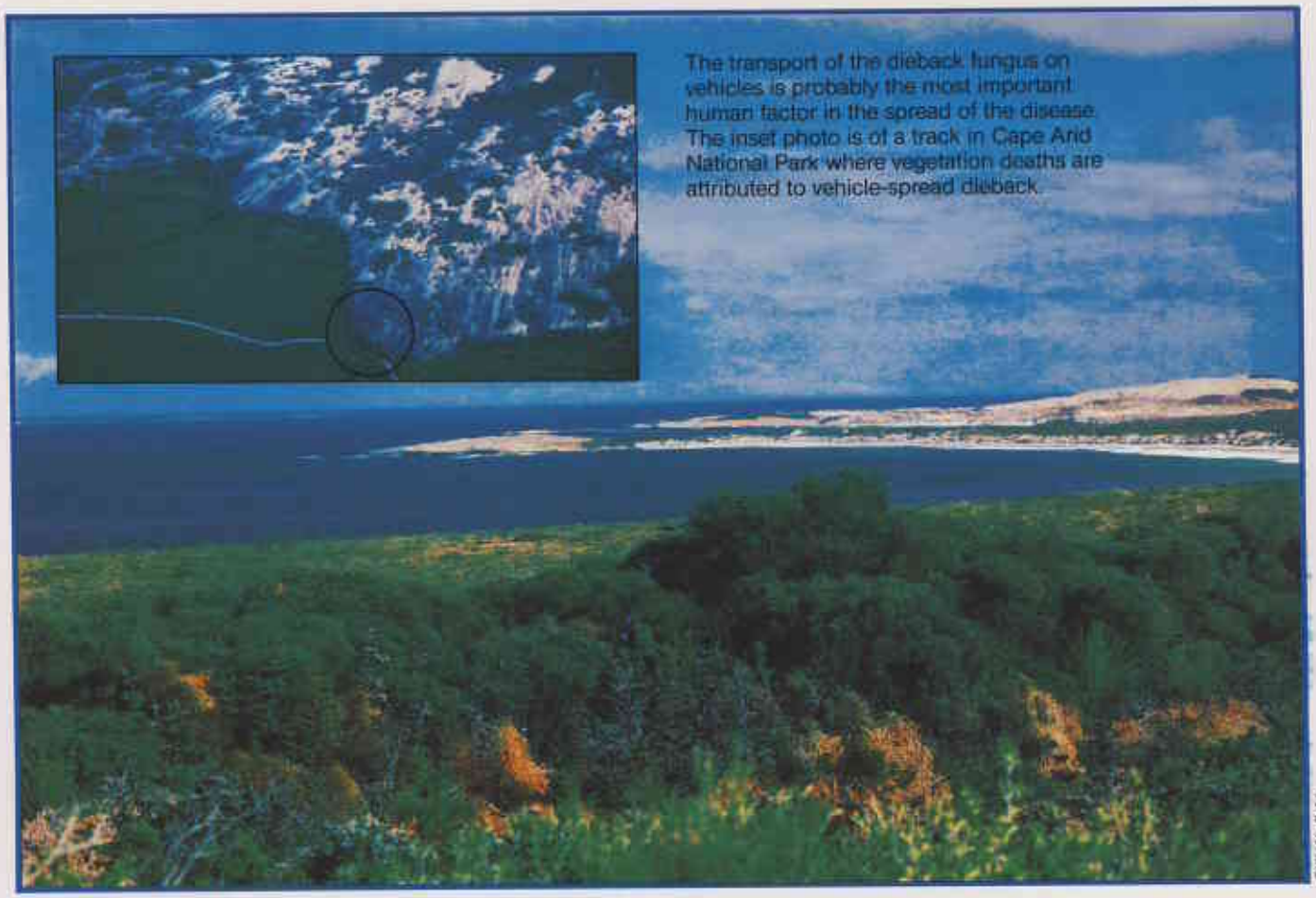


The transport of the dieback fungus on vehicles is probably the most important human factor in the spread of the disease. The inset photo is of a track in Cape Arid National Park where vegetation deaths are attributed to vehicle-spread dieback.

