendations contained therein. There are however a few minor factual errors and incorrect assumptions.

- Considerable emphasis is placed on the roles and responsibilities of the landowner in terms of the National Veld and Forest Fire Act. It is therefore not quite clear to what extent the municipality or agency in whose area of jurisdiction the fire occurs accepts accountability for any action or inaction on the part of the landowner concerned. Once the FPAs have been established the question arises as to who will ultimately be responsible and therefore accountable. It is not clear whether it will be the FPA or the managing local authority.
- Item 6.6.7: Aerial support - problems experienced in the Peninsula when the SAAF were called upon revolved mainly around uncertainties with regard to the rendering of assistance. One was never sure whether, and to what extent aerial support would be provided. Consistency in providing helicopters was never guaranteed and it is recommended that a proper agreement be negotiated. It is also a fact that municipalities seldom possess the financial means to sustain the use of aerial support over extended periods and it is further recommended that assistance rendered in the combating of bush and veld fires be done at preferential rates (as is applicable for disasters).

- Item 6.6.4: Human resources for fire-fighting control - Considering that the SPM was the major role player in combating the fires within the Cape Peninsula, no mention is made of this organisation's expertise. The SPM has a division within the Parks and Recreation Directorate that is specifically dedicated to the combating of veld, forest and mountain fires. The Parks and Forests Division is tasked with the role of fire pre-suppression and fire fighting and therefore possesses the necessary infrastructure and expertise. In this regard it can be mentioned that it has six qualified foresters specifically appointed for this purpose, all of whom are specialists in the management of wild fires, including specially equipped fire-fighting vehicles, emergency standby crews at all times and an emergency control room manned on a 24-hour basis.
- Fire reports - a number of minor errors occur e.g. wind direction reads South Westerly instead of North Westerly.

3. Commentator: Mr Braam du Preez, SAFCOL

Firstly I would like to congratulate the authors (members of the task team) with a comprehensive, balanced and factual report that covers all aspects of the recent Cape fires in detail. This report can also be used as a case study for similar events elsewhere in the Province and in S.A. for analysis of fires.

I agree with the findings and recommendations of the report as well as the detail, but would like to comment on one or two areas in more detail and more specifically i.e.:

- 6.3 Statutory Framework - Recommendation No. 6: a form of accreditation for FPOs is essential and must preferably be implemented before 2003
- 6.3 Recommendation 10: Agree with recommendation; but communication and contingency planning between both urban and "veld" fire managers specifically with regard to the urban-veld interface must be improved as a matter of urgency
- 6.4 Mutual Assistance: Accepted and legal mutual agreements are already in place between SAFCOL and several of its neighbours . SAFCOL will continue with format
- 6.5 Managing Fire Risk and Vulnerability: The report spells out all relevant elements and I agree 100% with the recommendations and believe that DWAF should play a more prominent role in this
- 6.6 Alien Invasive Plants: Thank you for a balanced review of the role of alien plants, which to my opinion was completely exaggerated by some prominent individuals. We have to deal with the threat of aliens to our environment and indigenous vegetation in an effective manner, however, which is well addressed in the report
- 6.5.5 Preventing Fires in Open Veld and 6.5.6 Urban Interface: More emphasis must be placed on fire prevention by all authorities and organisations involved in fire fighting. Agree 100 % with Recommendation 29 as well as Recommendation 30
- 6.6.6 Communications: It was one of the most important shortcomings during the week long fire-fighting operation in the Peninsula in January 2000 as well as many other fires elsewhere and must be addressed accordingly. I believe that more time and money should be spent on detection, timeous and accurate reporting of fires as well as rapid response, as all big fires start small.
- 6.6.7 Aerial Support: I believe that the Western Cape Provincial Government and WCNC Board are the best positioned to initiate and drive the possible establishment of an Aerial Fire Fighting Organisation for the South Western Cape (Cape Peninsula and Boland) which must include and represent all the important roleplayers involved in fire fighting. The forestry industry, as opposed to KZN and Mpumalanga, is way too small in the Western Cape to champion (drive) the process effectively.

