Phytophthora Dieback Disease

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Forest Management Branch

Department of Environment and Conservation

Introduction

- What is it?
- What is the problem?
- What can be done?
- Mapping and Detection
- Questions

What is Dieback?

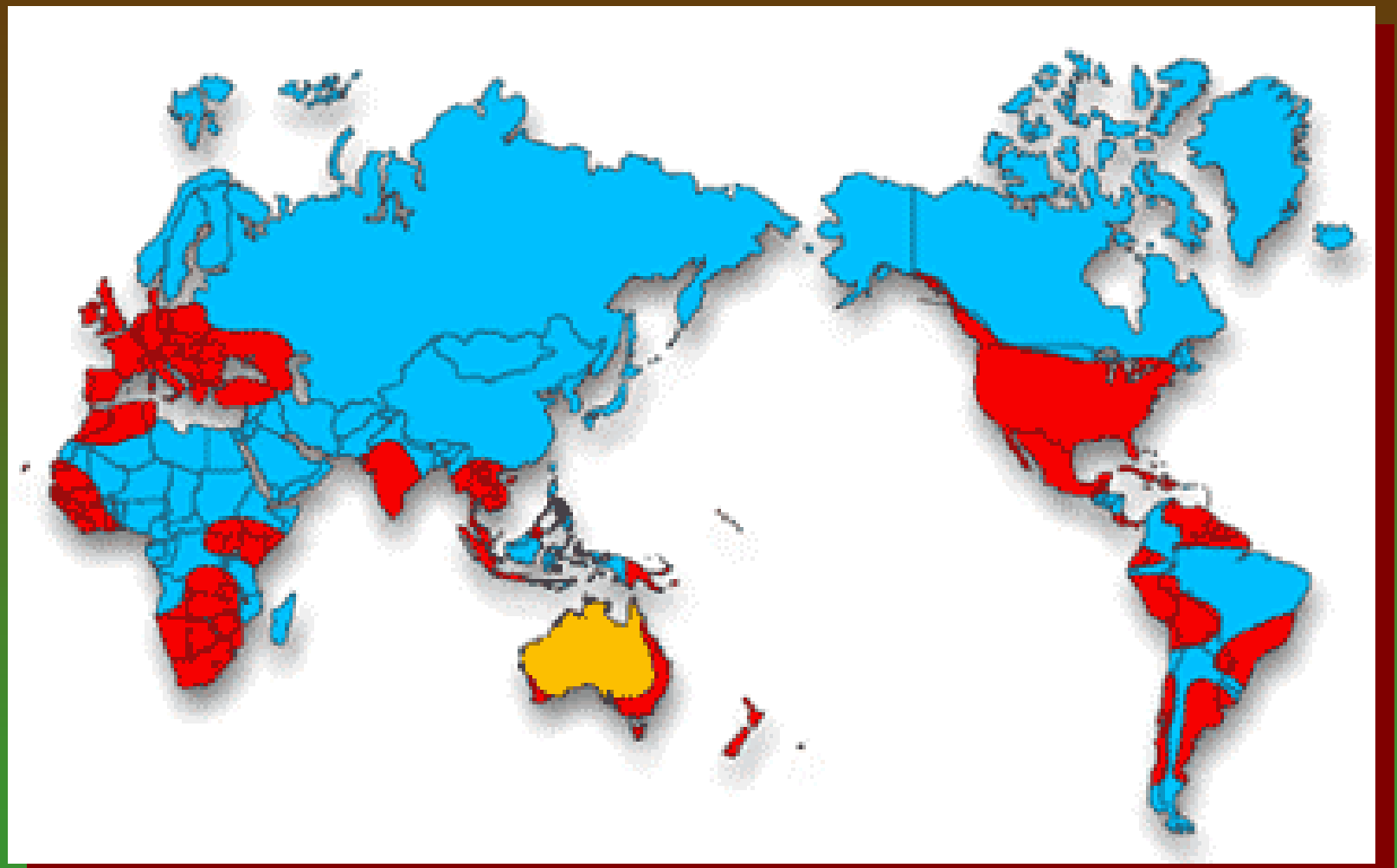
- Microscopic Organism
- Water Mold Family
- Colorless
- Odorless
- Same Family as Potato Blight in Ireland and Europe

Pc Growing on Agar

What is Dieback?

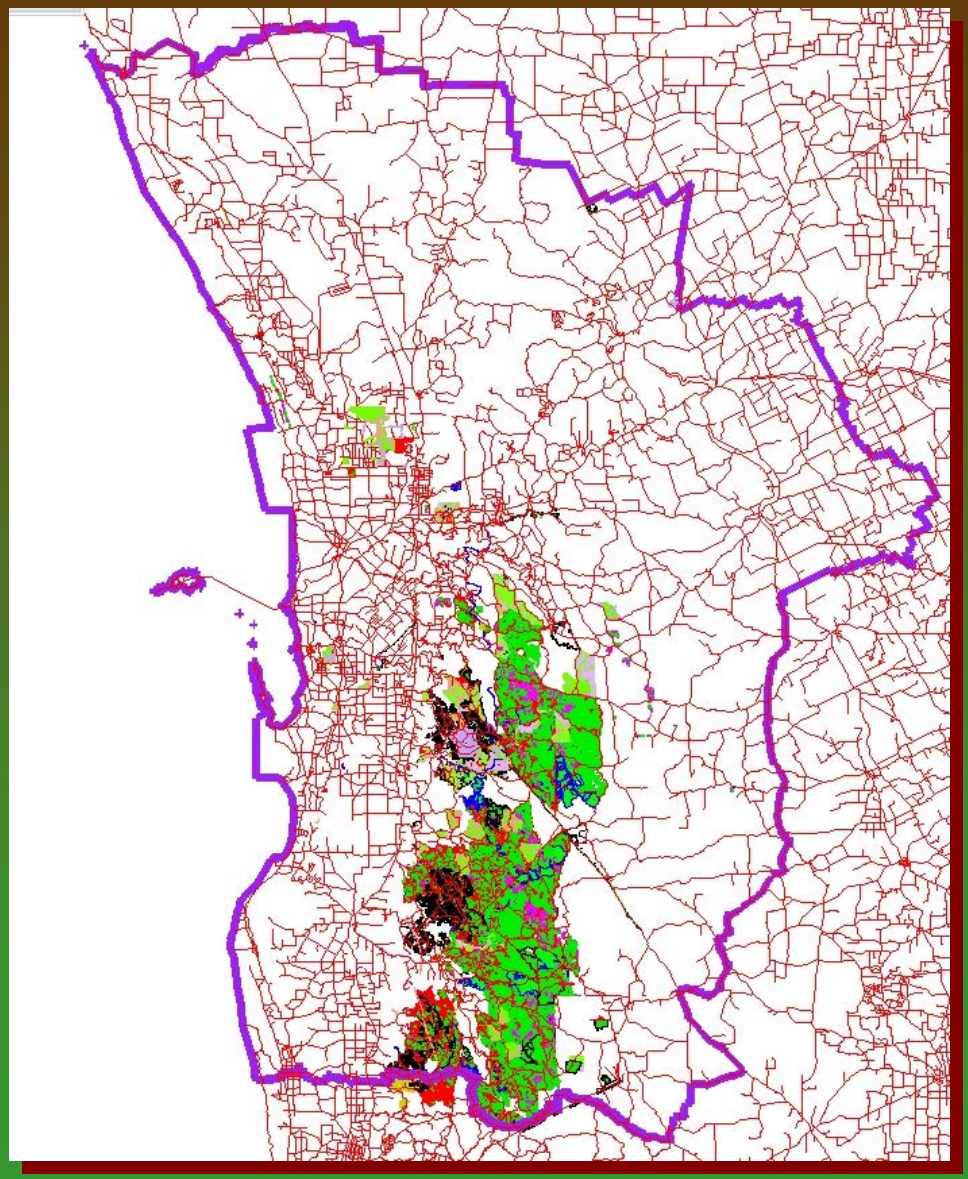
- Common name for disease in native plants caused by the pathogen *Phytophthora cinnamomi*
- Phyto = plant, phthora = destroyer (biological bulldozer)
- The common name is misleading:
  - - “sudden death” syndrome
  - - catastrophic ecosystem change