Clair Winfield

Dieback on the South Coast

by A. J. Brandis & F. Batini

Winning the dieback war depends on everybody — including campers, anglers, walkers, rangers, foresters, scientists, and those with commercial interests — acting together to stop the spread of this disease through our forests, national parks and nature reserves.

Introduction

The fungus *Phytophthora cinnamomi*, cause of the disease known locally as dieback, occurs throughout much of southern Western Australia. Although most people are aware that dieback poses a threat to our jarrah forests, it is less well known that the fungus has the potential to damage seriously other types of vegetation, including the banksia woodlands and heathlands which extend from east of Esperance to north of Perth. Many of these species occur on sites favourable to the fungus — areas of infertile soil which are poorly drained. Susceptible plants, like banksias, are often important food sources or habitats for animals such as the honey possum and birds, which can become hidden victims. Many host plants, particularly of the genus *Adenanthos*, are not widely distributed, so it is doubly important to prevent the spread of dieback into small and unique communities.

How Does The Fungus Spread?

A number of factors help spread *P. cinnamomi* through the south-west. Certain porous soils low in organic matter allow an easy percolation of the fungus through the soil — which is dieback's natural way of spreading. Harsh soils also encourage the development of specialized adaptations in the root systems of some species. Many south-western plants have fine, spreading and extremely efficient root systems which allow them maximum intake of nutrients, and, by the same token, maximum susceptibility to the fungus.

Dieback thrives in warm moist conditions, and it spreads most rapidly when rainfall coincides with warm temperatures, generally in early

and late summer. At these times the disease can spread exponentially with the help of 'artificial' factors such as human disturbance. The transport of infected soil and plant material by private vehicles and heavy machinery used in road making, road maintenance and logging is probably the single most important factor in the spread of dieback. A bulldozer not cleaned after working in an infected area, for example, could easily spread the disease to an uninfected site many kilometres away. Once an area is infected there is little that can be done to prevent the fungus from establishing at that site and spreading naturally.

F. Batini

Dieback is killing some species of plants in the Stirling Ranges along Stirling Drive.

Recent Developments

With the discovery of outbreaks in several national parks and nature reserves on the south coast, the fight against dieback has become increasingly urgent.

The vast area of land encompassed by the south coast and the Stirling Range National Park contains an unknown, but undoubtedly large, number of species threatened by *P. cinnamomi*.

Members of the Proteacea group of plants (including *Banksias* and *Adenanthos*) are especially vulnerable — and very numerous and highly evolved along the south coast.

Recently, officers from the Department of Conservation and Land Management's State headquarters and from the South-coast Region have inspected most of the national parks and some of the major nature reserves to assess the amount of dieback present and the likely impact on flora and fauna.