4. Commentator: Mr P. Smith, Manager: Fire Services, Cape Metropolitan Council

- The report is comprehensive enough but cognisance must be taken of the “Implementation Plan” of the F.I.T.T. document to ensure that cohesion exists between the two documents and that contradictions do not occur.
- The report up to page 48 is very technical, with the result that very few will really understand the contents, but hopefully as stated earlier an executive summary will highlight only the more important issues and recommendations.
- Chapter 4 is not complete but the following should be noted:
 - No mention is made of the CMC Joint Operations Centre that was established on the 19/01/2000 and started to coordinate the disaster in a structured manner
 - Most of the disciplines were represented in this JOC, e.g. Fire, Disaster Management, SANDF, SAPS, etc.
 - Province did not establish a separate JOC as they felt it would be a duplication of the CMC JOC, but they were present in the CMC JOC at all times and co-ordinated issues across the whole Province
 - Communication flowed more freely upwards and downwards and a marked improvement was noticed with detailed information available on a continuous basis
 - A volunteer centre was established in Noordhoek and also worked well with volunteers manning the communication systems. It obviously became extremely hectic at times and was not communicated extensively enough to the public
 - 4.1 page 4 fourth par. to read – the working group is responsible for the co-ordination of fire services in the Peninsula Mountain Chain.
- Page 5 Top – There is very little clarity regarding the command structures and who filled these posts during the initial three days.
 - Second bullet - such as the Fire mutual Aid Agreement and the internationally recognised implemented Incident Management System were not adhered to.
 - Fourth bullet – In general it seemed that the initial inter-organisational communication was disjointed and poor. Likewise, communication between local Command Posts seemed poor
- 4.2.3 – will comment on at next meeting
- Very little said about fire fighting and communication problems encountered
- Chapter 5 missing
- Chapter 6: The recommendations should deal with specific topics, e.g. Disaster Management Bill, Veld and Forest Fire Act, etc.

5. Commentator: Mr P J Prins, Cape Peninsula National park (SA National Parks)

1. Generally a very well-researched and considered report. The recommendations, however, are very “top-down” and “prescriptive” with very little creative insight
2. We believe that there is an overemphasis on Disaster Management. In most cases in the peninsula veldfires do not meet the reasonable definition of a “disaster” (i.e. an event which exceeds the ability of the affected organisation to cope using its own resources). When is an incident a disaster, and who decides when an incident constitutes a “disaster”? This could arise to conflict situations. There is also very little contribution in the report in respect of normal fire-fighting activities.

3. Although the review team makes a lot of good recommendations, there is a paucity of recommendations re the financing of the proposed actions.
4. The Cape Peninsula National Park and the South African National Parks are referred to in the report as South Peninsula National Park, Cape Point Nature Reserve and National Parks Service respectively.
5. The issue of firebreaks is not adequately addressed in the report. The National Veld and Forest Fire Act does not adequately address multiple land ownership within a natural area and the inappropriateness of firebreaks between property owners. It also does not address the need for rational firebreaks across properties (not necessarily on boundaries), which enable protection of, for example, an urban edge. How are private property owners “forced” to become participants in this rational fire management strategy? Any exemptions for firebreak maintenance should be delegated to the FPA.
6. There is conclusive evidence that the fires on the peninsula were exacerbated by invasive alien plants (the opening sentence of 6.5.4 is contradicted by 6.1 and further info in 6.5.4). It is incorrect to state that “operations to clear invasive alien plants have aggravated the fire management problem” – if anything they constitute proactive strategic steps to address the fire management problem. The statement has no basis in fact. Fire logs for the Peninsula stated that within the Silvermine area “cut and stacked alien vegetation exacerbated the situation” – in the instance referred to there was very little stacked and cut alien vegetation in the vicinity (only a small section of pines that were commercially harvested and where the branches were stacked).
7. The origin of the Silvermine fire was not, as reported, from a braai picnic – it was from something flammable discarded from a passing vehicle. Also, the fire did not start “near the picnic site at Gate 2”, but within the road reserve near Gate 1.
8. Fire log: chronology, fire behaviour and fire-fighting efforts – only from a South Peninsula Municipality perspective, very little mentioned of the phenomenal role played by SANP staff in the fire-fighting activities.
9. It is not the cost only which dictates the balance between fixed-wing aircraft and helicopters but also the suitability of the area in which they are to be deployed – the mountainous terrain of the Peninsula and the lack of the required infrastructure would make use of fixed-wing aircraft very difficult.
10. There is very little difference in the training between rangers within South African National Parks and the rangers within the Western Cape Nature Conservation Board. In the case of SAFCOL, the curriculum with regard to the training of foresters makes provision for subjects with regard to fire management.
11. The efficacy of a “national fire reaction team” needs a lot more debate before a sweeping recommendation is made.

6. Commentator: Ms C Blake, SPM Legal Services Division

The preliminary draft report forwarded to myself for comments refers.

I have read the draft and think that it is an excellent summary of the current situation and proposed way forward. I have no formal comments to make.

