DIG 07

MARITIME MUSEUM, VICTORIA QUAY, FREMANTLE, FRIDAY JULY 13

Conference Organising Committee

Stop Dieback the Biological Bulldozer

Dieback Treatment Services

City of Armadale

Department of Environment and Conservation

Conference Sponsors

Conference Agenda

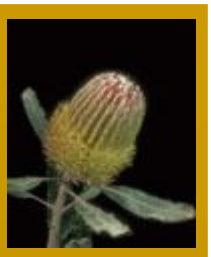
Registration Opens 8.30am

9:00 — 9:10	Conference Welcome	Gary Muir
9:10 — 9:40	Last Stand at the Bell Track, Fitzgerald River National Park , Western Australia	Malcolm Grant, DEC
9:40 — 9:55	Development of Molecular Diagnostic Tools for the Detection of *Phytophthora cinnamomi* from Soil Samples in Southern Australia	Nari Williams, CPSM
9:55 — 10:10	The Mechanism of Action of Phosphite in Protection of Host Plants Against Infection by *Phytophthora cinnamomi.*	Phil O'Brien, CPSM
10:10 — 10:25	Panel Discussion / Questions	
10:25 — 10:55	Morning Tea	
10:55 — 11:15	CPSM 5 Years On!	Emer O'Gara and Giles Hardy, CPSM
11:15 — 11:30	Does Abiotic Stress on a Plant Influence Phosphite Protection to *Phytophthora cinnamomi?*	Daniel Huberli, CPSM
11:30 — 11:40	New Phytophthora Species	Mike Stukely, DEC
11:40 — 11:55	Australasia is at High Risk of a *Phytophthora ramorum* Epidemic	Kylie Ireland, CPSM
11:55 — 12:10	Soil Acidification and Base Cation Depletion on the Swan Coastal Plain: Setting the scene for regional vegetation decline with increasing ground water use	Steve Appleyard, DEC
12:10 — 12:30	Panel Discussion / Questions	
12:30 — 13:30	Lunch	
13:30—13:45	Phytophthora Dieback Signage: One System for All	Gary Muir & Joanna Young, South Coast NRM
13:45—14:00	The Scope of Strategic Management for *Phytophthora* Dieback within the South Coast Region	Viv Read, NRM Consultants
14:00—14:15	The impact of *Phytophthora cinnamomi* induced plant deaths on small native mammals in the jarrah (*Eucalyptus marginata*) forest	Rod Armistead, Murdoch University
14:15—14:30	Update on South Coast NRM and Project Dieback Activities	Joanna Young & Annabelle Bushell, South Coast NRM
14:30—14:45	Dieback Communication Project Update	Lesley Thomas & Leah Pearson, EMRC
14:45—15:05	Panel Discussion	
15:05—15:30	Afternoon Tea	
15:30—16:30	Workshop	Facilitated by Ian Colquhoun
16:30—16:40	Conference Close	Ian Colquhoun

Due to the generosity of our sponsors, we are offering limited sponsored registration for community members and students (registration still required for catering).

This project is funded by the Australian and State Government's investment through the Natural Heritage Trust administered in the Swan Region by the Swan Catchment Council.

DIG 07



MARITIME MUSUEM,
VICTORIA QUAY
FREMANTLE

Registering for DIG 07

Due to the generosity of our sponsors, we are offering sponsored registration for community members and students (registration still required for catering).

Cost : $35 registration for professionals
Registration Close : 6th July 2007
Registration Contact : elita.lewis@water.wa.gov.au or fax (08) 9374 0685

Morning tea, lunch and afternoon tea will be provided.

Attendant's Details

Organisation Name: _____

Name of Attendee/s: _____

_____

Postal Address: _____

_____

Email Address: _____

Telephone: (___)_____ Fax: (___)_____

Special Dietary Requirements (eg. Vegetarian) _____

Are You Interested in Attending a Post Conference Dinner?
Note: this is not covered in the registration fee and is an opportunity for additional networking

Yes / No

No. of Seats

_____

Payment Details

Seats Required: _____

Conference Registration @ $35(inc. GST) per person. Total: $_____

O Cheque/Money order enclosed
(Made payable to the Swan Catchment Council—Post to PO Box 2206 Midland 6936)

O VISA O Mastercard O Bankcard

Account Name: _____

Credit Card Number: _____

Exp Date ___/_____ Signature _____

LAST STAND AT BELL TRACK – Saving the FRNP

Department of Environment and Conservation

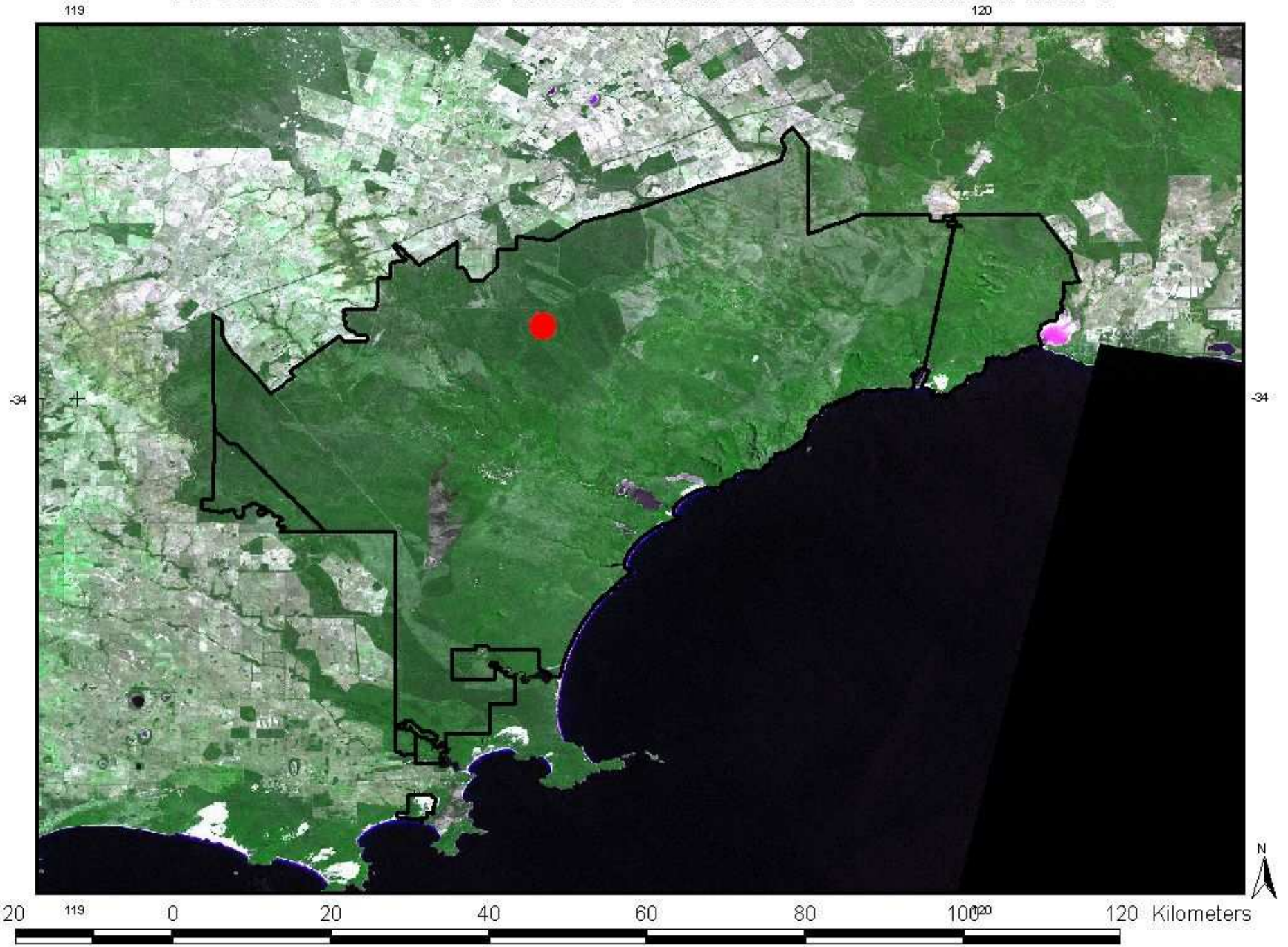
SAVING OUR SPECIES

SOUTHCOAST NATURAL RESOURCE MANAGEMENT

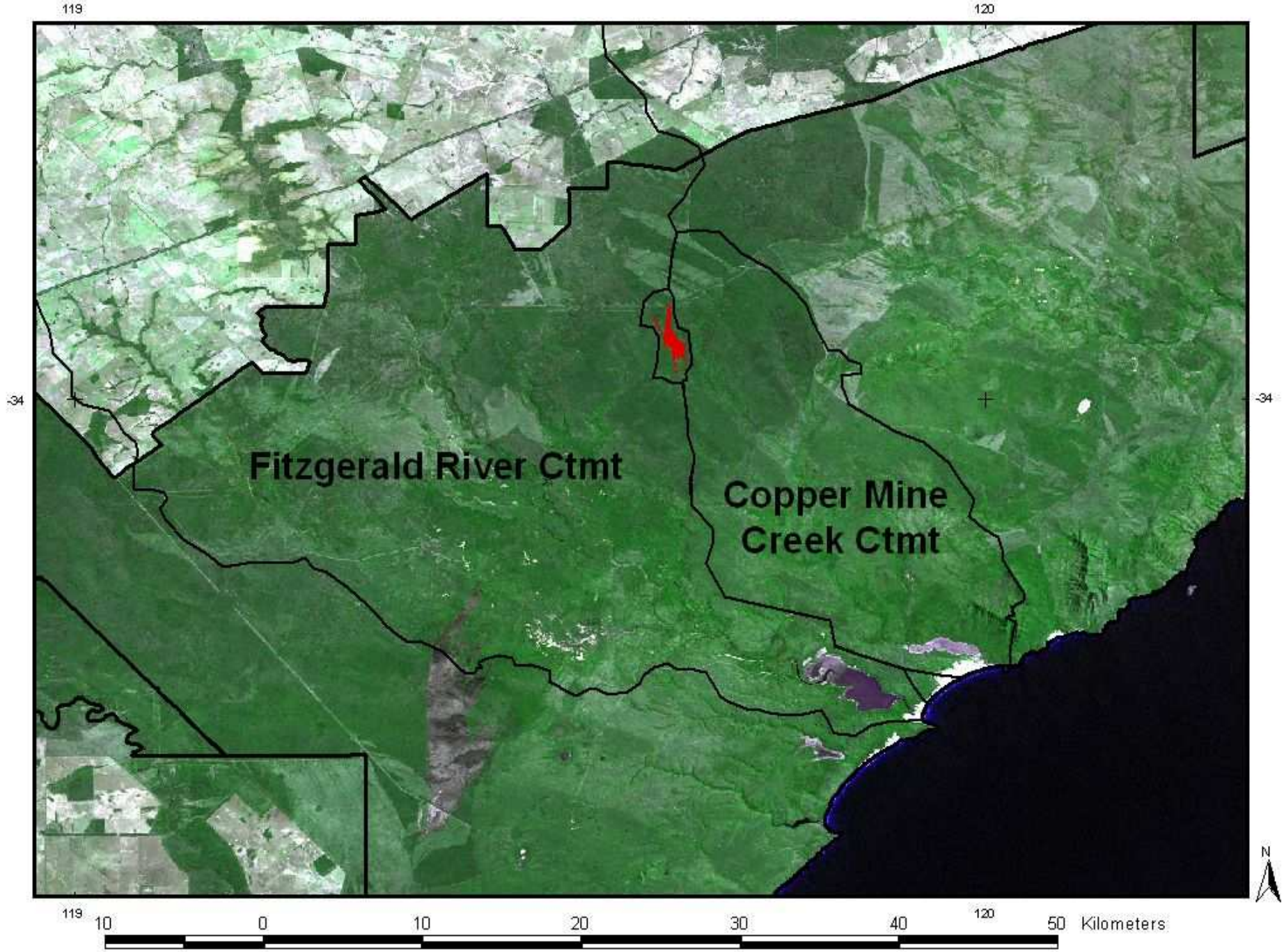
~ southcoastnrm.com.au ~

Australian Government

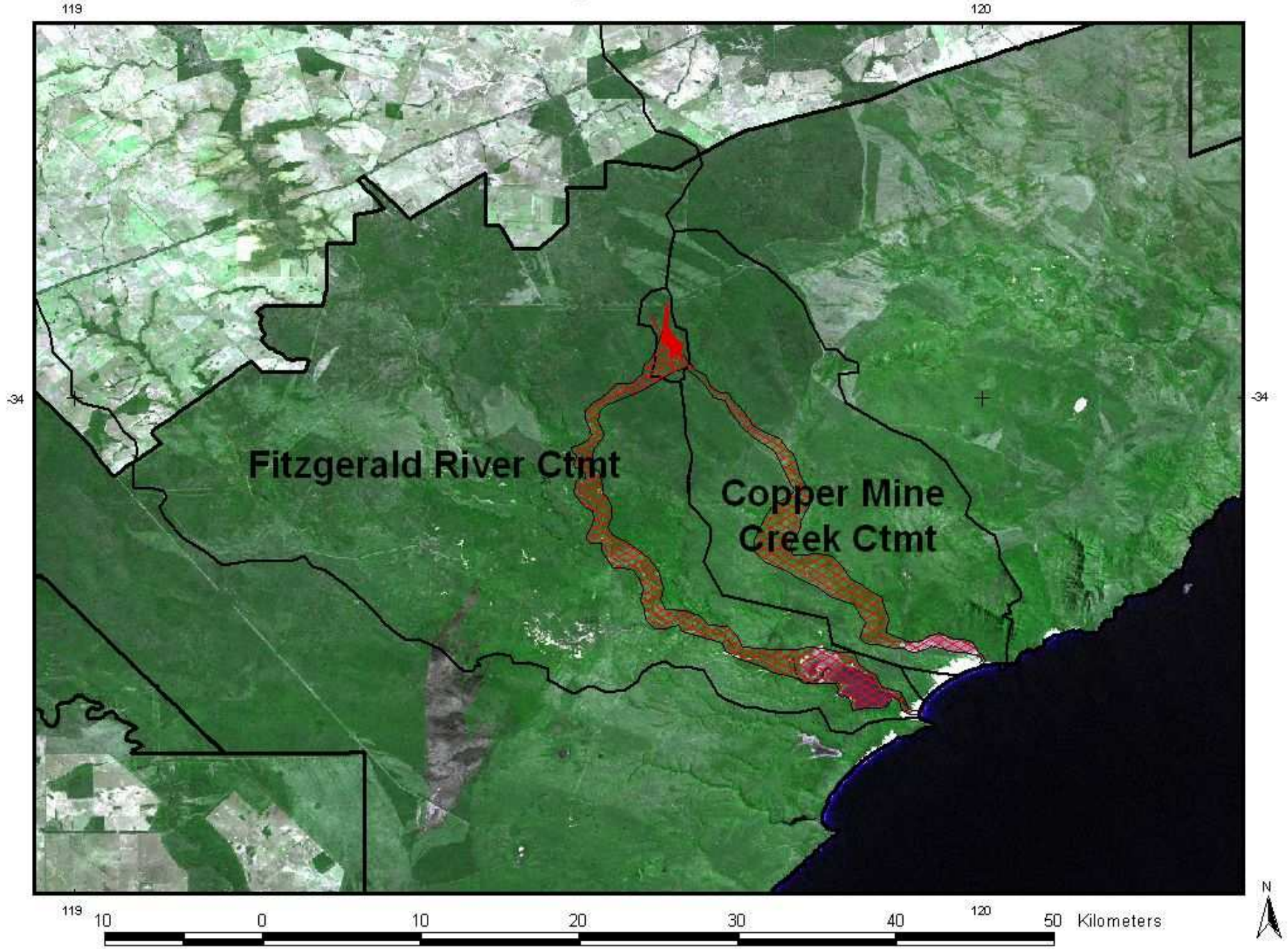
Location of the Bell Track P.c. Infestation within F.R.N.P.