World Distribution

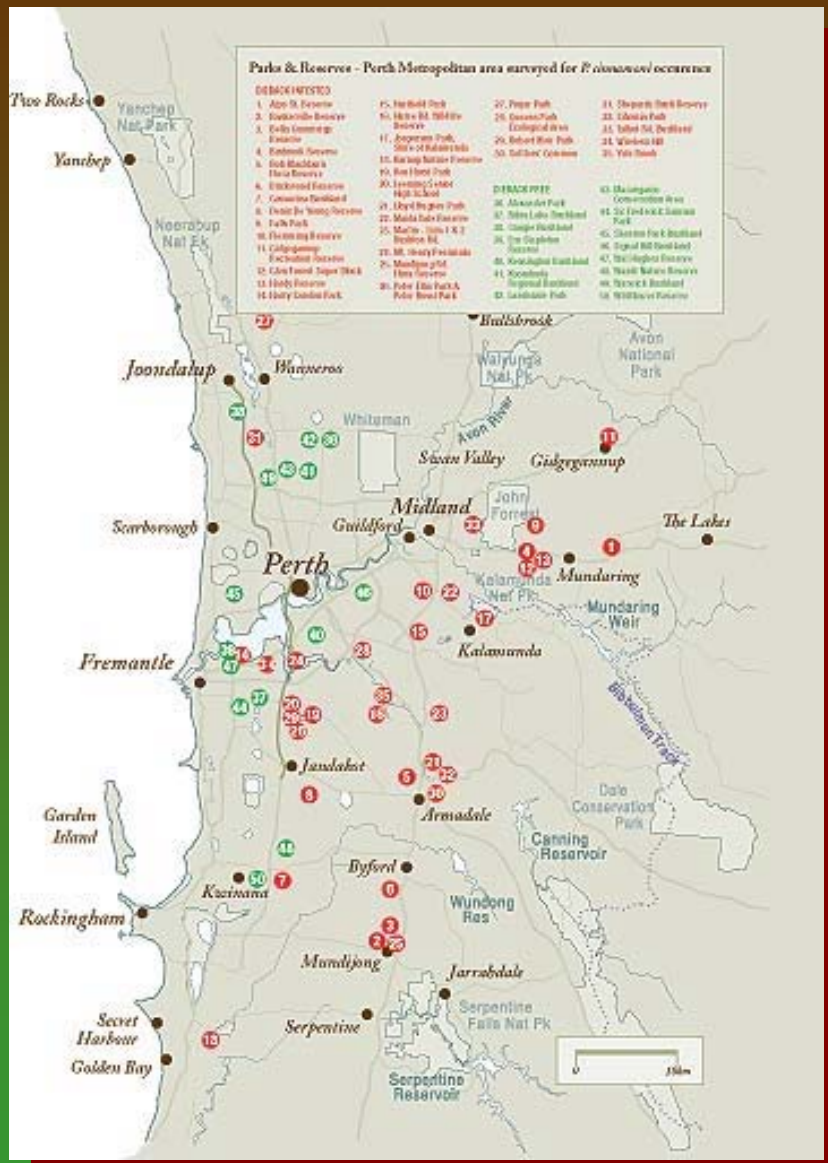


South West Distribution

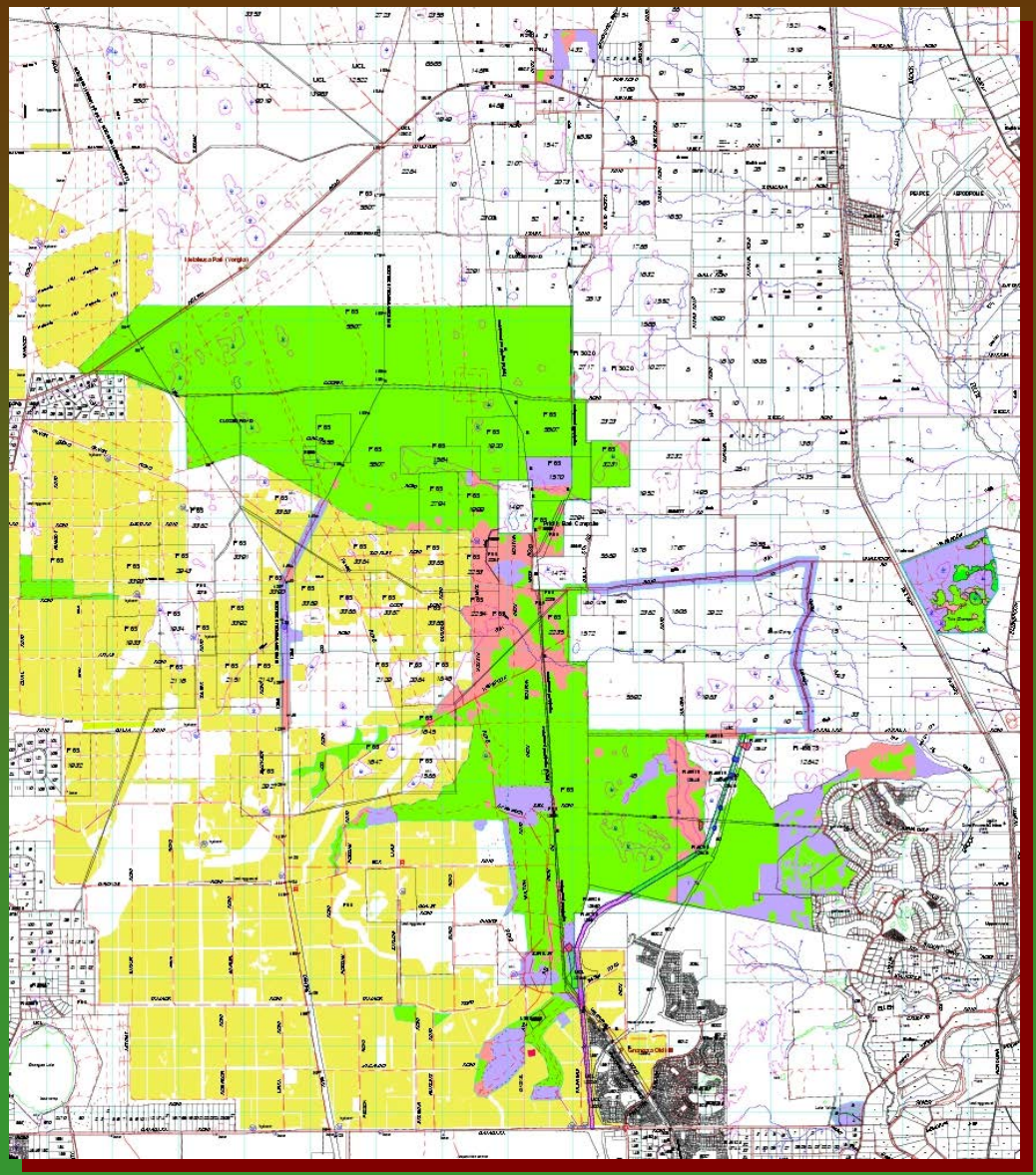
Swan Region



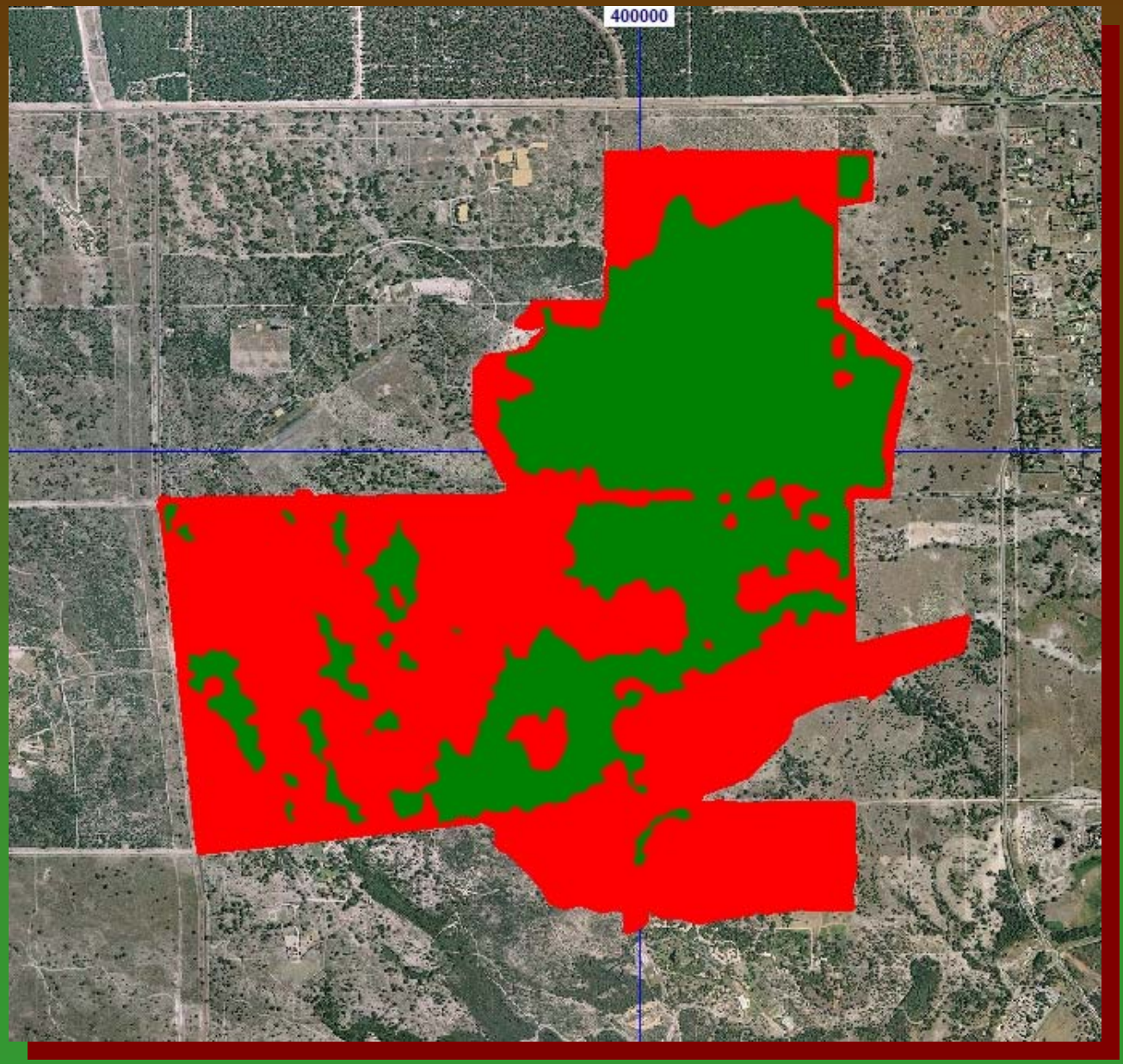
Perth Distribution



Wanneroo Pines



Whiteman Park



GLEVAN CONSULTING

WHITEMAN PARK
RECREATION & CONSERVATION RESERVE

WA Implications

Stirling Ranges National Park

What is it?

