

*Managing Phytophthora cinnamomi
for biodiversity conservation in the
South Coast NRM region of Australia*

**Phytophthora Dieback Management Plan for
the South Coast Region
2010-2017**

Summary of the (draft) Management Plan prepared for *South Coast Natural
Resource Management* in Western Australian.

(draft) SUMMARY DOCUMENT

Version 2

Date: February 2009

PREFACE

Purpose and Scope of the Plan

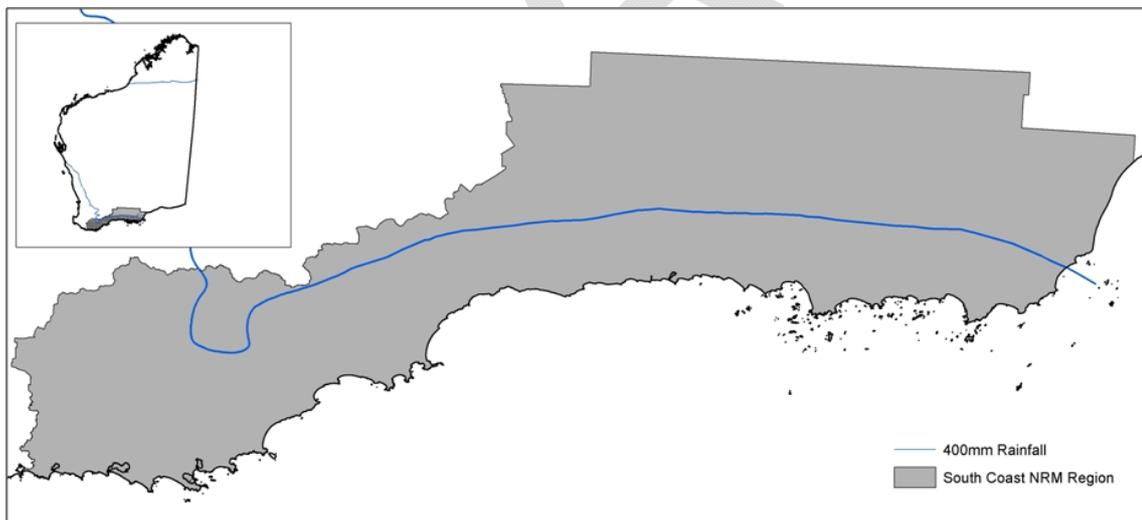
The substantial and extensive impact of Phytophthora Dieback on biodiversity values within the South Coast region is of global significance. There is considerable potential for the disease to spread further across the region. There is currently no means to eradicate the disease from infested areas once introduced.

The purpose of the Phytophthora Dieback Management Plan for the South Coast region is to:

1. provide strategic context for investment in Phytophthora Dieback response within the region, and
2. engage stakeholders at all relevant levels for effective participation in response activities.

The geographic scope of the Plan extends from west of Walpole to Cape Arid National Park east of Esperance within the South Coast NRM region. The boundary used is the South Coast NRM region south of 400mm isohyet and all of the Stirling Range National Park plus a 10km buffer (an area of 4,200,000 Ha – 45% of the South Coast region). The area is shown in Figure 1.

Figure 1 Geographic extent of the Phytophthora Dieback management plan



The Plan is for an investment period of 7 years (2010-2017) set with a 25 year Vision statement period based on a 100 year planning horizon.

Strategic management plans are to be prepared for other NRM regions in Western Australia following the processes developed for the South Coast plan. Regional management of Phytophthora Dieback is to be linked at a State-level through the *Dieback Response Framework* developed for government by the Western Australian *Dieback Consultative Committee*.

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Section 1

Phytophthora Dieback in the South Coast Region

1.1 What is Phytophthora Dieback?

Phytophthora Dieback is a root pathogen that infests plants resulting in death of susceptible species in forest, woodlands and heathlands of Australia. Phytophthora Dieback is caused by a microscopic soil-borne water mould (*Phytophthora* spp.). The word '*Phytophthora*' derived from Greek language means 'plant killer'. The disease is closely related to the potato blight (*P. infestans*) that spread rapidly across Europe causing catastrophic famine in Ireland in the 1840's. Soil conditions, a mild moist climate and the occurrence of susceptible plant communities within the South Coast region are conducive to the establishment and survival of the pathogen.

Dieback disease affecting our native vegetation probably originated from the forests of Asia being transported here soon after European settlement. There are anecdotal reports of the disease in the region from about the 1950's.

The *Phytophthora* pathogen invades roots and stems killing plant cells reducing the plants ability to transport nutrients and water. This eventually kills the plant where species are susceptible. The life cycle of Phytophthora Dieback is shown in Figure 1. 1. In addition to native flora, plants in commercial nurseries, horticulture (e.g. avocados) and domestic gardens are also susceptible.

Phytophthora cinnamomi is spread by soil or plant material that is relocated in the landscape by 'vectors' such as feral animals or earthmoving equipment. It can also be spread by water in the landscape or root-to-root contact between plants (known as autonomous spread). The disease can spread rapidly downslope by water flow or soil erosion from an infested area. Any process that transports soil from an infested area has potential to spread the disease. Vehicle movement, soil disturbance or local flooding from infested areas is a high risk.

1.2 Where it occurs in the South Coast Region

Recent mapping based on disease interpretation information shows where Phytophthora Dieback occurs in the south-west of Western Australia (the Phytophthora Dieback *Atlas*, Dieback Working Group, 2006). The total area of remnant vegetation in the region is 1,780,000 ha. The area of potential Phytophthora Dieback infestation is 395,151 ha (22.2% of natural vegetation remnant in the region).

Some areas of native vegetation have extensive disease infestation. For example, some 65% the Stirling Range National Park is estimated to be broadly infested by the disease.

The results of regional interpretation show that of the total susceptible area within the region (4,200,000 Ha), 5.5% is infested (or 18.1% of the area that was interpreted) and 25.1% is considered to be non-infested (only 3.8% is assessed

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with high or medium confidence information). The remaining area of the region is mostly agricultural land (54.6%) or not interpreted (13.8%) for various reasons.

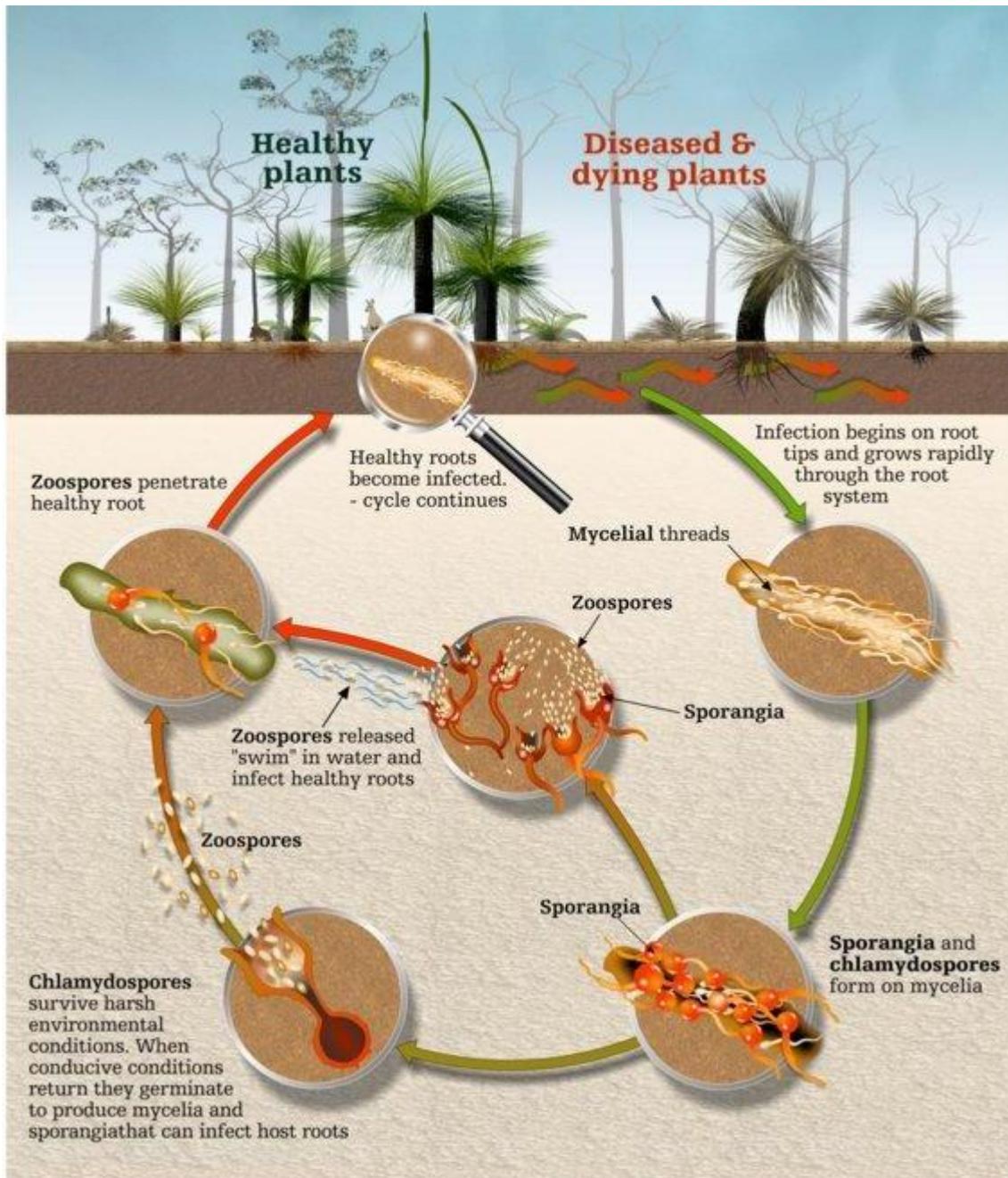


Figure 1.1 The Phytophthora Dieback lifecycle

(Source: WWF Australia, 2004, Dieback Working Group, 2008)

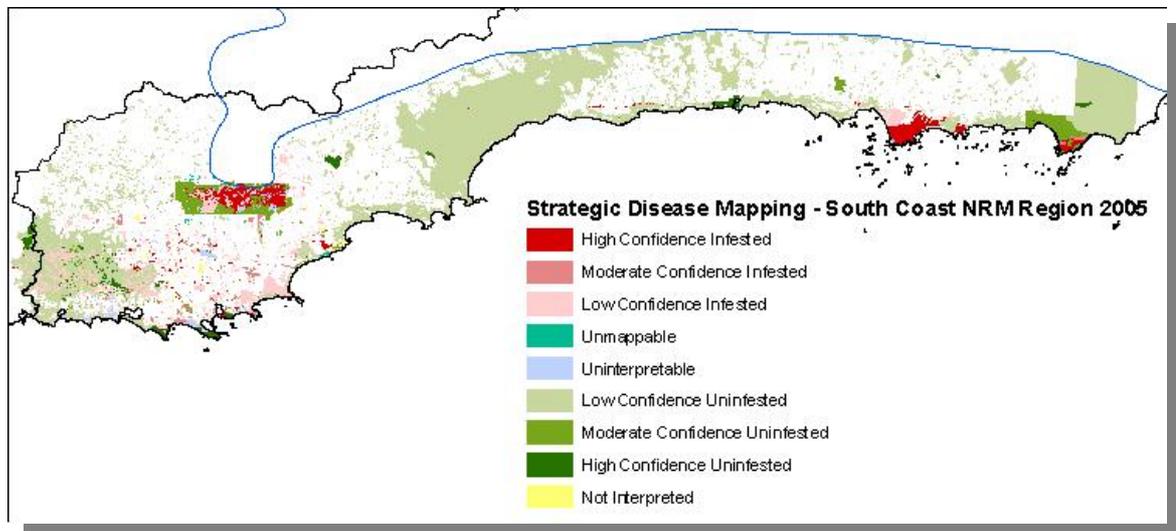
Map 1.1 shows the distribution of infested and non-infested areas interpreted for the region.

Information about the extent of Phytophthora Dieback infestation within the South Coast region is incomplete. Some areas have not been interpreted and a large proportion of assessed areas have only low or medium confidence information.

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There is an ongoing need to assess areas of natural vegetation and to systematically record high confidence information for the region.

Map 1.1 Disease mapping for *Phytophthora cinnamomi* within the South Coast region. (Source: DEC, 2007)



1.3 Impact on Biodiversity

The biological diversity (or 'biodiversity') of the South Coast region is well recognised. The area is within the Southwest Australian Floristic Region internationally-recognised for being one of 34 global 'hotspots' for biodiversity, and is the only identified global hot-spot for conservation in Australia.

The flora is rich in species with a high level of endemism (only occurring in geographically restricted locations) and has evolved in an ancient, nutrient-deficient landscape. An estimated 20% of the State's flora taxa occur within the South Coast region.

More than 40% of species are considered to be susceptible to the direct impact of *Phytophthora Dieback* in south-west Western Australia. The banksia (Proteaceae), pea (Papilionaceae), southern heath (Epacridaceae) and grass-tree (Xanthorrhoeaceae) families are highly susceptible to the disease. The disease can result in a significant reduction in vegetation cover and substantial changes in vegetation structure. Local extinction of plant species may also occur in infested areas. Change in vegetation structure and composition significantly changes habitat value for fauna.

The impact of *Phytophthora Dieback* is significant to threatened flora and fauna. For example, the highly susceptible prickly honey-suckle (*Lambertia echinata ssp echinata*), one of Australia's most endangered species found only in Cape Le Grand National Park, is highly threatened by the disease. Whole communities are also threatened by the disease such as the critically endangered Eastern Stirling Range Montane Thicket and Heath Community. This threatened ecological community contains many rare and highly susceptible endemic plant species. The Honey Possum (*Tarsipes rostratus*) is an example of a fauna species indirectly threatened by dieback as it is dependent on banksias for nectar and pollen.

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Biodiversity is described within the region as 'assets'. These are identified for management purposes at three levels:

1. Threatened or priority flora and fauna species and ecological communities,
2. regional priority areas, and
3. local priority areas.

Managing the impact and threat of Phytophthora Dieback on biodiversity within the South Coast region is focused on these assets.

Flora and fauna species and ecological communities

Species that are threatened by disease have been identified within the South Coast Dieback Risk Analysis (DEC, 2007). These assets are described in summary as:

Declared Rare Flora (DRF) - 89 species occurring at 2178 locations of which 44 species are susceptible and 39 have low susceptibility,

Priority Flora (P1-4) - 607 species at 6020 locations of which 242 species are susceptible and 298 have low susceptibility,

Non-listed endemic species (more than 80% of distribution within the South Coast region) - 556 species occurring at 9244 locations of which 234 species are susceptible and 235 have low susceptibility,

Threatened fauna - 59 species occurring at 6321 locations of which 2 species are susceptible due to habitat impact, 15 are not susceptible due to habitat impact and 42 are unknown,

Threatened Ecological Communities (TEC's) – 3 TEC's occur within the region that are formally endorsed by the State Minister for the Environment. A further 5 TEC's are currently being considered for endorsement. Of these, 5 TEC's are identified as susceptible to the disease. The status of one TEC is critical, 4 are endangered and 3 are vulnerable. Eleven plant communities in the region are listed as Priority Ecological Communities (PEC's) which are either listed as Priority 1 or Priority 2 and are data deficient. Seven of these are identified as being susceptible to the disease.

Ramsar-listed wetlands – 2 in the region (Lake Gore and Lake Warden), (12 in WA),

Nationally important wetlands - 14 identified in the region,

Vegetation Association endemics (as described by Hopkins *et al.*, 2000) – endemic if more than 80% of distribution is within the region.

Regional Priority areas

Operational management of biodiversity is planned and implemented within spatially defined areas (e.g. National Parks). These are areas where management of Phytophthora Dieback can be integrated with other management planning and action, including public access, road maintenance and fire control.

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Priority areas have been identified as regional assets for disease management. A total of 84 priority areas have been defined during a regional 'expert panel' workshop (held 19th May, 2008 in Albany).

The regional priority asset categories are:

- National Parks,
- Nature Reserves,
- State Forest,
- Local Reserves,
- Waterways and Rivers,
- Roadside vegetation,
- Remnant natural vegetation (on private land, including tree farms), and
- Off-shore islands.



Map 1.2 Location of Regional Priority Areas within the South Coast region.

These regional priority assets are shown in Map 1.2. The assets and their codes are listed for setting management priorities in Appendix 1. The total area of the regional priority assets is more than 1,710,000 Ha (95% of the area of natural vegetation in the region). The number and size range of these assets are shown in Table 1.1.

Table 1.1 Number, area and size range of Regional Priority Areas.

Local Area	Number	Total area (Ha)	Minimum Size (Ha)	Maximum Size (Ha)
Albany	27	44,569	99	7,944
Denmark-Walpole	17	174,891	52	23,192
Esperance	20	318,168	23	207,567
Mount Barker	13	123,489	29	113,485

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- Cranbrook				
Jerramungup	1	4,325		
Ravensthorpe	6	344744	2,173	295,910
	84	1010186		

Local priority areas

Locally significant assets at risk were identified during the 6 local area workshops held during February, 2008 in Esperance, Ravensthorpe, Jerramungup, Mt Barker, Albany and Denmark. The boundaries used for asset identification in each local area workshop are similar to municipal boundaries although there are some differences (e.g. areas less than 400mm annual average rainfall not included). The six local areas are shown in Map 1.3

Include map of 'local areas'.