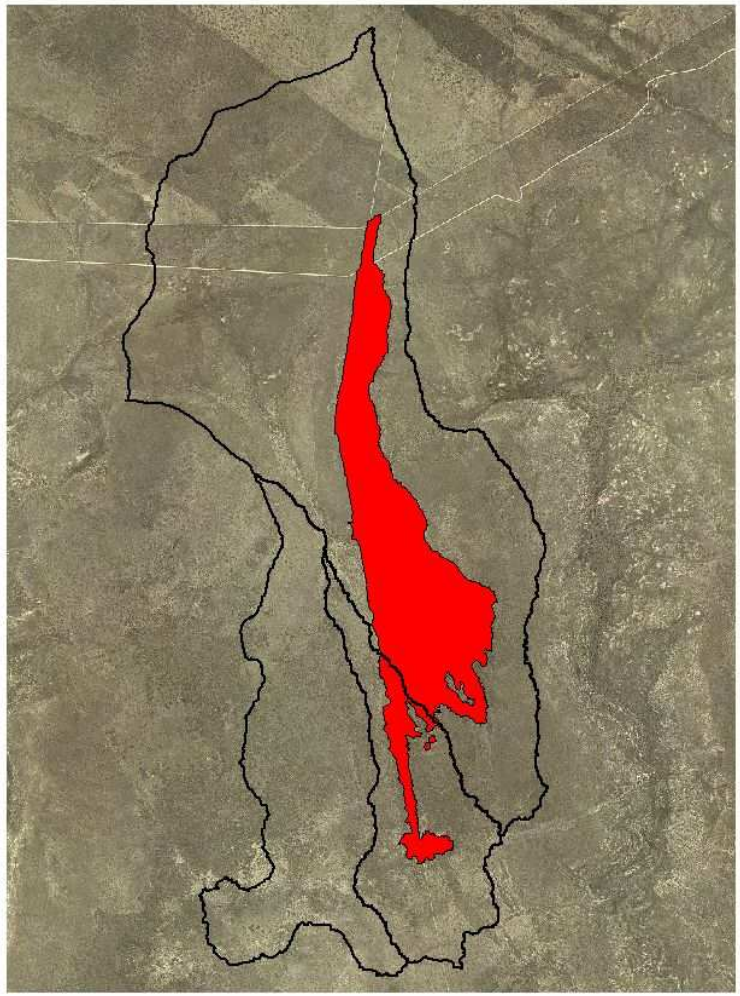
Location of the Bell Track P.c. Infestation and Micro Catchment within F.R.N.P.



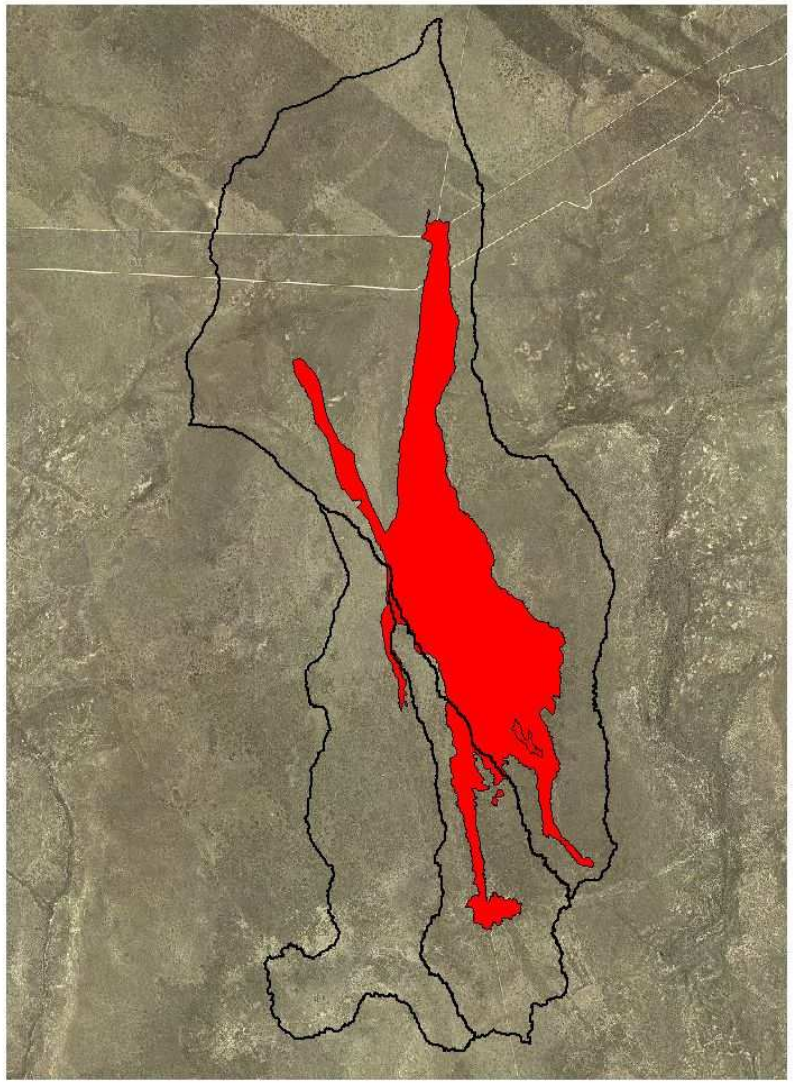
Location of the Bell Track P.c. and the Zone at High risk to infestation with future spread from the infestation



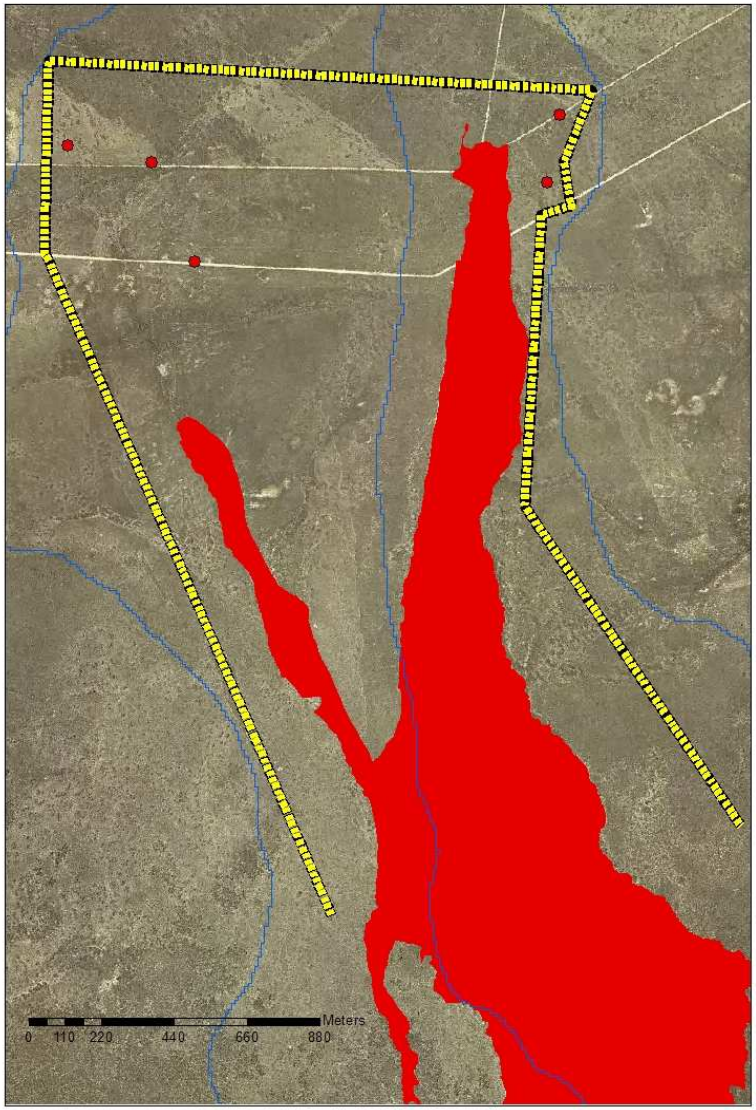
Bell Track Pc Infestation November 2004

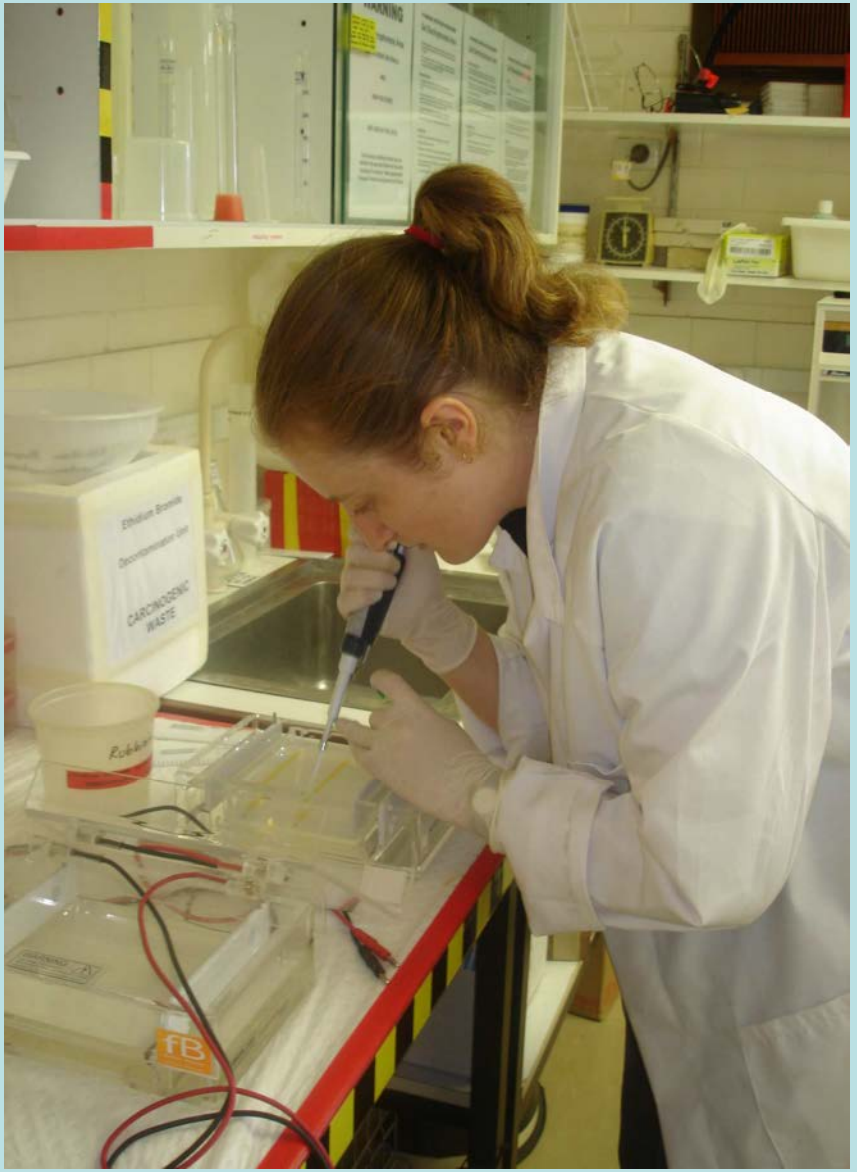


Bell Track Pc Infestation April 2007



FENCE


Meters
0 110 220 440 660 880


Ethidium Bromide
Decontamination Unit
CARCINOGENIC
WASTE
fB


DINGO
AUSTRALIA
K9-4


NO UNAUTHORISED ENTRY

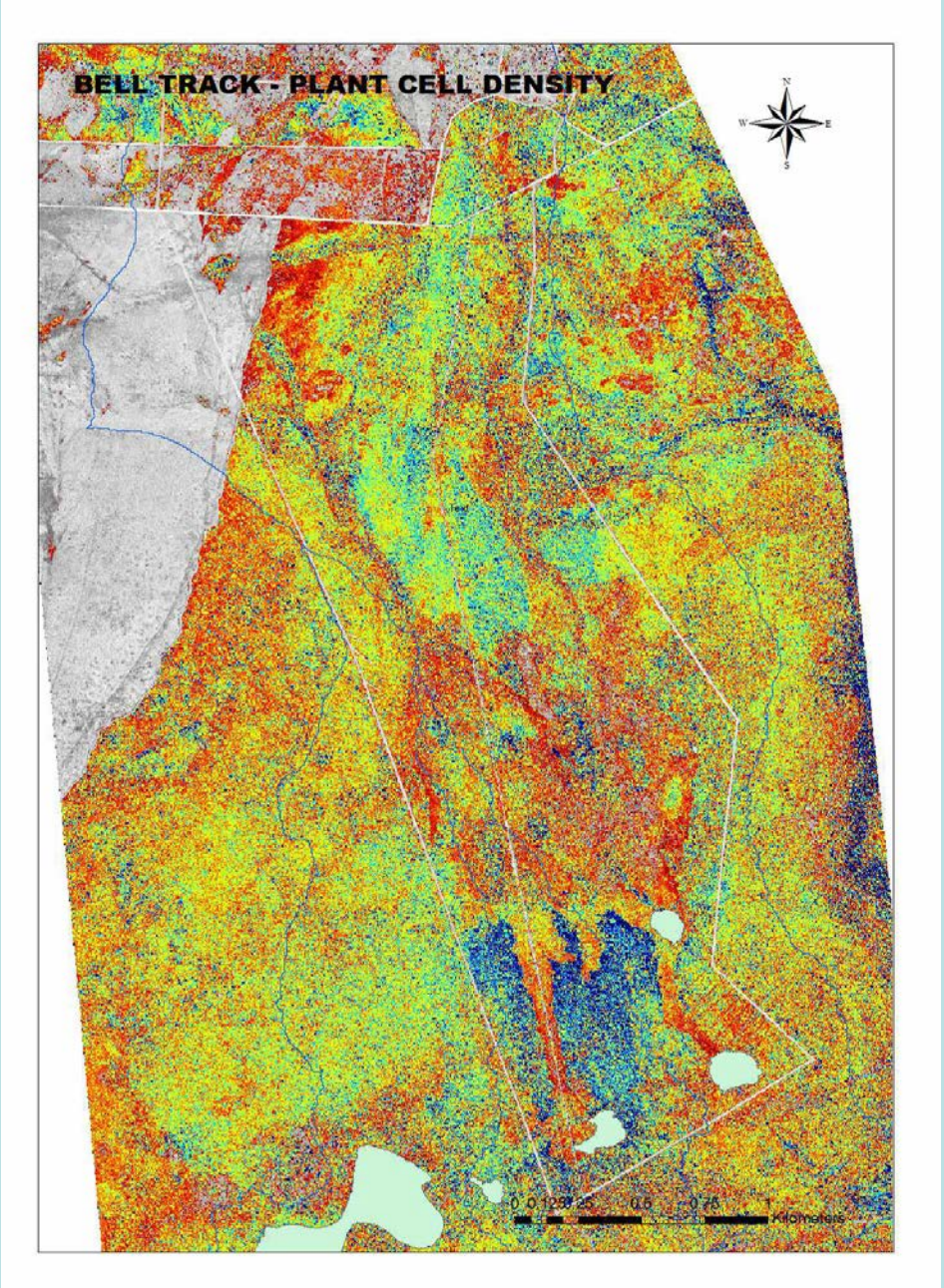
SOIL & EPIDEMIOLOGY STUDIES

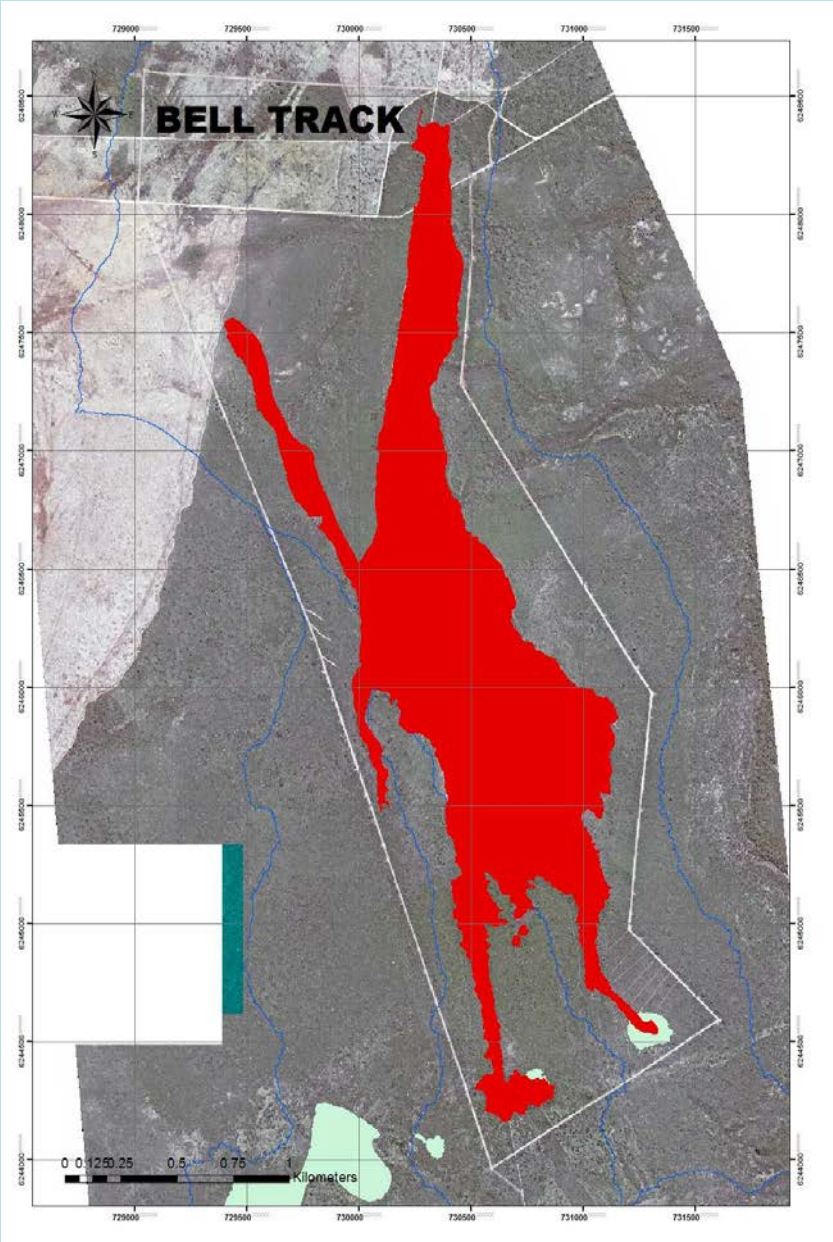
PHOSPHITE


Dieback Treatment Services
"Let's stop the Biological Bulldozer"
Phone
1300 785 311
www.diebacktreatments.com
9GX 487

