FOREWORD

The Department of Conservation and Land Management (CALM) has completed a review of progress with the implementation of the Dieback Protection Plan 1986 to 1988, for the South Coast Region.

As a result of this review, a modified Dieback Protection Plan has been prepared to cover the next five years, 1989 to 1993.

The achievements since 1986 have been very significant and have depended on the keenness, hard work and expertise of many CALM staff, drawn from several Branches within this Department.

To my mind, this has been one of CALM's great successes, which has benefited the conservation of the important endemic flora in this Region.

Syd Shea
EXECUTIVE DIRECTOR

PREFACE

This plan replaces the Dieback Protection Plan of 1986-88 and will be effective for a five year period. A review of progress in implementation of the previous plan is appended.

This dieback protection plan describes:

the dieback situation in the South Coast Region of the Western Australian Department of Conservation and Land Management (CALM)

strategies for dieback protection, including the determination of priority areas for management.

This dieback protection plan has been written for the guidance of departmental officers, and to meet the requirements of Sections 33(3) and 56(1) of the Conservation and Land Management Act (1984) which will provide for 'necessary operations (to be) undertaken... to restore the natural environment, and to protect...the...indigenous flora and fauna'. This plan will be made freely available to other government departments and Shire Councils; and to community groups, tertiary institutions and the general public on request.

THE DIEBACK PROBLEM IN THE SOUTH COAST REGION

The South Coast Region

This is one of the 11 administrative regions of the Western Australian Department of Conservation and Land Management. The South Coast Region stretches from the Irwin Inlet in the west to Eucla on the Western Australian/South Australian border in the east (Fig 1). The region encompasses 13 national parks, about 150 nature reserves and seven timber reserves. The South Coast Regional office is in Albany, there is a District office in Esperance, and rangers are stationed in the major national parks

What is dieback?

Dieback is the common name given to the disease caused by the microscopic soil borne fungus Phytophthora cinnamomi and other Phytophthora species. The fungus produces small motile spores which are spread in water, and large spores which will survive in soil and plant material. The spores infect plant roots and as the fungus establishes it rots the roots. Plants such as banksias die rapidly after infection, but trees such as jarrah often die gradually, hence the common name for the disease - "dieback".

Why is dieback a threat in the South Coast Region?

Firstly, the fungus can attack a wide range of plant species. It is known to attack at least 900 plant species in many different families. The Proteaceae (eg Grevillea, Banksia), Myrtaceae (eg Eucalyptus, bottlebrush, myrtles) and Epacridaceae (the heaths), which together dominate many of the plant communities in the South Coast Region, are highly susceptible. Numerous members of these families are endemic to the South Coast Region (that is, they are found nowhere else).

Secondly parts of this region have a warm, moist climate which favours the production of fungal spores, particularly after summer rains. Poorly drained soils which typify some of the region also favour the production of spores and spread of the fungus. Clay and laterite, which are significant components of many of the soils in the South Coast Region, act as impeding layers causing subsurface ponding necessary for the production of spores, and the water tends to drain laterally spreading the fungus further. Soils developed from limestone appear to be less susceptible to the disease.

Thirdly eradication is virtually impossible once the fungus is well established. Every effort must therefore be made to protect flora in the very substantial areas still free of the disease. The most effective protection is to ensure that the fungus is not introduced to uninfected areas.

In the light of these three factors, dieback is a serious problem in the South Coast region.

POLICIES FOR DIEBACK PROTECTION

The Department has seven policies regarding dieback protection for nature reserves, timber reserves and national parks in the South Coast Region. The aims of the policies are to:

a. prevent the introduction of dieback into disease-free areas; and

b. minimise spread in the areas where the disease already occurs.

These policies are:

1. A system of essential roads and firebreaks which are to be retained will be defined, based wherever possible on existing roads and firebreaks. Other roads and firebreaks will be closed.

2. Construction of new roads and firebreaks will take place only where essential. Where new roads and firebreaks are necessary, they will be located and constructed so as to minimise the risk of disease introduction or the impact of additional spread.

3. Offroad vehicular access on Departmental lands will be prohibited. Offroad access for management purposes (e.g., fire control) will also be strictly controlled and will be based on a consideration of hygiene requirements.

4. Before any operations are permitted the following factors will be evaluated:

i	the needfor the work proposed	iv	landform
ii	hygiene measures required	v	vegetation
iii	risk of introducing the dieback fungus	vi	likely impact
		vii	consequences of impact on land use

Evaluation will be based on a Seven Way Test which incorporates the above seven factors. A decision to accept, reject or modify the proposed activity will be made only after the relevant factors have been evaluated, using the Seven Way Test.