Map 1.3 Local Area boundaries used for Phytophthora Dieback management within the South Coast region.

Local priority areas have identified during workshop processes. These are listed in the (draft) Local Area Situation Statements prepared following the workshops. Some of these are also regional priority areas.

The potential risk of Phytophthora Dieback occurring or being spread to these areas has been initially assessed for each local priority area during workshop processes. The cause of disease risk is also listed in the (draft) Local Area Situation Statements.

Local priority area information derived from the workshops should be considered as preliminary information only. There is a requirement for detailed biodiversity asset value and disease risk assessment at the local scale.

There is a general lack of awareness about the biodiversity assets within the region. There is a need to further communicate these values by providing information and descriptions of:

- The high level of national and international interest in the assets of the region,
- the distinct ecological characteristics of the region (e.g. high diversity, endemism etc.), and
- threatened or priority flora, fauna and ecological communities that are at risk from the disease.

While our current knowledge of the impact of Phytophthora Dieback on biodiversity assets in the South Coast region is sufficient to recognise that there is significant risk, it is not yet adequate for effective targeted investment in managing the threat.

1.4 Future spread of Phytophthora Dieback

Infection of plants by *P. cinnamomi* occurs at a microscopic level by two main spore types. Motile zoospores produced by sporangia on hyphal threads move freely in

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moist soils and are attracted to the roots of host plants which they infect when environmental conditions are conducive.

Chlamydospores are the long term survival spore which survive harsh environmental conditions (such as dry soil during summer).

Disease is spread through root to root contact, surface and sub-surface soil water movement and by soil transport. There are two mechanisms for spread of the disease. These are:

Vectoring, which is transport of infected soil caused by vehicles, animals and humans including:

- ✚ Road building and maintenance,
- ✚ Soil excavation and transport,
- ✚ Mineral exploration and mining,
- ✚ Recreational activities and public access,
- ✚ Feral and native animals,
- ✚ Plant nurseries and garden soil supply, and
- ✚ Fire prevention and suppression activities.

Autonomous spread occurs through physical or biotic processes in the landscape including:

- ✚ Soil transport by erosion and flooding,
- ✚ Surface and sub-surface water flow, and
- ✚ Plant root-to-root contact.

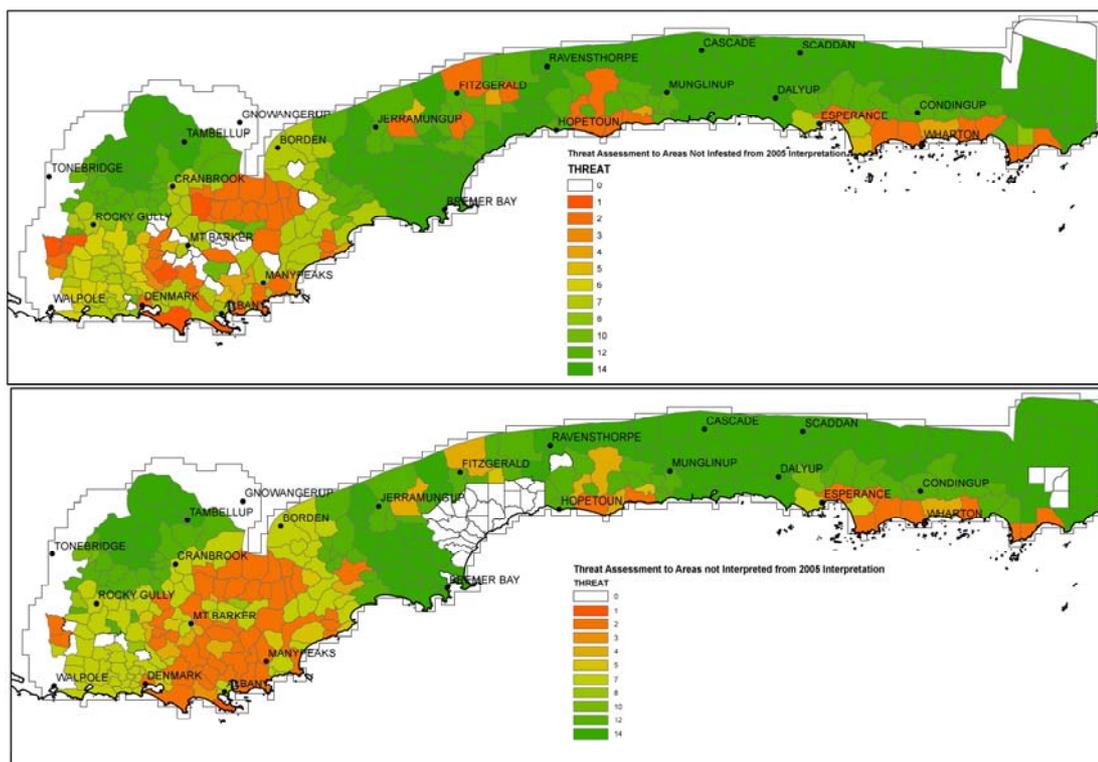
Human and faunal activity may transport both wet and dry soil from diseased areas within the landscape and cause new infestations. These mechanisms of spread clearly have potential to infest large areas. There is also potential for the disease to affect commercial industries and domestic gardens through use of disease-laden soil.

The rate of autonomous spread is slower but incessant. Slope, soil type, soil moisture, rainfall, surface water run-off and other environmental variables affect the rate of autonomous spread. Downslope spread is much more rapid than upslope spread due to soil and soil water movement. The rate of spread can be 1-2 meters annually upslope, downslope spread can be up to 100 metres annually under exceptionally wet or local flooding conditions.

Disease spread by vectoring is difficult to predict although there are opportunities for it to be managed (with the exception of faunal vectoring). Autonomous spread is more predictable but difficult to control.

Map 1.4 shows the computer-based risk assessment for the region.

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Note: Red is high threat and green is low threat. White areas are not assessed.

Map 1.4 Model assessment of Phytophthora Dieback threat to non-infested areas (top) and for areas not interpreted during 2004 (bottom) in the South Coast region. (Source: adapted from DEC, 2007)

Comprehensive and reliable prediction of future disease spread is dependent upon good information of current disease infestation. Improvement to risk assessment for the South Coast region requires:

- ✚ Capacity to manage the data sets and analysis criteria, and to report on or modify the information in a way that is relevant to management,
- ✚ Relating analysis from grid-cells or 'kingdoms' to existing planning units (e.g. LGA areas) or recognisable assets (e.g. Stirling Range National Park), and
- ✚ The ability to include expert panel assessment to verify or add-value to spatial analysis for predicted spread of disease.

Assessment of risk and prediction of disease spread need to be an on-going process using continuously improved information.

Section 2

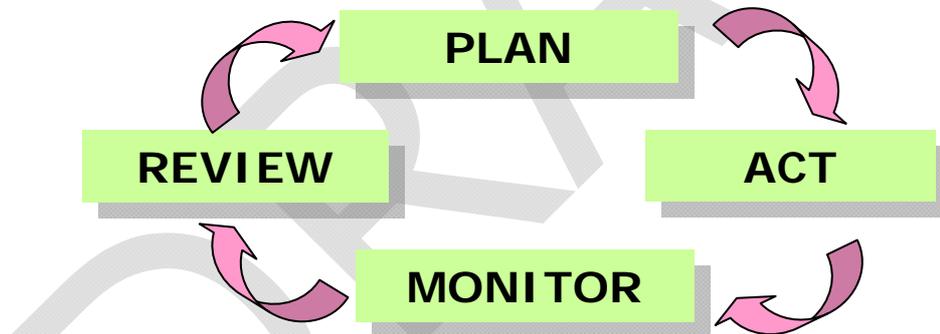
Responding to the Threat of Phytophthora Dieback

2.1 Adopting a strategic approach

Managing a plant disease that has substantial impact on both public and private values for which there is currently no option for eradication of it is inevitably difficult. Added to this is incomplete knowledge of the current distribution of the disease within the region and uncertain assessment of its rate of spread.

A strategic approach is required to ensure that financial resources and management capacity that are available is invested in identified actions that will deliver outcomes to meet clear objectives that represent social values and custodial responsibilities.

The processes of 'adaptive management' are paramount. Adaptive management requires that when planned actions are taken within an uncertain operating environment based on best knowledge available at the time a decision is made, that the effectiveness of these actions are monitored and evaluated to provide better knowledge to provide for continuously improved future decisions and actions. The four stages of adaptive management are represented in the diagram below.



The key factors for adaptive management are those that influence the risk of disease infestation or spreading at a site. A representation of an ecosystem risk management approach relevant to Phytophthora Dieback in the South Coast region is shown in Figure 2.1.

Phytophthora Dieback is characterised for the South Coast region in broad terms. The full extent of the threat remains difficult to estimate, and the full cost of the consequences is too complicated to calculate.

The strategic approach adopted for managing *P. cinnamomi* for biodiversity conservation in the South Coast region is focused on developing risk reduction strategies and management decision processes set within an adaptive management framework.



Figure 2.1 Ecosystem Risk Management for Phytophthora Dieback

2.2 A Vision for the future

The complexity of managing risk for Phytophthora Dieback requires clear vision for what might be expected from investment in management. A vision for the disease to be eradicated from the South Coast region within 25 years is desirable, but with no known cure, this is not achievable. A guide to an achievable vision for the region is provided at the National and State levels.

The Vision statement for the South Coast region is:

‘Within 25 years, as a result of protection of high conservation value areas threatened by Phytophthora Dieback within the South Coast region, there is no loss of plant or animal species and minimal loss of ecological community values.

This statement is based on two broad assumptions:

1. That without management effort, there will be considerable further spread of the disease resulting in loss of species to the region, and in some situations there could be total species extinction, and that biodiversity within ecosystems is de-valued as a result, and
2. That limited options for recovery of plant species or communities from the impacts of disease or for eradication of the disease are feasible for management within 25 years.

The Vision for the South Coast region to have no further spread or biodiversity loss within 25 years is ambitious. Should a feasible management option for recovery or

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disease eradication become available within the period, then the vision could be revised to one of a higher level of achievement for the period.

There are three aspirational Goals set for achievement of the regional Vision within 25 years:

1. Identified Regional Priority Areas (High Conservation Areas) are protected from further *Phytophthora Dieback* infestation to ensure that the biodiversity values of non-infested areas are maintained,,
2. Identified threatened biodiversity assets, including plant and animal species and ecological communities, are protected from *Phytophthora Dieback* infestation, and
3. Further spread of the disease by humans is stopped.

Delivery of outcomes to achieve the 25-year Goals is proposed through a series of Programs. The first investment period is termed the *Foundation Program*. Subsequent programs are to be focused on perpetuating foundation change in management within the region.

The short term *Foundation Program* Goals for the 7-year investment period are for:

- ✚ There to be easy access to high confidence information about disease status and management,
- ✚ Community and organisations have changed to a high level of understanding and 'ownership' of the *Phytophthora Dieback* issue, and
- ✚ A high level of strategic and operational planning is resulting in effective actions being adopted through implementation by key stakeholder organisations within identified local areas with adequate capacity.

Management is to be applied to identified regional and local priority areas at a level commensurate with the value of assets and the level of risk of infestation.

There are fifteen 7-year Objectives and corresponding Targets (Table 2.1) designed to provide the foundation for achievement of the three *Foundation Program* goals.

Table 2.1 Seven-year Objectives and Targets for Phytophthora Dieback management in the South Coast region

1. Establish the Threat

7-year Objectives

7-year Program Targets

Comments

<p>1.1 The regional community and key stakeholder organisations have developed strong ownership by being aware of the threat of Phytophthora Dieback, and by being well informed about the value of assets at risk, the potential impacts and potential for further infestation within the region.</p>	<p>1.1.1 Community survey processes show that 75% of the regional community is aware and well informed about the potential impact of the disease within the region,</p> <p>1.1.2 Key stakeholder organisation survey processes show that 90% are aware and well informed about the potential impact of the disease within the region.</p>	<ul style="list-style-type: none"> ➤ Entry survey required to establish benchmark information about current knowledge, awareness and participation, ➤ Periodic (annual suggested) surveys to show trends in awareness and knowledge, ➤ Exit survey to show targeted level of achievement.
<p>1.2 Key stakeholder organisations are informing their members with a high level of information about the potential for their activities to increase the risk of infestation.</p>	<p>1.2.1 75% of key stakeholder organisations can demonstrate that 90% of their staff/members are aware and are informed about the disease at a high level.</p>	<ul style="list-style-type: none"> ➤ Key stakeholder organisation staff/member surveys to be aligned with community surveys and included within organisational disease risk management planning.

2. Analyse the Risk

<p>2.1 The biodiversity asset values at risk to Phytophthora Dieback within the South Coast region, including those threatened by local or permanent extinction, are identified.</p>	<p>2.1.1 The biodiversity asset values for all (84) regional priority assets and 50% of local priority assets are documented based on relevant site assessment processes.</p>	<ul style="list-style-type: none"> ➤ There is currently insufficient information to set targets for protection of biodiversity assets in the region in all areas. These should be set within 5 years of commencement of the Implementation Program.
<p>2.2 Areas of infestation are mapped with a high level of confidence information.</p>	<p>2.2.1 High confidence assessment of all priority regional assets and 50% of local area assets is documented based on relevant site assessment processes.</p>	
<p>2.3 The level of disease risk (introduction and spread) in priority regional and local assets is based of high confidence information.</p>	<p>2.3.1 A revised risk assessment is based on high confidence information for all identified regional and local area priority areas.</p>	

3. Target the Response

<p>3.1 Targets are established for disease risk reduction management of regional and local priority areas based on biodiversity asset</p>	<p>3.1.1 Preliminary targets are revised based on additional information about assets values and risk assessment.</p>
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values and the level of disease risk.

4. Adopt Risk Reduction Strategies

- | | |
|---|---|
| 4.1 Feasible and cost-effective risk reduction management strategies are developed for the region with capacity for full containment of risk due to human vectoring. | 4.1.1 A program of trials and demonstration of actions for strategic risk reduction is developed and implemented. |
| 4.2 Identified gaps in skills and knowledge required for management are being addressed by relevant research. | 4.2.1 A research and development program relevant to the region is developed and being implemented through partnership arrangements with key organisations. |
| 4.3 Key stakeholder organisations are well informed, understand and have confidence in available information about the feasibility and effectiveness of proposed strategic actions. | 4.3.1 Survey information shows that 75% of key stakeholder organisations understand the risk reduction strategies and are implementing actions according to these strategies at a level commensurate with their targeted level of risk reduction. |

5. Capacity for Action

- | | | |
|---|--|---|
| 5.1 The priority and level of actions required for full disease containment and specific protection of regional and local priority areas and other threatened biodiversity assets is known. | 5.1.1 Site plans are prepared and are being implemented for identified (greater than medium intervention level) regional and local priority areas. | 5.1.2 All Recovery Plans for threatened species and ecological communities contain relevant actions for disease risk reduction. |
| 5.2 There is adequate knowledge and skills for delivery of planned actions to achieve targeted outcomes. | 5.2.1 Entry and exit KASA survey (for knowledge, aspirations, skills and attitudes) of key stakeholder organisations shows that capacity has been adequately developed within key stakeholder organisations to meet the requirements of targeted risk reduction. | |
| 5.3 There are adequate resources and facilities for delivery of planned actions to achieve | 5.3.1 Annual review of investment planning and program delivery ensures that available | |

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targeted outcomes.

5.4 Key stakeholder organisations and the regional community are adopting planned practice change for identified risk reduction.

resources are applied to the highest priority risk reduction areas.

5.4.1 Annual program review and final program evaluation shows that proposed actions are being implemented at a level required to achieve targeted risk reduction.