HYDRO

- LIDR
- DMSI
- Vegetation & Soil Survey
- Hydrological Investigation and Feasibility Study





2007/08

- Engineering works
- High-water use species planting
- Barrier membranes
- Aerial phosphite application
- Fauna management

Development of molecular diagnostic tools for the detection of *Phytophthora cinnamomi* from cryptic soil samples in southern Australia

Nari Williams, Emer O'Gara, Phillip O'Brien and Giles Hardy

Centre for Phytophthora Science and Management, School of Biological Science and Biotechnology, Murdoch University, South Street, Murdoch, Western Australia

n.williams@murdoch.edu.au

Phone: 9360 2605

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Centre for *Phytophthora* Science and Management

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Division of Science and Engineering
School of Biological Sciences and Biotechnology

Role of pathogen diagnosis in disease management

- Effective management of *P. cinnamomi* is reliant on the identification of dieback boundaries and detection from soil samples.
- Detection of *P.cinnamomi* from soil is especially critical in cryptic sites which have no visible plant symptoms.

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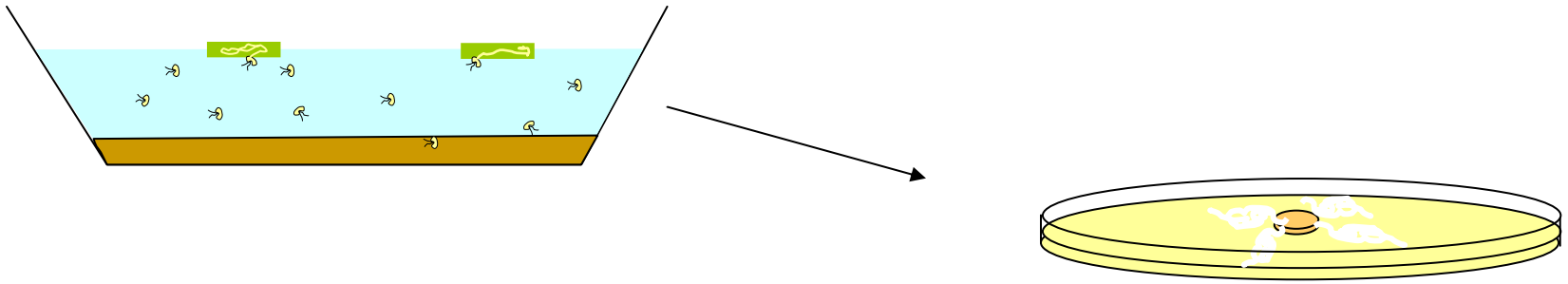
Current Testing Methods

- Culture based detection
- Potential to miss slower species/isolates or those inhibited by the growth of other micro-organisms



Days 2-10

Days 7-14

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DNA Tests

- Application of DNA based detection on other species have shown these are;
  - More sensitive
  - More specific
  - Relatively quick
  - Relatively little knowledge needed about the pathogen
- Conducive to robotic analysis systems

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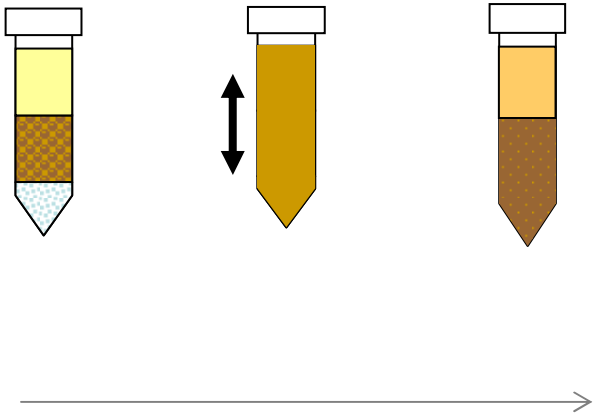
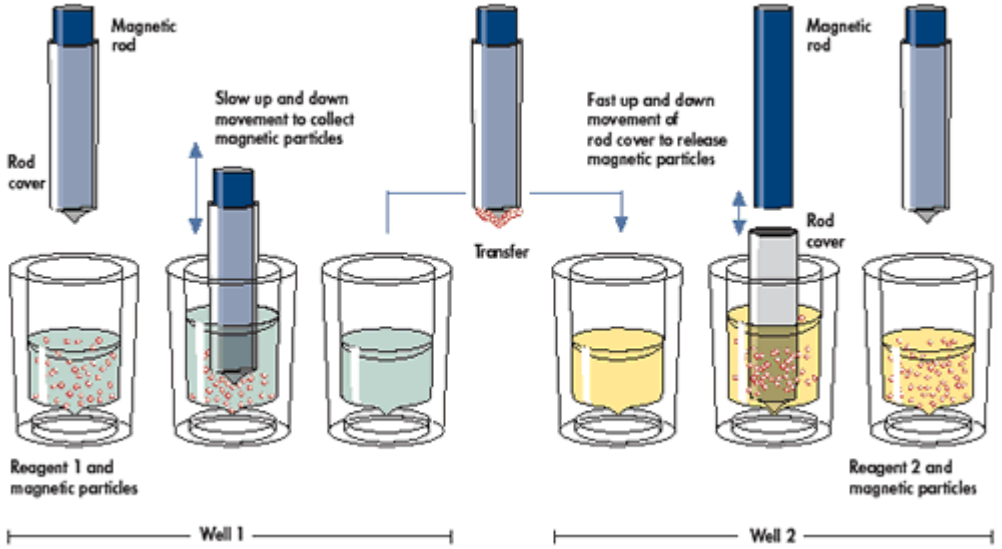
Semi-Automated DNA Extraction

1. Measure 2. Grind 3. Spin



4. The BioSprint robot does the rest



30 minutes

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DNA Analysis

(A) Nested PCR

Set up PCR → **Amplify DNA** → **2nd Amplification of DNA** → **Gel Electrophoresis** → **Result**

2 Days

(B) Real Time PCR

Set up PCR → **Amplify DNA** → **Result**

4 hours

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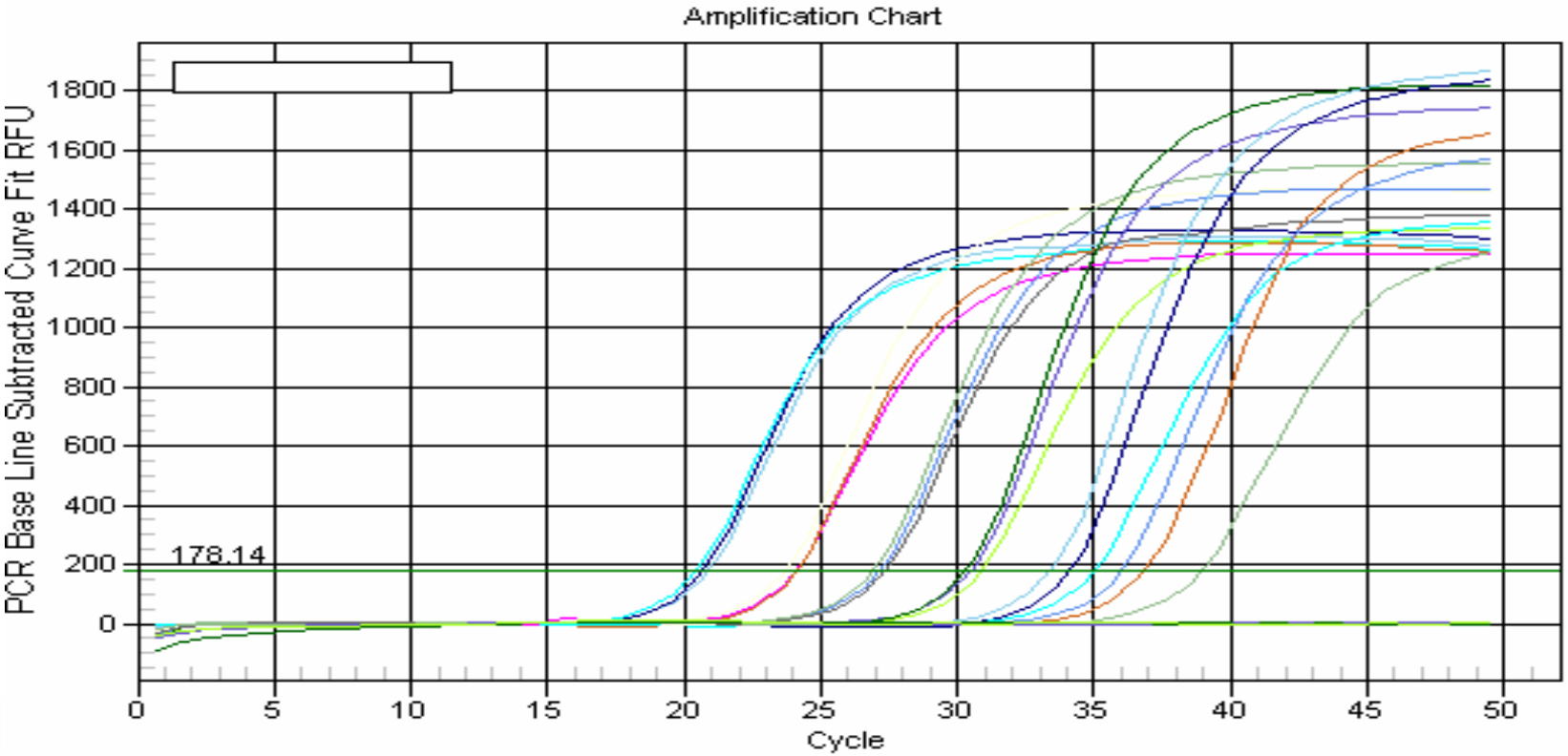
Real Time PCR



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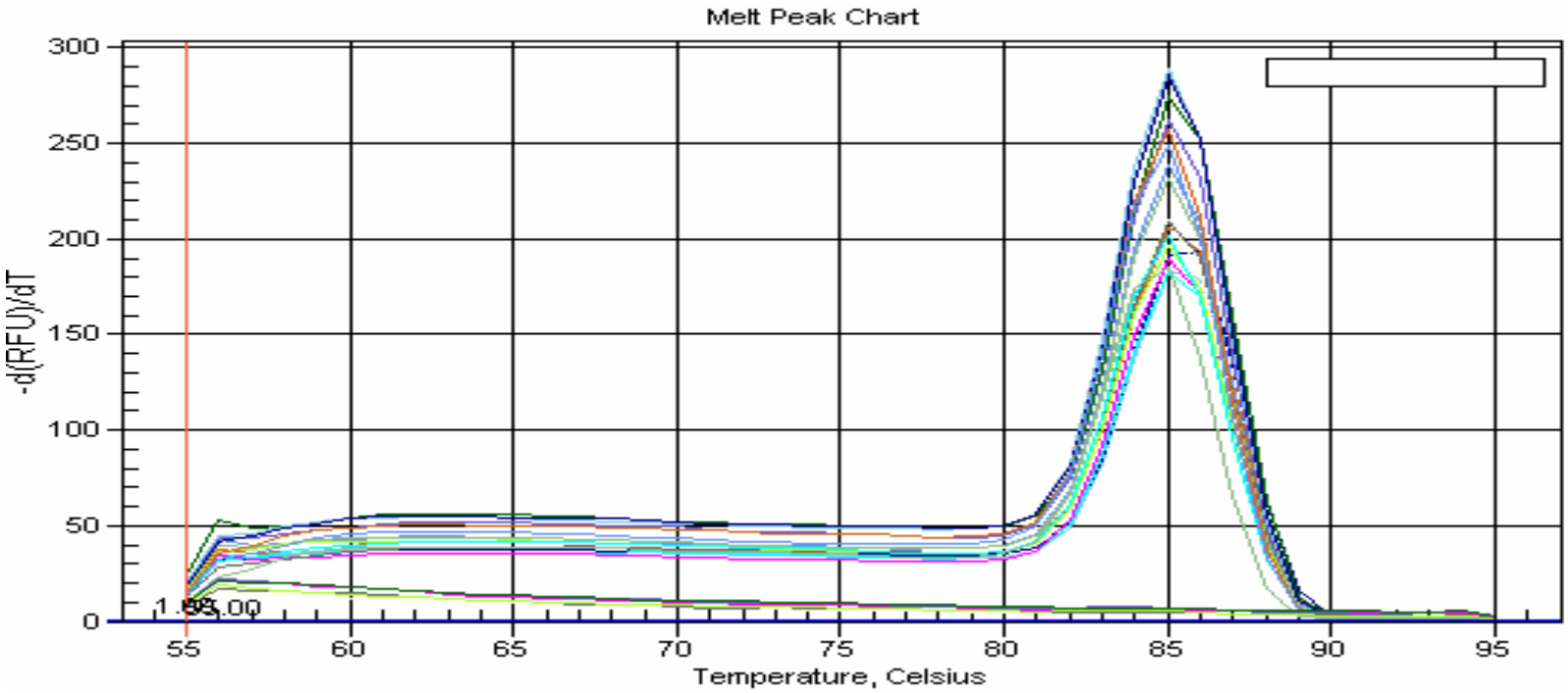
Real Time PCR

Thermal stability of DNA products



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CPSM Diagnostics Program

- Aim: To provide a *Phytophthora* diagnostic service to researchers and land managers
  - Run on a fee for service basis
  - Is being established in conjunction with the research program aiming to further improve our knowledge regarding the application of DNA based diagnostic tools.

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Where to from here?

- Testing on naturally infested soils
- Validation of real time PCR by comparison with baiting.
- Variation in detection
  - Variation in inoculum levels
  - Seasonal/climatic variation
  - Vegetation types
  - Soil types
- Application of the quantitative nature of rtPCR as a research tool within comparable soil types

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Where to from here?