- Disease that affects native plants
- Highly Destructive to plant communities
- Widespread in the South West of WA
- Spread in Soil, Ground Water, plant tissue
- Autonomously spreads root to root

Swan Coastal Plain

"The Strawberry Farm" 1942 to 1988

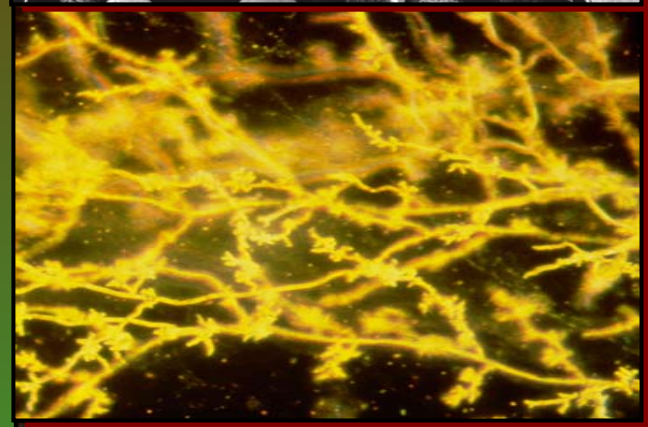
Biology

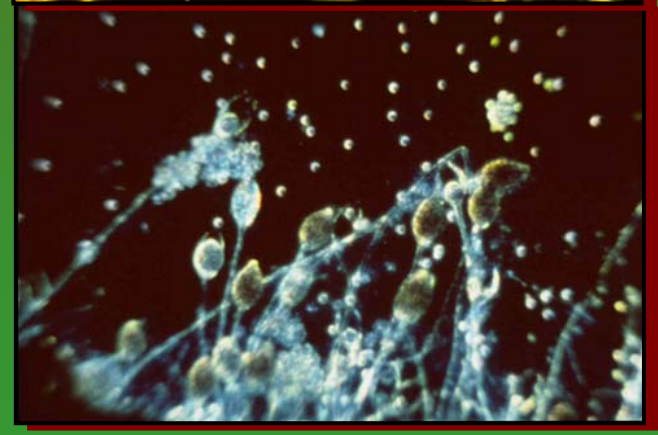
- Attacks roots of susceptible plants
- Stops nutrients reaching the plant
- “Ring Barks” the plant underground
- Sudden Death

Sudden Death

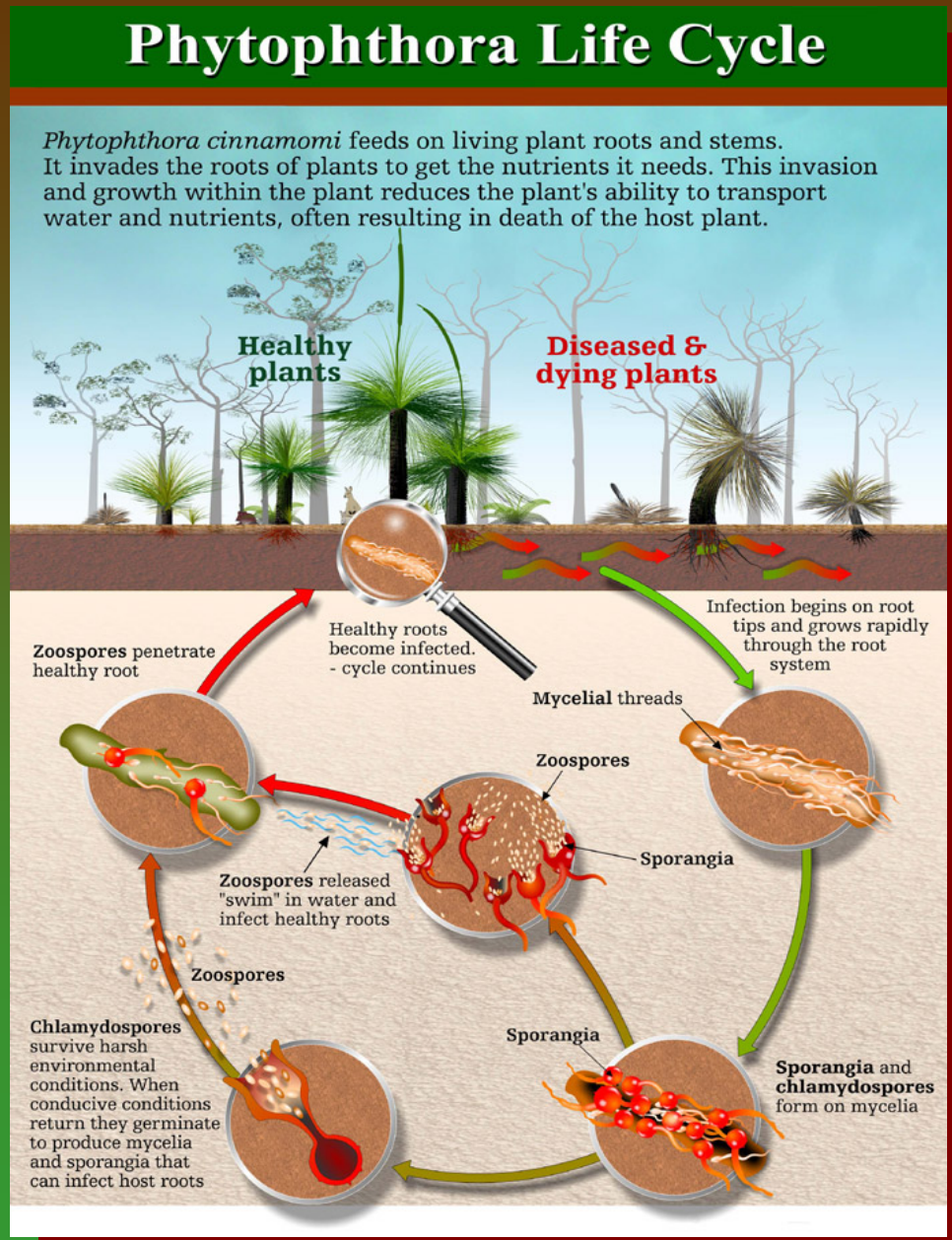
Biology

- Pathogen infects root tissue
- Mycelium grows along root
- Sporangia release zoospores
- Zoospores cause new infections