7. Commentator: Brig. Genl. Monster Wilkins, SANDF

I have read through the draft review and have nothing further to add. I think that all pertinent points have been taken up and that the report is comprehensive. I concentrated mainly on chapter 6 - "Assessment and Recommendations" and have only given the remainder a cursory going over.

References

- ANDREWS, PL. 1986. BEHAVE: Fire behaviour prediction and fuel modelling systems - Burn Subsystems Part 1. USA Forest Service, General Technical Report INT-194.
- BANDS, DP. 1977. Prescribed burning in fynbos. In: *Proceedings of the symposium on the environmental consequences of fire and fuel management in Mediterranean ecosystems*, pp. 245-256. General Technical Report No WO-3, USDA Forest Service, Washington.
- BANDS, DP. 1985. The influence of mountain catchment area control measures on land management in the Groot Winterhoek area of the Western Cape. M.Sc. Thesis, University of Stellenbosch.
- BRAIN, CK & SILLEN, A. 1988. Evidence from Swartkrans cave for the earliest use of fire. *Nature* 336: 464-6.
- BOND, WJ . 1980. Fire and senescent fynbos in the Swartberg, Southern Cape. *South African Forestry Journal* 114: 68-71.
- BOND, WJ & VAN WILGEN, BW . 1996. *Fire and plants*. Chapman & Hall, London.
- BOTHA, CG. 1924. Note on early veld burning in the Cape Colony. *South African Journal of Science* 21: 351-352.
- BOUCHER, C. 1981a. Floristic and structural features of the coastal foreland vegetation south of the Berg River, Western Cape Province, South Africa. In: *Proceedings of a symposium on the coastal lowlands of the Western Cape* (ed. E Moll), 21-26. University of the Western Cape.
- BOUCHER, C. 1981b. Autecological and population studies of *Orothamnus zeyheri* in the Cape of South Africa. In: *The biological aspects of rare plant conservation* (ed. Syngé H), pp. 343-353. J Wiley and Sons Ltd., London.
- BOUCHER, C. 1983. Floristic and structural features of the coastal foreland vegetation south of the Berg River, western Cape Province, South Africa. *Bothalia* 14: 669-674
- BOUCHER, C & JARMAN, ML. 1977. The vegetation of the Langebaan area, South Africa. *Transactions of the Royal Society of South Africa* 42: 241-272.
- BOUCHER, C & LE ROUX, A. 1993. Dry coastal ecosystems of the South African west coast. In: *Dry coastal ecosystems: Africa, America, Asia and Oceania* (ed. Van der Maarel, E), pp. 75-88. Elsevier, Amsterdam.
- BROWN, JC. 1875. *Hydrology of South Africa*. John Crawford, Kirkaldy, UK.
- BROWN, PJ, MANDERS, PT, BANDS, DP, KRUGER, FJ & ANDRAG, RH. 1991. Prescribed burning as a conservation management practice: a case history from the Cederberg Mountains, Cape Province, South Africa. *Biological Conservation* 56: 133-150.
- CAMPBELL, BM. 1983). Montane plant environments in the fynbos biome. *Bothalia* 14: 283 – 298.
- COWLING, RM. 1987. Fire and its role in coexistence and speciation in Gondwanan shrublands. *South African Journal of Science* 83: 106-112.
- COWLING, RM & HOLMES, PM. 1992. Flora and vegetation. In: *The ecology of fynbos. Fire, nutrients and diversity* (ed Cowling, RM), pp. 23-61. Oxford University Press, Cape Town.
- DEACON, HJ. 1992. Human settlement. In: *The ecology of fynbos. Fire, nutrients and diversity* (ed. Cowling, RM), pp. 260-270. Oxford University Press, Cape Town.
- FAIRBANKS, DHK & SCHOLES, RJ. 1999. South African country study on climate change. Vulnerability and adaptation assessment for plantation forestry. Report ENV-P-C 99013, prepared by Environmentek, CSIR for the National Climate Change Committee, Department of Environment Affairs and Tourism, Pretoria.
- HENDEY, QB. 1983. Palaeoenvironmental implications of the late Tertiary fauna of the fynbos region. In: *Fynbos palaeoecology: a preliminary synthesis* (eds. Deacon, HJ, Hendey, QB and Lambrechts, JJN), pp. 100-115. Report No 75, South African National Scientific Programmes, Foundation for Research Development, Pretoria.