- Expansion of the diagnostic tool box
  - Establish probes generic for all species of *Phytophthora*
  - New and emerging species
  - Multiplex reactions
    - Targeting more than one species within a single assay

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Diagnostics Program

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PERTH, WESTERN AUSTRALIA

Nari Williams

Centre for Phytophthora Science and Management
Diagnostics Program

n.williams@murdoch.edu.au
Phone: 9360 2605

Thank you

Department of Environment and Conservation

ALCOA

Worsley Alumina

bhpbilliton

The Mechanism of Action of Phosphite in Protection of Host Plants Against Infection by *Phytophthora cinnamomi*.

Philip A. O'Brien

Centre for Phytophthora Science & Management,

Murdoch University

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Phosphite, Phosphorus Acid, Phosphonate

- Application to native vegetation sites can slow the progress of disease fronts through the site.
- It's the only chemical available for effective control.
- It's relatively cheap, and non-toxic.
- Phosphite is not metabolised by plants but accumulates in the tissues.
- Efficacy depends on the amount applied, the time of application and the host spp.

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Objectives of the Research

- Does phosphite activate the host defence mechanisms? Does this make the plant resistant?
- Does phosphite activate other pathways in the plant that lead to resistance?
- Does accumulated phosphite in the plant act directly on *P cinnamomi*?
- What does phosphite do to *P cinnamomi*?
- Will *P cinnamomi* become resistant to phosphite?

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Arabidopsis thaliana

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Advantages of using *A. thaliana*

- The genome is fully sequenced.
- Small plant.
- Grows quickly (6 weeks)
- Experimental protocols well developed.
- Strains with mutations in known genes are available.
- Recombinant Inbred Lines are available.
- Genetics are well understood.
- Gene libraries and arrays are available.

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P cinnamomi infection of *A thaliana*.

Infected plants do not develop a root system.

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

Phosphite treatment activates the defence systems.

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

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Current Methods for Measuring Phosphite

- Requires specialised equipment.
- Requires processing of each individual sample.
- Limited access to equipment.
- Expense limits scope of studies.
- AIM
  - To develop a cheap, inexpensive highthroughput method.

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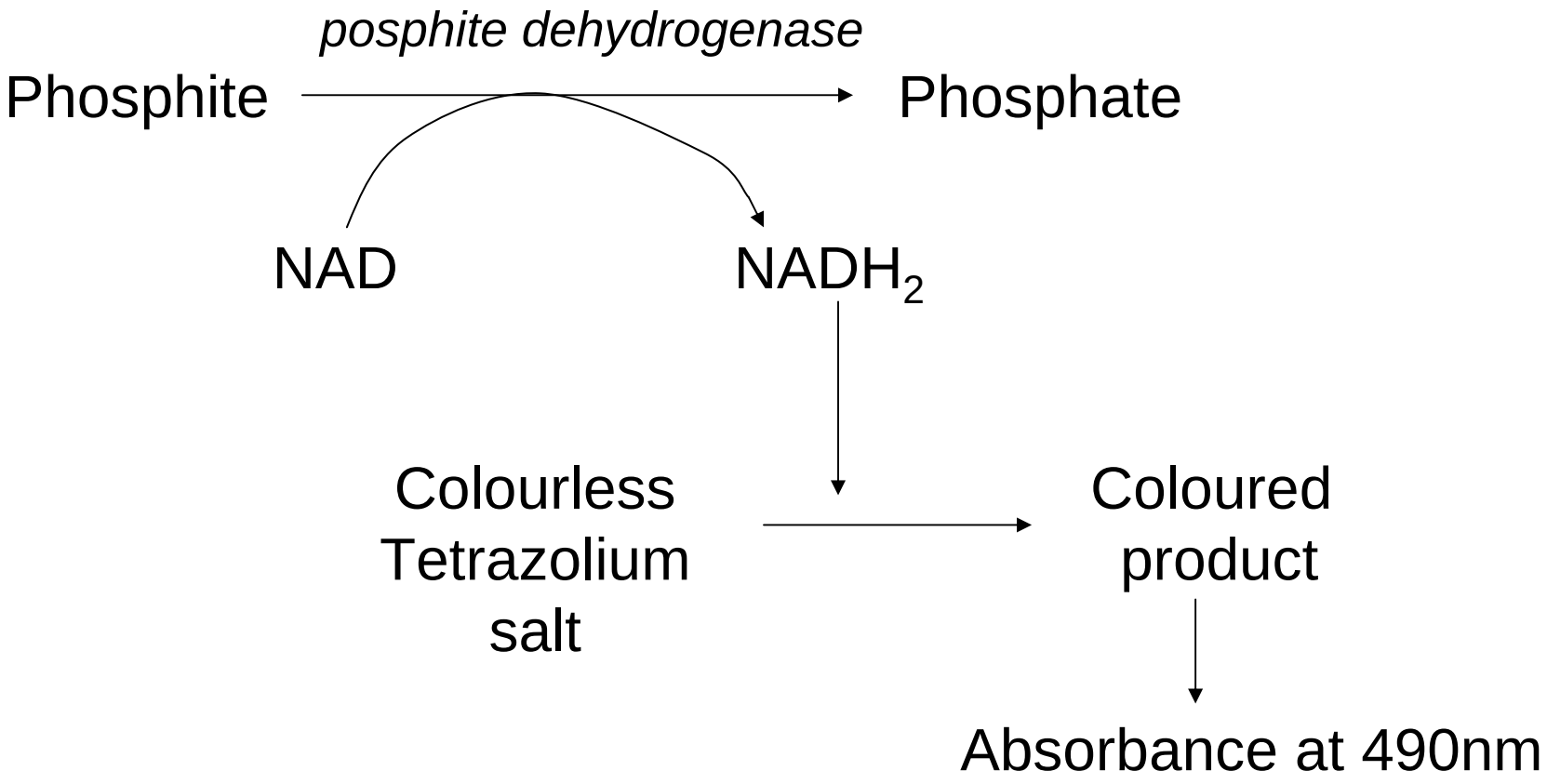
Development of assays for phosphite



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Spectrophotometric Assay for Phosphite

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are needed to see this picture.

Phosphite (mg)

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Effect of Treating Plant Extracts with Activated Charcoal

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are needed to see this picture.

(Control - enzyme; Control + enzyme; Act Char - enzyme; Act char + enzyme)

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Phosphite can also be detected by a silver deposition assay.

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TIFF (LZW) decompressor
are needed to see this picture.

$$2AgNO_{3\ (aq)} + H_3PO_3 \Rightarrow 2Ag_{\ (s)} + H_3PO_4 + 2H^+_{\ (aq)} + 2NO_3$$

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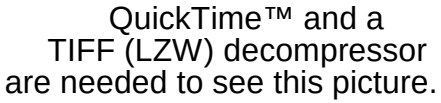
Phosphite can be detected in the tissues of plants exposed to phosphite.

4



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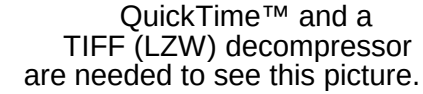

Controls Treated

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Effect of Phosphite on *Phytophthora cinnamomi.*

- Inhibition of growth *in vitro*.
- Inhibition of zoospore production *in planta*.
- Changes in morphology of mycelium.

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Phosphite Inhibits Growth of *Phytophthora cinnamomi.*

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TIFF (LZW) decompressor
are needed to see this picture.

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Microarray Analysis of *P. cinnamomi* genes

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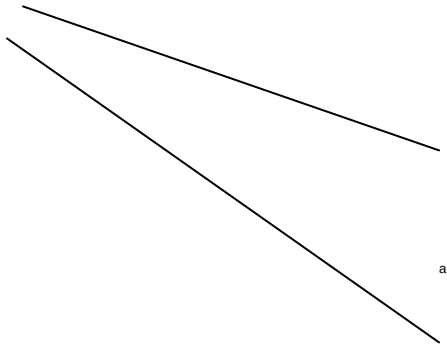

Red-gene switched on
Yellow-not affected
Green-switched off

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Types of *P cinnamomi* genes affected by Phosphite

- ABC Transporters.
- Adhesive protein genes.
- Genes involved in protein degradation.
- Alternative oxidase.
- Cellulose synthesis
- Activators of host defence (elicitins).
- Signal Transduction genes.
- Glutamine synthase
- ADP-ribosylation factor

Future Directions

- PLANT
  - The role of defence pathways.
  - The role of stress response pathways.
  - Phosphate metabolism.
  - More effective methods for detection of phosphite.
- PATHOGEN
- What are the critical pathways that are affected by phosphite.
- Studies on resistance to phosphite.
- Variation in response to phosphite.

RESEARCHERS

N Jardine
P Stasikowski
L Eshraghi
M King
M Wong

COLLABORATORS

G Hardy
J McComb
B Dell
W Reeve
B Shearer (DEC)

FUNDING

Australian Research Council
Dept Environment & Water Resources
Murdoch University

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The Centre for Phytophthora Science & Management (CPSM)

5 Years On!

Emer O'Gara (Manager) & Giles Hardy (Director)

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Centre for *Phytophthora* Science and Management

an outstanding australian university

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CPSM : A Potted History!

- Founded on > 20 years of research on Phytophthora and other aspects of plant health

- 2003 Murdoch University Centre for Phytophthora Science and Management launched

- Focused primarily on diseases of natural ecosystems caused by *P. cinnamomi*

(Left to right) Prof Jeff Gawthorne - DVC, Dr Judy Edwards MLA - Minister for Environment and Heritage and Dr Giles Hardy - Centre Director

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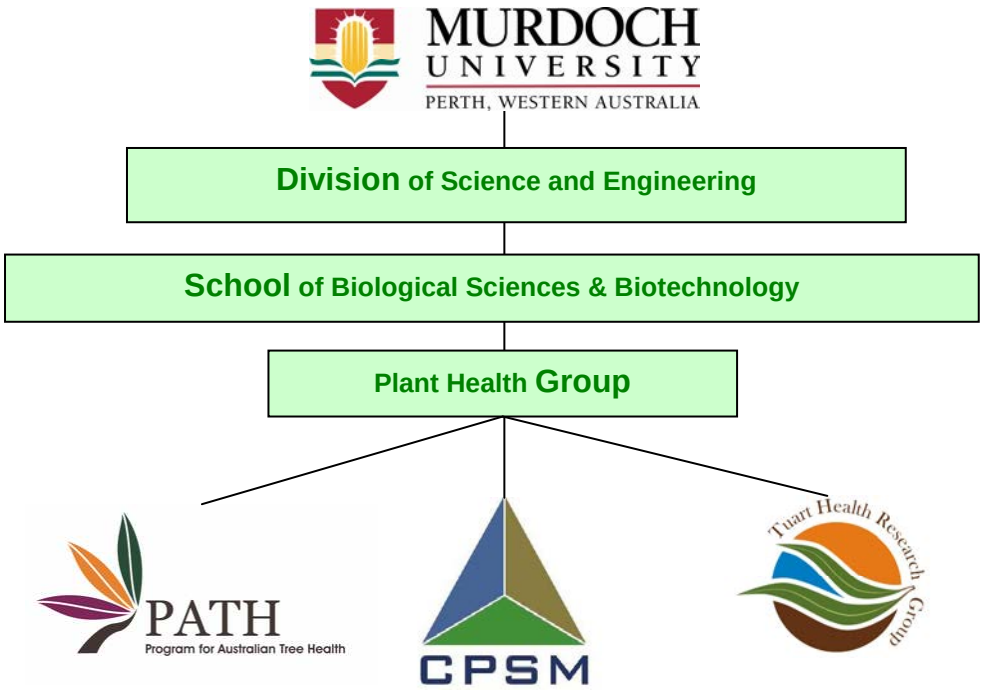
What is a Murdoch University Centre?

- Recognition of area of existing and potential research strength
- `Administrative entity within the University'
- Fixed term 5 years – with potential for extension
- Funding of the Centre is driven almost exclusively by the Centre's activities



CPSM : 2003 to 2005

- Initial Centre Plan had described a detailed structure and 5 research programs
- Difficult to implement the Plan because no resources available over an above those won to undertake specific research projects
- Research Programs not formally established
- **…but that did not stop the research from continuing**

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CPSM : 2006 to 2007

- Manager position funded in 2006/2007 via DRG/DEC and MU
- Board of Management appointed
- Revisit original Centre Plan
- Survey new environment

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Surveying the New Environment?

- new stakeholders
- new technology
- consultancy work vs. grants
- market demand
- WA economic boom
- DEST Research Quality Framework
- MU restructure
- climate change

Current Planning

- Strategic Plan
- Business Plan
- Action Plan

Vision

No Australian biota is threatened by Phytophthora

Mission

Through a coordinated program of management and research, and in partnership with industry, government and community, the Centre will provide science, management and training to underpin the amelioration of the threats posed by *Phytophthora*.

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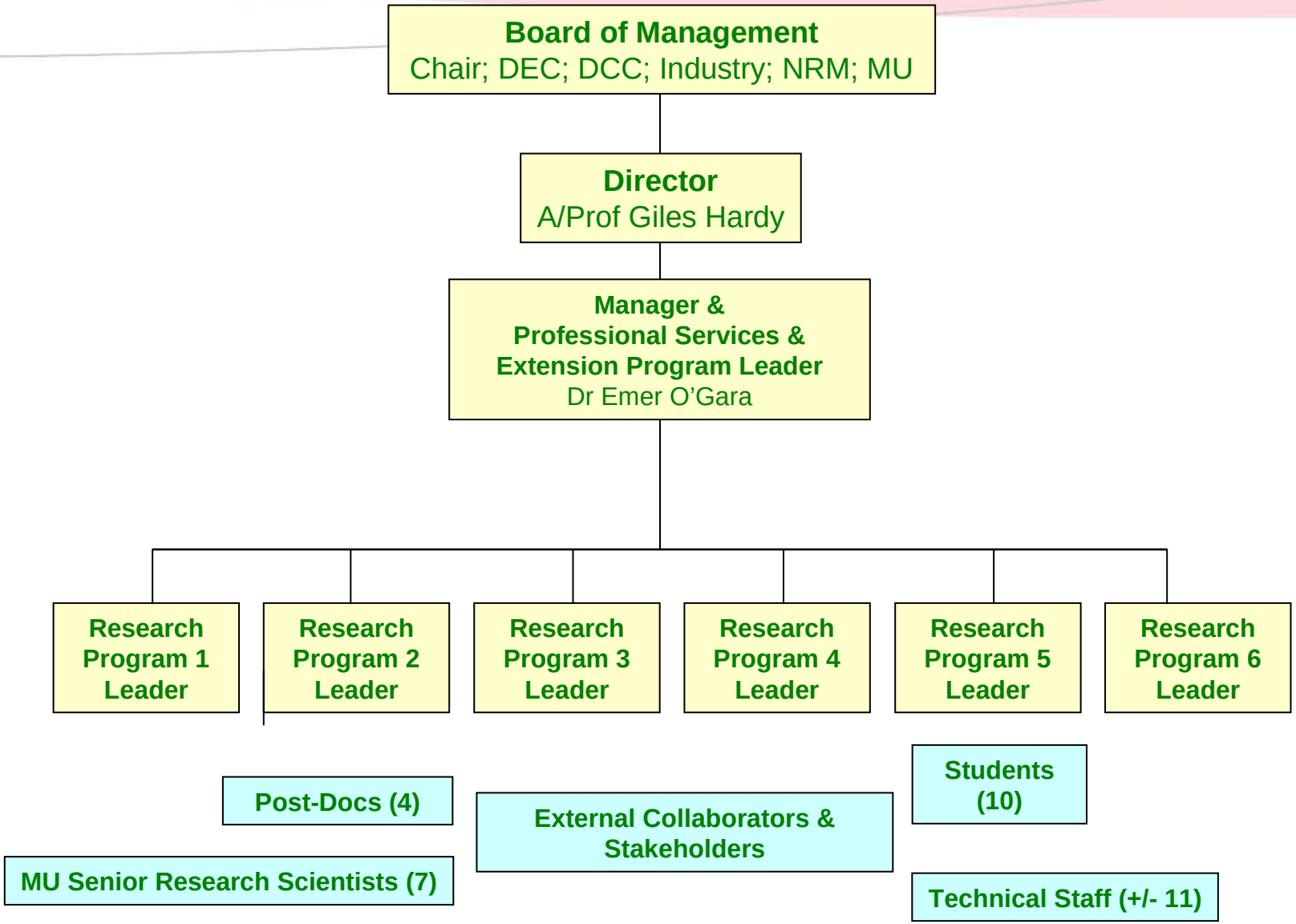
CPSM Structure



Title	Objective
1. Taxonomy, Biology, Epidemiology of *Phytophthora* spp. (10)	To provide knowledge and un… of the taxonomy, biology, epiden… gy of *Phytophthora* spp. that … d adaptive management.
2. Disease Management (14)	To provide tool… *hytophthora* spp. from na… stems
3. Conservation, Biodiversity and Ecosystem Restoration (4)	To iden… cts of *Phytophthora* on biod… and health. To provide the s… ce the impact and restore … function.
4. Detection and Disease Diagn…	… methods for the detection of … p.
5. Biosecurity	…ew and emerging *Phytophthora* Emergency …s; possible entry points; potential impacts and; …op management recommendations.
6. Disease Mapping Modelling and Risk Assessment	…o provide knowledge and technologies for *Phytophthora* disease risk analysis.