Life Cycle of Pc

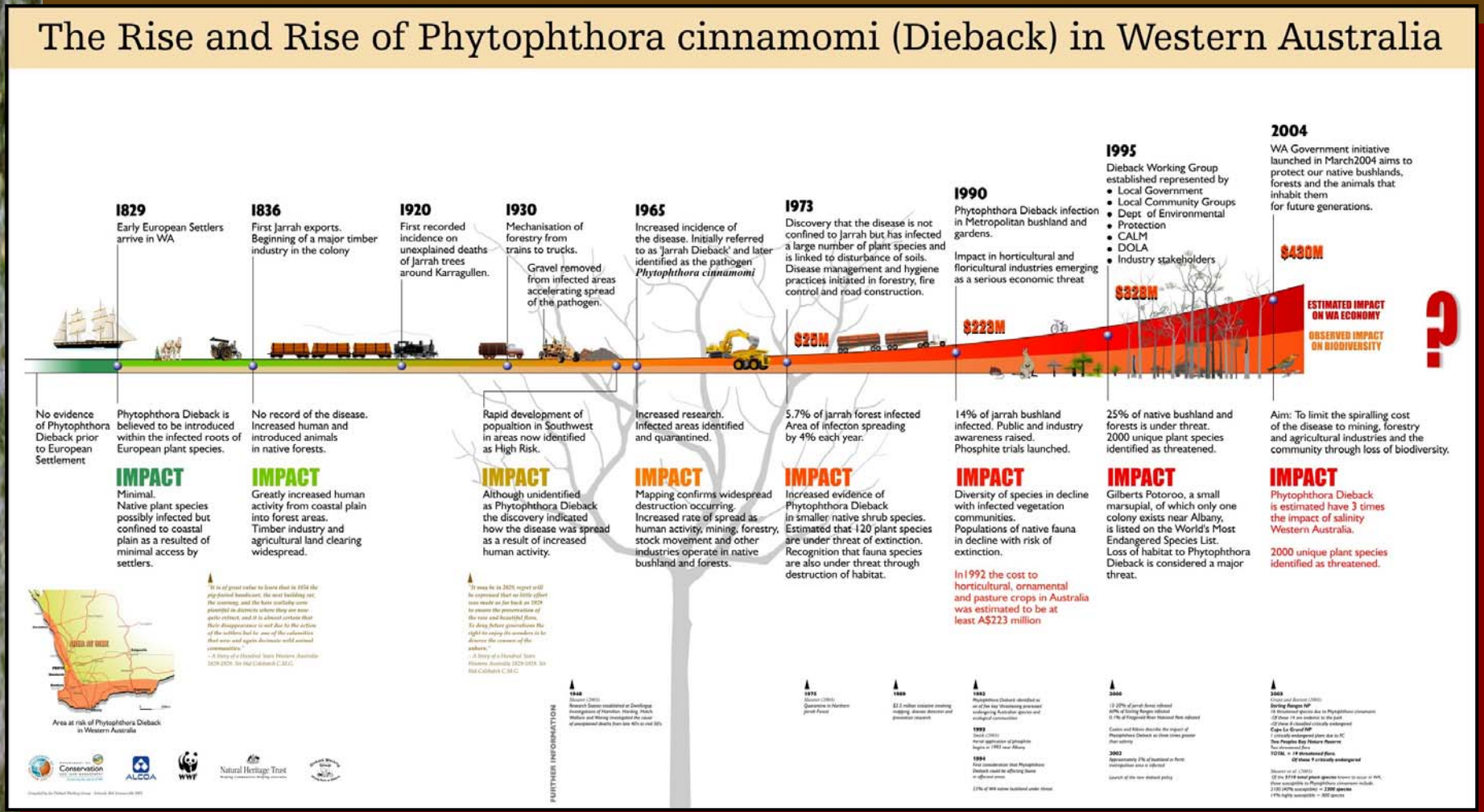


Xanthorrhoea Death

What is the Problem?

- Loss of biodiversity
- Loss of habitat
- Loss of fauna and flora
- Cost to Government and Community
- Cost to Industry

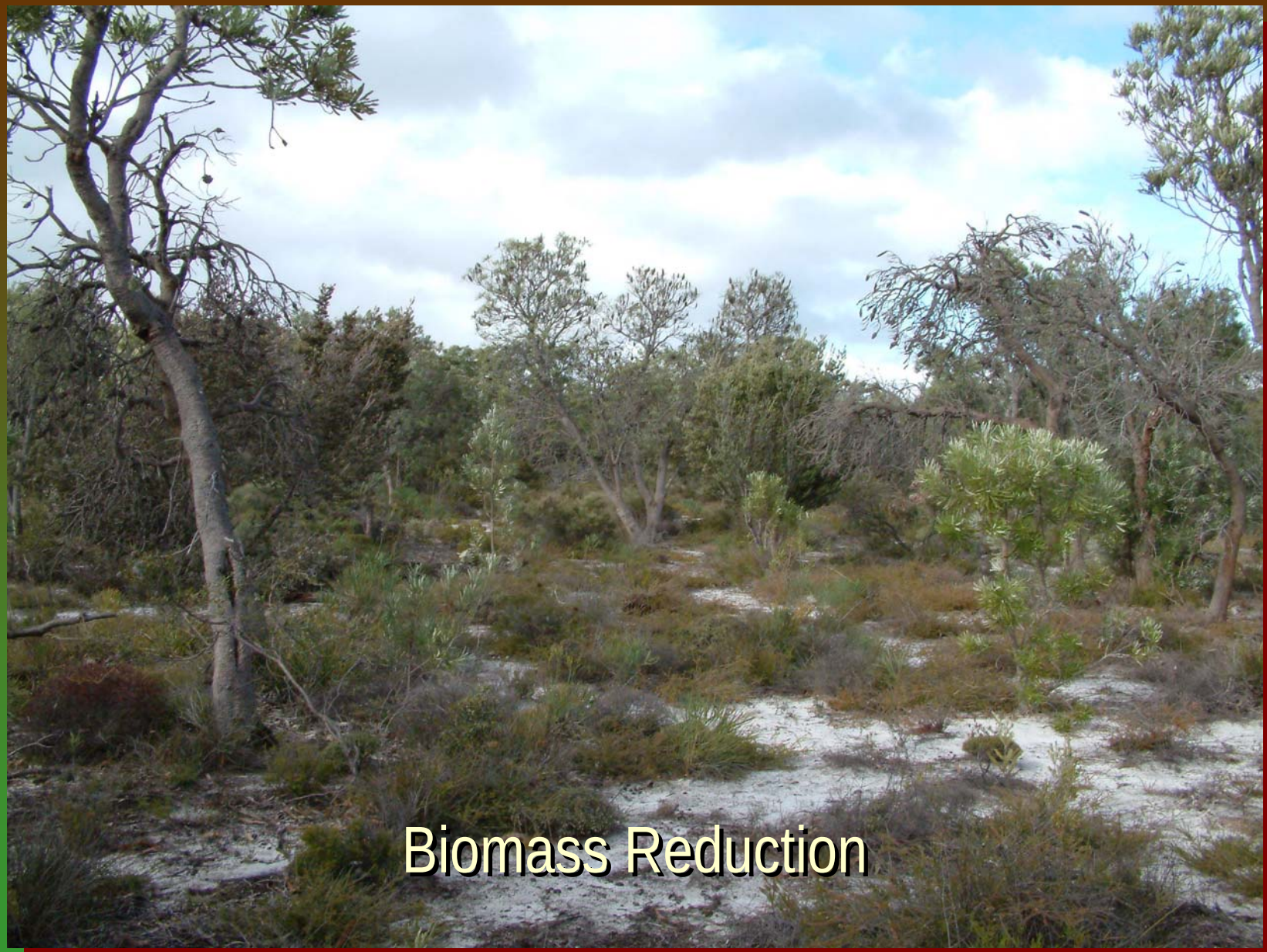
Impact in WA


The Rise and Rise of Phytophthora cinnamomi (Dieback) in Western Australia
1829
Early European Settlers arrive in WA
No evidence of Phytophthora Dieback prior to European Settlement
1836
First Jarrah exports. Beginning of a major timber industry in the colony
No record of the disease. Increased human and introduced animals in native forests.
IMPACT
Greatly increased human activity from coastal plain into forest areas. Timber industry and agricultural land clearing widespread.
1920
First recorded incidence on unexplained deaths of Jarrah trees around Karragullen.
1930
Mechanisation of forestry from trains to trucks.
Gravel removed from infected areas accelerating spread of the pathogen.
Rapid development of popualtion in Southwest in areas now identified as High Risk.
IMPACT
Although unidentified as Phytophthora Dieback the discovery indicated how the disease was spread as a result of increased human activity.
1965
Increased incidence of the disease. Initially referred to as 'Jarrah Dieback' and later identified as the pathogen Phytophthora cinnamomi
Increased research. Infected areas identified and quarantined.
IMPACT
Mapping confirms widespread destruction occurring. Increased rate of spread as human activity, mining, forestry, stock movement and other industries operate in native bushland and forests.
1973
Discovery that the disease is not confined to Jarrah but has infected a large number of plant species and is linked to disturbance of soils. Disease management and hygiene practices initiated in forestry, fire control and road construction.
$2M
5.7% of jarrah forest infected Area of infecton spreading by 4% each year.
IMPACT
Increased evidence of Phytophthora Dieback in smaller native shrub species. Estimated that 120 plant species are under threat of extinction. Recognition that fauna species are also under threat through destruction of habitat.
1990
Phytophthora Dieback infection in Metropolitan bushland and gardens.
Impact in horticultural and floricultural industries emerging as a serious economic threat
$223M
14% of jarrah bushland infected. Public and industry awareness raised. Phosphite trials launched.
IMPACT
Diversity of species in decline with infected vegetation communities. Populations of native fauna in decline with risk of extinction.
In1992 the cost to horticultural, ornamental and pasture crops in Australia was estimated to be at least A$223 million
1995
Dieback Working Group established represented by
• Local Government
• Local Community Groups
• Dept of Environmental
• Protection
• CALM
• DOLA
• Industry stakeholders
$328M
25% of native bushland and forests is under threat. 2000 unique plant species identified as threatened.
IMPACT
Gilberts Potoroo, a small marsupial, of which only one colony exists near Albany, is listed on the World's Most Endangered Species List. Loss of habitat to Phytophthora Dieback is considered a major threat.
2004
WA Government initiative launched in March2004 aims to protect our native bushlands, forests and the animals that inhabit them for future generations.
$430M
ESTIMATED IMPACT ON WA ECONOMY
OBSERVED IMPACT ON BIODIVERSITY
?
Aim: To limit the spiralling cost of the disease to mining, forestry and agricultural industries and the community through loss of biodiversity.
IMPACT
Phytophthora Dieback is estimated have 3 times the impact of salinity Western Australia.
2000 unique plant species identified as threatened.
Area at risk of Phytophthora Dieback in Western Australia
FURTHER INFORMATION
Conservation
ALCOA
WWF
Natural Heritage Trust


Before
2006✓ 8-25


After
2006/ 8/25


Complete Collapse


Biomass Reduction

Altered Landscape

What Can Be Done?