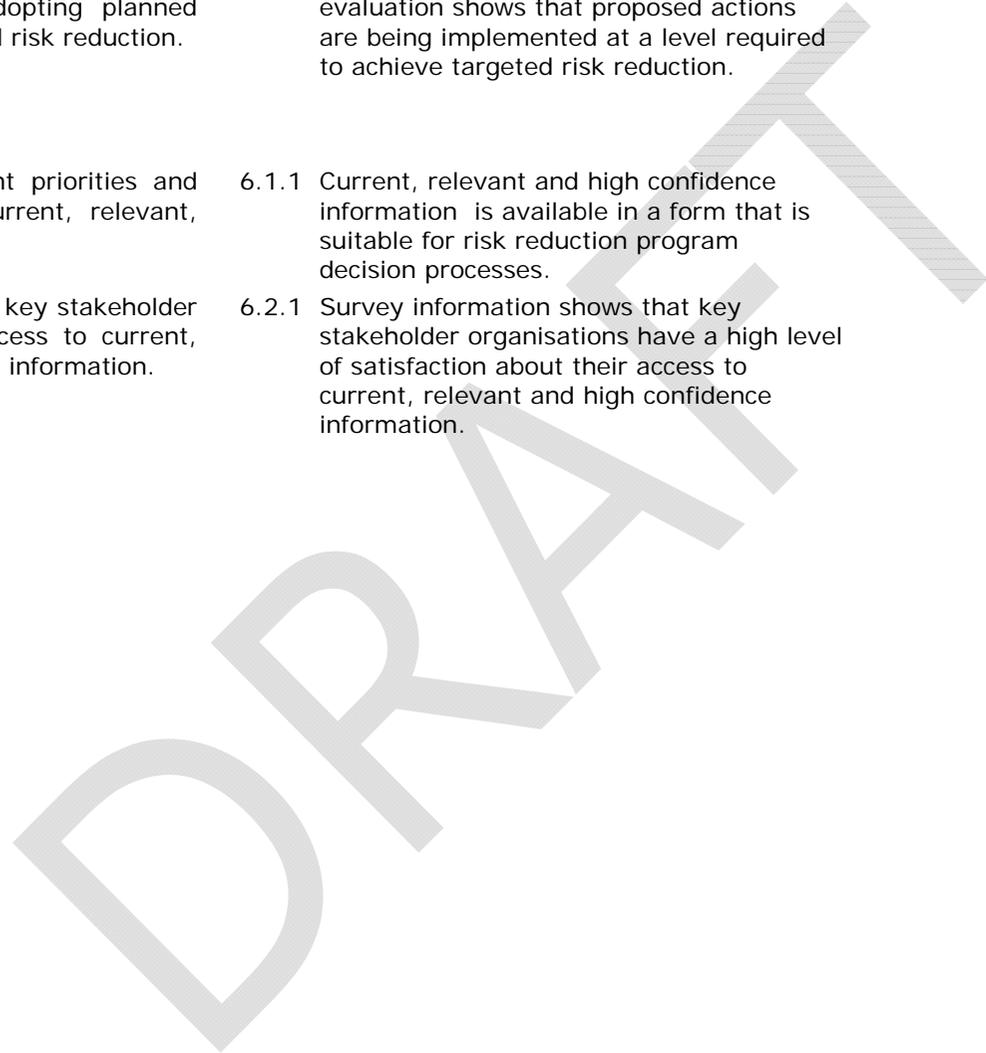
6. Monitoring and Review

6.1 Decisions about management priorities and processes are based on current, relevant, high confidence information.

6.1.1 Current, relevant and high confidence information is available in a form that is suitable for risk reduction program decision processes.

6.2 The regional community and key stakeholder organisations have easy access to current, relevant and high confidence information.

6.2.1 Survey information shows that key stakeholder organisations have a high level of satisfaction about their access to current, relevant and high confidence information.



2.3 People and Organisations involved

One of the *Foundation Program* goals is for community and organisations to have a high level of 'ownership' for managing *Phytophthora Dieback* within the region. A 'whole-of-community' approach is required that is applied 'across-tenure' (including both public and private land).

The purpose of requiring a high level of community and organisational engagement in reducing the risk of further disease impact and spread is ensure that actions taken are effective. For example, a road closure will be more effective if road users understand and support the reason for the road being closed.

Previously, some people and organisations considered *P. cinnamomi* to be confined to forested areas and that it was a problem for government to manage. We now know that many plant species and communities including heath and shrublands across the South Coast region are vulnerable to the disease. Managing the disease risk can be led by government but it requires a high level of co-operation by community and organisations.

A strategic approach to engagement of community and organisations is needed. This is to ensure that relevant information is provided appropriate to each stakeholder group and to ensure that all are contributing to disease risk reduction actions at levels that will be effective. The levels of support required by groups differ significantly.

Stakeholder groups relevant to the South Coast region have been identified in two ways:

- 1 Key organisations that provide leadership and information for disease risk management within the State and region, and
- 2 Key organisations to be engaged for disease risk management within the region.

South Coast NRM and the Department of Environment and Conservation (DEC) have provided leadership for *Phytophthora Dieback* management through '*Project Dieback*' that has prepared the regional atlas, risk assessment and this strategic plan.

Other organisations that provide a leading or informing role relevant to the region are shown in Table 2.2.

Table 2.2 Roles of leading and informing organisations for Phytophthora Dieback management relevant to the South Coast region.

Organisation			Roles
'Project Dieback' Committee	Steering		<ul style="list-style-type: none"> ▪ Initiatives a coordinated approach to Phytophthora Dieback management within the South Coast and other NRM regions, ▪ Arrangements for preparation of regional Dieback Atlas and Risk Assessment, ▪ Developed a standard disease signage protocol and design.
Department of Environment and Conservation (DEC)			<ul style="list-style-type: none"> ▪ Management of public conservation land vested with the Conservation Commission of WA, ▪ Protection and recovery of threatened species and ecological communities,
South Coast NRM Invasive Species Sub-program Working Group			<ul style="list-style-type: none"> ▪ Sets priorities, allocates funds and reviews program performance for <i>South Coast NRM</i>.
Conservation Commission of WA			<ul style="list-style-type: none"> ▪ Custodial responsibility for public conservation land (including National Parks and Nature Reserves)
Dieback Consultative Committee (DCC)			<ul style="list-style-type: none"> ▪ Provide high quality advice to the Minister and stakeholders, ▪ Promote a strategic approach and recommended framework including supporting systems and processes, ▪ Foster policy development, ▪ Promote the development and implementation of a <i>State Phytophthora Dieback Management and Investment Plan</i>, ▪ Promote research and training including the development and maintenance of a Centre of Excellence for Phytophthora Science and Management; ▪ Foster community engagement, awareness and capacity building, ▪ Foster critical levels of investment by stakeholders to enable an effective response,

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- Promote partnerships amongst stakeholders and linkages to other State wide strategies,
- Promote monitoring, evaluation, review and adaptive management, and
- Promote transparency, including auditing and reporting to the community.

Dieback Response Group (DRG)

- Provides advice to the State Minister,
- Implements the *WA Dieback Response Framework*,

Dieback Working Group (DWG)

- Formed in 1996 to work with Local Government to educate and promote Phytophthora Dieback management (mostly effective in the Perth metropolitan area),
- Aims to provide management advice in areas beyond the outside of the conservation estate,
- Prepared a guide for landholders and community conservation groups (*Managing Phytophthora Dieback in Bushland* Ed. 4)

Dieback Information Group (DIG)

- Provides networking of stakeholders,
- Arranges an annual forum for information exchange.

Centre for Phytophthora Science and Management (CPSM – Murdoch University)

- Research on diseases caused by *phytophthora* in natural ecosystems,
- Research initiatives to address on-ground management.

There is a very wide range of stakeholder groups who are linked in some way with Phytophthora Dieback risk management within the region. There are 21 broad categories of stakeholder groups with many sub-categories and many more individual organisations within each category. Most stakeholder groups identified would not be currently aware of their existing or potential links or potential roles with disease risk management.

Some significant stakeholder groups for Phytophthora Dieback management are not based within the region (e.g. people from the Goldfields who recreate in coastal areas).

The grouping of stakeholder categories differ between the six local areas reflecting differences in predominant industries or land use, and the values or priorities of local communities and their local government. There has been considerable change in the past 7 years (e.g. substantial increase in mining activity in the Shire of Ravensthorpe and the extent of commercial tree plantations in other areas). Further substantial change that may affect Phytophthora Dieback risk management in the next 7 years can be expected (e.g. significant increase in demand for coastal access with for fishing, camping, off-road vehicles and other recreation).

The stakeholder groups most likely to be effective in disease risk management differ to the now traditional farmer-based NRM or catchment groups. A significant difference is that management will require a very high level of adoption (i.e. a small minority not adopting a practice could still result in there being a high risk). Differing networks will need to be developed.

The category of 'Difficult to Manage People' includes the small number of individuals who do not respond to information and communication initiatives and are of a renegade style who will not voluntarily comply with management initiatives (e.g. access restrictions). This group often requires a disproportionately high level of management.

The capacity of the seven LGA's within the region where Phytophthora Dieback risk is highest differs considerably, as shown by several key characteristics:

- ✚ LGA area ranges from 1,843 km² to 42,450 km²,
- ✚ Population ranges from 1,208 to 33,519,
- ✚ 2007/8 budget ranges from \$2.2m to \$40.6m,
- ✚ Number of employed staff ranges from 25 to 270,
- ✚ Length of unsealed roads ranges from 770 km to 3,679 km, and
- ✚ Percentage of unsealed roads (as a proportion of total roads) ranges from 45.8% to 93.7%.

Most organisations have very limited capacity to provide leadership for management of Phytophthora Dieback, and few are considered 'legitimate' (i.e. seen as it being their business) or empowered (i.e. with statutory powers) to lead, however a large proportion of stakeholder groups are identified as being potentially influential. With leadership provided by DEC, Local Government and South Coast NRM, this provides a substantial foundation for broad engagement of community and organisations within the South Coast region.

2.4 Management needs assessment

Management for Phytophthora Dieback has been undertaken in various ways previously. However, without a full assessment of the biodiversity values at risk, or of the full potential disease threat, it is difficult to assess the effectiveness of current management effort or to estimate the full level of management required to achieve the Goals set for the program.

The initial local area workshop processes raised issues relevant to management. These are summarised in Table 2.3. These reflect some common concerns across the region about the issues and capacity for local area disease risk management. Local Area workshop processes also identified activities or policies that should received some emphasis for management (in Appendix 2).

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Table 2.3 Local Area issues for Phytophthora Dieback management within the South Coast region.

Local Management Issues	Albany	Denmark	Jerramungup	Plantagenet/ Cranbrook	Ravensthorpe
Need for knowledge (biodiversity values at risk, endemism, risk to wilderness areas, 'islands' that are disease-free, risk to habitat for Carnaby's Cockatoo, occurrence of <i>P.c.</i> , old 'infection' sites).	✓	✓	✓		✓
Access to bush, gravel pits, coastal areas, rivers and wetlands (including for 4WD/ATV tracks, camping, fishing, marroning, firewood collecting and others).	✓	✓	✓	✓	
Concern about rapidly increasing population growth and demand for access to recreation areas (including tourism pressure transfer between LGA's).	✓	✓	✓		
Why is disease NOT spreading faster in some areas?			✓		
Identification of sites of cultural significance and recognise cultural teaching.	✓		✓	✓	
Managing disease causes and vectors (e.g. pigs, foreshore erosion, wildflower picking, and installation of firebreaks).	✓	✓			
Need for wider consultation (e.g. with the Noongar community).	✓				
Need for an ethic of 'community ownership' (of the disease).		✓	✓		
Better understanding of the inter-actions between the risk of <i>P.c</i> and environmental and management factors (e.g., soils, fire).	✓	✓		✓	
Assessing statutory and other control options (e.g. TPS, land rezoning and development, applications, processes for native vegetation clearing, litigation).	✓	✓		✓	
Need a 'sensitivity checklist' for plant species.		✓			
Increase the focus for <i>P.c.</i> management onto ecosystems and habitats.					✓

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Phosphite applications - how extensively should this be used?	✓			✓	
Limitations of capacity (e.g. for DEC).		✓			
Concern about management of Un-allocated Crown Land (UCL).		✓			
Who is to take the lead on this issue locally?			✓		
Identification of training needs.			✓		
Shires to prepare annual road works plans to enable consideration of <i>P.c.</i> hygiene requirements.				✓	
Systematic assessment of gravel pits needed.				✓	
Need for adequate interpretation signage (e.g. in car parks).	✓				
Information for specific groups (e.g. canoeists, timber harvesting, fox baiting, power pole maintenance, road works, urban areas, revegetation programs).		✓	✓	✓	
Potential use of icon species (e.g. <i>Banksia seminuda</i> , orchids).		✓		✓	
Integrating with other management (e.g. for weed control on private land).			✓		
Location of wash down facilities – where should these be?			✓		
Potential impact of climate change?		✓			
Potential for use of 'buffer zones' around intensive horticultural industries.	✓				
Option to develop concept of 'biodiversity credits'.		✓			

Note: Local issues not developed at the Esperance workshop and only partially developed at the Ravensthorpe workshop.

Priority management actions derived from Local Area workshops are:

1. Development of information and knowledge in the region about:
 - a. Asset and cultural values at risk,
 - b. Threatening processes.
2. Substantial change in public attitude, understanding and behaviour towards *Phytophthora Dieback*.
3. Create an ethic of community-based ownership of the issue (e.g. through custodian or stewardship concepts).
4. Develop a management response that is commensurate with the scale of the issue (concept of 'the big issue').
5. Identifying 'icon species/locations' to focus management and engage stakeholder groups.
6. Maintain a focus on 'large green management areas' (i.e. protection of large areas of high conservation value), with priority for coastal areas.
7. Provide regional coordination for localised management.
8. Clarify roles and responsibilities at all levels and develop clear direction for leadership.
9. Ensure consistency through cross-tenure management.
10. Increase opportunities for Aboriginal involvement.
11. Review statutory control options relevant to the region.
12. Develop a consistent and effective approach to education and signage within the region.
13. Prepare management guidelines for the range of key stakeholder groups.
14. Develop a strategic approach to key management issues at a regional level although operational at a local scale (e.g. for gravel pit use, road closures and for coordinated wash-down facilities).
15. Undertake a feasibility and benefit cost study to determine the extent to which phosphite should be used for control management.
16. Undertake Local Response (or Action) planning for the six local areas.
17. Develop a suitable system for local risk assessment.
18. Assess options for multiple-issue management (e.g. combining *P.c.* management with weed management).
19. Arrange training programs to increase regional capacity in site assessment and management response.
20. Arrange to record current and historic knowledge of *P.c.* in the region (e.g. through aural histories).
21. Assess the potential change to infestation risk and therefore to management due to climate change.
22. Develop a set of incentives to facilitate behaviour change, innovation or other management requirements.
23. Evaluation market-based options for management (e.g. increasing consumer demand for disease-free soil products or disease-free contract earthmoving services).
24. Increase regional capacity for research and management innovation.
25. Develop regional capacity for on-going information management.

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Preliminary priorities for regional-scale disease risk management identified through 'expert panel' processes are shown in Table 2.4.

Table 2.4 Expert Panel priorities for regional-scale management of Phytophthora Dieback.

Actions	Rank
Field Survey & Interpretation - identification and assessment of plant communities at risk	1
LGA and community support	2
Phosphite program - existing - new	3
Planning	4
Community engagement and practice change - devolved grants - signage	5
Program capacity development	6
Co-ordination within the region	6
Implementation of actions	7
Priority Asset Management	7
Management program for 'risk roads'	8
Research & development - Disease - landscape association	9
Training - operational - interpretation	10
Sampling & laboratory services	11
Information & knowledge management	12
Regional laboratory facilities	12
Preventative infrastructure support	12
Washdown facilities	12
Assessment of private land / tree farm remnant vegetation	13
Monitoring	14

Climate change issues

Because of the long-term requirement for management of Phytophthora Dieback, there is a need to consider the potential effects of changing climate. Climate change is expected to lead to increased summer rain and increase incidence of cyclones within the region. Changes in rainfall patterns causing increased soil

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moisture status, soil temperature and/or increased soil movement through erosion could increase the risk of disease.

Public land management

Most previous management for Phytophthora Dieback has been undertaken by the (former) Department of Conservation and Land Management (CALM) for the public forest and conservation estate within the region based on the *South Coast Region Dieback Protection Plan 1986-88* (CALM, 1986). This has policies to prevent the spread to disease-free areas and guidelines to minimise the spread in areas where the disease occurs, including:

- ✚ Closure of roads and firebreaks (with exceptions),
- ✚ Prohibit off-road vehicle access,
- ✚ Risk assessment prior to forest operations,
- ✚ *Dieback Hygiene Manual* to be followed,
- ✚ Priority areas were identified for Fitzgerald River National Park, Stirling Range National Park, Cape Arid National Park, Cape Le Grand National Park, West Cape Howe National Park and Two Peoples Bay Nature Reserve.

Priority areas for management are identified as 'Disease Risk Areas' (DRA).

Bell Track Project in Fitzgerald National Park

During the 1970's, the first infestation of the Fitzgerald River National Park occurred due to earthmoving equipment in the construction of Bell Track (constructed for mineral exploration). The potential for further spread of Dieback puts very substantial public and environmental assets at risk.

A Response Plan (CALM, SCRIPT and DRG, 2006) provides detailed actions for control of the disease. Currently, the 184 Ha infested area is contained within a 540 Ha control area. Management includes:

- ✚ Fencing to control movement of native animals, especially kangaroos (12 km trenched with 1-way control gates for native animals),
- ✚ Impermeable membrane (plastic) installed to a depth of 1 metre below the soil surface is intended to stop roots of infected plants spreading the pathogen to uninfected plants outside the infested area,
- ✚ Semi-automated sub-surface soil profile drenching system designed to release a growth inhibiting chemical so that the risk of deep roots from diseased plants passing under the membrane is reduced,
- ✚ Aerial phosphite spraying,
- ✚ Digital multi-spectral mapping (scale 1:4,500 with 50cm contour interval elevation),
- ✚ Climate recording stations,
- ✚ Fire risk reduction (hazard reduction external to the fence),
- ✚ Wash down facilities at site, and at DEC depot in Ravensthorpe,
- ✚ Road access closure.