Research Programs

Professional Services and Extension Program

To adapt and apply the knowledge and technology developed in the research programs to on-ground management of *Phytophthora* spp.

To develop revenue streams for CPSM activities by developing commercial services based on the knowledge and technology

- Molecular Diagnostic Facility
- Training

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Alignment with Other Initiatives

- National Research Priorities
- National Threat Abatement Plan for Pc[1]
- Draft Biodiversity Conservation Strategy for WA
- DCC and State Dieback Response Framework
- NRM planning processes
- Department of Environment and Conservation, Science Division, Strategic Plan for Biodiversity Conservation Research 2008-2017
- WA Phytophthora Dieback Management and Investment Plan

Photo BB Wells/DEC

1 Draft revised NTAP available for public comment until mid August
http://www.environment.gov.au/biodiversity/threatened/publications/draft-tap-phytophthora.html

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Thankyou

Emer O'Gara
e.ogara@murdoch.edu.au
08 9360 7414

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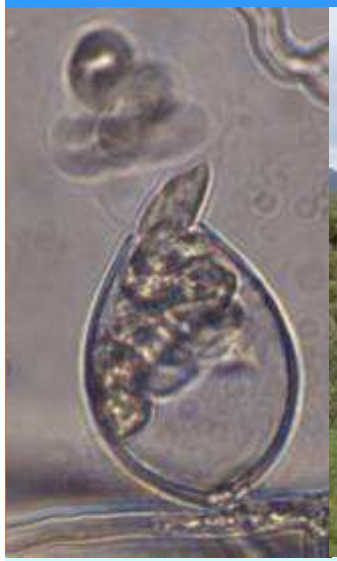
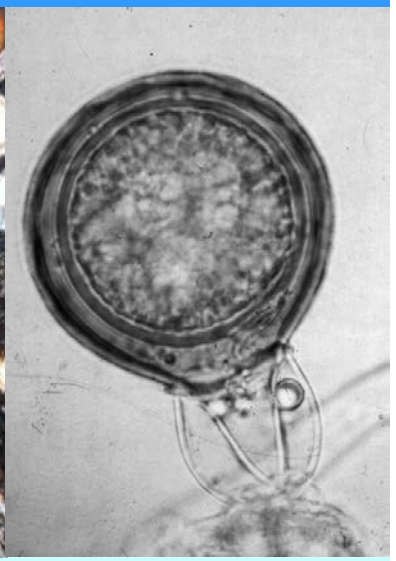
PERTH, WESTERN AUSTRALIA

Does the physiological status of a plant at the time of spraying affect the efficacy of phosphite?



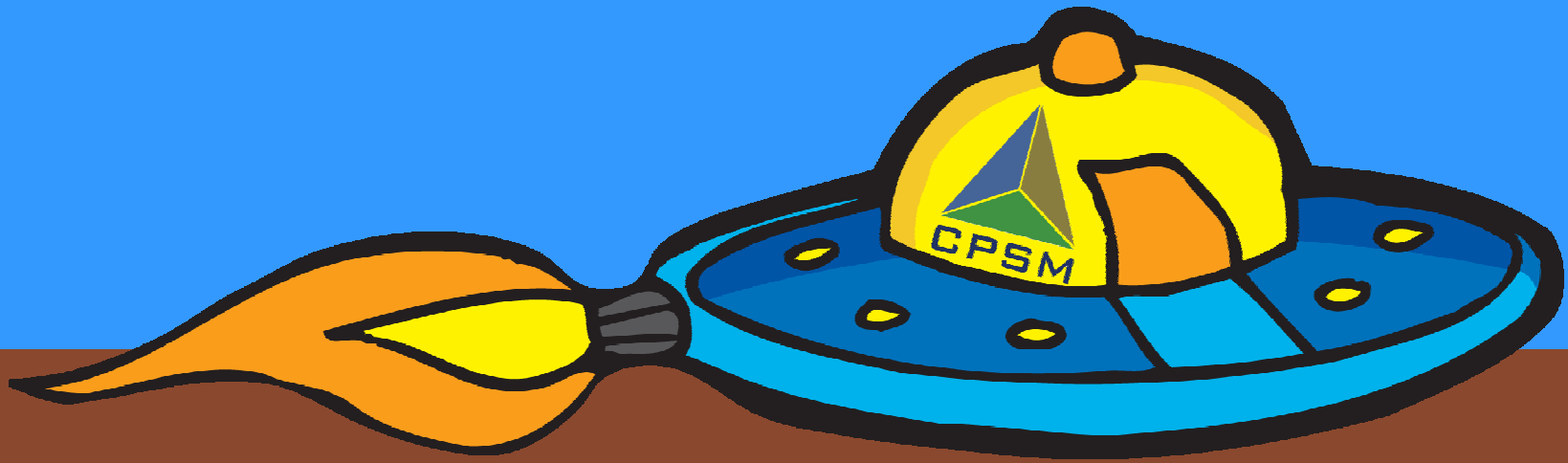



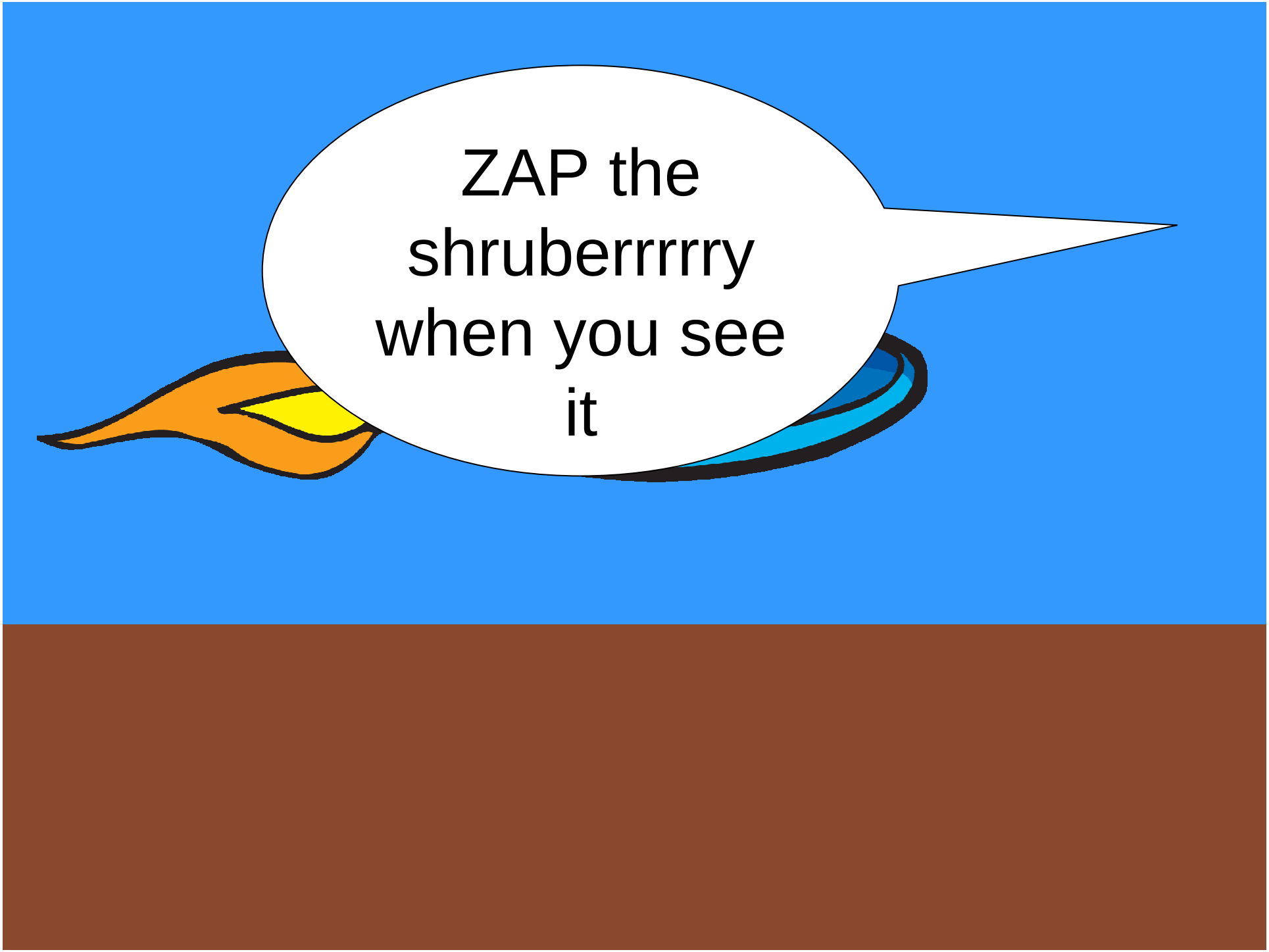
Daniel Hüberli, Trudy, Paap, Nicole Moore,
Nathalie Long, Karyn Gower, Bernie Dell & Giles Hardy

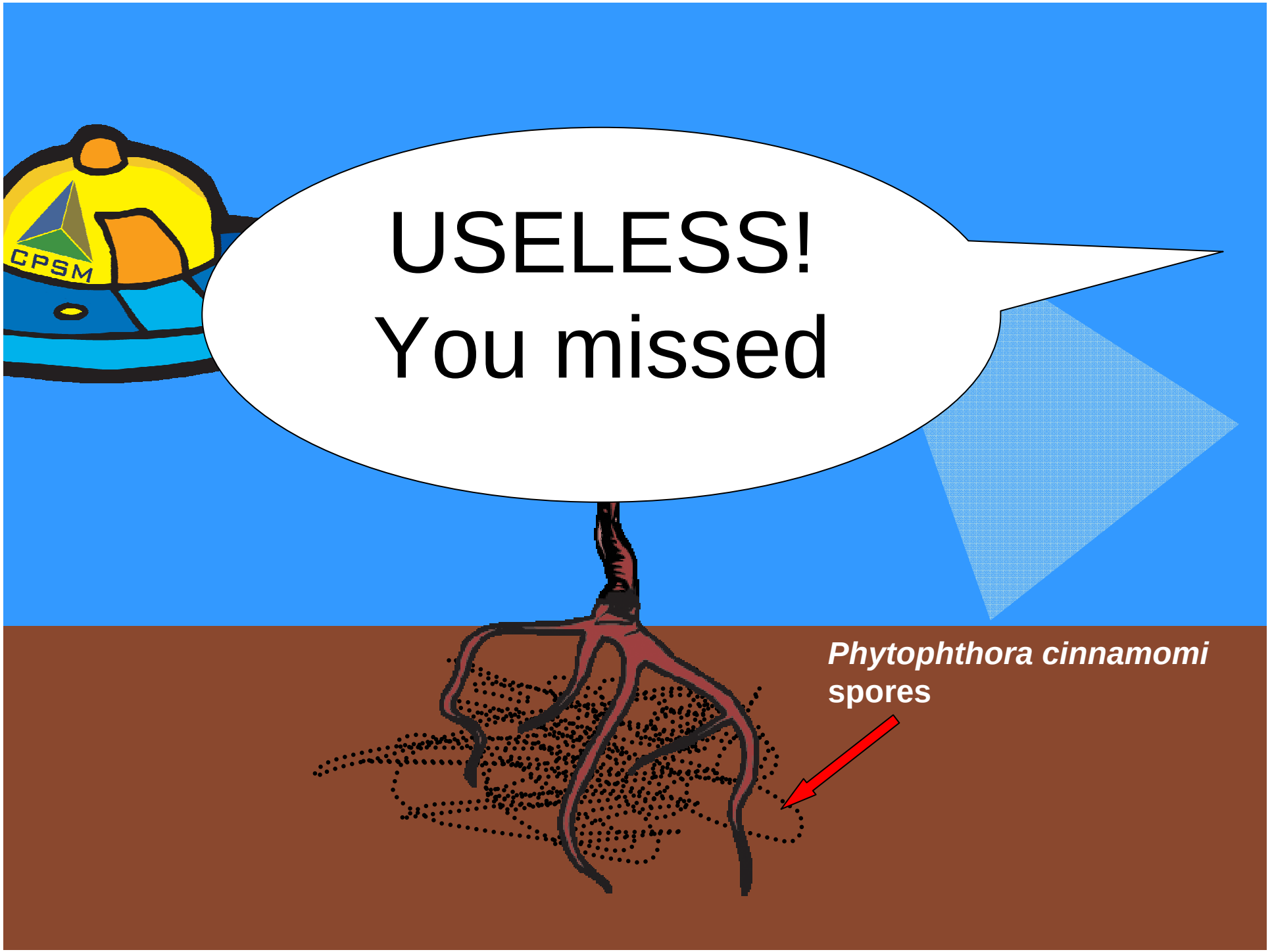
Murdoch UNIVERSITY

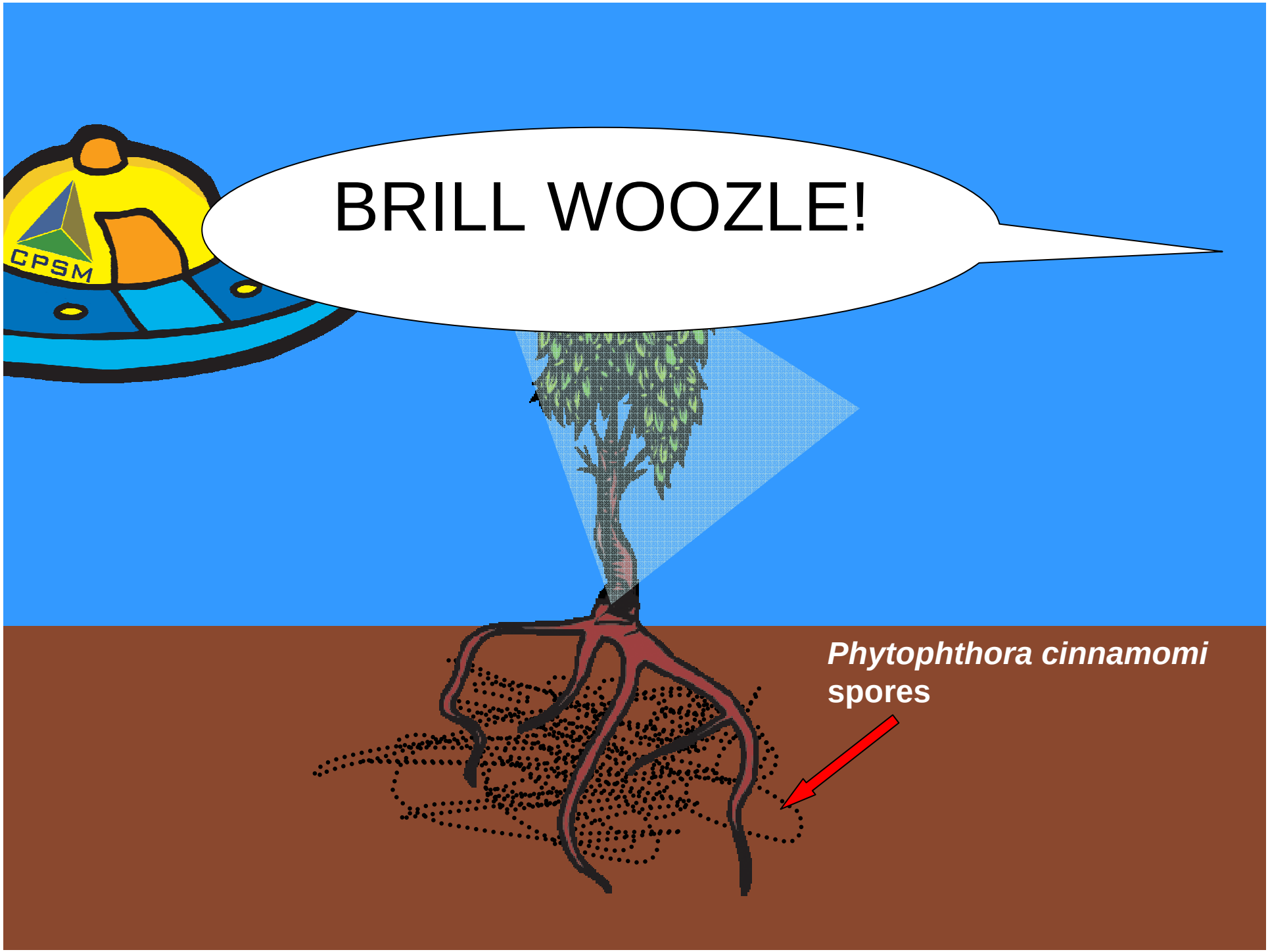
CPSM
Centre for *Phytophthora* Science and Management