5. If a decision to proceed is made, existing hygiene practices, as specified in the Dieback Hygiene Manual, will be used. If necessary, new procedures will be developed.

6. Road and firebreak maintenance will be carried out in accordance with the guidelines given in the Dieback Hygiene Manual and such specific prescriptions as are required in special circumstances.

7. Undertake research, as far as practicable, on dieback spread, control, susceptibility of plant communities and risk of infection.

STRATEGIES FOR DIEBACK PROTECTION

The Department will implement the following strategies for dieback protection on nature reserves, timber reserves and national parks in the South Coast Region:

1. The programme of identification of priority areas for protection from dieback will continue, based on conservation values and predicted hazard;

2. Dieback protection plans for priority protection areas will continue to be prepared;

3. Staff and training will be provided;

4. Community awareness of the disease will be fostered;

5. Dieback mapping will continue;

6. Dieback research will be undertaken;

7. Monitoring of diseased areas will continue, and

8. An action plan has been prepared and will be implemented.

Each of these points is elaborated upon below.

1. IDENTIFICATION OF PRIORITY AREAS

The priority areas for protection from dieback will be determined using the following criteria:

1.1. Broadscale zoning of the region.

The whole region is to be zoned into hazard classes based on site conditions and biological factors. These should conform fairly closely with the A, B and C zones identified in the past three years.

1.2. Detailed zoning into hazard classes

Using existing vegetation, landform and geological mapping bases it is possible to identify hazard classes. Hazard is to be assessed on -

(a) climate: whether conditions are warm and moist for at least part of the year (Distance inland and local features affecting the amount of rain are to be considered).

(b) whether there is a high concentration of endemic susceptible species in the community

(c) whether soil characteristics/geomophology/geology suggest that soil conditions are favourable for P. cinnamomi

(d) whether conditions favour rapid spread of the fungus (drainage patterns, impeding layers, etc)

1.3. Tenure

Priority is to be given to CALM managed lands and lands which could be managed by CALM, as identified in the draft South Coast Regional Management plan.

1.4. Extent of infection

Areas of land with very limited disease or (at the other end of the spectrum) remnants within areas of very extensive disease are of equally high importance.

1.5. Public use

Where use is high there is a greater risk of introduction of the fungus. Vehicles and pedestrians are potential vectors.

1.5. Management capability

Dieback management is likely to be more effective in areas where departmental field staff are close at hand to implement this plan.

Effective dieback management will be applied to all CALM managed land but with most energy concentrated on the areas identified using the above criteria.

2. PREPARATION OF DIEBACK PROTECTION PLANS

Dieback protection plans for the areas of highest priority have been prepared. They are presented through Interim Management Guidelines and Area Management Plans. These will be available to interested parties.

The protection plans for individual parks and reserves will address the following aspects:

* The current description of each area and its key features.

* The current dieback status (extent and impact) and hazard rating of areas presently uninfected.

* Proposed management actions to prevent introduction and spread of dieback.

In developing these plans, recreational access and fire protection will be considered and integrated with the need for dieback protection.

3. PROVISION OF REGIONAL STAFF AND TRAINING

Additional staff and resources will continue to be required. Assistance from Specialist branches will continue to be provided.

Departmental staff will be trained in:

(a) disease biology and recognition of dieback - affected plants in the field and sampling procedures;

(b) use of the Seven Way Test guidelines and Necessary Operations Check List;

(c) use of the Dieback Hygiene Manual;

(d) general dissemination of information to the public;

(e) hazard mapping and disease biology.

4. INCREASING COMMUNITY AWARENESS

This programme will continue to ensure that the community, including other government departments and local government, is informed about the seriousness of, and the consequences of dieback on south coast flora and fauna and the need for protection programmes.

5. DIEBACK MAPPING

Dieback mapping will be important in monitoring disease behaviour, in addition to its role in planning hygiene and protection strategies.

The dieback mapping techniques developed for forest areas have been modified to suit the conditions on the south coast. Whilst some of the larger species found in forests (blackboys, zamias, banksias) also occur on the south coast, it has been necessary to use other indicators.This involves observation of the response of plant species to the disease, and detailed analysis of sampling results to establish the reliability of likely species as indicator plants. It may therefore take some time before this work is completed.

Dieback mapping will be done by several means, depending on the purpose of the mapping:

- ground survey along roads and firebreaks
- broadscale mapping by ground survey
- aerial photography of special areas

6. RESEARCH

Study of the following is required:

6.1. The range and distribution of susceptible species

Departmental staff will sample a wide range of plant species to determine useful indicators of the disease.

In the longer term a research project will be designed to determine the susceptibility of declared rare species or species not previously sampled.