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Risk assessment shows infestation to have spread rapidly following a recent flood event.

Phosphite program

The first broad-scale aerial application of phosphite began in the Albany area in 1997. The current Phosphite Program now has 39 'target areas' (total area of 290 ha) in the South Coast region where phosphite is regularly applied. Most of these areas are near Albany although there are sites in the Shires of Esperance and Denmark (Mt Lindesay). The area sprayed in the Stirling Range National Park is 164 ha.

Phosphite has also been applied to 375 ha of the Fitzgerald River National Park within the Bell Track project area.

Priorities are set for protectable areas that contain Declared Rare Flora (DRF) and priority flora, Threatened Ecological Communities (TEC's) and/or Priority Ecological Communities (PEC's). Target TEC's and PEC's are:

- ✚ Eastern Stirling Range Montane Heath and Thicket,
- ✚ Stirling Range Montane Mallee Thicket, and
- ✚ Mt Lindesay – Little Lindesay Vegetation Complex, and
- ✚ *Allocasuarina fraseriana* – *Eucalyptus staeri* woodland in association with *Banksia coccinea* thicket (PEC).

Phosphite target assets and target areas are reviewed annually by the Phosphite Program advisory team within DEC.

Walpole Wilderness Area Management Plan

The *Management Plan for the Walpole Wilderness Area* (WA Conservation Commission, 2006) provides a revised Department Policy Statement No. 3 and accompanying guidelines.

Section 3

Targeting the Response

In Section 2, a strategic approach is outlined to achieve 7-year *Foundation Program* Goals set within a 25-year period. An Ecosystems Risk Management framework is used to provide direction to achieve these goals.

Protection of large non-infested areas of high value natural vegetation threatened by Phytophthora Dieback is ideally the highest priority investment because investment in disease prevention is more efficient than investment in ameliorating the impacts of the disease. However, current disease impacts endanger the existence of some natural species and ecological communities in the region. Some of these are endemic to the region so their extinction would be permanent. This outcome is unacceptable to Australian governments and communities so there needs to also be priority for minimising the impacts of disease on threatened biota within infested areas.

The approach to setting priorities for disease risk management within the South Coast region includes the need to both prevent spread to high value areas and to ameliorate the current impacts on threatened species and ecological communities.

3.1 Regional Priorities for Management

Processes for setting priorities are applied to identified biodiversity assets within the region. These are:

- ✚ threatened or priority flora and fauna species and ecological communities,
- ✚ regional priority areas, and
- ✚ local priority areas (to be identified during Local Area Planning).

Species and ecological communities known to be threatened by Phytophthora Dieback are geo-referenced within spatial databases although this specific information is not publicly available.

A simple Multiple Criteria Analysis (MCA) was developed based on information derived from an 'expert panel' (10 people currently professionally engaged in Phytophthora Dieback management within the region) during a workshop (held 19th May, 2008 in Albany) and with subsequent electronic communications.

The criteria used were:

1. Non-infested Vegetation areas (i.e. large 'Green Areas'),
2. Vulnerability,
3. Threat, and
4. Level of management.

(Note: these criteria are defined in the main document of the Phytophthora Dieback Regional Plan for the South Coast region.)

The four criteria were measured as High (= 3), Medium (= 2) and Low (= 1). The 'expert panel' considered that more detailed assessment of these criteria would not be justified with current levels of information and knowledge.

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Priorities were applied to the 84 Regional Priority Areas (listed in Appendix 1).

Table 3.1 shows the results of the preliminary assessment of the Regional Priority Areas undertaken. A high score represents high protectable area value, high vulnerability and high threat. The score is lower where any of these criteria are assessed to be 'medium' or 'low'.

Table 3.1 Number, area and range of Regional Priority Areas.

Score	Regional Priority Area Codes
9	DMZ2D, ENR1, ELR3, RNP1&JNP1, RR1
8	ANP2, ANP3, ANR14, DMZ2A, DNR5, DNR6, ENR1, ENR4, ER1, ENP4, ENP5, RNR4, ENR7, ELR2, PCNP2, PCNR4, PCNR7, RNR2,
7	ALR1, ALR2, ANP4, ANP2LP, ANR1, ANR2, ANR3, ANR5, ANR6, ANR7, ANR9, ANR15, ANR17, ANR18, AWC2, DMZ1A, DMZ1B, DMZ2B, DMZ2C, DMZ3A, DMZ3B, DNP4, DSF1, ENP1, ENR2, ENR5, ENR6, ENR9, ENR10, ELR4, PCLNR1, PCNP1, PCNR3, PCNR6, PCNR11, JNR1, RNR3,
6	ANP5, ANR4, ANR8, ANR10, ANR11, ANR12, ANR13, AWC1, DMZ1C, DMZ7A, DMZ7B, DNR2, ELR1, PCNR5, PCNR8, PCLNR2, RNR1
5	ANR16, ENR8, PCNR9, PCNR10
4	DNR4
3	
Not scored	EWR1, ER2

3.1 Level of Response

The level of response could range from doing nothing (i.e. less than current management) through to a high level of technical intervention. At a regional scale, the first of these would be socially unacceptable as the disease would inevitably spread causing loss of biodiversity values and extinction of some species. The second would not be affordable or cost effective at a regional scale. Neither of these levels of response would be acceptable for the region. The level of regional response will be based on assessment of individual priority areas.

The level of response will differ between areas. The criteria for assessing the level of response required are:

1. Values of identified assets at risk (e.g. threatened species),
2. Occurrence of 'protectable areas',
3. Potential for disease infestation or spread (the threat), and
4. Vulnerability.

Table 3.3 shows six levels of response for application to priority areas. These range from taking no action in highly infested areas where the threat to other areas is low through to recovery planning and actions where high value assets have been impacted significantly by disease. The level of management effort and investment clearly differs across this range.

Targeting the response for disease risk reduction and recovery from impacts of the disease will require individual site assessment.

On-going monitoring of all priority areas will be required to re-assess the level of response. Assessment for sites may change over time and the level of response may need to change accordingly.

Table 3.3 Level of Response categories and assessment

Level of Response	Asset values	Non-infested Vegetation area	Threat	Vulnerability	Management Response
1. No Action (highly infested, low asset values, low threat to other areas)	L	L	L	L	<ul style="list-style-type: none"> ▪ Monitoring for level of threat to other areas.
2. Threat Reduction (highly infested area, medium to high potential for spread of disease to other areas)	L	L	H	H	<ul style="list-style-type: none"> ▪ Signage, ▪ Restricted public access, ▪ Monitoring for level of threat.
3. Minimal Intervention (assets or protectable areas vulnerable, the level of threat is low)	M	M	L	M	<ul style="list-style-type: none"> ▪ Signage, ▪ Monitoring for level of threat.
4. Medium Intervention (vulnerable assets and protectable areas with medium threat level)	M	H	M	M	<ul style="list-style-type: none"> ▪ Site mapping, ▪ Risk reduction plan.
5. High Intervention (low infestation of vulnerable assets or protectable areas with high level of threat)	H	H	H	H	<ul style="list-style-type: none"> ▪ Site mapping, ▪ Multiple management response (e.g. Bell Track site within FRNP), ▪ Site and reconnaissance monitoring.
6. Impact Recovery (High impact of infestation on high value assets)	H	N/A	H	H	<ul style="list-style-type: none"> ▪ Recovery planning, ▪ Phosphite applications, ▪ Site restrictions, ▪ Revegetation and re-introductions, ▪ Detailed site monitoring.

Section 4

Adopting Risk Reduction Strategies

Risk reduction strategies are required at a regional scale to achieve the short term goals of the *Foundation Program* (section 2.2.3). The proposed strategies are to reduce the risk of spread of the *Phytophthora Dieback* disease within priority areas.

The risk reduction strategies are:

- 1. Practice Change through Awareness and Engagement,**
- 2. Diagnosis, Detection and Mapping,**
- 3. Priority Asset Protection,**
- 4. Local Area Risk Reduction,**
- 5. Risk Reduction in Operational Planning,**
- 6. Standard Operating Procedures, and**
- 7. Compliance and Regulation.**

Each of these strategies is developed from the current situation within the South Coast region. A set of actions is proposed for the initial 7-year period for each strategy. Assessment is made of the feasibility of strategies and actions and the expected effectiveness of their application.

The application of risk reduction strategies to individual assets will be based on assessment of their feasibility and effectiveness for each site. This process will be undertaken as a part of the local area management planning process.

4.1 Practice Change through Awareness and Engagement

Disease risk reduction will require perpetual practice change for key stakeholder groups and organisations. Many are currently not aware of the disease, its impacts or the potential for spread through their activities. Sustained adoption of practice change can occur by a range of mechanisms, including regulation, however all start with awareness and engagement.

Human transfer of the disease and poor hygiene are the most significant disease risk factors to be managed. For this to occur there is a need to engage the interest of people through awareness and understanding.

Transportation of soil occurs during operational activities including vehicles, machinery and equipment, footwear and clothing. It similarly occurs during recreational activities.

Ongoing awareness and engagement by community and organisations is a pre-requisite for effective management of *Phytophthora Dieback*.

There is currently no information about the level to which the regional community and organisations are aware and informed about the extent of the disease or potential impacts on biodiversity assets and some industries. Nor is there information about regional awareness of the potential for the activities of individuals or organisations to spread the disease or prevent its occurrence.

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Those involved need to recognise their responsibility with disease risk reduction and take ownership of it. The approach to management needs to be across tenure (i.e. consistent for public and private land) and across the region.

The key stakeholder groups for engagement are identified in Section 2.3.2. This shows the potential for leadership in Phytophthora Dieback to be with DEC, Local Government and South Coast NRM. However there are many organisations identified as being influential though engagement of either their members or of other organisations.

The processes of targeted stakeholder group engagement have commenced in some areas. South Coast NRM has undertaken communications activities across the region through *Project Dieback* (e.g. production of a documentary film). DEC provides information and training for regional staff, supports community group initiatives (e.g. with the *Twin Creeks* project in the Porongurup Range) and provides information to community as requested. More specifically, awareness has been raised in the Shire of Ravensthorpe through coordinated activities with the Shire Council staff, mining industry and community organisations (e.g. the Ravensthorpe Enduro motorcycle club). BHP Billiton engages private capacity for staff information and training within the region.

Community and organisational engagement for risk management through practice change requires a strategic approach. A practice change model is used to develop targeted engagement processes. The model is to be consistent with the need for adaptive management, as outlined in the risk management approach (section 2.1.1).

The principles of adoption through an engagement change model for disease risk reduction are:

1. Whole-of-community 'ownership' of managing disease risk is developed,
2. Leadership is provided by government through inter-agency cooperation,
3. Processes for adoption are applied cross-tenure,
4. The focus for adoption is on recognisable assets (e.g. a National Park),
5. There is targeted engagement of key stakeholder organisations,
6. Adoption processes lead to perpetual practice change,
7. Decision-making processes are recognised as the key to adoption,
8. Community and organisational learning is through demonstration and training,
9. Confidence in reliable 'best practice' information and advice for disease risk reduction is developed, and
10. Applying 'adaptive management' to engagement processes with new knowledge in the region.

The engagement model is represented in Figure 4.1. This shows linkage of decision-making processes between the continuous learning processes of 'awareness', 'participation' and 'adoption'. This should be the under-lying approach applied for all key stakeholder groups. It is based substantially on the importance of those who make decisions (e.g. for soil hygiene or vehicle wash-down practices) having

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increasing assuredness in the risk reduction outcomes of their decisions and that practice change adoption through these decisions is permanent.

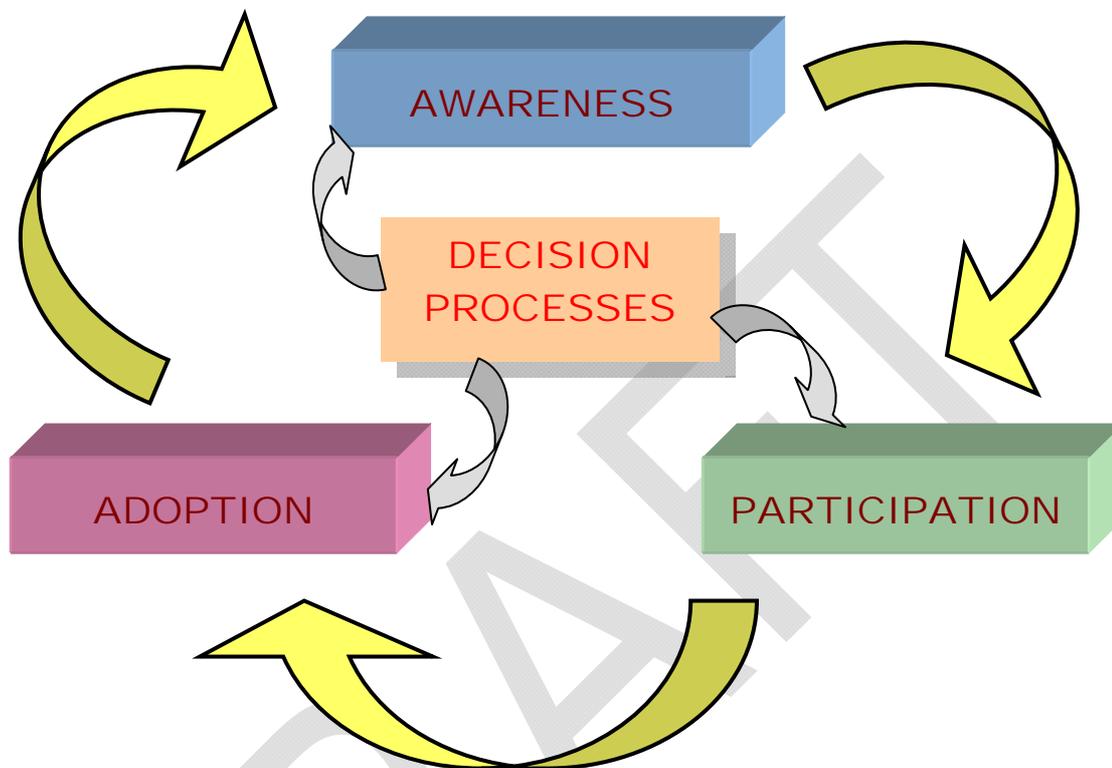


Figure 4.1 Engagement model for disease risk reduction

The mechanisms available to assist in adoption of practice change are represented in Figure 4.2. The actions range from raising awareness to control through regulation. Some practice change will require several mechanisms. For example, restricting public access through road closure will require awareness of the need for the action through information and communication and regulation to ensure compliance. Adoption of hygiene practices may require demonstrated actions, cost sharing and management planning.

The mechanisms for adoption of disease risk reduction are policy-based. There are very few market-based mechanisms that would apply effectively for risk reduction.

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Figure 4.2 Adoption mechanisms for disease risk reduction practices.

The actions required for achieving practice change through awareness and engagement are linked to other strategies and actions. The key actions proposed are:

1. Undertake *stakeholder survey and evaluation* processes with key stakeholder organisations to determine the current level of awareness, participation and adoption and to identify the key factors ('barriers' and 'drivers') with each stakeholder group that influence stakeholder engagement in disease risk reduction. Survey and evaluation processes are required at three levels:
 - a. Initial survey setting benchmark information,
 - b. Mid-term review,
 - c. Final survey to assess full program achievement according to targeted outcomes,

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2. Preparation of a *Communications Plan* based on the initial survey information for key stakeholder organisations, and
3. Undertake a *Targeted Engagement Program* with mechanisms relevant to key stakeholder organisations.

4.2 Detection, Diagnosis and Mapping

Management to reduce the risk of impact or further spread of Phytophthora Dieback disease within the South Coast region depends upon early detection of occurrence of infestation and confident diagnosis of the disease. The extent of current disease occurrence and the potential for further autonomous or vectoring spread needs to be mapped. This information is a pre-requisite to operational planning and an investment in disease risk reduction actions.

The current level of disease detection, diagnosis and mapping within the South Coast region is limited. There is no assessment information for approximately 55% of remnant natural vegetation within the region.

Standard methods for interpretation are provided in the *Interpreter Guidelines for Detection, Diagnosis and Mapping* (DEC, 2001).

The tasks to undertake comprehensive disease detection and mapping within the region would require time and resources that would exceed the value of the information. This would be a slow process and the information would have a limited period of relevance (as low as 12 months) due to the potential for disease spread or change in disease risk. However, there is a need for high confidence information for operational planning and disease risk assessment.

Detection and mapping information is to be collated and managed at three levels:

1. Regional-scale survey,

- Applied to regional and local priority assets,
- Includes biodiversity asset values and disease detection,
- Baseline information for change detection,
- Periodic repeat surveys of high risk areas,
- Increasing the efficacy of risk assessment, and
- Used for ongoing monitoring, evaluation and reporting.

(Note: regional-scale survey information is not suitable for operational site assessment and planning.)