2050

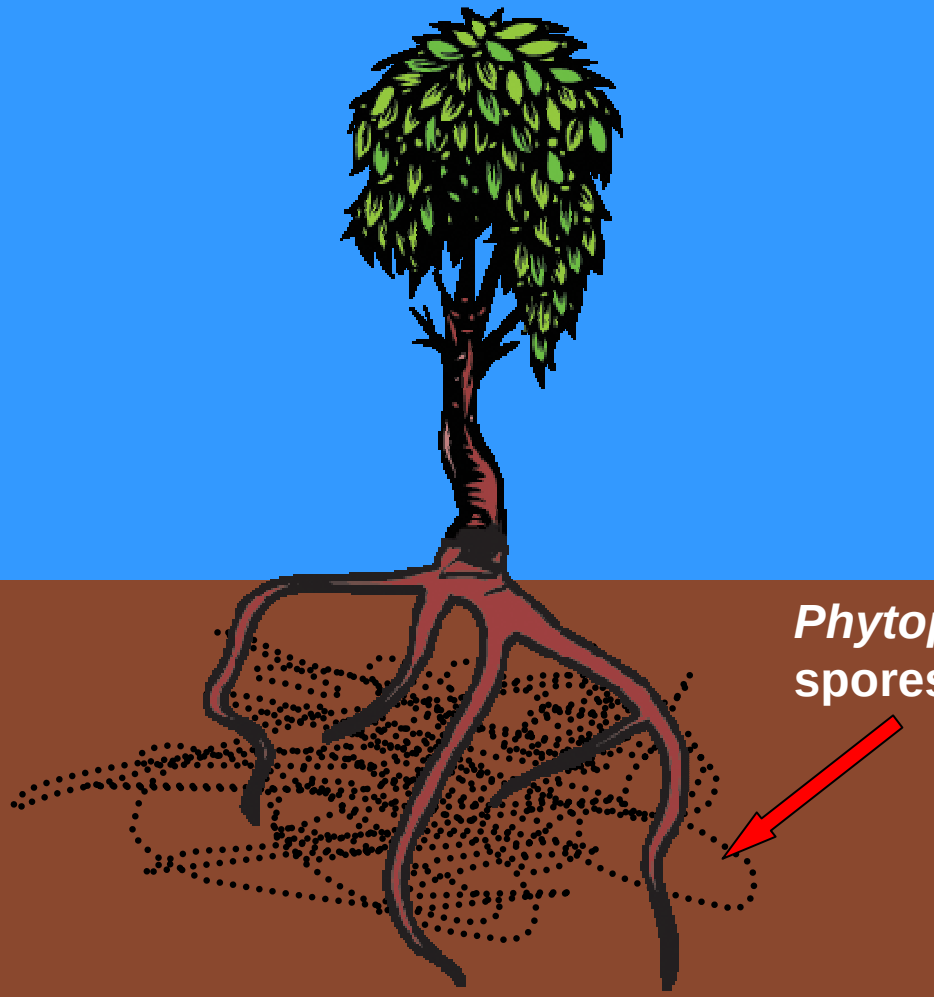



ZAP the shruberrrrry when you see it

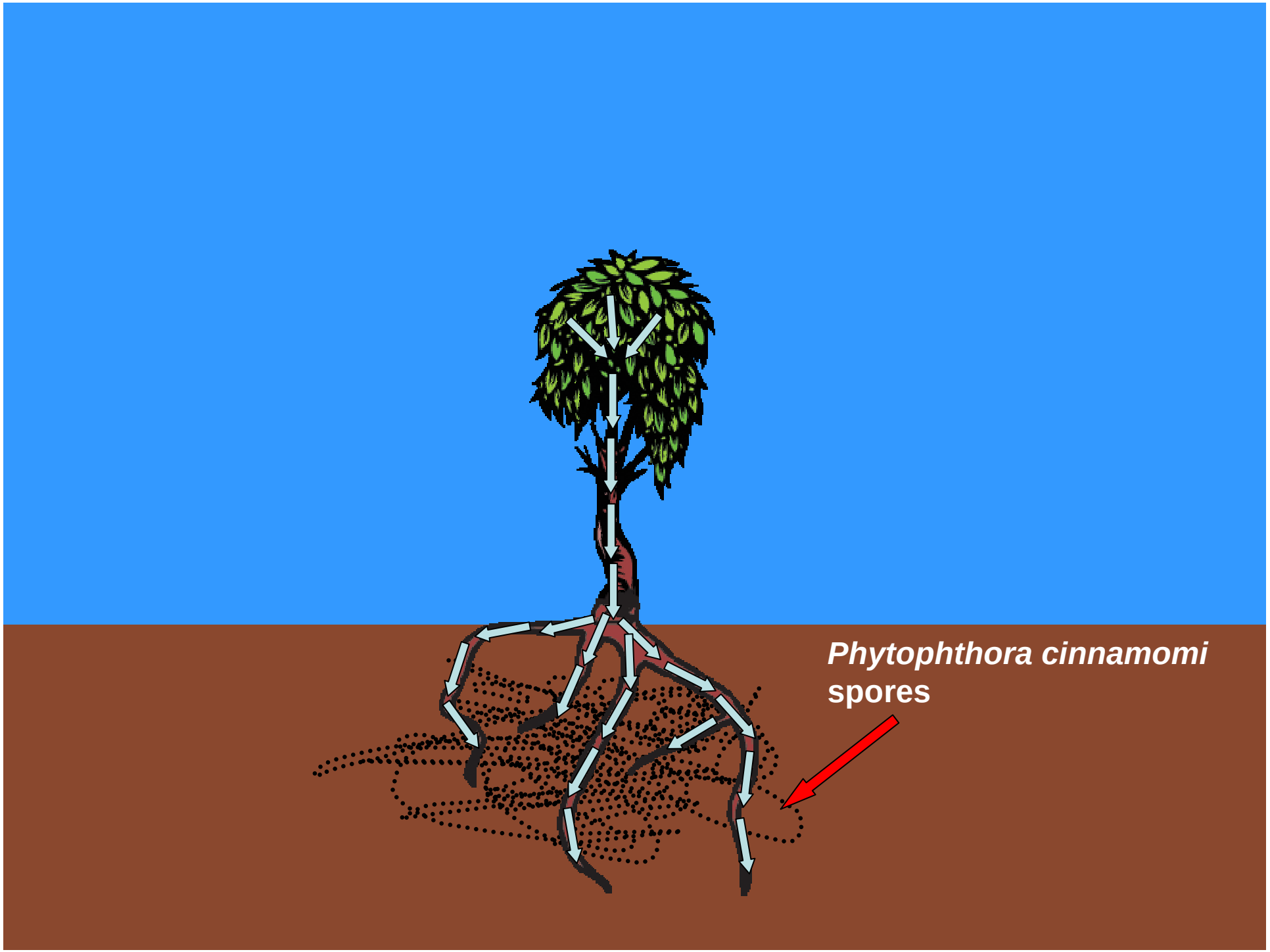

CPSM
USELESS!
You missed
Phytophthora cinnamomi
spores


BRILL WOOZLE!
CPSM
Phytophthora cinnamomi
spores

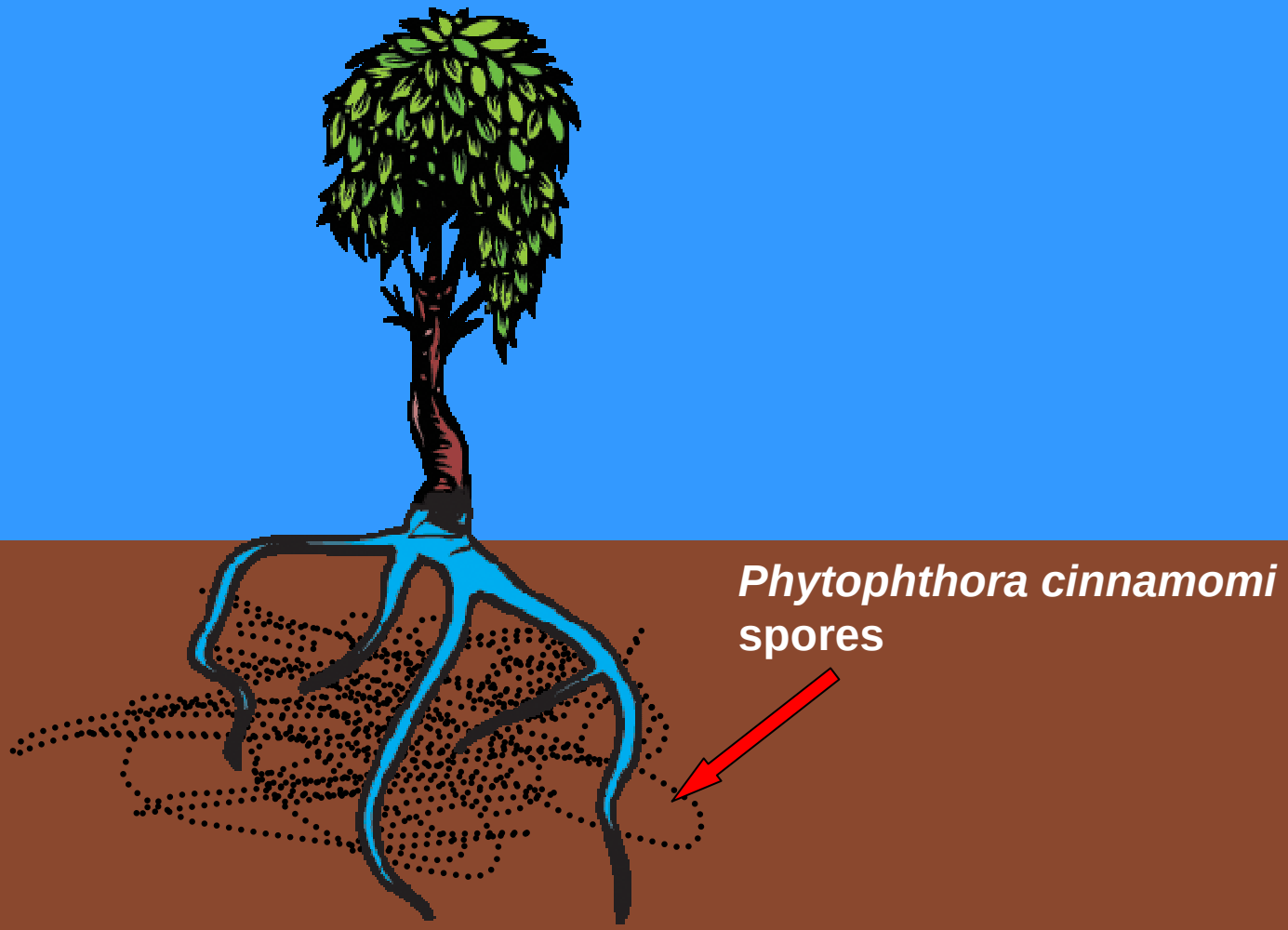
We know….. (!)



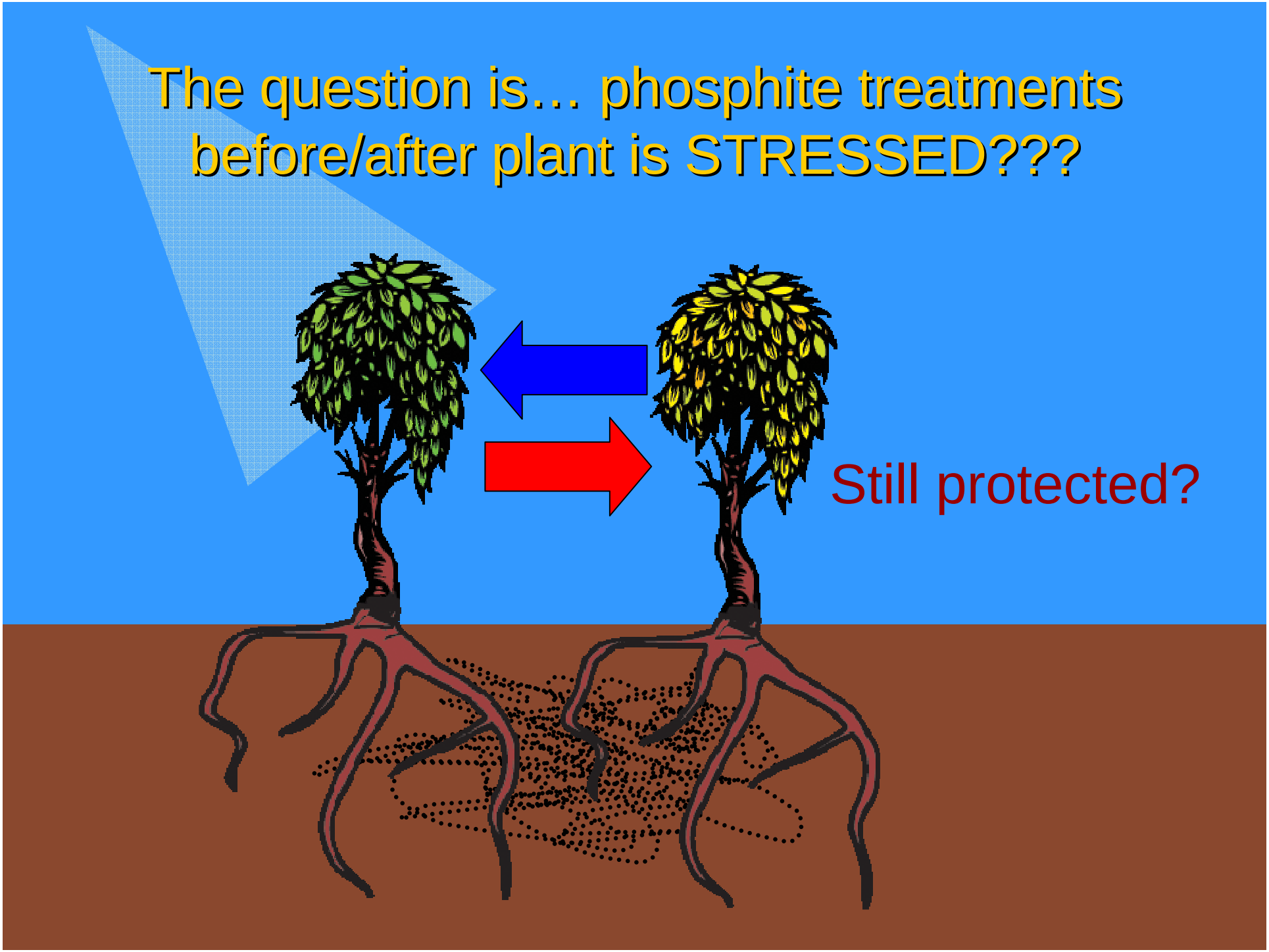
Phytophthora cinnamomi **spores**


Phytophthora cinnamomi
spores

PROTECTED!



The question is… phosphite treatments before/after plant is STRESSED???



Still protected?