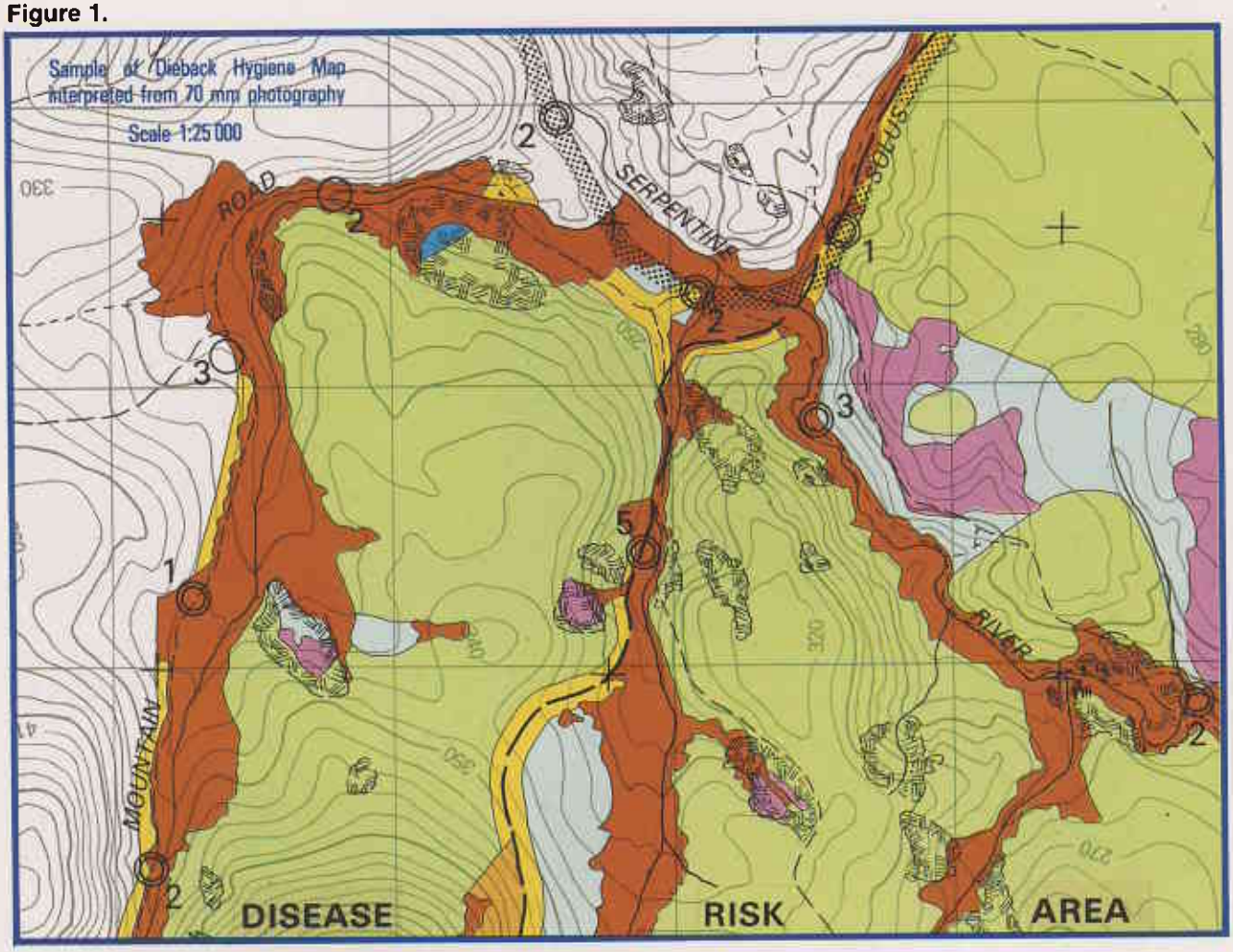
The extensive spread of the fungus in the Stirling Range National Park has been known for some time. Dead vegetation is particularly evident around the Toll Peak walking track. On the eastern and western slopes of Mt Arid, in Cape Arid

A. J. Brandis

Banksia pulchella (above), one of many coastal heathland species (below) threatened with destruction by dieback.

Cliff Winfield

Figure 1.



HYGIENE MAP—LEGEND

SECURE DIEBACK-FREE: FOREST APPARENTLY FREE OF DIEBACK AND UPSLOPE FROM DIEBACK, SUSPECT, UNINTERPRETABLE, AND N.E.Q. ROADS.

LOW POTENTIAL RISK: FOREST APPARENTLY FREE OF DIEBACK BUT DOWNSLOPE FROM DIEBACK, SUSPECT, UNINTERPRETABLE OR N.E.Q. CONSIDERED TO HAVE A LOW POTENTIAL FOR INFECTION BY *PHYTOPHTHORA CINNAMOMI* BY NATURAL SPREAD.