2. Operational site risk reduction planning,

- Site assessment with detailed asset value and risk assessment,
- Provides 'high confidence' disease detection and mapping,
- Applied to –
 - infested sites for risk reduction planning,
 - sites proposed for development or change in land use,
 - identified non-infested 'protectable areas' with high risk,

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- Used for detailed site operational planning.

3. Recovery planning for biodiversity assets

- Detailed site assessment of assets values and risks,
- Applied to threatened species and ecological communities,
- Information integrated with other recovery planning information.

The actions proposed for detection, diagnosis and mapping for the South Coast region are:

1. Reconnaissance-scale interpretation of Regional Priority assets to provide:
 - a. Biodiversity assets values at risk,
 - b. Current infestation,
 - c. Risk assessment, and
 - d. Asset-based management needs assessment.

The Regional Priority Assets assessment will be undertaken using air photo interpretation combined with field survey for each identified asset.

2. Undertake biological survey to identify regional priority assets (e.g. threatened ecological communities susceptible to dieback),
3. Baseline monitoring information method development and application for Regional Priority Assets, including:
 - a. Evaluation of remote sensing techniques for baseline survey and periodic condition change detection, and
 - b. Develop and implement a program of baseline monitoring information collation and review.
4. Prepare guidelines and provide support for operational site risk reduction planning. This is to apply to planning undertaken for specific sites (such as for road construction and maintenance, management of recreation reserves and development proposals), including:
 - a. Survey to identify biodiversity and other asset values threatened by disease,
 - b. Detection and mapping of infested areas,
 - c. Assessment of further disease spread risk, and
 - d. Assessment of the disease risk posed by existing or proposed activities.

The guidelines and support are to be adopted by private service providers engaged for operational site assessment.

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5. Prepare guidelines and support for threatened biodiversity asset recovery planning. Phytophthora Dieback is one of several threats that may be endangering native species, communities or ecosystems. Guidelines and support are required for managing the disease threat in recovery planning processes.
6. Detection and mapping information collation and management. This will ensure information from all sources (public and private) is collected in a standardised and geo-referenced format and is stored for monitoring, evaluation and risk assessment purposes.
7. Increased regional capacity and efficiency for disease diagnosis, including:
 - a. A feasibility study and cost benefit analysis of establishing a regional diagnosis laboratory with sufficient capacity for planned disease risk assessment process and anticipated research requirements.

4.3 Priority Asset Protection

There are 84 Regional Priority Areas identified. Local Priority Assets will also be identified. There is a need for targeted response to risk reduction in each priority area.

Preliminary priorities for disease risk reduction in Regional Priority Areas are provided in Section 3.2.

Planning for risk reduction within Regional Priority Areas will account for previous and existing actions and capacity for disease control. For example, Phosphite is applied regularly in target areas. Long-term continuity for these actions is important.

The strategy for protection of priority assets is to prepare Priority Asset Protection Plans for each area with a level of response category identified from reconnaissance survey as being 'medium intervention' or higher level. Some of these plans exist (as Recovery Plans for threatened species and ecological communities) or are well advanced (e.g. for the Stirling Range National Park). Others are not yet initiated. Priority Asset Protection Plans will be incorporated within Local Area Risk Reduction Plans. Some may also be integrated within other management planning (e.g. for National Parks).

Priority Asset Protection Plans will differ according to the assets at risk. Each will include:

- ✚ Assessment of biodiversity assets at risk,
- ✚ Projected risk analysis,
- ✚ Targets and expected outcomes within 7 years,
- ✚ Feasibility and cost benefit analysis of management options,
- ✚ Implementation and investment framework,
- ✚ Communications and engagement,
- ✚ Monitoring, evaluation and reporting.

The priority asset plans will be coordinated through regional Priority Asset Protection Sub-program.

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Planning for protection of priority assets will identify facilities and capacity required for implementing the actions. These are expected to include:

- ✚ Priority Asset Protection Program Coordination to:
 - arrange protection planning processes,
 - coordinate implementation of planned actions,
 - manage the Phosphite Program,
 - coordinate monitoring of impacts on assets and disease occurrence/ rate of spread,
 - Information and communicate with key stakeholder organisations and the community,
- ✚ aerial and ground-based phosphite spraying capacity (e.g. experienced contract pilots for aerial services, phosphite spray trailer kits), and
- ✚ diagnostic laboratory and chemical storage facilities.

The proposed actions are:

1. Initiate and arrange the Priority Asset Protection Program,
2. Arrange the Priority Asset Protection Coordination roles,
3. Undertake priority asset protection planning according to regional priorities,
4. Arrange a 'triple-bottom-line' evaluation of investment in the program (i.e. environmental, economic and social benefits and costs),
5. Review the current Phosphite Program within the context of priorities for protection for all Regional Priority Assets,
6. Implementation of priority asset protection actions (including phosphite applications) and maintaining a monitoring, evaluation and reporting cycle.

4.4 Local Area Risk Reduction

Permanent adoption of disease risk reduction practices for Phytophthora Dieback across the South Coast region is needed. Actions for engagement and practice change are most effectively delivered at a local scale where there are communities with common interests.

Six local areas are delineated for disease risk reduction within the region. Local Government Authority boundaries are used. The areas are:

Albany,

Denmark-Walpole,

Esperance,

Jerramungup,

Mount Barker-Cranbrook, and

Ravensthorpe.

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Operational activities are to be coordinated through Local Area Risk Reduction Plans. These will contain disease risk reduction principles that are consistent for the region. They will include management requirements for both Regional Priority Assets and Local Priority Assets.

Local Area Risk Reduction Plans will integrate all forms of disease risk planning for the area.

Local Area consultation processes during February 2008 identified:

- ✚ Key stakeholder organisations (agencies, interest groups, companies),
- ✚ Potential leaders and influential groups,
- ✚ Local disease risk management issues,
- ✚ Suggested management actions, and
- ✚ Current limitations to management capacity.

A (draft) Situation Statement has been prepared for each local area. These are compiled within the Regional Situation Statement for Phytophthora Dieback management in the South Coast region.

An interim Steering Committee was formed for each local area during the consultation workshop processes.

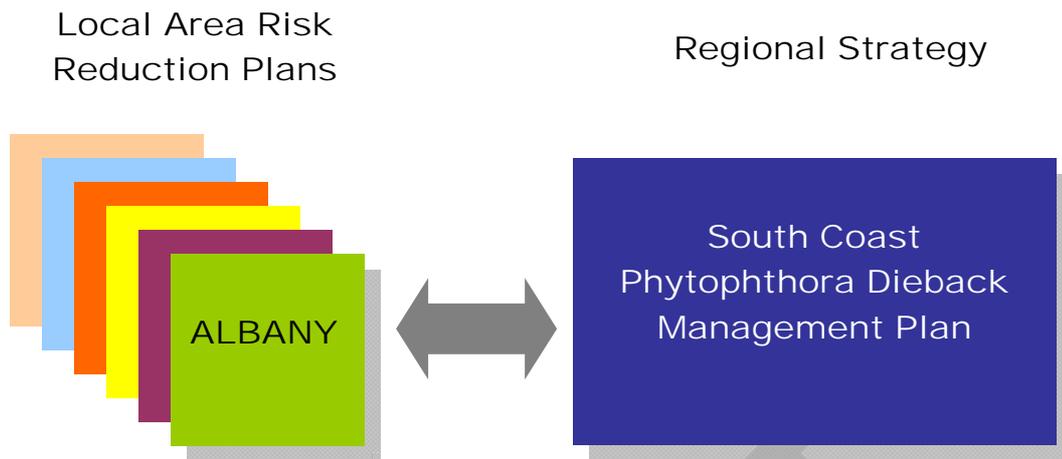
A Local Area Risk Reduction Plan will be prepared for each of the six identified local areas. Planning will be supported sequentially according to the priority for management of Regional Priority Assets. Priority for local area planning support is shown in Table 3.2 of the full management plan. Delivery of actions for disease risk reduction will occur through investment into the six local areas.

A standard process will be developed for local area planning. This will include:

- ✚ Recognition of risk reduction management principles and processes developed for the region,
- ✚ Inclusion of Regional Priority Areas and associated management requirements (e.g. Priority Asset Protection Plans),
- ✚ Identifying Local Priority Areas with planned risk reduction actions,
- ✚ Adoption of Site Operational Planning and Standard Operational Procedures,
- ✚ Key stakeholder group engagement processes and partnership opportunities,
- ✚ Communication and information management linked to regional processes,
- ✚ Implementation and investment planning, and
- ✚ Monitoring, evaluation and reporting.

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The inter-relationship between local and regional planning is represented below.



Local Area Risk Reduction Plans will provide a framework for other planning, including:

- ✦ Statutory planning and policy processes (e.g. local government Town Planning Schemes),
- ✦ National Park and Conservation Reserve plans,
- ✦ Infrastructure construction and maintenance planning,
- ✦ Mining and mineral exploration plans and approvals,
- ✦ Site Operations Plans,
- ✦ Strategic catchment and community group plans, and
- ✦ Sporting organisation and other recreation group plans.

The intention is to ensure that all planning processes that have potential to influence disease risk are coordinated and consistent within a local area context. This will then ensure regional consistency for planning.

The actions proposed for Local Area Risk Reduction Planning are:

1. Formalise and develop Steering Committees with region coordination through local consultation processes,
2. Prepare an appropriate local area planning method linked to regional management requirements in consultation with local Steering Committees,
3. Prepare geographic information sets for local area planning,
4. Prepare Local Area Risk Reduction Plans,
5. Arrange resources and capacity for implementation of planned actions, and
6. Provide local area planning coordination and support services.

Local area planning is to be undertaken according to regional priorities for management and local area requirements. While some processes can be undertaken concurrently, it is expected that delivery of the six local area plans will

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be staged over a three year period.

4.5 Risk Reduction in Operational Planning

Specific planning requirements for Phytophthora Dieback risk reduction need to be incorporated in operational planning processes of identified key stakeholder organisations. Operational planning provides the opportunity to assess the need for risk reduction and include Phytophthora Dieback risk management into project design.

Operational planning for Phytophthora Dieback is currently driven by key stakeholder organisation policy (e.g. DEC operations, Western Power, Main Roads WA, BHP Billiton and others). However, implementation of policies varies between and within organisations resulting in inconsistent Phytophthora Dieback risk reduction actions.

Most identified key stakeholder organisations do not incorporate any form of Phytophthora Dieback risk reduction planning into their project plans and activities.

The highest priority requirement is for the adoption of Phytophthora Dieback risk reduction management in operational planning by identified key stakeholder organisations and user groups, particularly those involved in disturbance of natural vegetation or earth moving activities.

Disease risk reduction planning is to include:

- ✚ Site assessment (biodiversity values at risk, current infestation and future disease risk),
- ✚ Consultation to obtain current information,
- ✚ Compliance with statutory planning requirements,
- ✚ Application of Standard Operating Procedures for risk reduction actions,
- ✚ Adoption of 'Clean on Entry' service provider contracts,
- ✚ Hygiene assurance by service providers,
- ✚ Timing of operations, and
- ✚ Ongoing site operational procedure monitoring and review.

For less specific sites (e.g. for routine road maintenance), standard management principles and procedures are to be applied to all operations.

The onus of responsibility for disease risk reduction is to be with those who undertake operations at a site.

The actions proposed for incorporation of disease risk reduction management within operational planning are:

1. Undertake a survey of identified stakeholder categories to assess the needs for support in development of disease risk reduction in operational planning (note to be linked to the proposed KASA survey listed in Section 5.2.2).
2. Prepare and implement an adoption strategy for disease risk management in operational planning following the processes outlined in Section 3.1, and including:

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- a. Promoting existing operational guidelines developed by the Dieback Working Group for adoption within specific industries (e.g. for extractive industries),
 - b. Demonstration and communications processes based on stakeholder adoption (i.e. using good examples of adoption from within the region).
3. Development of a standard set of planning criteria (a planning checklist) that includes:
- a. Statutory compliance requirements for specific operations,
 - b. Standard operating procedures required for specific operations,
 - c. High priority assets requiring high level application of Phytophthora Dieback management
 - d. Staff training and awareness requirements, and
 - e. Programs for monitoring and review of the effectiveness of operations.
4. Monitor and evaluate the rate of adoption of planning processes and the level of compliance with these plans.

It is expected that the current high level of disease risk reduction in operational planning by some organisations (e.g. by DEC in forestry operations) will be maintained.

4.6 Standard Operating Procedures

A range of Standard Operating Procedures and management guidelines has been previously prepared by for use by DEC in Phytophthora Dieback disease risk management on public land, including:

- ✚ *Management Guidelines* (CALM, 2003)
- ✚ *Interpreter's Guidelines for Detection, Diagnosis and Mapping* (CALM, 2001)
- ✚ *Phosphite Operations Guidelines* (CALM, 1999a)
- ✚ *A Dieback Hygiene Manual*, and
- ✚ *Best Practice Guidelines for the management of Phytophthora cinnamomi* (DEC, 2004)

These apply to DEC staff and contractors engaged to provide services on land managed by DEC.

Other existing 'standard operating procedures' available in Western Australia are:

- *Managing Phytophthora Dieback in Bushland* (DWG, 2008, Edition 4),

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- *Managing Phytophthora Dieback, Guidelines for Local Government* (DWG, 2000),
- *Code of Practice for Extractive Industries* (DWG, 2004), and
- *The Nursery and Garden Industry Accreditation Scheme* (NIASA, 2003)

Standard operating procedures are based on the 'Clean on Entry' principle for dieback management which requires effective hygiene through cleanliness of all vehicles, machinery, equipment (including clothing and footwear) and materials to ensure that soil is not spread from infected to uninfected areas.

Standard operating procedures are used for:

- assessment for Phytophthora Dieback infestation and risk,
- the time of operations (e.g. when there are dry soil conditions),
- options to adopt split phase operations,
- staff training,
- control of soil movement across identified disease boundaries,
- conducting operations in dry soil conditions or with split phase operations,
- 'Clean on Entry' requirements for all vehicles, equipment and machinery for dieback free sites, and
- clean-down of all vehicles, equipment and machinery before leaving dieback infected areas.

A specific area for which Standard Operating Procedures are required is in sourcing disease-free road building materials. The importance of using clean material is emphasised in the range of operating procedures detailed in Appendix 5 of the Phytophthora Dieback Management Plan for the South Coast Region. A limitation to this requirement is that the disease status of current supplies may not be known. Further, there may not be adequate disease-free materials near to a road construction site. Where this occurs, the costs of transporting clean material could significantly increase the over-all road construction project costs.

There may be an identified need to survey and assess the disease status of road building material source areas. This could be undertaken as a part of proposed Local Area Risk Reduction Plans.

There are 20 key stakeholder categories identified for Phytophthora Dieback management within the South Coast region. The currently available 'standard operating procedures' are not specifically targeted for most of these groups.

The highest priority requirement is for adoption of hygienic clean-down practices by identified key stakeholder organisations, particularly those involved in disturbance of natural vegetation or earth moving activities.

The key stakeholder categories that should have 'standard operating procedures' applicable to their activities and be adopting hygiene practices are:

State Government agencies

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Local Government

NGO's

Community Conservation Groups

Catchment/NRM Groups

Infrastructure Managers

Earthmoving Contractors

Recreation operators (Outdoor/adventure, 4-Wheel Drive and Motorbikes, Fishing, Equestrian and Surfing)

Mining

Plantation Forestry

Nurseries/ Landscaping/Soil Suppliers

Land Development (Developers and Surveyors), and

Fire Response organisations (including Fire Brigades).

The strategy is to develop or assist in development of 'standard operating procedures' that are targeted for each of these stakeholder groups. These will be:

- ✚ based on a consistent set of principles and practices,
- ✚ focused on disease risk reduction through hygienic operations,
- ✚ prepared in consultation with members of respective organisations,
- ✚ practical, relevant and achievable, and
- ✚ available for periodic review.

There will also be support to ensure standard procedures are being adopted by members of these organisations. This support will be integrated within the adoption model for disease risk reduction, including demonstration and engagement processes.

The main standard operating procedures expected to be adopted by many key stakeholder groups are:

- ✚ Site risk assessment,
- ✚ practical wash-down methods and facilities (permanent or mobile),
- ✚ identification and supply of dieback free basic raw materials (e.g. gravel for road construction and maintenance operations),
- ✚ dry soil activities,
- ✚ split-phase or barrier-system operations,
- ✚ surface water control and drainage,
- ✚ quarantine areas and road closures,
- ✚ control of public access,
- ✚ use of standard signage, and

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✚ disturbed site restoration.

The proposed actions for development and adoption of targeted 'standard operating procedures' are:

1. Develop a set of 'standard operating procedures' based on common principles and consistent practices for all identified key stakeholder categories.
2. Develop a facilitated engagement program using demonstrations, training and other mechanisms to ensure adoption of standard procedures by targeted stakeholder groups.
3. Prepare a coordinated and strategic approach to management of disease-free materials supply (e.g. gravels, sand) for the region.
4. Provide on-going professional support for continuous adoption and improvement of 'standard operating procedures'.
5. Evaluate and implement suitable performance assessment methods, accreditation and compliance options to ensure a high level of continuous adoption is achieved.