6.2. The hazard rating of plant communities and their risk of infection

6.3. Mechanisms and rate of spread in different areas

Basic information on the pattern of the disease in different plant communities is needed. Hazard may be correlated with rainfall and drainage patterns.

6.4. Control measures

Further research is required into the large scale use of control measures such as fungicides, soil sterilants and physical barriers to the movement of the fungus.

6.5. Rehabilitation

Rehabilitation may be necessary in areas prone to erosion. Research is also required to identify local species or strains resistant to the fungus.

6.6. Historical research

Research into past land use and records of the disease patterns essential. Such work could prove invaluable in assessing possible vectors of the fungus. These may include native and feral animals, as well as man.

6.7 Aerial Photographs

Continue the assessment of the effectiveness of aerial photography for interpretation purposes.

7. MONITORING

Monitoring is necessary to determine the rate of spread of the fungus and the success of control measures. The following techniques will be used:

7.1. Pegging infection boundaries

The boundary of most dieback infections can generally be marked along the "green line" between infected and uninfected vegetation. A number of sites will be chosen across the region (Cape Arid National Park, Bell Track in the Fitzgerald River national Park, Stirling Range National Park, Millbrook Nature Reserve).

7.2. Aerial photography

Aerial photographs record disease location at a point in time, and a series illustrates the pattern of disease spread.

Whilst aerial photography is a specialist area, the other forms of monitoring can be carried out by departmental field staff who are in closest contact with the situation. In addition these personnel are in a position, through constant observation and documentation, to further improve the understanding of dieback disease behaviour.

7.3. Map updates

It will be essential to regularly update existing dieback free maps.

8. ACTION PLAN

All of these strategies will be converted to departmental instructions. These will deal with the day to day procedures for implementing the strategies. These procedures will identify the task to be done, who will be responsible, operational guidelines and control systems.

This action plan identifies how the seven strategies outlined in the Dieback Protection Plan will be implemented.

STRATEGY	RESPONSIBILITY	TIME FRAME
1. Identification of priority areas		
- co-ordination	South Coast Region Environmental Protection Branch	Ongoing
- broadscale zoning	South Coast Region Environmental Protection Branch, Research, Interpreters	Ongoing Dec 1989
- detailed zoning	Research, Interpreters	Dec 1990
2. Preparation of Dieback Protection Plans	South Coast Region submit to relevant branches for comment	Ongoing annual review
3. Provision of regional staff	General Manager	Ongoing annual review
- training	South Coast Region Environmental Protection Research Branch	Ongoing
4. Increasing community awareness	South Coast Region Environmental Protection Public Affairs	Ongoing
5. Dieback mapping - roads and firebreaks	District Staff, Inventory (Interpreters)	1989/90
- mapping by ground survey	Inventory (Interpreters)	1989/90
- aerial photography (special areas	Inventory (Interpreters)	Autumn 1989
- aerial photography (broadscale)	Inventory (Interpreters)	1993
6. Research	Research Branch	Ongoing
7. Monitoring		
- pegging infection boundaries	South Coast Region	Summer 1989/90
- aerial photography	Inventory (Interpreters)	Autumn 1989 & bi-annually

SOUTH COAST REGION

DIEBACK PROTECTION PLAN 1986-88

A REVIEW

Management of dieback disease was seen as a high priority in 1985 for areas under CALM management in the South Coast Region.

In 1986 the South Coast Region Dieback Protection Plan 1986-88 was prepared, distributed and subsequent implementation commenced. A written review of this plan was to be prepared in 1988 and a revised protection plan prepared.

Review of Dieback Protection PLan 1986-88 by Strategies

Strategy 1 Identification of priority areas for protection

The region was divided into three zones based on these criteria:

A Zone
- High rainfall
- Known infections
- High hazard sites
- High public use
- Management capability

B Zone
- Lower rainfall
- No known infections
- Moderate/low hazard sites
- Limited public use
- Minimal management capability

C Zone
- Low rainfall
- No known infections
- Low hazard
- Nominal public use
- Nominal management capacity.

17 priority areas within the A Zone were targeted (see Table 1) based on age of infection, endemism and susceptibility of flora, level of public use, condition of roads and management presence.

Strategy 2 Preparation of Dieback Protection Plans

Dieback protection plans are prepared through either Interim Management Guidelines or Area Management Plans. The current status of the Dieback Protection Plans for the 17 priority areas is outlined in Table 1.

Strategy 3 Implementation of Departmental Policy

Within most of the 17 priority areas the following actions have occurred.

(a) A system of essential access roads, tracks and firebreaks has been identified, others have been closed.

(b) Essential access has been upgraded or limited to dry soil activities. Further work is required, particularly on unsheeted tracks in the Fitzgerald River National Park.

(c) Any major earthmoving works are now considered under Necessary Operations Guidelines (Administrative Instruction 39).