Project questions

- Plant stress factors
  - **–Fire**
  - –Waterlogging
    - Water deficit
- Determine whether spray is effective if plants are treated
  - Before, or
  - After stress

Field site/plant selection criteria

- Suitable for burning
- High plant density, and…
  - *P. cinnamomi* susceptible
  - Phosphite responsive
  - Similar age and size
  - Leaf physiology
  - Reseeder/ resprouter species
- Large area that included fire buffers
- Easy off-road access

Three Species

Resprouter species

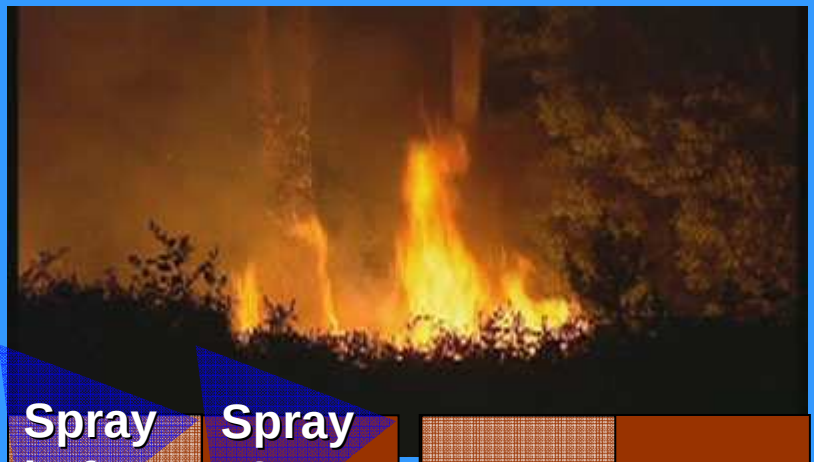
Adenanthos cuneatus

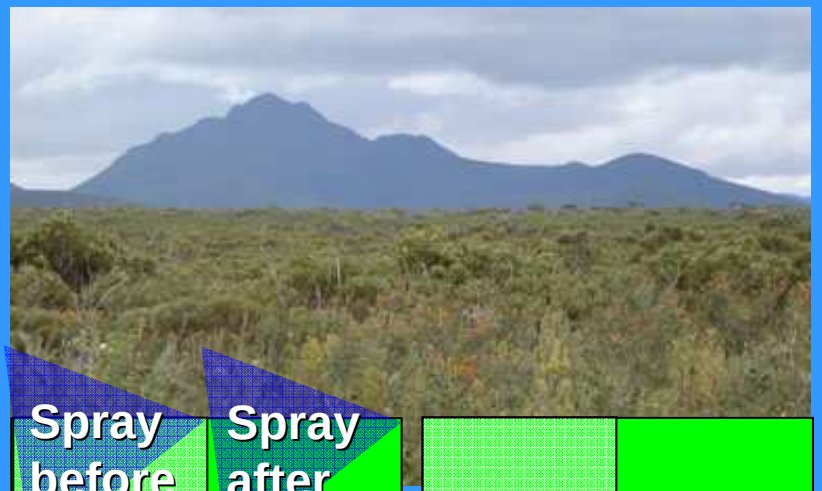
Banksia attenuata

Reseeder species

Banksia baueri

Field site





Spray before

Spray after

Cohort 1

Cohort 2

Cohort 1

Cohort 2

FIRE BREAK

Spray before

Spray after

Cohort 1

Cohort 2

Cohort 1

Cohort 2

Plot 1

Plot 2

Plot 3

Plot 4

Phosphite application


24 kg/ha phosphite

Spray events

Spray 1

2 months

2 months

8-10 months?

Spray 2

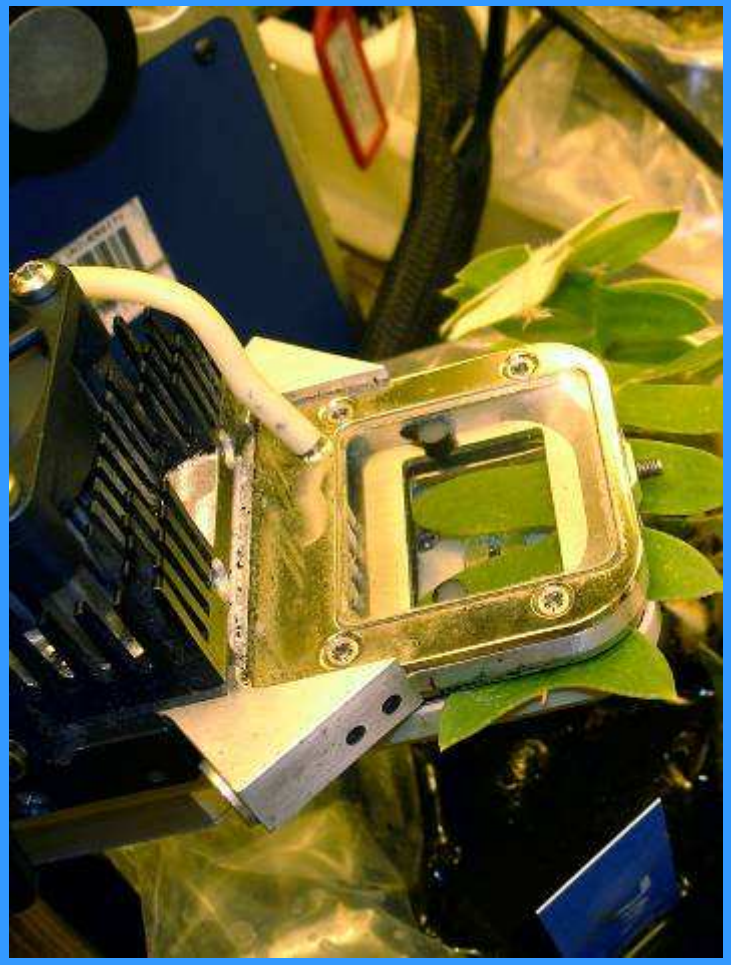
Results (in the future)

Progressive measurements for 2 cohorts (before/after fire):

- Lesion development (to do)
- Phosphite analysis (OJI)
- Leaf gas exchange (OJI)
- Pressure potentials (OJI)

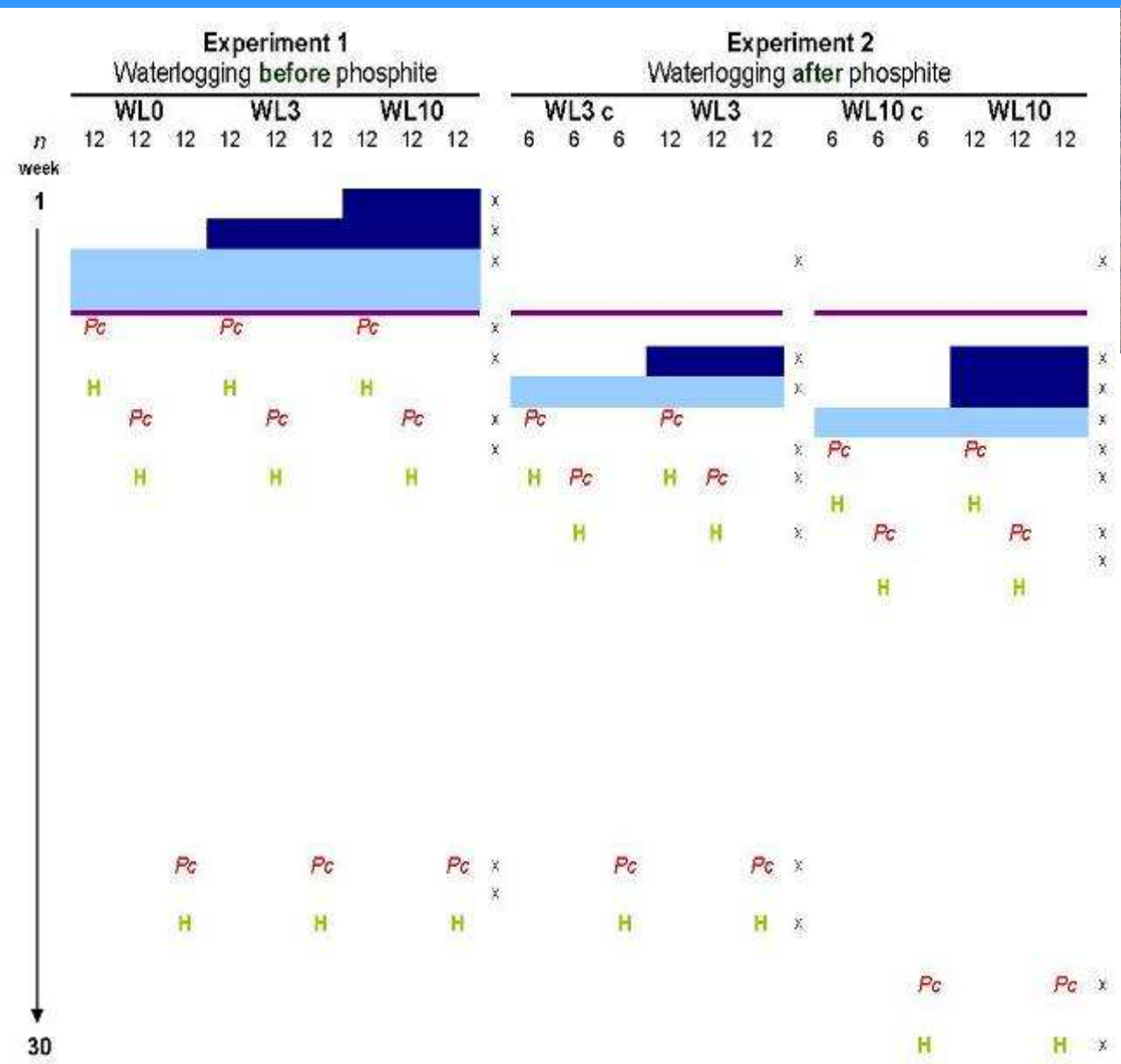
Physiology measurements

Water potentials



Gas exchange

Waterlogging trials



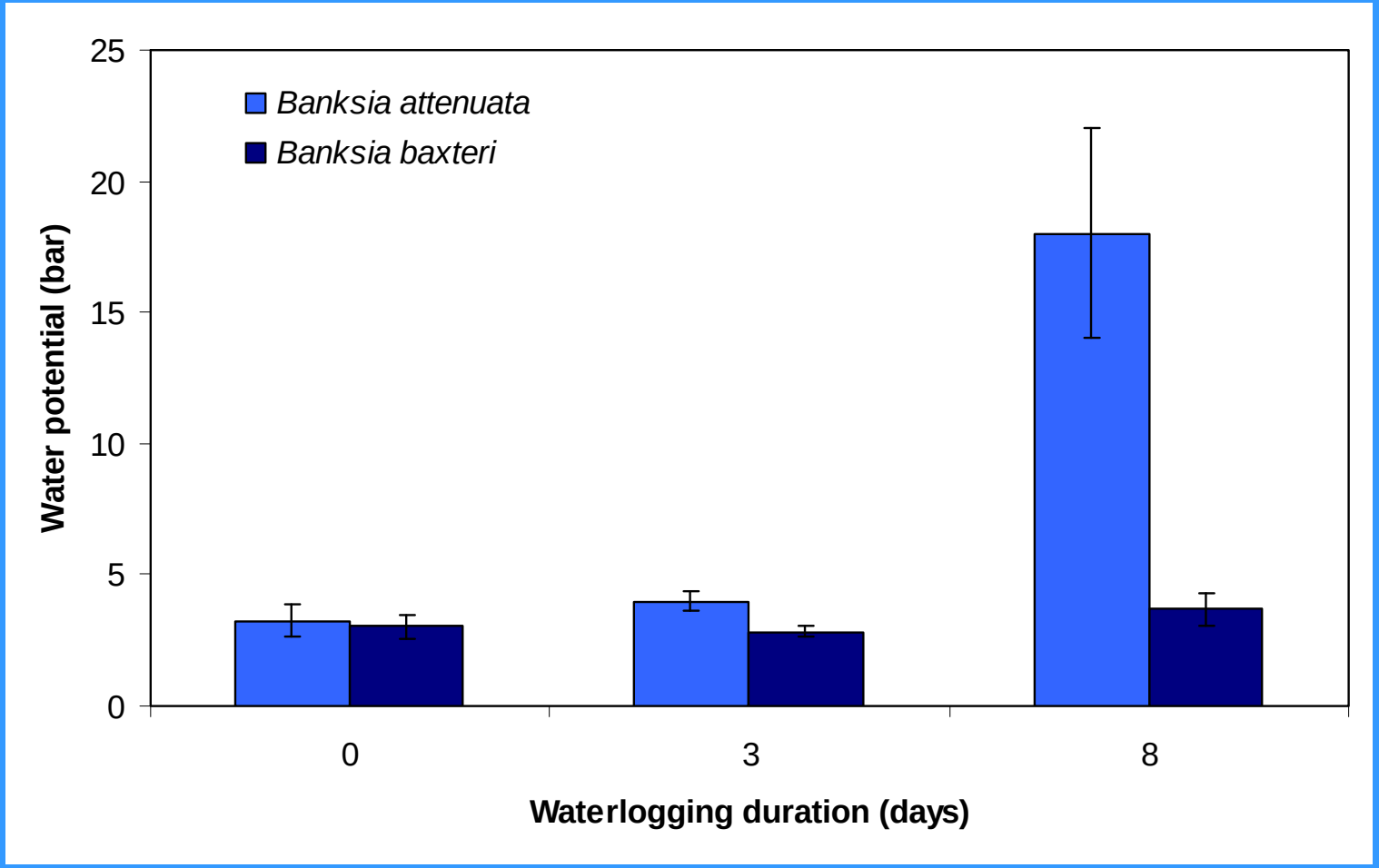
P. cinnamomi stem lesions

1 week later

B. attenuata
(110 cm)

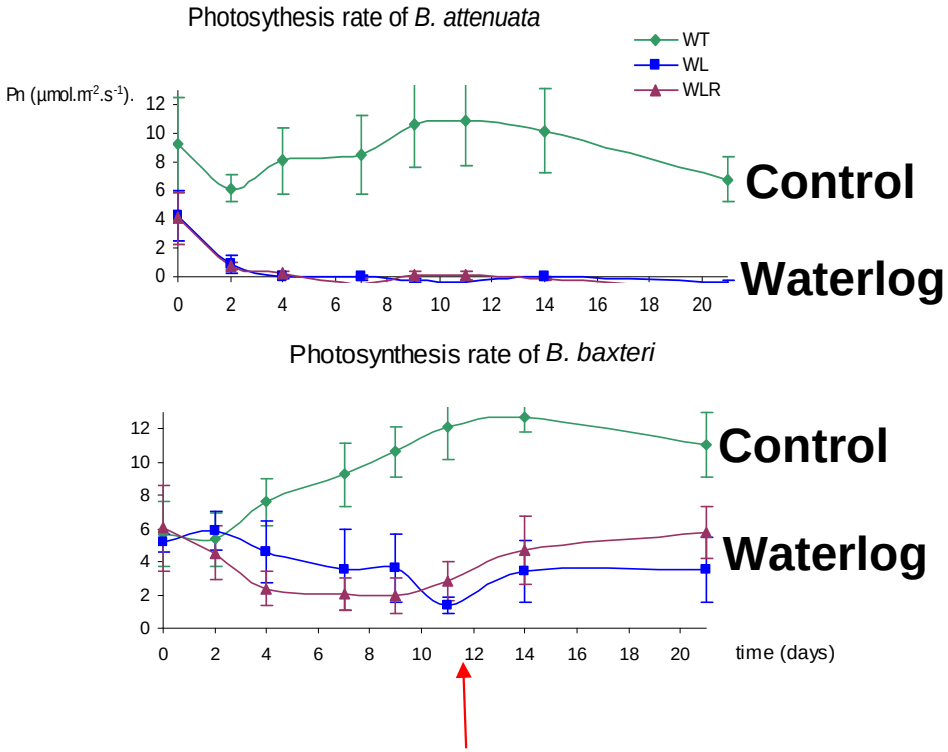
B. baxteri
(90 cm)

Water potentials after waterlogging



We know…

- *B. baxteri* is less sensitive to waterlogging



We hope to answer…

Are treated plants still protected from *P. cinnamomi*?

Thank you!