An assessment of some Standard Operating Procedures is shown in Table 4.1.

Table 4.1 Effectiveness of key standard operating procedures for Phytophthora Dieback risk reduction in the South Coast region.

Procedure	Description	Effectiveness
Site risk assessment	<ul style="list-style-type: none"> ✚ Disease detection, diagnosis and mapping, ✚ Landuse assessment, including neighbouring lands, ✚ Topography and drainage assessment, ✚ Soils and rainfall assessment. 	<ul style="list-style-type: none"> ✚ Provides accurate disease presence and risk information for incorporation into operational planning ✚ Enables effective disease risk reduction actions to be developed, ✚ Not suitable for widely dispersed operations due to large fragmented sites.
Practical wash-down methods and facilities	<ul style="list-style-type: none"> ✚ Wash-down stations – permanent, ✚ Wash-down stations - mobile, ✚ Foot ware cleaning. 	<ul style="list-style-type: none"> ✚ Suitable for cars and trucks, ✚ Time-consuming and costly for bulldozers and graders, ✚ Requires drainage control from wash down locations.
Identification and supply of dieback free basic raw materials (e.g. gravel for road construction and maintenance operations)	<ul style="list-style-type: none"> ✚ Interpretation of vegetation on and surrounding basic raw materials to determine disease status, ✚ Transport and supply of disease free materials to disease free areas. 	<ul style="list-style-type: none"> ✚ Can identify sources of disease free material for use in high priority disease free areas, ✚ Basic raw materials located on cleared areas must be classified as uninterpretable and treated as infected, ✚ Large costs may be incurred in the transport of disease free material, ✚ High level of hygiene is required to maintain the disease free status of pits.
Dry soil activities	<ul style="list-style-type: none"> ✚ Activities and access must cease when soil moisture levels allow soil to adhere to vehicles. Commonly agreed to be >5mm over 24hr. 	<ul style="list-style-type: none"> ✚ Vectoring of the disease through soil movement on vehicles, machinery and equipment is greatly reduced.
Split-phase or barrier-system operations	<ul style="list-style-type: none"> ✚ Segregation of operational activities across disease boundaries, ✚ Use of barriers and hygiene stations to restrict the movement of vehicles from infected areas to 	<ul style="list-style-type: none"> ✚ Risk of soil movement from disease areas into disease free areas is reduced.

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Procedure	Description	Effectiveness
Surface water control and drainage	<p>uninfected areas without wash down.</p> <ul style="list-style-type: none"> ✚ Directing surface water flow from disease areas away from disease free areas via drainage systems or holding ponds. 	<ul style="list-style-type: none"> ✚ Risk of introducing infected soil carried by surface water flow into disease free areas.
Quarantine areas and road closures	<ul style="list-style-type: none"> ✚ Permanent or seasonal access control to areas or tracks, ✚ Enforceable through the Conservation and Land Management Act (1985) on land managed by DEC. 	<ul style="list-style-type: none"> ✚ Reduces the risk of introducing disease through the movement of infected soil, ✚ Limited by the support of local communities.
Use of standard signage	<ul style="list-style-type: none"> ✚ Adoption of standard signage across the region to communicate management actions, disease distribution and required activities eg wash down. 	<ul style="list-style-type: none"> ✚ Raise awareness and contribute to practice change, ✚ Inform locations of disease boundaries to enable hygiene activities in appropriate locations, ✚ Resources required for erection and on-going maintenance, replacement of old dieback signage.
Disturbed site restoration	<ul style="list-style-type: none"> ✚ Rehabilitation of degraded sites to restore vegetation and ecological values. ✚ Potential for need to apply protective measures including phosphite control and other new techniques currently being researched and developed. 	<ul style="list-style-type: none"> ✚ Re-establish plant communities but will not enable re-establishment of susceptible species without appropriate controls such as phosphate application.

4.7 Compliance and Regulation

Practice change through awareness and engagement is the preferred approach for Phytophthora Dieback risk reduction within the South Coast region. However this approach is limited by regional capacity for a sustained period of investment in social practice change processes. Temporary adoption is not an acceptable outcome. Changes that are required need to be adopted permanently.

In the absence of market-based mechanisms (i.e. with financial benefits or costs), permanent practice change is most effectively driven by statutory processes, including regulation.

The revised WA *Environmental Protection Amendment Act 2003* makes provision for Phytophthora Dieback infestation to be considered as causing environmental harm. This may apply to non-compliance of conditions placed on a statutory approval that is considered to be negligent.

DEC is able to quarantine 'Disease Risk Areas' and regulate operations and public access.

Conditions may be applied for approval of mineral exploration and mining proposals through *Mining Act 1978*. These may restrict activity in high risk Phytophthora Dieback areas or require adoption of hygiene practices.

Otherwise, statutory and non-statutory planning processes provide opportunities to control human activities within infested or high disease risk areas.

The strategy for compliance and regulation is to develop the capacity for all available options to be applied within the region should the need arise. However, the strategy for voluntary adoption through a program of awareness and adoption is given priority during the 7-year period of the *Foundation Program*.

The proposed actions are:

1. Review local and state statutory planning and approval processes with potential for Phytophthora Dieback risk management within the South Coast region,
2. Prepare policy guidelines and protocols for adoption by local and state government agencies for disease risk reduction relevant to the South Coast region,
3. Provide current regional information and advice for disease risk reduction to local and state government agencies.

Section 5

Capacity for Action

The South Coast Phytophthora Dieback Management Plan is based on implementing a set of seven Risk Reduction Strategies within an initial 7-year period (the *Foundation Program*) to achieve the 25-year Goals of the regional vision for containment of the disease. In this section, the methods and capacity required for delivering these actions within the South Coast region are outlined.

5.1 A 'Road Map' for regional delivery

Actions are to be undertaken according to a regional delivery model. The key advantages of regional-scale management are:

- ✚ Engagement of local communities and key stakeholder organisations, including local government,
- ✚ Setting regional and local priorities for disease risk reduction,
- ✚ Applying consistent management across tenure,
- ✚ Adjusting to specific needs of the region (e.g. actions for non-forest plant communities at risk),
- ✚ Arranging multiple-benefit management (i.e. with other threatening processes),
- ✚ Providing a 'one-stop-shop' within the region for information, and
- ✚ Efficient delivery through existing regional partnership arrangements.

There is a need to ensure consistency of approach across regional boundaries.

There are limitations to the roles and functions that can be efficiently delivered at a regional scale. These include:

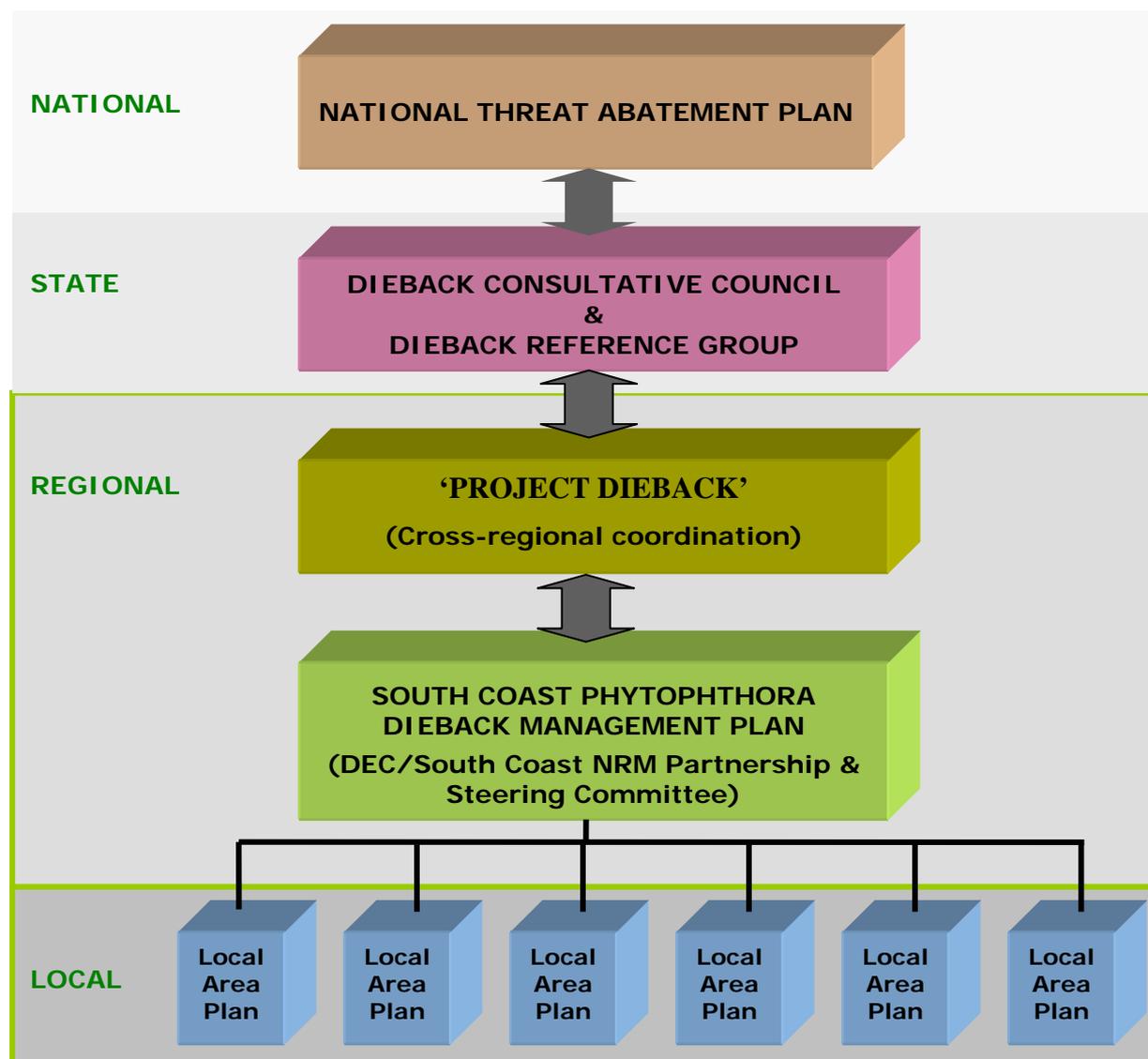
- ✚ Development of government policies and statutory processes,
- ✚ Provision of skills training and development,
- ✚ Undertaking or coordinating research and development, and
- ✚ Engagement of state-level government and business organisations.

The regional delivery model for the South Coast region is represented in Figure 5.1.

Delivery of risk reduction outcomes within the South Coast region is proposed to be based on a management partnership arrangement between DEC South Coast Region, Frankland District (Warren Region) and South Coast NRM. The partnership is to be coordinated through 'Project Dieback' to ensure consistency of approach between regions. A Steering Committee for the 7-year *Foundation Program* will be appointed by and accountable for deliverable outcomes to the organisations of this partnership.

Actions required for delivery are identified in the following sections.

Figure 5.1 South Coast Regional Delivery Model



5.2 Building operational capacity

Building the skills, knowledge and experience within key regional stakeholder organisations to a level that is required to reduce the risk and control the disease is an imperative.

The South Coast Phytophthora Dieback Regional Situation Statement provides a listing of current capacity for key stakeholder organisations within the region. This indicates there to be no identifiable disease risk reduction capacity in most identified key stakeholder organisations. Most capacity that does exist is contained within DEC although this varies considerably between the 4 district offices within the region. While there is dedicated capacity for the phosphite program and management of the Bell Track project within

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Fitzgerald River National Park, albeit subject to short-term funding programs, all other disease risk management functions are performed by staff employed with a range of other duties. The current capacity within DEC to effectively management the disease within reserves is limited.

Some Local government councils are aware of the risks and have taken action. For example, the City of Albany is undertaking site operational planning and has allocated resources to implement actions of the plan. Others are seeking information, support and leadership to deal with the issues.

Very few community-based organisations have capacity for disease risk management. Most have very limited awareness and information.

Mining companies have developed their own capacity to ensure hygiene in their operations. For example, BHP Billiton has a Dieback Management Plan for their operations in the Shire of Ravensthorpe with ongoing monitoring and mapping. This company has provided funding for related research and for construction of a community-based wash-down station. Operational hygiene information is included in staff induction processes and service provision contracts.

The proposed actions are:

1. Undertake a 'Knowledge, Aspirations, Skills and Attitudes' (KASA) survey linked with a management needs assessment for identified key stakeholder organisations within the South Coast region. (Note – the management needs assessment is to be linked with processes for development of Standard Operating Procedures as outlined in Section 2.5).
2. Prepare and implement a 'Skills Training Program' to meet capacity development needs within the region. This is expected to include skills training for communication and engagement, site planning and operations, and specialist skills for detection, diagnosis, mapping and phosphite operation.
3. Prepare and implement a 'Management Needs Support Program'. This is expected to include physical capacity requirements for information materials, signage, hygienic operation facilities and others.

DEC currently has four competency-based training courses. These are for:

- ✚ management,
- ✚ detection, diagnosis and mapping (4 days and 3 months field experience),
- ✚ field operators, and
- ✚ phosphite operators.

The detection, diagnosis and mapping course is compulsory for 'dieback interpretation' responsibilities with DEC. DEC training is currently limited to its staff and contractors.

Other training is currently available through the WA DWG. Both DEC and WA DWG are recognised through the Australian Quality Training Framework.

5.3 Engagement for adoption of practice change

A targeted approach to stakeholder engagement for adoption of practice change is outlined in Section 3.1. An initial approach to stakeholder communications and engagement has been developed through the current Communications Plan for *'Project Dieback'*.

Experienced staff members employed by DEC provide information to stakeholder organisations although their capacity for engagement is limited by their time available. Information provided is generally in response to requests rather than being a targeted engagement program.

The proposed actions in Section 3.1 lead towards a revised Communications Plan and a Targeted Engagement Plan.

The Communications Plan will provide consistency of information by:

- ✚ Developing key message statements,
- ✚ Creating relevant communications imagery for the region (including consideration of local area suggestions for iconic imagery),
- ✚ Promoting the use of standard signage,
- ✚ Ensuring publications and other extension material is relevant and consistent with other communications,
- ✚ Identifying methods and materials to extend information through schools and other educational organisations,
- ✚ Initiating or developing communications networks (e.g. website information, report to community and others),
- ✚ Continuously updating information (e.g. knowledge about disease distribution and risk areas),
- ✚ Communicating successful adoption (e.g. demonstration site, stakeholder category 'champions'),
- ✚ Arranging information media (e.g. documentaries, statements), and
- ✚ Identifying liaison options for partnership development.

The Communications Plan will develop and extend the information that is considered important for Phytophthora Dieback risk reduction in the region.

The Targeted Engagement Program will more specifically identify key stakeholder group needs for adoption of identified practices. This will range from relatively small adoption practices (e.g. information distribution through tourism outlets) through to substantial practice change (e.g. hygienic operational practices for earthmoving contractors). Some practice changes may incur significant inconvenience or expense.

The principles of an engagement model and a range of mechanisms for adoption are provided in Section 3.1. The engagement program is expected to include:

- ✚ Survey processes to provide benchmark information of current knowledge, skills, attitudes and management needs for identified key stakeholder categories (linked to the KASA survey proposed in Section 5.2.2),
- ✚ A review of engagement mechanisms relevant to each key stakeholder category,

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- ✚ Priorities for engagement,
- ✚ Processes for engagement, and
- ✚ Monitoring and evaluation processes for continuous improvement in engagement within the region.

Successful engagement needs to be recognised as permanent adoption of practice change. Investment in temporary adoption of practices is inefficient as it will not provide on-going disease risk reduction.

5.4 Information and knowledge management

An effective risk reduction strategy is substantially dependent upon efficient information and knowledge management. Management of Phytophthora Dieback as a 'complex system' requires information to determine:

- ✚ Which parts of the system to manage (*setting priorities*), and
- ✚ What changes to management are required with time (through 'adaptive management').

To meet these requirements, the principles that should apply to a regional information management framework are that:

1. the application to management is relevant both at a regional and local scale (\approx Local government boundaries),
2. the source information used is of a quality that is relevant to management and that there are verification statements about the quality and consistency of source information used,
3. local information can be combined with regional, state and national datasets,
4. spatial information is linked with data sets and reporting processes,
5. source information is easily accessible for key stakeholder organisations within the region,
6. the framework can be operated within the region for continuous information updating, altering priorities and reporting processes,
7. use of the information management framework remains are focused on disease risk reduction for natural resource assets.

The basic structure for an effective information and knowledge framework is provided by the South Coast regional Phytophthora Dieback Atlas and risk assessment (DEC, 2007).

The South Coast Phytophthora Dieback Information Management Framework is to be developed as a computer-based information management system with capacity to:

- ✚ Manage spatial information (as outlined in section 5.4.1),
- ✚ Provide current information for 'adaptive management' processes incorporating continuous un-dating processes,
- ✚ Undertake on-going regional and local disease risk assessments,
- ✚ Supply relevant information for communication and stakeholder engagement

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processes,

- ✚ Enable *Foundation Program* project reporting processes (including quantified project outputs), and
- ✚ Contribute information to state and national threat abatement reporting processes.