- Minimise human spread
  - Control Access
  - Clean on Entry (Hygiene)
- Map the Disease
- Phosphite Application
- Education

Minimize Human Vectoring

Restrict Access

Minimize Human Vectoring

Remove access

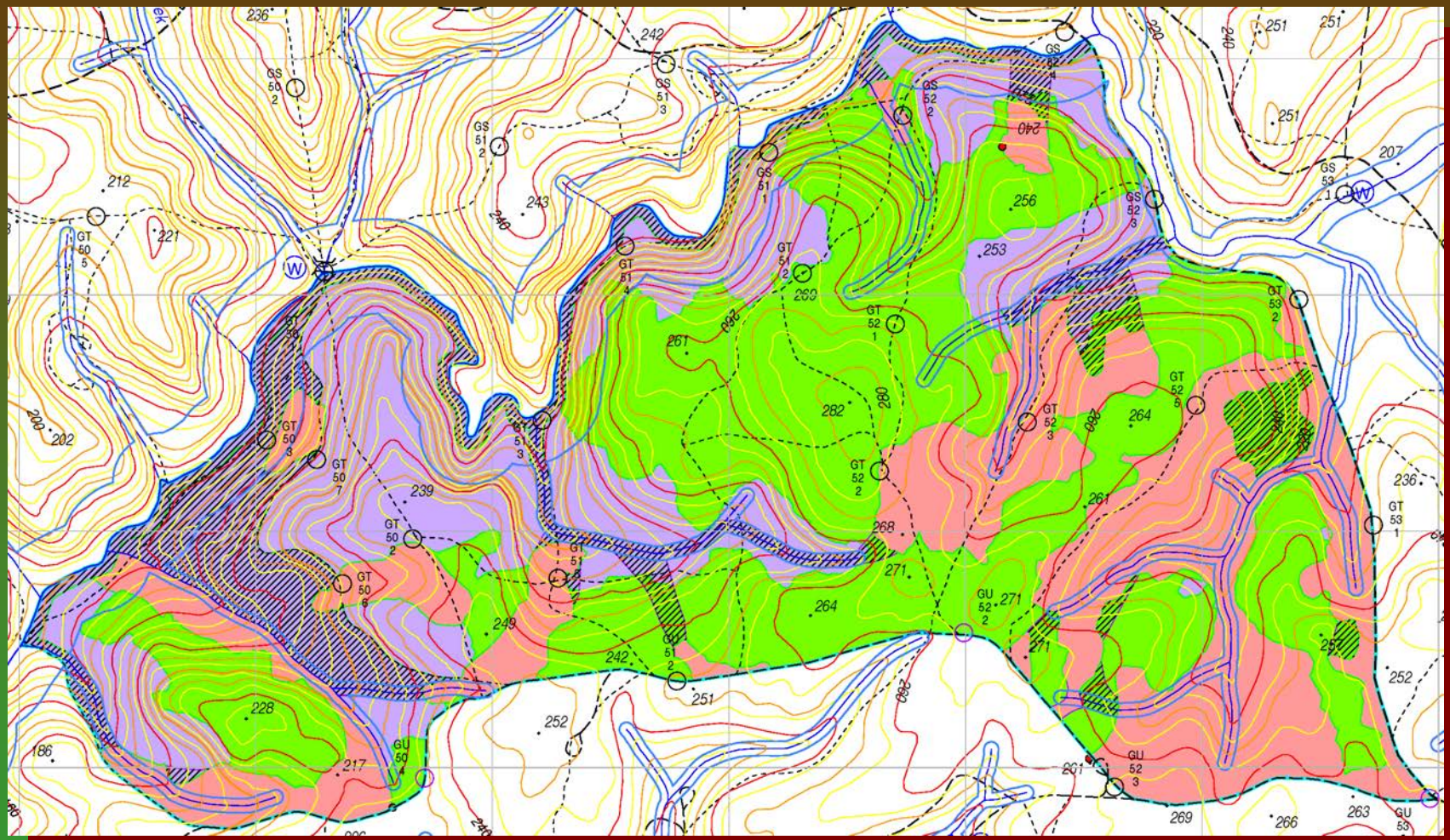
Minimize Human Vectoring

Wash Down

Minimize Human Vectoring

Clean Basic Raw Materials

Mapping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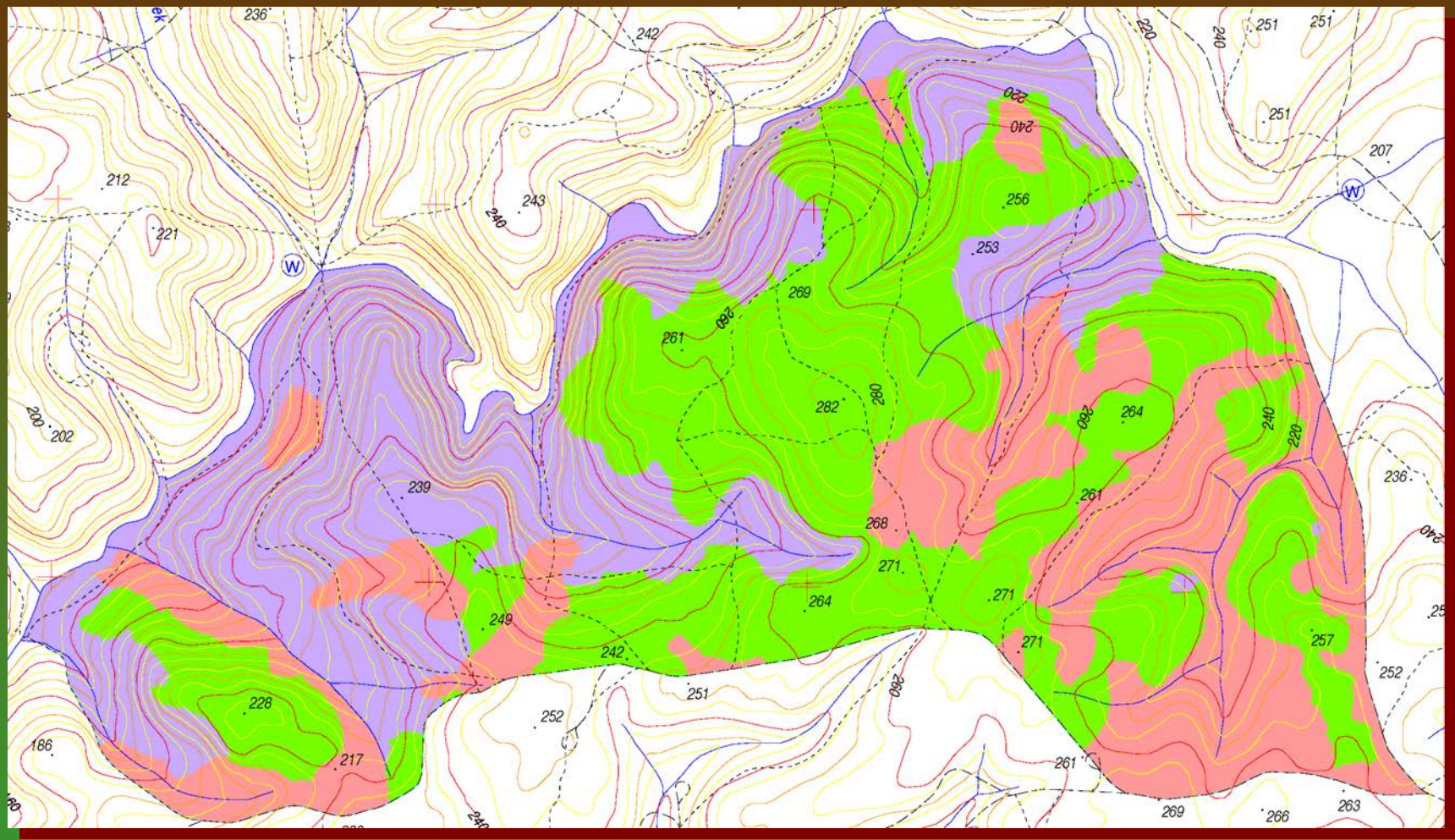
Mapping