(d) Off-road vehicle use continues to be policed.

(e) 7-way tests are carried out for all earthmoving operations.

(f) Provisions of the Dieback Hygiene Manual are implemented for all operations including firebreaks and road maintenance.

(g) Washdown facilities have been installed at 10 stations:

Cape Arid National Park
Cape Le Grand National Park
Esperance Depot
Stokes National Park
Fitzgerald River National Park (Jacup and East Mt Barren)
Stirling Range National Park
Porongurup National Park
William Bay National Park
Torndirrup National Park.

A mobile washdown unit is permanently based at Two Peoples Bay Nature Reserve.

Strategy 4 Provision and Training of Staff

Regional staff have been trained in dieback recognition, sampling and management. With new staff coming into the region this is an ongoing requirement.

Strategy 5 Increasing Community Awareness

A major community awareness programme was carried out in 1986/87. This involved meetings with shires, public interest groups, press coverage, preparation of brochures and broadsheets.

Strategy 6 Dieback Mapping

Mapping of disease infections has occurred (see Table 1) by:

(a) Mapping of disease boundaries along roads and firebreaks prior to upgrading or maintenance.

(b) Broadscale survey by trained staff mapping along roads, tracks and footpaths. In the case of the Stirling Range National Park a distribution map for the whole park has been prepared from ground survey.

(c) Sample photography has been taken of 10 priority areas. This photography has been interpreted and reports for each sample are available. Distribution maps derived from this interpretation are not yet available.

(d) Records of dieback sample points are held at District and park headquarters.

Draft hazard maps have been prepared for some areas (Table 1) based on vegetation, landform and geological maps. Some important findings have been made through mapping of the disease. Dieback is much more widespread than was thought several years ago. In parks such as the Stirling Range and Cape Le Grand the disease is so widespread that the protection of remnant dieback free areas is now considered to be critical.

The impact of the disease is greater on some sites. Hazard mapping, using landform vegetation and geology is an essential tool for choosing road alignments, firelines, etc, and needs to be refined and applied across the whole region.

Strategy 7 Research

Some research has been carried out, eg:

- species susceptability by Dr G Keighery
- work on eradication by T Hill has relevance to the South Coast.

There is, however, a need for greater input into dieback disease studies on the south coast, especially in community susceptabilities and the mechanisms of spread in different areas.

Strategy 8 Monitoring

Records of dieback samples have been kept. Some infection fronts have been pegged, eg Bell Track infection at the Fitzgerald River National Park. Aerial photography has provided a baseline to monitor change (Table 1).

Conclusion

A number of achievements in implementation of the plan have been made. In the light of our experience and achievements over the last two years it is appropriate to review and renew the plan.

TABLE 1 RESULTS ACHIEVED DURING THE PERIOD OF THE 1986-1988 DIEBACK PROTECTION PLAN

	DIEBACK PROTECTION PLAN	DIEBACK ASSESSMENT OF ROADS AND FIREBREAKS	DIEBACK MAPPING - GROUND SURVEY	DIEBACK SAMPLE AERIAL PHOTOGRAPHY	MAPS OF DIEBACK SAMPLING POINTS	HAZARD MAPS
Cape Arid National Park	IMG in place 1988	Yes	No	Yes	Yes	B
Cape Le Grand National Park	IMG in place 1987	Yes	No	Yes	Yes	B
Stokes National Park	IMG Draft Approved	Yes	No	Yes	Yes	B
Fitzgerald River National Pk	Area Management Plan Draft December 1988	Yes	Yes	Yes	Yes	A,B
Stirling Range National Park	IMG in place 1987	Yes	Yes	Yes - Not interpreted	Yes	B
Porongurup National Park	IMG in place 1987	Yes	No	No	Yes	B
Torndirrup National Park	IMG Draft Approved by branches	Yes	No	No	Yes	C & M
West Cape Howe National Park	IMG Draft Prepared	Yes	No	Yes	Yes	C & M
William Bay National Park	IMG Draft Prepared	Some	No	No	Yes	-
Hassell National Park	No Action	Some	No	nO	Yes	-
Three Esperance Townsite Nature Reserves	IMG Draft Prepared	Yes	No	No	Yes	-
Two Nature Reserves at Hopetoun	No Action	No	No	No	Yes	-
Two Peoples Bay Nature Reserve	Area Management Plan Draft Prepared	Yes	No	Yes	Yes	C & M
Millbrook Nature Reserve	No Action	Yes	Yes	No	Yes	-

NOTE: Hazard maps based on the following vegetation mapping bases: B. Beard
see IMG's for references to documents A. Aplin
C & M. Churchwood and McArthur.

* IMG = Interim Management Guidelines