It is expected that the information management framework will be operated from within the South Coast region.

In addition to spatial and quantifiable information, there is a need to develop, extend and retain new knowledge in the region. This includes both science-based knowledge (through Research and Development) and local knowledge developed through employed staff, service contractors, key stakeholder organisations and from within local communities.

Research and Development

While it is not the current role of key stakeholder organisations within the region to undertake major research programs, there is a requirement to direct research effort to priority regional needs. Initial needs for new knowledge in the region identified during regional planning processes are to:

- ✚ Identify plant communities and ecosystems at risk through desk-top and systematic survey processes (e.g. for threatened ecological communities, areas of high disease vulnerability),
- ✚ Identify environmental determinants of disease risk (e.g. conducive / suppressive soils, soil-water conditions),
- ✚ Estimate the effects of climate change on disease risk,
- ✚ Develop usable field diagnostic kits for determining phosphite levels,
- ✚ Develop 'additives' that may enhance the effectiveness of phosphite,
- ✚ Evaluate remote sensing options for long-term disease monitoring and risk assessment,
- ✚ Establish long-term monitoring sites in key areas across the region to monitor the long-term impact and spread of Phytophthora Dieback, and
- ✚ Identify success factors and barriers to permanent adoption for practice change by key stakeholder organisations for disease risk reduction.

The over-riding priority research is to identify a cure for eradication of the disease.

Valuing regional and local knowledge

There are many individuals and organisations within the region with extensive Phytophthora Dieback risk management experience, including people within government agencies, service provider organisations and informed people within local communities. New initiatives during the period of the *Foundation Program* will increase this knowledge base.

SUMMARY: South Coast Phytophthora Dieback Management Plan

There is a need to add value to regional and local knowledge by providing access to this information by others without over-burdening those who hold the knowledge. The processes proposed to add value to knowledge within the region are through formation of:

- ✚ An 'Expert Panel' to set priorities for management and review program outcomes,
- ✚ A 'Technical Advisory Group' to advise on and review technical procedures for disease risk reduction,
- ✚ 'Local Area Working Groups' to set local area priorities, share local information and suggest options for management, and
- ✚ Personalised 'Stories' developed for key stakeholders who adopt practice change and provide key messages to others.

Management of local and regional knowledge is linked with actions of the proposed Communications Plan.

The proposed actions for information and knowledge management within the South Coast Region are:

1. Prepare a 7-year plan for development of the South Coast Phytophthora Dieback Information Management Framework,
2. Provide capacity for implementation of the South Coast Phytophthora Dieback Information Management Framework over the 7 year period,
3. Review disease risk assessment processes and develop a reiterative program for assessing change in disease risk within the region,
4. Undertake a 'Research and Development' needs assessment for the South Coast region,
5. Arrange 'Research and Development' partnerships with provider organisations (e.g. CPSM),
6. Prepare and 7-year plan for fostering regional and local knowledge development and sharing,
7. Provide capacity to implement actions of the regional and local knowledge sharing plan.

It is expected that the proposed actions will be reviewed and continuously improved through 'adaptive management' processes.

Section 6

Monitoring, Evaluation and Review

A risk-based management approach to control of Phytophthora Dieback within the South Coast region is dependent upon effective use of adaptive management procedures. This requires efficient and effective monitoring information, evaluation and review processes.

Monitoring, evaluation and review is needed at three levels:

1. Field-based monitoring of disease risk and impacts,
2. Monitoring the level of adoption of practices through procedural compliance audits, and
3. Program performance.

A comprehensive monitoring, evaluation and review process is required for the *Foundation Program*. This is to be developed during the period of the program when there is sufficient survey information to set targets for levels of adoption.

5.1 Monitoring Disease Risk and Impacts

A range of long-term monitoring sites have been established by DEC during the period 1991-7 to monitor the spread of infestation within the South Coast region. Other sites were established after 1999 to monitor the rate of spread and response to phosphite applications. There is further need for a strategic approach to long-term disease risk monitoring within the region. This is to be based on information from the proposed reconnaissance-scale assessment of the 84 Regional Priority Areas. The assessment will indicate those areas with greatest vulnerability to Phytophthora Dieback.

Field-based monitoring should be based on site vulnerability (i.e. applying most monitoring effort to the most vulnerable sites) and on-going assessment of site impacts. Impact assessment is to include change in plant species and plant community status, the quality of faunal habitat and site susceptibility to weeds or other detrimental change to the natural ecosystem.

Monitoring information is to be regularly evaluated in a way that informs investment decision processes. Change in disease risk status (either increase or decrease) will require a corresponding change in investment priority. For example, this would apply to decisions for application of phosphite. Annual review of disease risk monitoring information is proposed.

During the period of the *Foundation Program*, the *risk analysis* previously undertaken for the region (DEC, 2007) will be reviewed and re-run based on a substantially improved information derived from both field interpretation and strategic monitoring.

5.2 Procedural compliance audits

The *Foundation Program* has a range of proposed actions to engage stakeholder groups in practice change to reduce Phytophthora Dieback risk within the region. Some of these are for adoption of Standard Operating Procedures. Permanent practice change is required to ensure disease risk reduction.

SUMMARY: South Coast Phytophthora Dieback Management Plan

Use of procedural compliance audits for Phytophthora Dieback disease risk is not well developed in Australia (O'Gara *et al.*, 2005). While a framework approach for adoption within the South Coast region is not required at this stage, auditing procedures are to be developed in a way that can be subsequently contained within a regional-scale Environmental Management System (EMS) framework.

5.3 Program performance

The third level of monitoring, evaluation and review is for program performance. This is essential to provide progressive information to enable adaptive management processes during the investment period of the *Foundation Program*.

Investment is arranged through seven Sub-programs (section 7). These are set within a 'logical framework' that shows the contribution of expected outcomes from planned projects to achievement of the 7-year *Foundation Program* goals and objectives.

Program performance review is to be based on quarterly reporting processes.

More comprehensive program assessment is to be undertaken through a Mid-term Review.

A Final Program Evaluation is to be undertaken that will evaluate the effectiveness of investment in the *Foundation Program* and provide direction for further investment in a subsequent program.

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Section 7

Implementing the 'Foundation Program'

The 7-year *Foundation Program* is the first of three investment periods to achieve the 25-year goals for Phytophthora Dieback risk reduction in the South Coast region. A set of seven Sub-programs have been developed to implement actions of the program.

7.1 Sub-programs and projects

The Sub-programs are:

Sub-program One Practice Change through Awareness and Engagement

Purpose: to provide a high level of targeted stakeholder understanding and engagement with the need for disease risk reduction resulting in permanent adoption of required practices.

Sub-program Two Diagnosis, Detection and Planning

Purpose: to ensure adequate and relevant disease risk reduction skills and capacity within the region.

Sub-program Three Regional Priority Area Protection

Purpose: to identify, plan and implement targeted response actions for each identified Regional Priority Area.

Sub-program Four Local Area Risk Reduction

Purpose: to prepare Local Area Plans that provide a local strategic approach to disease risk reduction and engage local stakeholder groups in implementation of actions for regional and local priority areas. Capacity provided for implementation of local area actions in regional and local priority areas.

Sub-program Five Standard Operating Procedures

Purpose: to prepare a set of relevant Standard Operating Procedures for each identified key stakeholder group. These procedures are to be adopted through actions of Sub-program One.

Sub-program Six Information and Knowledge Management

Purpose: to provide capacity to management information and knowledge relevant to risk reduction according to regional needs. To identify regional priorities for research and development.

Sub-program Seven Regional Coordination and Program Management

Purpose: To provide adequate capacity for effective and efficient delivery of the actions of the Program.

The set of projects for each Sub-program is shown in Table 7.1

Table 7.1 Sub-program structure and projects

Adaptive Management	Project Title and Description	Tasks	7-year Targets (cf. Table 2.1)
SUB-PROGRAM ONE PRACTICE CHANGE THROUGH AWARENESS AND ENGAGEMENT			
PLAN	<p>P1.1 Targeted stakeholder survey and evaluation</p> <p>Establish baseline information to develop regional engagement program.</p>	<ul style="list-style-type: none"> ✚ Knowledge, Aspirations, Skills and Attitudes (KASA) survey , ✚ Undertake survey according to stakeholder priorities, ✚ Identify adoption success factors and barriers, ✚ Needs assessment for operational planning. 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2 ▪ 4.2.1, 4.3.1 ▪ 5.2.1, 5.4.1 ▪ 6.1.2
	<p>P1.2 Planning for Targeted Engagement</p> <p>Prepare key stakeholder engagement plan based on information from KASA survey.</p>	<ul style="list-style-type: none"> ✚ Include adoption targets and mechanisms for adoption, ✚ Adoption of standard operating procedures, ✚ Adoption of disease risk management in operational planning, ✚ Include demonstrations program. ✚ Link to Project P5.1. 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2, 1.2.1 ▪ 4.3.1 ▪ 5.4.1
	<p>P1.3 Communications Plan</p> <p>Prepare communications guidelines and plan to ensure consistent use of information in communications required for awareness and engagement.</p>	<ul style="list-style-type: none"> ✚ Key messages targeted for key stakeholder audiences, ✚ Use of iconic species, brands, ✚ Consistent format for information, ✚ Linked to Targeted Engagement (Project P1.2) 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2, 1.2.1 ▪ 4.3.1
	<p>P1.4 Phytophthora Dieback risk management within local and state planning and approval processes.</p> <p>Review options and engage local and state planning organisations relevant to the region to ensure disease risk reduction processes are incorporated within statutory and non-statutory policy and planning processes.</p>	<ul style="list-style-type: none"> ✚ Review statutory and non-statutory planning opportunities for disease risk management within the region (including local government, state government instrumentalities), ✚ Prepare policy statements and planning guidelines suitable for adoption, ✚ Initial engagement of relevant organisations to facilitate adoption. 	<ul style="list-style-type: none"> ▪ 4.1.1, 4.3.1 ▪ 5.4.1

SUMMARY: South Coast Phytophthora Dieback Management Plan

Adaptive Management	Project Title and Description	Tasks	7-year Targets (cf. Table 2.1)
	<p>Priority Areas.</p> <p>Survey of all Regional Priority Areas to prepare initial assessment, including classification for level of response.</p>	<p>detection capacity. One person will be a botanist, the other an accredited disease interpreter.</p> <ul style="list-style-type: none"> ✚ Develop methodology for reconnaissance-scale site survey, ✚ Arrange training and supervision as required, ✚ Undertake assessment of biodiversity assets, infestation, risk and management needs, ✚ Prepare 'level of response' classification. 	<ul style="list-style-type: none"> ▪ 5.1.1
	<p>A2.3 Undertake regional risk assessment</p> <p>Undertake computer-based regional disease risk assessment based on increased information for the region.</p>	<ul style="list-style-type: none"> ✚ Adapt risk assessment for Regional Priority Areas (method to be based on Project P2.4), ✚ Undertake and report on risk assessment, ✚ Include annual update procedures if feasible. 	<ul style="list-style-type: none"> ▪ 2.3.1 ▪ 3.1.1 ▪ 5.1.1
MONITOR & REVIEW	<p>M2.1 Review of detection, diagnosis and planning methods and capacity.</p> <p>Review of all site detection, diagnosis and planning processes in preparation for the second 7-year investment period.</p>	<ul style="list-style-type: none"> ✚ Arrange external review process, ✚ Link with Project M1.1 	<ul style="list-style-type: none"> ▪ 2.1.1, 2.2.1, 2.3.1 ▪ 4.2.1 ▪ 5.1.1
SUB-PROGRAM THREE REGIONAL PRIORITY AREA PROTECTION			
PLAN	<p>P3.1 Prepare/integrate site risk reduction plans for Regional Priority areas</p> <p>To ensure that there are site-based risk reduction plans for all Regional Priority Areas identified with medium-level response or higher classification.</p>	<ul style="list-style-type: none"> ✚ To be based on results from Project 2.1, ✚ Prepare site specific risk management plans (following guidelines developed in Project P2.1), ✚ Integrated with other purpose planning (e.g. park management), ✚ Tasks to be undertaken by local area coordinators, ✚ Order of planning to follow priorities set for regional areas, ✚ Include annual review processes. 	<ul style="list-style-type: none"> ▪ 2.1.1, 2.2.1, 2.3.1 ▪ 3.1.1 ▪ 4.1.1, 4.3.1 ▪ 5.1.2
ACT	A3.1 Implementation of Priority	✚ 'Roll-out' program from Project P3.1 (excluding 'aerial	▪

SUMMARY: South Coast Phytophthora Dieback Management Plan

Adaptive Management	Project Title and Description	Tasks	7-year Targets (cf. Table 2.1)
	<p>Regional Area Protection Implementation of actions identified in Project P3.1.</p>	<p>phosphite application – see Project A3.3), ✚ To be undertaken by local area coordinators.</p>	<ul style="list-style-type: none"> ▪ 4.1.1, 4.3.1 ▪ 5.1.1, 5.4.1
	<p>A3.2 Interim Priority Regional Area Protection To ensure on-going Regional Priority Area management for period up to commencement of Project A3.1.</p>	<ul style="list-style-type: none"> ✚ Management as needed prior to area planning (Project P3.1) and implementation ‘roll-out’ (Project A3.2), ✚ Excluding ‘aerial phosphite application’, ✚ To be arranged by local area coordinators. 	<ul style="list-style-type: none"> ▪ 5.1.1, 5.1.2
	<p>A3.3 Aerial phosphite program Annual program for aerial phosphite application.</p>	<ul style="list-style-type: none"> ✚ Continuing from current program but based on review from Project P3.2, ✚ Including salaries, vehicle and aerial spraying contracts (included within total budget allocation), ✚ Include annual target area setting and review process, ✚ Arrange for South Coast region only. 	<ul style="list-style-type: none"> ▪ 5.1.1, 5.1.2
MONITOR & REVIEW	Monitoring and review to be included in above projects.		
SUB-PROGRAM FOUR LOCAL AREA RISK REDUCTION			
PLAN	<p>P4.1 Local Area Risk Reduction Planning Preparing local area plans that involve and engage local communities and key stakeholder organisations in a consistent and coordinated approach to disease risk reduction. The primary focus remains on the Regional Priority Areas.</p>	<ul style="list-style-type: none"> ✚ Preparing local area planning method based on regional planning process, ✚ Undertake according to grouped priority of Regional Priority Areas, ✚ Include Local Priority areas, ✚ Include roads at risk. 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2, ▪ 2.1.1, 2.2.1, 2.3.1 ▪ 3.1.1 ▪ 4.1.1 ▪ 5.1.1, 5.4.1 ▪ 6.1.2
ACT	<p>A4.1 Local Working Groups Initiating and supporting local leadership</p>	<ul style="list-style-type: none"> ✚ Regional coordination through local consultation processes. 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2 ▪ 6.1.1, 6.1.2

SUMMARY: South Coast Phytophthora Dieback Management Plan

Adaptive Management	Project Title and Description	Tasks	7-year Targets (cf. Table 2.1)
	through informed and consultative processes with local Working Groups.		
	A4.2 Implementing Local Area Plans. Undertake actions identified in Project 4.1.	<ul style="list-style-type: none"> ✚ Linked also to Projects A3.1, A3.2, ✚ Role for Local Area Coordinator, 	<ul style="list-style-type: none"> ▪ 2.1.1, 2.2.1, 2.3.1 ▪ 4.1.1, 4.3.1 ▪ 5.4.1
MONITOR & REVIEW	M4.1 Local Area risk reduction review.	<ul style="list-style-type: none"> ✚ Significant review of actions for Region Priority and Local Priority areas following risks assessment in Year 3 and following years (linked to Project A2.3). 	<ul style="list-style-type: none"> ▪ 2.2.1, 2.3.1 ▪ 3.1.1 ▪ 4.2.1, 4.3.1 ▪ 5.1.1, 5.4.1 ▪ 6.1.1
SUB-PROGRAM FIVE STANDARD OPERATING PROCEDURES			
PLAN	P5.1 Preparation of Standard Procedures. To ensure consistent adoption of standard operating procedures by targeting procedures for identified key stakeholder organisations within the region.	<ul style="list-style-type: none"> ✚ Formation of temporary Technical Advisory Group (TAG), ✚ Preparation of 'key stakeholder standard operating procedures', ✚ Develop a facilitated engagement program (Link to Project A1.1), ✚ Include procedures for operations planning, ✚ To be based on stakeholder consultation processes. 	<ul style="list-style-type: none"> ▪ 4.1.1, 4.3.1 ▪ 5.1.1, 5.1.2, 5.4.1
ACT	Include adoption within Project A1.1		
MONITOR & REVIEW	Include monitoring within Project M1.1	<ul style="list-style-type: none"> ✚ Arrange for monitoring of level of adoption and compliance, ✚ Processes for periodic TAG review processes and procedure updates. 	