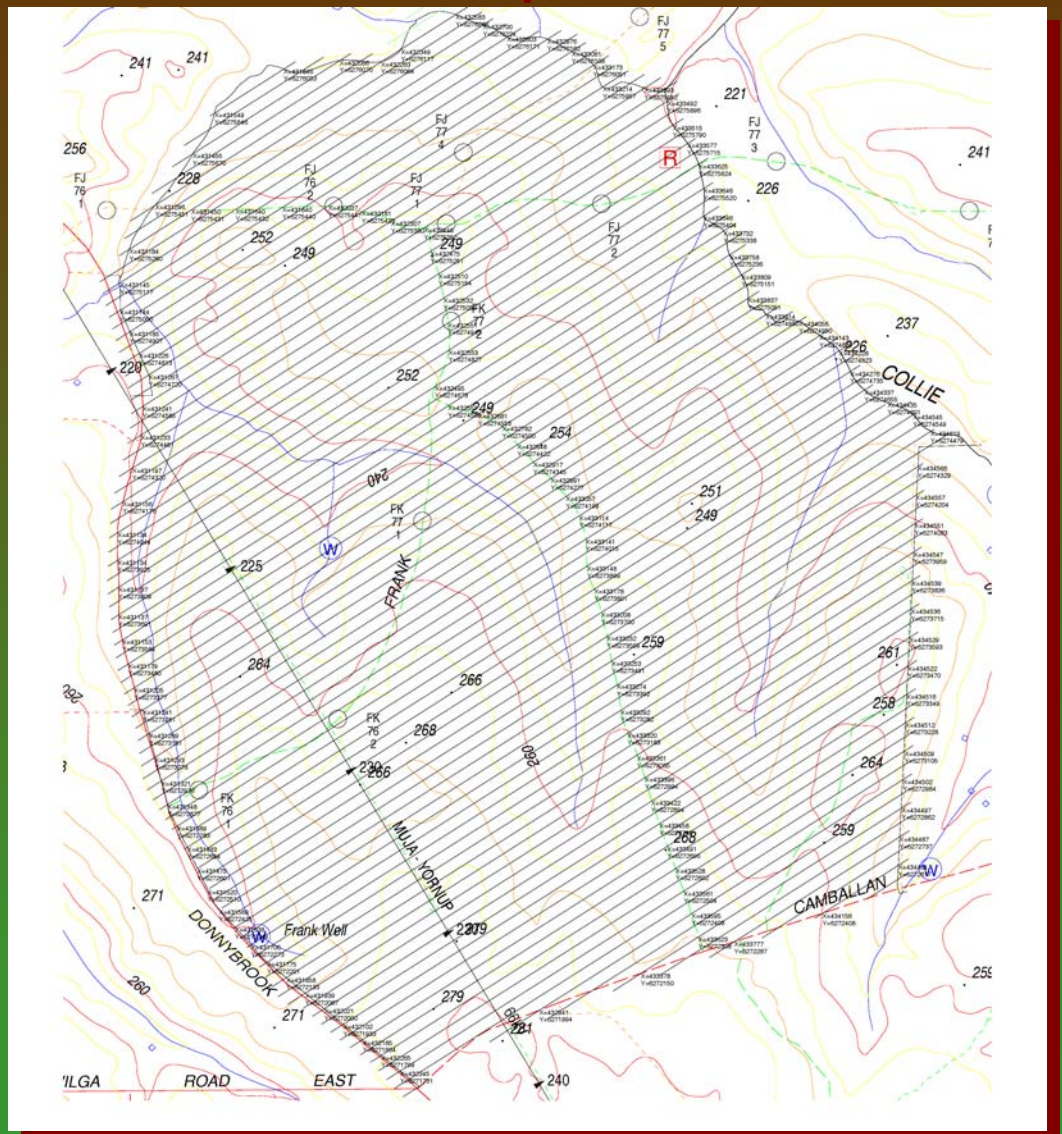
- Starting Point
- Shows the extent of your problem
- First tool for planning
- What is “doable”
- Basis for Management

Mapping



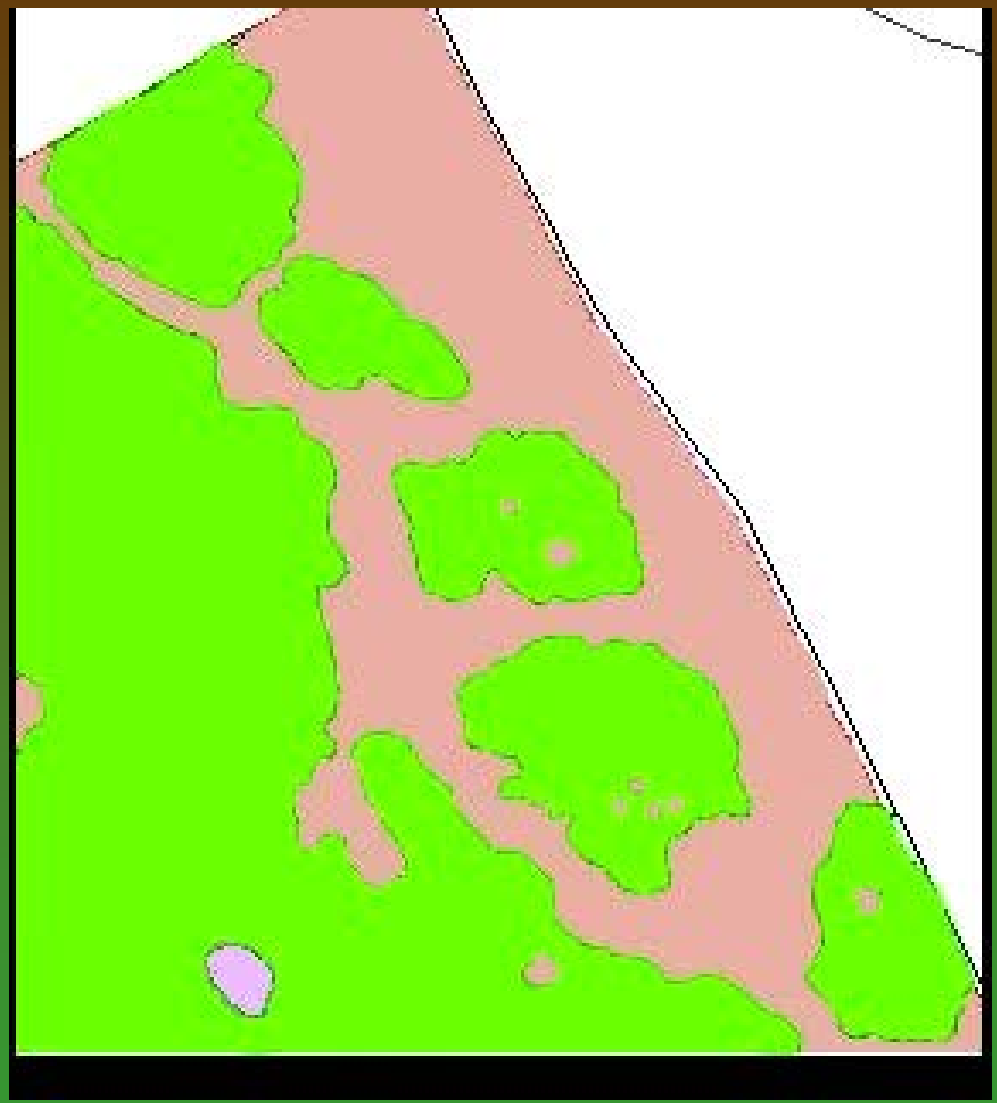
Occurrence Map

Strip Lines



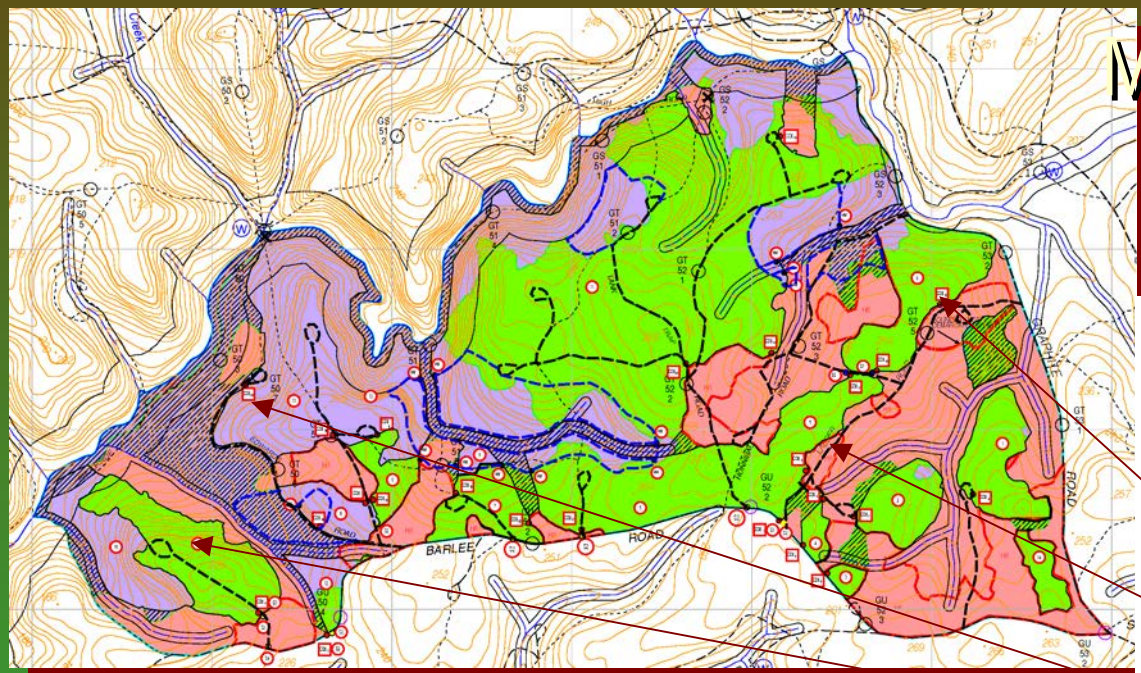
Transects at 50 metres

Disease Spread Over 13 Years

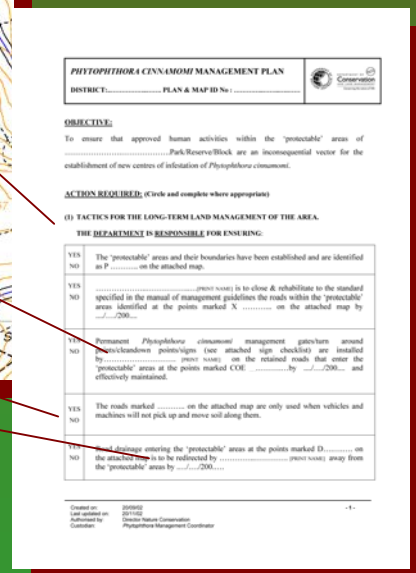


Maps Have a Limited Life of 3 Years

Mapping



Management Plan



***PHYTOPHTHORA CINNAMOMI* MANAGEMENT PLAN**

DISTRICT:..... PLAN & MAP ID No : .....