UNINTERPRETABLE: FOREST IN WHICH SUSCEPTIBLE PLANTS ARE ABSENT OR TOO FEW TO ENABLE THE INTERPRETATION OF *P. CINNAMOMI* PRESENCE OR ABSENCE.

N.E.Q.: FOREST ADJACENT TO ROADS IN WHICH THERE IS A POTENTIAL FOR INCIPIENT DISEASE.

HIGH POTENTIAL RISK: FOREST APPARENTLY FREE OF DIEBACK OR UNINTERPRETABLE, BUT DOWNSLOPE FROM OR IN THE SAME SWAMP AS DIEBACK OR SUSPECT. CONSIDERED TO HAVE A HIGH POTENTIAL FOR INFECTION BY *P. CINNAMOMI* BY NATURAL SPREAD, IN FREE WATER.

SUSPECT: FOREST IN WHICH THE EVIDENCE FOR *P. CINNAMOMI* PRESENCE OR ABSENCE IS INCONCLUSIVE.

DIEBACK: FOREST AREAS WHICH SHOW CURRENT DIEBACK SYMPTOMS AND ARE SUPPORTED BY LABORATORY RECOVERIES OF *P. CINNAMOMI* FROM SOIL AND TISSUE SAMPLES.

N.B.—N.E.Q. NOT EFFECTIVELY QUARANTINED—ROADS, TRACKS WITHIN THE DISEASE RISK AREA THAT HAVE HAD CONSIDERABLE USE THROUGHOUT ALL SEASONS WITH AN UNKNOWN DEGREE OF HYGIENE.

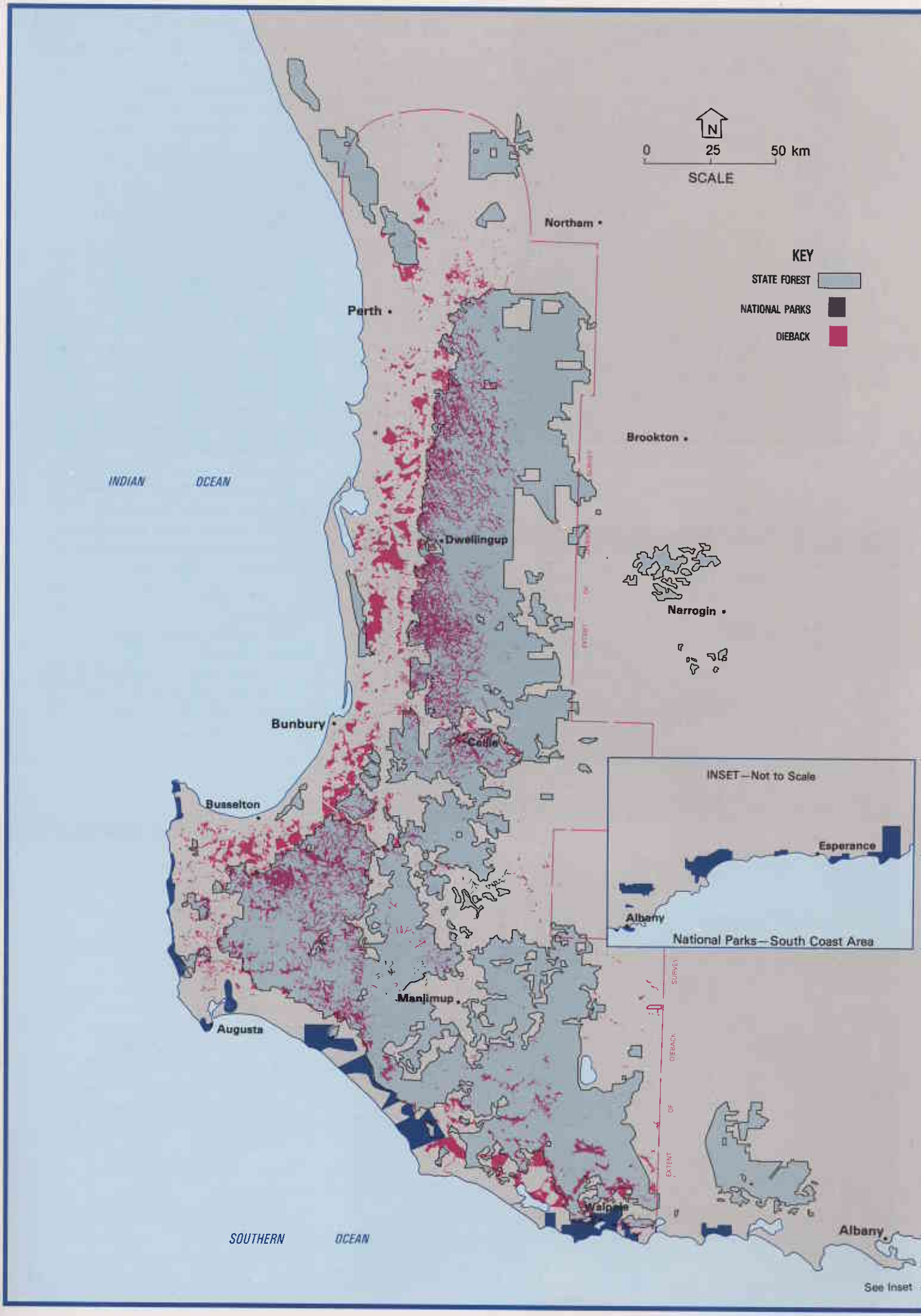
INCIPIENT DISEASE—FOREST IN WHICH *P. CINNAMOMI* MAY BE PRESENT BUT SYMPTOMS ARE YET TO APPEAR.