- HOLMES, PM, RICHARDSON, DM, VAN WILGEN, BW & GELDERBLUM, C. *In press*. The recovery of South African fynbos vegetation following alien woody plant clearing and fire: implications for restoration. *Austral Ecology*
- HORNE, IP. 1981. The frequency of veld fires in the Groot swartberg Mountain Catchment Area, Cape Province, South Africa. *South African Forestry Journal* 118: 56–60.
- HUNTLEY, BJ. 1987. Ten years of cooperative ecological research in South Africa. *South African Journal of Science* 83: 72-79.
- HUNTLEY, BJ. 1992. The fynbos biome project. In: *The ecology of fynbos. Fire, nutrients and diversity* (ed. Cowling, RM), pp. 1-5. Oxford University Press, Cape Town.
- JORDAAN, PG. 1949. Aantekeninge oor die voortplanting en brandperiodes van *Protea mellifera* Thunb. *Journal of South African Botany* 15: 121-125.
- JUHNKE, SR & FUGGLE, RF. 1987. Predicting weather for prescribed burns in the South-western Cape, Republic of South Africa. *South African Forestry Journal* 142: 41-46.
- KRUGER, FJ. 1977. A preliminary account of aerial plant biomass in communities of the Mediterranean-type climatic zone of the Cape Province. *Bothalia* 12: 555-560.
- KRUGER, FJ, & LAMB, AJ. 1979. Conservation of the Kogelberg State Forest. Preliminary assessment of the effects of management from 1967 to 1978. Interim report on project 1/3/11/07. Report No 79-02, Jonkershoek Forestry Research Centre, Stellenbosch.
- KRUGER, FJ & BIGALKE, RC. 1984. Fire in fynbos In: *The Ecological Effects of fire in South African Ecosystems* (eds. Booysen P de V and Tainton NM). Springer Berlin.
- LE MAITRE, DC, VERSFELD, DB, CHAPMAN RA. *In press*. Impact of invading alien plants on surface water resources in South Africa: A preliminary assessment. *Water SA*
- LE MAITRE, DC, VAN WILGEN, BW, CHAPMAN, RA & MCKELLY, DH. 1996. Invasive plants in the Western Cape, South Africa: modelling the consequences of a lack of management. *Journal of Applied Ecology* 33: 161-172.
- LEVYNS, MR. 1924. Some observations on the effects of bushfires on the vegetation of the Cape Peninsula. *South African Journal of Science* 21: 346-347.
- MARLOTH, R. 1924. Notes on the question of veld burning. *South African Journal of Science* 21: 342-345.
- PILLANS, NS. 1924. Destruction of the indigenous vegetation by burning on the Cape Peninsula. *South African Journal of Science* 21: 348-349.
- RAAL, P & LE MAITRE, D. 1996. An environmental management plan for the Bantamsklip nuclear site (Confidential). Report No. EMAS-C 96006 B (incl A), Division of Water, Environment and Forestry Technology, CSIR, Stellenbosch.
- RICHARDSON, DM, MACDONALD, IAW, HOLMES, PM & COWLING, RM. 1992. Plant and animal invasions. In: *The ecology of fynbos. Fire, nutrients and diversity* (ed. Cowling, RM), pp. 271-308. Oxford University Press, Cape Town.
- RICHARDSON, DM, VAN WILGEN, BW, LE MAITRE, DC, HIGGINS, KB & FORSYTH, GG. 1994. A computer-based system for fire management in the mountains of the Cape Province, South Africa. *International Journal of Wildland Fire* 4: 17-32.
- ROTHERMAL, RC. 1972. A mathematical model for predicting fire spread in wildland fuels. USA Forest Service, Research Paper INT-115.
- SCOTT, DF & VAN WYK, DB. 1992. The effects of fire on soil water repellency, catchment sediment yields and streamflow. In: *Fire in South African mountain fynbos. Ecosystem, community and species response at Swartboskloof* (eds. Van Wilgen, BW, Richardson, DM, Kruger, FJ and van Hensbergen, HJ), pp.216-239. Springer Verlag, Berlin.
- SCOTT, DF, LE MAITRE, DC & VAN WILGEN, BW. 1991. The problems relating to the fire site on Devil's Peak and proposals toward their solution. Report FOR-C 72, Prepared by the Division of Forest Science and Technology for the City Engineers Department, Cape Town.
- SCOTT, DF, PRINSLOO, FW & LE MAITRE, DC. 2000. The role of invasive alien vegetation in Cape Peninsula fires of January 2000. Report No. ENV-S-C 2000-039. Prepared for the Working for Water Programme, Department of Water Affairs and Forestry by Environmentek, CSIR, Stellenbosch.