OBJECTIVE:

To ensure that approved human activities within the 'protectable' areas of .....Park/Reserve/Block are an inconsequential vector for the establishment of new centres of infestation of *Phytophthora cinnamomi*.

ACTION REQUIRED: (Circle and complete where appropriate)

(1) TACTICS FOR THE LONG-TERM LAND MANAGEMENT OF THE AREA.

THE DEPARTMENT IS RESPONSIBLE FOR ENSURING:

YES NO	The 'protectable' areas and their boundaries have been established and are identified as P ..... on the attached map.
YES NO	.....(PRINT NAME) is to close & rehabilitate to the standard specified in the manual of management guidelines the roads within the 'protectable' areas identified at the points marked X ..... on the attached map by ...../...../200....
YES NO	Permanent *Phytophthora cinnamomi* management gates/turn around bays/cleandown points/signs (see attached sign checklist) are installed by.....(PRINT NAME) on the retained roads that enter the 'protectable' areas at the points marked COE .....by ...../...../200.... and effectively maintained.
YES NO	The roads marked ..... on the attached map are only used when vehicles and machines will not pick up and move soil along them.
YES NO	Road drainage entering the 'protectable' areas at the points marked D..... on the attached map is to be redirected by .....(PRINT NAME) away from the 'protectable' areas by ...../...../200....

Created on: 20/09/02
Last updated on: 23/11/02
Authorised by: Director Nature Conservation
Custodian: Phytophthora Management Coordinator

-1-

Demarcation

Sampling

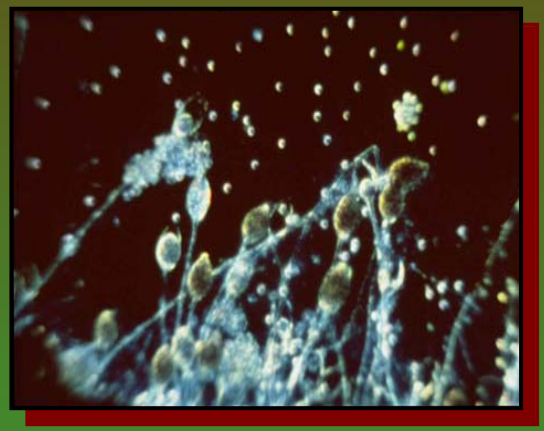
Sample Process in the Lab

Empty Soil
Into Containers

Add Distilled Water

Sampling

Baiting Trays



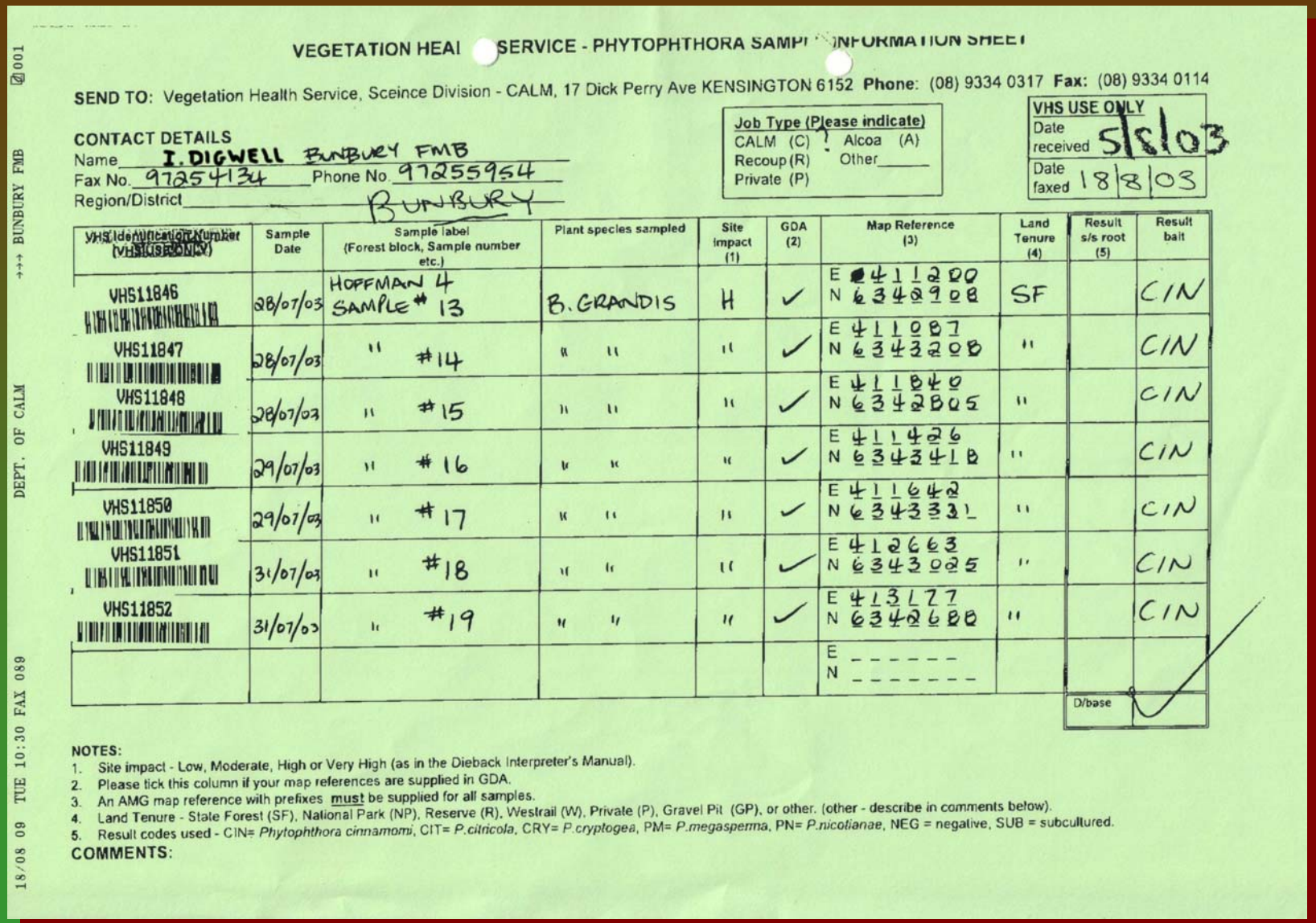
Zoospore release

Agar Culture

Sporangia

Mycelium

Sample Results



VEGETATION HEAL SERVICE - PHYTOPHTHORA SAMPL INFORMATION SHEET

SEND TO: Vegetation Health Service, Sceince Division - CALM, 17 Dick Perry Ave KENSINGTON 6152 **Phone:** (08) 9334 0317 **Fax:** (08) 9334 0114

CONTACT DETAILS
Name I. DIGWELL BUNBURY FMB
Fax No. 97254134 Phone No. 97255954
Region/District BUNBURY

Job Type (Please indicate)
CALM (C) Alcoa (A)
Recoup (R) Other
Private (P)

VHS USE ONLY
Date received 5/8/03
Date faxed 18/8/03

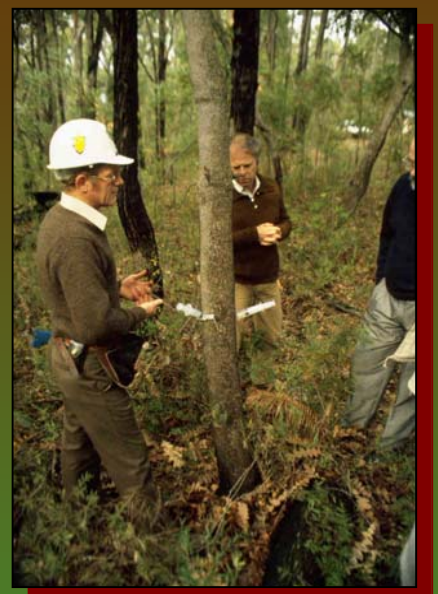
VHS Identification Number (VHS USE ONLY)	Sample Date	Sample label (Forest block, Sample number etc.)	Plant species sampled	Site Impact (1)	GDA (2)	Map Reference (3)	Land Tenure (4)	Result s/s root (5)	Result bait
VHS11846	28/07/03	HOFFMAN 4 SAMPLE # 13	B. GRANDIS	H	✓	E 411200 N 6342908	SF		CIN
VHS11847	28/07/03	" #14	" "	"	✓	E 411087 N 6343208	"		CIN
VHS11848	28/07/03	" #15	" "	"	✓	E 411840 N 6342805	"		CIN
VHS11849	29/07/03	" #16	" "	"	✓	E 411426 N 6343418	"		CIN
VHS11850	29/07/03	" #17	" "	"	✓	E 411642 N 6343331	"		CIN
VHS11851	31/07/03	" #18	" "	"	✓	E 412663 N 6343025	"		CIN
VHS11852	31/07/03	" #19	" "	"	✓	E 413177 N 6342688	"		CIN
						E ------- N -------			
								D/base	✓