MAP LIMITATION: THE SMALLEST AREAS OF INTERPRETATION THAT CAN BE PORTRAYED ON THIS MAP ARE 1 MILLIMETRE IN DIAMETER, REPRESENTING 25 METRES DIAMETER ON THE GROUND. AREAS LESS THAN THIS ARE SYMBOLISED TO THIS SIZE.

Figure 1.
A hygiene map showing where dieback is located or suspected. The map also shows areas at risk from natural or artificial spread, as well as those that remain, as yet, dieback free.

Figure 2.
The general distribution of dieback in Western Australia.

FIGURE 2.


N
0
25
50 km
SCALE
KEY
STATE FOREST
NATIONAL PARKS
DIEBACK
Northam
Perth
Brookton
INDIAN
OCEAN
Dwellingup
Narrogin
Bunbury
Collie
Busselton
INSET—Not to Scale
Esperance
Albany
National Parks—South Coast Area
Manjimup
Augusta
Walpole
Albany
SOUTHERN
OCEAN
See Inset

Cliff Winfield

A healthy specimen of *Banksia speciosa*.

Cliff Winfield

Most of the susceptible plants between the base of Mt Arid and the track will eventually suffer the same fate as this *Banksia speciosa*.

Cliff Winfield

National Park, diseased vegetation bears witness to the fearsome rapidity with which the fungus spreads. First observed here as recently as 1984, *P. cinnamomi* has already made inroads into vegetation strips bordering granite outcrops, hillslopes and a *Banksia speciosa* community west of Mt Arid. At Cape Le Grand National Park damage to coastal communities with a high proportion of susceptible proteaceaous species is depressingly evident. Fortunately, despite fears, the Fitzgerald River National Park still appears to be almost free of the disease. The one known occurrence is near the northern boundary on the Bell track. A susceptible site downslope of an old gravel pit on the western flank of east Mt Barren has been inspected, but the presence of *P. cinnamomi* is considered unlikely.