- SEYDACK, AHW & ODENDAAL, PB. 1980. Beleidsmemorandum: Anysberg, Klein Swartberg, Groot Swartberg en Swartberg-oos. Forestry and Environmental Conservation, Department of Water Affairs and Forestry, Knysna.
- STOCK, WD & ALLSOP, N. 1992. Functional perspective of ecosystems. In: *The ecology of fynbos. Fire, nutrients and diversity* (ed. Cowling, RM), pp. 241-259. Oxford University Press, Cape Town.
- STOCK, WD, VAN DER HEYDEN, F & LEWIS, OAM. 1992. Plant structure and function. In: *The ecology of fynbos. Fire, nutrients and diversity* (ed. Cowling, RM), pp. 227-240. Oxford University Press, Cape Town.
- THOMPSON, M. 1992. Monitoring fires in remote areas. *Veld & Flora* 78: 121-123.
- VAN WILGEN, BW. 1981. An analysis of fires and associated weather factors in mountain fynbos areas of the South-Western Cape. *South African Forestry Journal* 119: 29-34.
- VAN WILGEN, BW. 1982. Some effects of post-fire age on the above ground plant biomass of the fynbos (macchia) vegetation in South Africa. *Journal of Ecology* 70: 217-225.
- VAN WILGEN, BW. 1984. Adaptation of the United States fire danger rating system to fynbos conditions. Part 1. A fuel model for fire danger rating in the fynbos biome. *South African Forestry Journal* 131: 13-17.
- VAN WILGEN, BW. 1985. Fire danger during wildfires in fynbos vegetation in the western Cape Province. In: *The derivation of fire hazard indices and burning prescriptions from climatic and ecological features of the fynbos biome*. Unpublished PhD Thesis – Department of Botany. University of Cape Town.
- VAN WILGEN, BW. 1986. A simple relationship for estimating the intensity of fires in natural vegetation. *South African Journal of Botany* 52: 384-385.
- VAN WILGEN, BW & BURGAN, RE. 1984. Adaptation of the United States fire danger rating system to fynbos conditions. Part 11. Historic fire danger in the fynbos biome. *South African Forestry Journal* 129: 66-78.
- VAN WILGEN, BW & RICHARDSON, DM. 1985. The effect of alien shrub invasions on vegetation structure and fire behaviour in South African fynbos shrublands: a simulation study. *Journal of Applied Ecology* 22: 955-966.
- VAN WILGEN, BW & VAN HENSBERGEN, HJ 1992. Fuel properties of vegetation in Swartboskloof. In: *Fire in South African mountain fynbos. Ecosystem, community and species response at Swartboskloof* (eds. Van Wilgen, BW, Richardson, DM, Kruger, FJ and van Hensbergen, HJ), pp. 37-53. Springer Verlag, Berlin.
- VAN WILGEN, BW, BOND, WJ & RICHARDSON, DM. 1992. Ecosystem management. In: *The ecology of fynbos. Fire, nutrients and diversity* (ed. Cowling, RM), pp. 345-371. Oxford University Press, Cape Town.
- VAN WILGEN, BW, EVERSON, CS & TROLLOPE, WSW. 1990. Fire management in southern Africa: some examples of current objectives, practices and problems. In: *Fire in the tropical biota. Ecosystem processes and global challenges* (ed. Goldammer, JG), pp. 179-215. Springer Verlag, Berlin.
- VAN WILGEN, BW, LE MAITRE, DC & KRUGER, FJ. 1985. Fire behaviour in South African fynbos (macchia) vegetation and predictions from Rothermel's fire model. *Journal of Applied Ecology* 22: 207-216.
- VAN WILGEN, BW, RICHARDSON, DM & SEYDACK, AHW. 1994. Managing fynbos for biodiversity: constraints and options in a fire-prone environment. *South African Journal of Science* 90: 322-329.
- VERSFELD, DB, LE MAITRE, DC & CHAPMAN, RA 1998. Alien Invading Plants and Water Resources in South Africa: A Preliminary Assessment. Report No. TT 99/98, Water Research Commission, Pretoria.
- WICHT, CL (ed.). 1945. *Report of the committee on the preservation of the vegetation of the south-western Cape*. Special Publication of the Royal Society of South Africa, Cape Town.
- WICHT, CL & KRUGER, FJ. 1973. Die ontwikkeling van bergveldbestuur in Suid Afrika. *South African Forestry Journal* 86: 1-17.
- WORTH, SW & VAN WILGEN, BW. 1988. The Blushing Bride: status of an endangered species. *Veld & Flora* 74: 123-124.
- WWF Report. *Climate change southern Africa*. Summary available at: http://www.panda.org/climate/pubs/Africa_Issues/index.htm