SUMMARY: South Coast Phytophthora Dieback Management Plan

Adaptive Management	Project Title and Description	Tasks	7-year Targets (cf. Table 2.1)
SUB-PROGRAM SIX INFORMATION AND KNOWLEDGE MANAGEMENT			
PLAN	<p>P6.1 Prepare plan for South Coast Phytophthora Dieback Information Management Framework.</p> <p>Review of current information management options and development of a plan to meet regional disease risk management needs.</p> <p>Provide a standard format for collection and collation of disease risk information that is suitable both for easy access and retrieval and for ongoing risk assessment.</p>	<ul style="list-style-type: none"> ✚ Review information management options, ✚ Prepare scoping document, ✚ Ensure capacity to link information requirements across Sub-programs, ✚ Incorporate existing atlas and risk assessment database. ✚ Arrange for standardised and geo-referenced information collation, storage and retrieval (link to Information and Knowledge Management , including R&D), ✚ Review regional disease risk assessment methodology and ensure that data collation is relevant to the information needs of risk assessment. 	<ul style="list-style-type: none"> ▪ 2.1.1, 2.2.1, 2.3.1 ▪ 5.2.1 ▪ 6.1.1, 6.1.2
	<p>P6.2 7-year plan for regional and local knowledge development and sharing.</p> <p>Processes for local communities and key stakeholder organisations to develop and share knowledge.</p>	<ul style="list-style-type: none"> ✚ Identify community leaders for disease risk management through Local Area Risk Reduction planning processes, ✚ Develop opportunities for identified people to share information and knowledge (websites, newsletters, bus tours etc.), ✚ Document 'success stories' and made available through various media, ✚ Link to Projects P1.1, P1.2 and P1.3. 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2, 1.2.1 ▪ 4.1.1, 4.2.1, 4.3.1 ▪ 5.2.1, 5.4.1 ▪ 6.1.2
	<p>P6.3 Undertake a 'Research and Development' needs assessment for the South Coast region.</p> <p>Prepare a list of priority research needs relevant to the region with regular updates.</p>	<ul style="list-style-type: none"> ✚ Undertake regional R&D needs assessment, ✚ Documented annual R&D 'update' (to be undertaken by Program Coordinator). ✚ 	<ul style="list-style-type: none"> ▪ 2.1.1, 2.2.1 ▪ 4.2.1 ▪ 5.1.1, 5.1.2
ACT	A6.1 Capacity for implementation	✚ Arrangements for information management between South	▪ 2.1.1, 2.2.1

SUMMARY: South Coast Phytophthora Dieback Management Plan

Adaptive Management	Project Title and Description	Tasks	7-year Targets (cf. Table 2.1)
	<p>of the South Coast Phytophthora Dieback Information Management Framework.</p> <p>Capacity within the region for information management.</p>	<p>Coast NRM and state agencies (linked at State level),</p> <ul style="list-style-type: none"> ✚ Include detection and mapping information collation and management, ✚ Prepare geographic information sets for local area planning, ✚ Include provision of current information and advice for disease risk reduction to local and state government agencies. 	<ul style="list-style-type: none"> ▪ 5.2.1 ▪ 6.1.1, 6.1.2
MONITOR & REVIEW	<p>M6.1 Information and knowledge management review.</p> <p>Review of information management processes prior to second 7-year investment period.</p>	<ul style="list-style-type: none"> ✚ Prepare review briefing document, ✚ Arrange for information management review, ✚ Link with Project M4.1. 	<ul style="list-style-type: none"> ▪ 1.2.1 ▪ 2.1.1, 2.2.1 ▪ 3.1.1 ▪ 5.2.1, 5.4.1 ▪ 6.1.1, 6.1.2
SUB-PROGRAM SEVEN REGIONAL COORDINATION AND PROGRAM MANAGEMENT			
PLAN	<p>P7.1 Steering Committee Direction for Program Management and Investment Review Framework</p> <p>Development of a Program and investment management framework.</p>	<ul style="list-style-type: none"> ✚ Establish Foundation Program Steering Committee, ✚ Prepare Program and Project Management framework, ✚ Prepare on-going Investment Review framework, ✚ Tasks undertaken by Regional Program Coordinator 	<ul style="list-style-type: none"> ▪ 3.1.1, ▪ 5.3.1
	<p>P7.3 Program M&E Plan</p> <p>Prepare a Monitoring and Evaluation plan that links investment performance to targeted outcomes.</p>	<ul style="list-style-type: none"> ✚ Set targets for disease risk reduction following reconnaissance survey processes (Project A2.1), ✚ Arrange M&E Plan that meets the requirements of all Sub-programs. <p>Initial plan review process suggests that R&D review should occur in the first year.</p>	<ul style="list-style-type: none"> ▪ 3.1.1 ▪ 6.1.1
ACT	<p>A7.1 Regional Program Coordination</p> <p>Full-time on-going regional coordination</p>	<ul style="list-style-type: none"> ✚ Plan and implement Project Management Framework, ✚ Provide team leadership, ✚ Provide executive support and report to 'Steering 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2 ▪ 3.1.1 ▪ 4.1.1, 4.2.1, 4.3.1

SUMMARY: South Coast Phytophthora Dieback Management Plan

Adaptive Management	Project Title and Description	Tasks	7-year Targets (cf. Table 2.1)
	role.	Committee', 🚧 Arrange and coordinate projects across the region, 🚧 Liaise with key stakeholder organisations, 🚧 Develop partnership arrangements, 🚧 Arranges relevant R&D, 🚧 Undertake review processes.	<ul style="list-style-type: none"> ▪ 5.1.1, 5.1.2, 5.3.1, 5.4.1 ▪ 6.1.1
	A7.2 Stakeholder Engagement Full-time roles for 2 years to establish specialised engagement program.	<ul style="list-style-type: none"> 🚧 Linked to Projects P1.1, A1.1 and M1.1, 🚧 Conducts Sub-program One. 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2, 1.2.1 ▪ 4.3.1 ▪ 5.4.1
	A7.3 Communications Services Part-time role for 2 years to establish appropriate communication processes.	<ul style="list-style-type: none"> 🚧 Links to Project P1.3. 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2, 1.2.1
	A7.4 Information Management Services Part-time ongoing information management service provision.	<ul style="list-style-type: none"> 🚧 Provides services within ProjectA6.1 	<ul style="list-style-type: none"> ▪ 2.1.1, 2.2.1, 2.3.1 ▪ 6.1.1
	A7.5 Local Area Coordination Two full-time on-going local area coordination roles.	<ul style="list-style-type: none"> 🚧 Undertakes actions of Sub-Program Four, 🚧 Links to Projects in Sub-Program Three. 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2, 1.2.1 ▪ 2.1.1, 2.2.1 ▪ 4.1.1, 4.3.1 ▪ 5.1.1, 5.1.2, 5.4.1 ▪ 6.1.1
MONITOR & REVIEW	M7.1 Program M&E Ongoing processes.	<ul style="list-style-type: none"> 🚧 Based on Project P7.3. 	<ul style="list-style-type: none"> ▪ 3.1.1 ▪ 5.3.1 ▪ 6.1.1
	M7.2 Mid-term review	<ul style="list-style-type: none"> 🚧 Prepare review briefing document, 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2

SUMMARY: South Coast Phytophthora Dieback Management Plan

Adaptive Management	Project Title and Description	Tasks	7-year Targets (cf. Table 2.1)
	External review processes to assess program performance and report with recommendations to the Steering Committee.	<ul style="list-style-type: none"> ✚ Arrange review processes, ✚ Arrange Program adjustment through Steering Committee, ✚ Link to Project M1.1 	<ul style="list-style-type: none"> ▪ 2.3.1 ▪ 3.1.1 ▪ 4.2.1 ▪ 5.1.1, 5.1.2, 5.3.1, 5.4.1 ▪ 6.1.1, 6.1.2
	<p>M7.3 Final Foundation Program review</p> <p>External Final Program review process with recommendations for second 7-year investment Program.</p>	<ul style="list-style-type: none"> ✚ Prepare review briefing document, ✚ Arrange review processes, ✚ Prepare second 7-year investment program, ✚ Link to Project M 1.1 	<ul style="list-style-type: none"> ▪ 1.1.1, 1.1.2 ▪ 2.3.1 ▪ 3.1.1 ▪ 4.2.1 ▪ 5.1.1, 5.1.2, 5.3.1, 5.4.1 ▪ 6.1.2

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7.2 Regional delivery of the *Foundation Program*

The basis for regional delivery of the activities of the South Coast Phytophthora Dieback Management Plan is provided in Section 5.1. This shows the context of the Plan at national, state, regional and local scales.

Delivery of the *Foundation Program* is to be led by a Steering Committee with responsibility for providing strategic direction for the Program and for financial accountability to the lead organisation.

The Program is to be administered at all levels by a full-time Program Coordinator. There are to be specialist roles for:

- Stakeholder engagement,
- Communications, and
- Information management.

Activities of the program are to be delivered broadly through two areas ('east' and 'west'). Two full-time local Area Coordinators are to undertake the roles required for local program delivery.

Delivery activities will be coordinated at the local level through a set of six Local Area Plans.

Figure 7.1 provides a diagrammatic representation of the regional delivery program.



Figure 7.1

Regional delivery framework

Acronyms

API	Air photo interpretation
CALM	(former) Department of Conservation and Land Management
CCWA	Conservation Commission of WA
CPSM	Centre for Phytophthora Science and Management, Murdoch University
DCC	Dieback Consultative Council
DAFWA	Department of Agriculture and Food, WA
DEC	Department of Environment and Conservation
DEWR	Department of Environment and Water Resources
DIG	Dieback Information Group
DoW	Department of Water
DRA	Disease Risk Area
DRF	Declared Rare Flora
DRG	Dieback Response Group
DWG	Dieback Working Group
GAWA	Greening Australia, WA
GST	Goods and Services Tax
Ha	hectares
KASA	Knowledge, Aspirations, Skills and Attitudes (survey)
NRM	Natural resource management
NHT2	Natural Heritage Trust 2 (continuing)
PEC	Priority Ecological Community
SCRIPT	(former) South Coast Regional Initiative Planning Team
South Coast NRM	South Coast Natural Resource Management
SCDMP	South Coast Dieback Management Plan
TEC	Threatened Ecological Community
VHS	Vegetation Health Service (DEC)
WWF Australia	World Wide Fund for Nature, Australia

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APPENDIX 1 Regional Priority Areas

Asset Code	Regional Priority Area	Area (ha)
ALR1	Bon Accord Local Reserve	130
ALR2	Boulder Hill and Betty's Beach	499
ANP2	Torndirrup National Park	3929
ANP2LP	Hassall National Park	1100
ANP3	Waychinicup National Park	3980
ANP4	Gull Rock and Mt Martin National Parks	2539
ANP5	West Cape Howe National Park	3544
ANR1	Bakers Junction Nature Reserve	1086
ANR2	Down Road Nature Reserve	717
ANR3	Granite Hill Nature Reserve	128
ANR4	Mailalup Nature Reserve	774
ANR5	Marbelup Nature Reserve	99
ANR6	Mettler Lake Nature Reserve	423
ANR7	Mill Brook Nature Reserve	1484
ANR8	Mount Manypeaks Nature Reserve	1288
ANR9	Mount Mason Nature Reserve	191
ANR10	Napier Nature Reserve	221
ANR11	North Sister Nature Reserve	1011
ANR12	Pallinup Nature Reserve	428
ANR13	Sleeman Creek Nature Reserve	416
ANR14	South Stirling Nature Reserve	1699
ANR15	Tinkelup Nature Reserve	584
ANR16	Two Peoples Bay Nature Reserve	4686
ANR17	Bald Island Nature Reserve	798
ANR18	Cheyne Road Nature Reserve	427
AWC1	Mount Manypeaks Water Reserve	7944
AWC2	Angove Water Reserve	4444
	Sub-total	44569
DMZ1A	Long Rocky	14245
DMZ1B	Table Hill Gully	23192
DMZ1C	Karara Northumberland	12117
DMZ2A	Peak Roe Crossing	12661
DMZ2B	London Surprise	11502
DMZ2C	Willmott Quindinillup core wilderness	15546
DMZ2D	Soho	7202
DMZ3A	Powley Denmark	21150
DMZ3B	Denbarker Sheepwash	22522
DMZ7A	Quarram Owingup Nature Reserves West	3949
DMZ7B	Quarram Owingup Nature Reserves East	1845
DNP4	Walpole-Nornalup National Park	18137
DNR2	Mehinup Nature Reserve	285
DNR3	Mount Shadforth Nature Reserve	84
DNR5	Redmond Road Nature Reserve	52
DNR6	Kordabup Nature Reserve	301

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DSF1	Denmark Catchment State Forest	10101
	Sub-total	174891
ELR1	Parmango Road Local Reserve	127
ELR2	Duke of Orleans Bay Local Reserve and UCL	3216
ELR3	Alexander Bay Local Reserves and UCL	12990
ELR4	Condingup Town Site Reserves	599
EMR1	Helms Arboretum	3773
ENP1	Cape Arid National Park	207567
ENP4	Cape Le Grand National Park	30657
ENP5	Stokes National Park	9865
ENR1	Alexander Nature Reserve	812
ENR10	Coolinup Nature Reserve	217
ENR2	Beaumont Nature Reserve	11831
ENR4	Lake Shaster Nature Reserve East	4519
ENR5	Lake Warden Nature Reserve	701
ENR6	Mullet Lake Nature Reserve	1895
ENR7	Springdale Nature Reserve	23
ENR8	Truslove Townsite Nature Reserve	6321
ENR9	Woody Lake Nature Reserve	623
ER1	Quagi Area	4807
ER2	Qualliup Area	6327
EWR1	Lake Mortijinup	11298
	Sub-total	318168
JNR1	Corackerup Nature Reserve	4325
	Sub-total	4325
PCLNR1	Camel Lake Nature Reserve	3215
PCLNR2	Jebarjup Nature Reserve	1026
PCNP1	Porongurup National Park	2667
PCNP2	Stirling Range National Park	113485
PCNR10	Wamballup Nature Reserve	473
PCNR11	Pardelup Nature Reserve	608
PCNR3	Tenterden Nature Reserve	85
PCNR4	Warrenup Nature Reserve	246
PCNR5	Chillinup Nature Reserve	325
PCNR6	Chorkerup Nature Reserve	29
PCNR7	Kalgan Plains Nature Reserve	51
PCNR8	Lake Barnes Road Nature Reserve	297
PCNR9	Tootanellup Nature Reserve	982
	Sub-total	123489
RNP1_JNP1	Fitzgerald River National Park	295910
RNR1	Cheadanup Nature Reserve	6837
RNR2	Jerdacuttup Lakes Nature Reserve	7598
RNR3	Kundip Nature Reserve	2173
RNR4	Lake Shaster Nature Reserve West	6375
RR1	Ravensthorpe Range	25851
	Sub-total	344744

APPENDIX 2 Local Emphasis for Management

Key factors that should be emphasized for management were identified through local area workshop processes. They are:

- ✚ Recognising the urgency for action,
- ✚ Public awareness of the risk,
- ✚ Arranging clean-down facilities (they may not all involve 'washing'),
- ✚ Ensure inclusion of all in the community (including Aboriginal people),
- ✚ Coordination between all government agencies (especially those with NRM roles),
- ✚ Localised 'behaviour change' processes are important,
- ✚ Identify international attention on this areas for biodiversity values,
- ✚ Develop community lobby capacity,
- ✚ Document values that may be lost to *P.c.* over time,
- ✚ Develop concepts of 'custodianship',
- ✚ Evaluate options for 'biodiversity credits' (local experience with Tony Jack),
- ✚ Focus more on understanding of soil health and capacity for resistance to *P.c.*,
- ✚ Importance of using a local newsletters,
- ✚ Priority for 'large green area' management,
- ✚ Developing adequate capacity to respond to the disease,
- ✚ Having sufficient financial capacity,
- ✚ Developing operational guidelines relevant to the local area.
- ✚ Taking a co-operative approach,
- ✚ Ensuring there is wide ownership of the problems of dieback,
- ✚ High level of information and awareness,
- ✚ Approach to education, adequate on-going resources,
- ✚ Hygiene protocols,
- ✚ Localised management,
- ✚ Maps that show high priority areas (e.g. roads affected or at risk),
- ✚ Keep major focus on 'the park' (i.e. FRNP),
- ✚ Addressing the current low capacity for response to the problem, and
- ✚ Communicate that 'it is not too late'!
- ✚ Recognise that WA is leading in *P.c.* management and should learn from previous management (don't re-invent the wheel),
- ✚ Build sufficient capacity especially for education and on-ground action,

SUMMARY: South Coast Phytophthora Dieback Management Plan

- ✚ Ensure that the financial resources are commensurate with the scope of the tasks for *P.c.* management,
- ✚ Awareness to as to overcome the 'so what' responses,
- ✚ Education and signage,
- ✚ Effective action (not bad practices) that are adapting with new knowledge,
- ✚ Research to find a cure,
- ✚ Coordinating and networking,
- ✚ Relevant facilities located within the local area,
- ✚ Adequate Shire resources for staff education and training,
- ✚ Adequate capacity for local area interpretation,
- ✚ Build on current energy and enthusiasm,
- ✚ Be dynamic and move forward as it is a 'big issue'.