The potential impact of dieback on south coast flora is devastating, because many of these plants grow only in restricted areas in Western Australia, and, unless we can protect and conserve them in our national parks and nature reserves, they could face extinction.

What We Are Doing

Although cause for concern, the above findings are the first step towards controlling the disease — determining its distribution. Hygiene measures already taken include the provision of facilities for washing down vehicles and machinery in the Fitzgerald River and Esperance area. Already the Bell track in the Fitzgerald River National Park has been closed, and plans to close other tracks traversing the diseased areas in the south coast parks and reserves are being completed.

We control the spread of the disease by:

Introducing hygiene measures for all activities

within State Forests, national parks and nature reserves to reduce the risk of disease introduction and spread;

and,

Restricting public and industry access to areas that have little or no disease but contain many susceptible species of plants. Some access by foot will usually be permitted.

An important strategy for determining the distribution of dieback is the production of disease maps, based on interpretation of colour aerial photographs. An area to be photographed and mapped must be undisturbed by fire or human activities for about three years because it takes that amount of time after an initial infection for the disease to become detectable on the photographs. The final product, known as a hygiene map (Fig. 1), shows where the disease is located, suspected, or areas at risk from natural or artificial spread. The hygiene maps also show areas that, as yet, remain dieback-free.

How You Can Help

We have a lot to lose through dieback spread. Visitors to our State Forests, national parks, and nature reserves need to be aware of the long-term detrimental effects of dieback to conservation and aesthetic values.

There are many reasons to visit these areas. You may live nearby and enjoy bird watching or fishing, you may be studying the range of wildlife unique to these ecosystems, you may be employed by the Department of Conservation and Land Management, or private industry, you may be touring the parks in vehicles or on foot. Whatever the reason, if you visit the south coast please help reduce the spread of dieback.

Keep to appropriate, well-formed, well-drained roads and observe departmental notices of road closure. Park visitors can become our greatest allies in the fight against dieback by familiarising themselves with the appearance of dieback, and notifying the ranger of suspected outbreaks. Vehicle owners, particularly those with four-wheel drives, should use the vehicle washing facilities available, especially if they are moving from one park to another.

All construction and maintenance work, including Commonwealth, State and Local Government works, must consider the need for controlling dieback spread. Planned activities of any sort must be discussed with departmental staff well in advance.

The unique flora of our state is a heritage belonging to everyone, therefore we must all take responsibility for ensuring its preservation.

Further Information

For further information please contact

— The Regional Manager, Department of Conservation & Land Management. 44 Serpentine Rd, ALBANY WA (098) 41 4088

— The Branch Manager, Environmental Protection, Department of Conservation & Land Management, Hayman Road, COMO WA 6152 (09) 367 6333

Cliff Winfield

The circled area in this photograph of Cape Arid National Park is a patch of vegetation which has already succumbed to *P. cinnamomi*.

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Contents

The Charm of Yanchep
David Lamont
Helen Bradbury ..... Page 3

Dieback on the South Coast
A. J. Brandis
F. E. Batini ..... Page 6

Fragile South Coast: A Photo Essay
Cliff Winfield ..... Page 12

Searching for Numbats
G. W. Connell
J. A. Friend ..... Page 21

Historic Trees of Western Australia
Len Talbot ..... Page 27

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Cover — Looking west over Groper Bluff towards Cape Riche on the south coast of Western Australia.

Harmony of nature and civilization: mother and joey on the lawn in the morning light seem to symbolize . . .

The

No other national park reflects the changing attitudes to conservation and land management over the years than does Yanchep, 53 km north of Perth on the coastal plain, and one of the oldest of WA's parks. Established in 1903 for 'Protection and Preservation of Caves and Flora and for a Health and Recreation Pleasure Resort', Yanchep reveals a series of developments that are generally not contemplated in national parks being established today.

Entrance to the park immediately gives the visitor an impression of a garden. Graceful lemon-scented gums, planted by children as an Arbor Day tribute