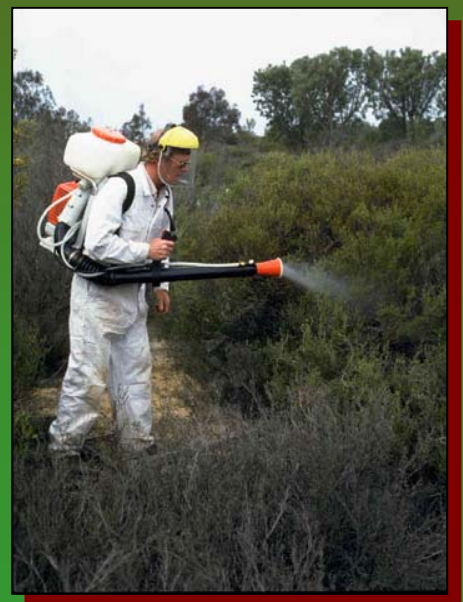
NOTES:
1. Site impact - Low, Moderate, High or Very High (as in the Dieback Interpreter's Manual).
2. Please tick this column if your map references are supplied in GDA.
3. An AMG map reference with prefixes **must** be supplied for all samples.
4. Land Tenure - State Forest (SF), National Park (NP), Reserve (R), Westrail (W), Private (P), Gravel Pit (GP), or other. (other - describe in comments below).
5. Result codes used - CIN= *Phytophthora cinnamomi*, CIT= *P.citricola*, CRY= *P.cryptogea*, PM= *P.megasperma*, PN= *P.nicotianae*, NEG = negative, SUB = subcultured.

COMMENTS:

18/08 09 TUE 10:30 FAX 089 DEPT. OF CALM →→→ BUNBURY FMB 001

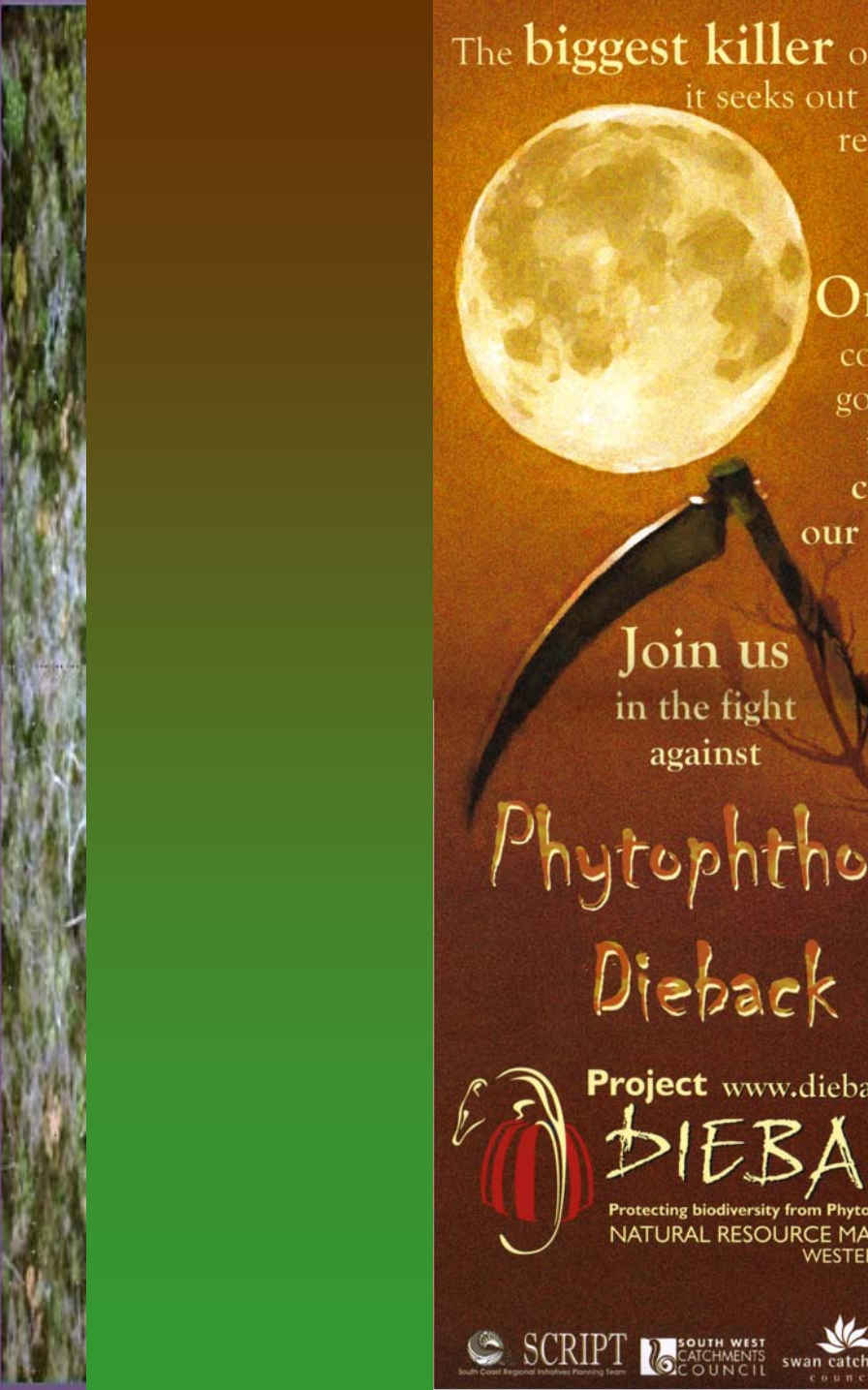
Phosphite Application



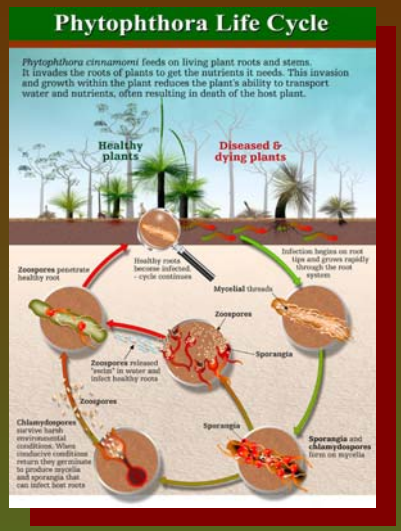


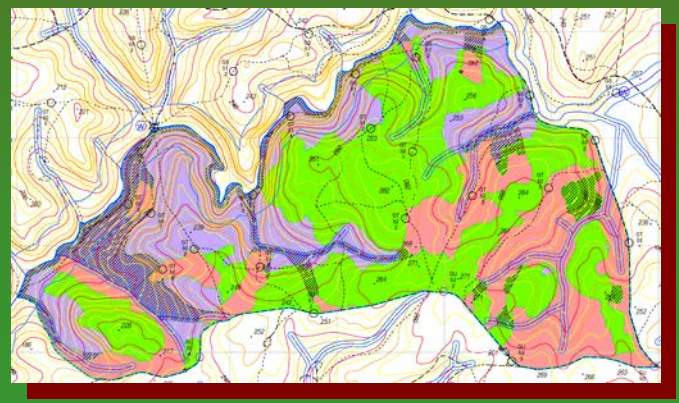
Conclusion

- We have a large problem
- We can do something about it
- Manage Human Vectoring
- KEEP IT CLEAN


The biggest killer of our natural heritage is here...
it seeks out plants...destroys animal habitats...
reproduces... swims on in mud...
hitchhiking on feet, wheels...
Only together...
community,
government,
industry,
can we save
our most valued
areas...
Join us
in the fight
against
Phytophthora
Dieback
Project www.dieback.net.au
DIEBACK
Protecting biodiversity from Phytophthora Dieback
NATURAL RESOURCE MANAGEMENT
WESTERN AUSTRALIA
Government of Western Australia
Australian Government
SCRIPT
South Coast Regional Initiatives Planning Team
SOUTH WEST CATCHMENTS COUNCIL
swan catchment council
AVON CATCHMENT COUNCIL
nacc
Department of Environment and Conservation

Questions?


Phytophthora Life Cycle
Phytophthora cinnamomi feeds on living plant roots and stems. It invades the roots of plants to get the nutrients it needs. This invasion and growth within the plant reduces the plant's ability to transport water and nutrients, often resulting in death of the host plant.
Healthy plants
Diseased & dying plants
Zoospores penetrate healthy root
Healthy roots become infected - cycle continues
Infection begins on root tips and grows rapidly through the root system
Mycelial threads
Zoospores
Sporangia
Zoospores released "swim" in water and infect healthy roots
Zoospores
Chlamydospores survive harsh environmental conditions. When conducive conditions return they germinate to produce zoyotia and sporangia that can infect host roots
Sporangia
Sporangia and chlamydospores form on mycelia




STOP
DIEBACK: THE BIOLOGICAL BULLDOZER


GATE


Bell Track