- **Funding**
  - Department of the Environ. and Heritage
- **Collaborators**
  - Department of Conservation (Greg Freebury, Sarah Barrett, Sara Hands, Nicole Moore)
  - Chemistry Centre, WA (Ted Spadek)
- **The CPSM team!**

New *Phytophthora* spp. in WA: Update 2007

Mike Stukely

Manager, Vegetation Health Service

Department of Environment and Conservation

New *Phytophthora* species from WA – as reported in 2006

- "P. sp. 1"
  morphology ~ *P. cactorum*
- "P. sp. 2" APDN (2007)
  morphology ~ *P. citricola*
- *P. inundata* APP (in press)
  morphology ~ *P. cryptogea*

DNA sequencing

Prof Giles Hardy – CPSM
Dr Treena Burgess, Diane White

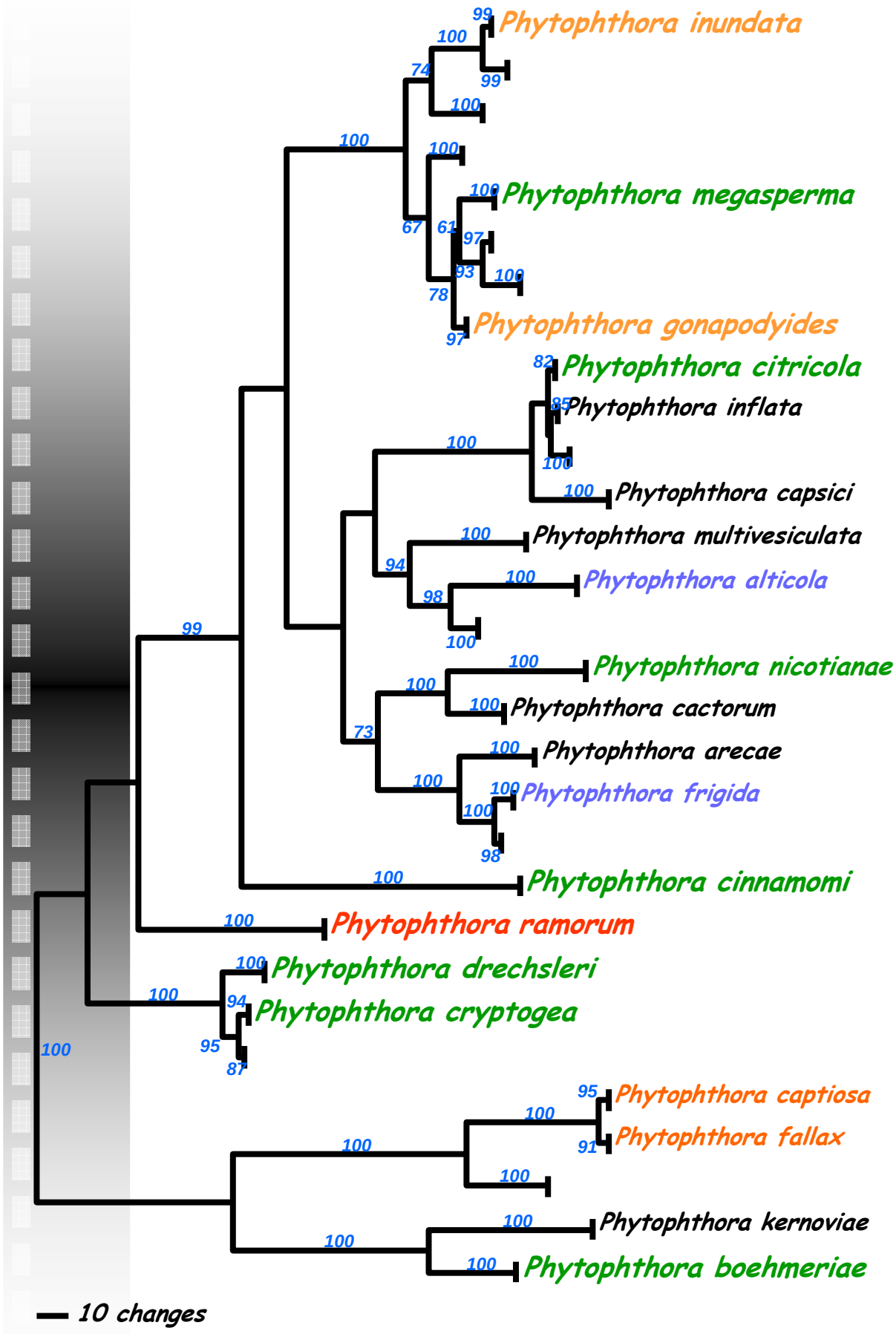
- DNA extracted – pure cultures
- Internal Transcribed Spacer (ITS) regions of the rDNA
- Amplified using Primers ITS6 and ITS4
- Sequences are compared with all GenBank accessions – on a world database

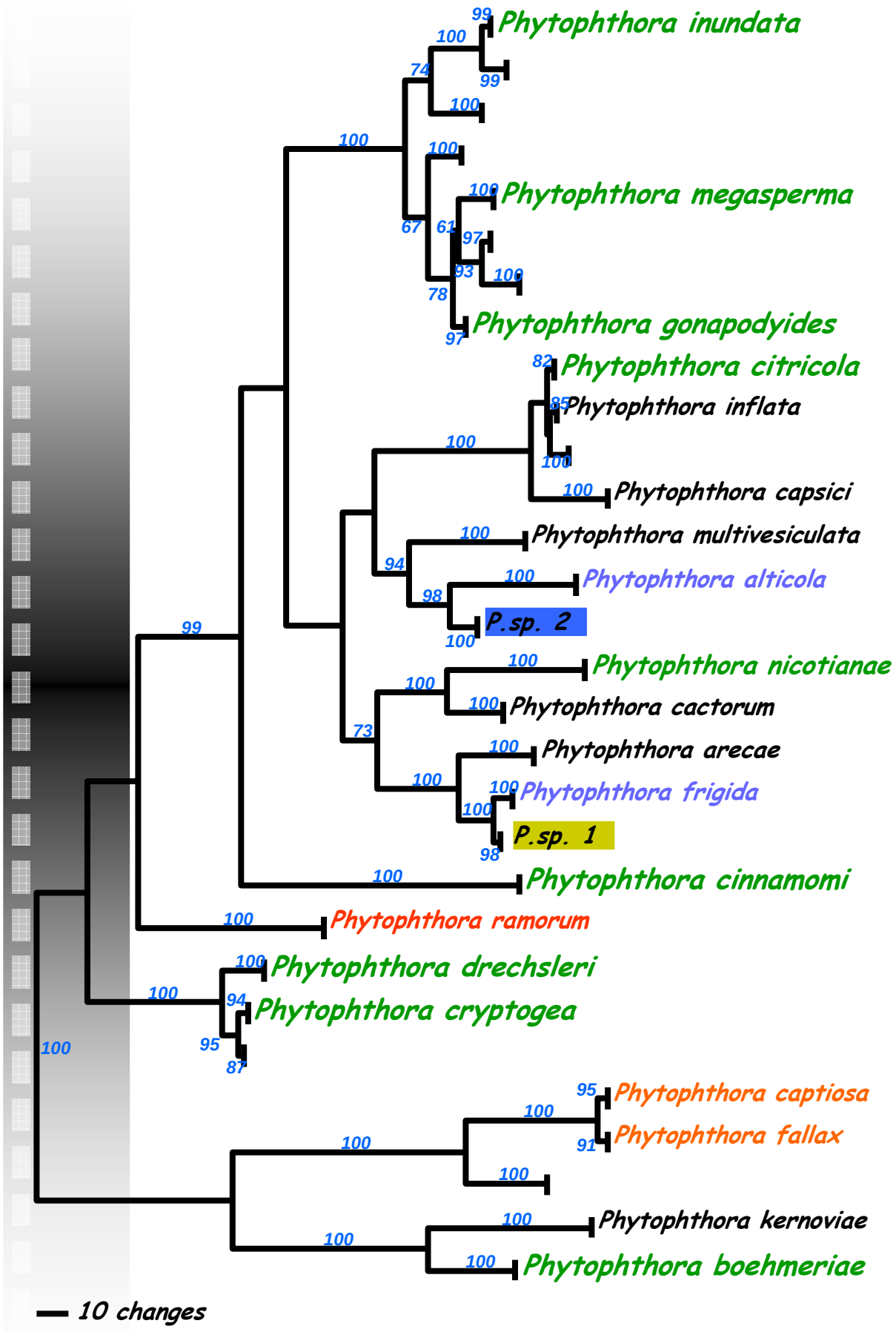
Phytophthora species other than *P. cinnamomi* in WA native ecosystems

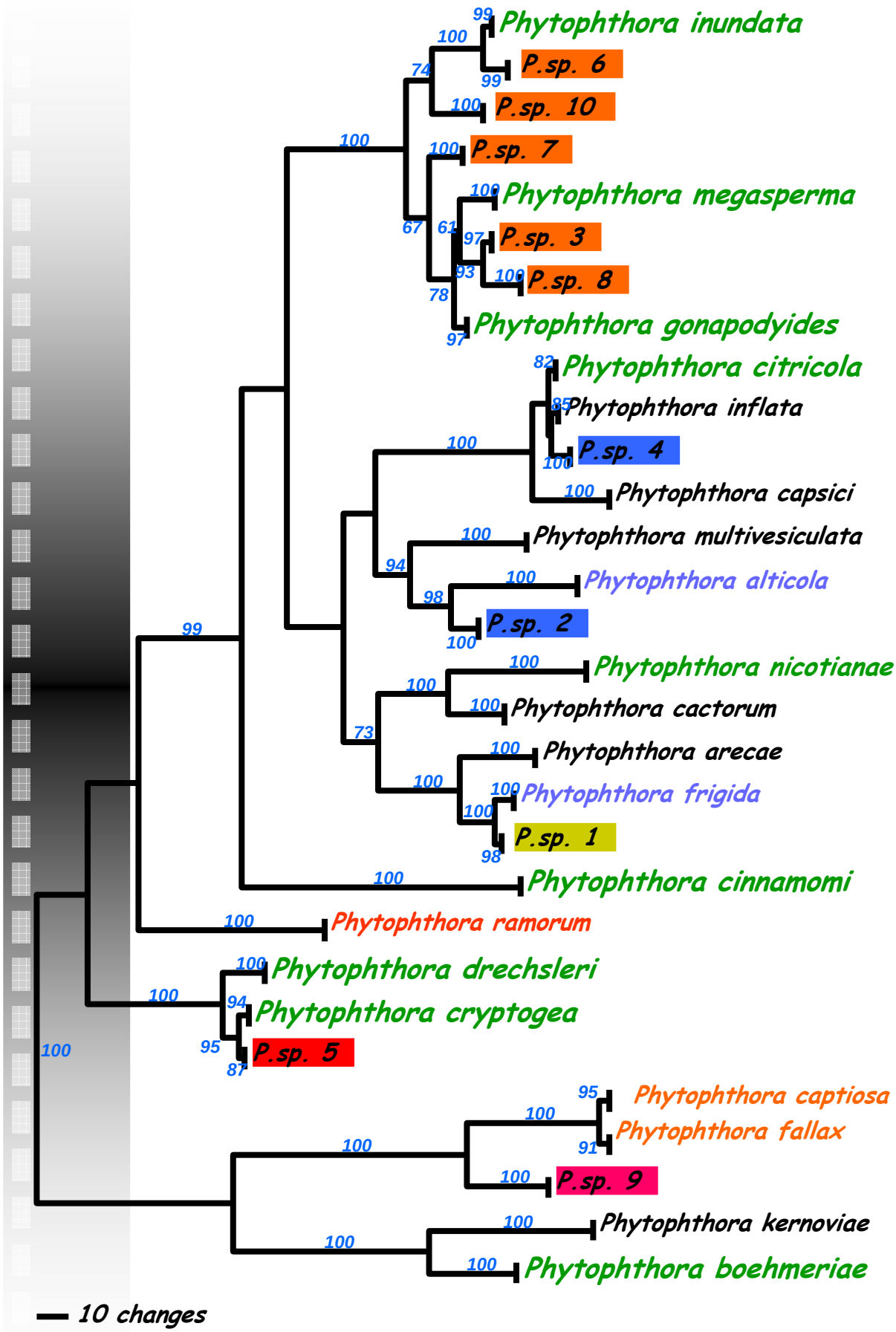
Traditionally, we identified species on morphology

- *P. citricola*
- *P. megasperma* [complex]
- *P. cryptogea*
- *P. drechsleri*
- *P. nicotianae*
- *P. boehmeriae*

…and others are found in nurseries, horticulture, etc


Phytophthora inundata
Phytophthora megasperma
Phytophthora gonapodyides
Phytophthora citricola
Phytophthora inflata
Phytophthora capsici
Phytophthora multivesiculata
Phytophthora alticola
Phytophthora nicotianae
Phytophthora cactorum
Phytophthora arecae
Phytophthora frigida
Phytophthora cinnamomi
Phytophthora ramorum
Phytophthora drechsleri
Phytophthora cryptogea
Phytophthora captiosa
Phytophthora fallax
Phytophthora kernoviae
Phytophthora boehmeriae
10 changes


Phytophthora inundata
Phytophthora megasperma
Phytophthora gonapodyides
Phytophthora citricola
Phytophthora inflata
Phytophthora capsici
Phytophthora multivesiculata
Phytophthora alticola
P.sp. 2
Phytophthora nicotianae
Phytophthora cactorum
Phytophthora arecae
Phytophthora frigida
P.sp. 1
Phytophthora cinnamomi
Phytophthora ramorum
Phytophthora drechsleri
Phytophthora cryptogea
Phytophthora captiosa
Phytophthora fallax
Phytophthora kernoviae
Phytophthora boehmeriae
10 changes


Phytophthora inundata
P.sp. 6
P.sp. 10
P.sp. 7
Phytophthora megasperma
P.sp. 3
P.sp. 8
Phytophthora gonapodyides
Phytophthora citricola
Phytophthora inflata
P.sp. 4
Phytophthora capsici
Phytophthora multivesiculata
Phytophthora alticola
P.sp. 2
Phytophthora nicotianae
Phytophthora cactorum
Phytophthora arecae
Phytophthora frigida
P.sp. 1
Phytophthora cinnamomi
Phytophthora ramorum
Phytophthora drechsleri
Phytophthora cryptogea
P.sp. 5
Phytophthora captiosa
Phytophthora fallax
P.sp. 9
Phytophthora kernoviae
Phytophthora boehmeriae
10 changes

Phytophthora species identification

Isolate	Morphology	DNA
(many)	P. citricola	P.sp. 2
(many)	P. citricola	P.sp. 4
(many)	P. cryptogea	P.sp. 5
(several)	P. drechsleri	P.sp. 3/8
VHS 9854	P. megasperma	P.sp. 7
VHS 16127	P. megasperma	P.sp. 9
TCH 009	P. megasperma var. sojae	P.sp. 10
DDS 3884	P. boehmeriae	P.sp. 1*

Phytophthora species identification

Isolate	Morphology	DNA
DDS 1450	P. citricola IMI 329674 (UK)	P.sp. 4
DCE 444	P. drechsleri A1 IMI 329666 (UK)	P.sp. 3
TCH 009	P. megasperma var. sojae IMI 329669 (UK)	P.sp. 10
DDS 3884	P. boehmeriae CBS (Netherlands)	P.sp. 1

New Phytophthoras – the present position

- We have as many as 10 new and undescribed *Phytophthora* species in WA ecosystems (about 8 are certain)
- Also new records of 2 named species – *P. inundata*, *P. gonapodyides*

We know that:

- These P.spp. are genetically distinct from all the known, named species
- Many isolates of the new species are associated with dying native plants
- Some are widely distributed – found in multiple land Regions in SW-WA

Significance of the New Phytophthoras for Land Managers

Key question:

- Do they pose a threat to biodiversity?

If the threat level is significant – cost-effective management strategies will need to be developed

What next?

To determine levels of threat and devise management strategies – Questions to be answered.

We now need to investigate:

- Host ranges, pathogenicity
- Distribution – start with culture collection
- Factors affecting spread and impact
- Characteristics – eg effectiveness of Phosphite – what are weaknesses?
- …Are these "new" Phytophthoras introduced or indigenous?

Management Strategy – must be based on sound Science

- The approaches we use for *P. cinnamomi* may or may not be appropriate, eg phosphite, dry soil operations/access
- We need detailed knowledge of these new pathogens, in the Disease Triangle context
- Climate change – what effect on levels of activity/impact/spread?

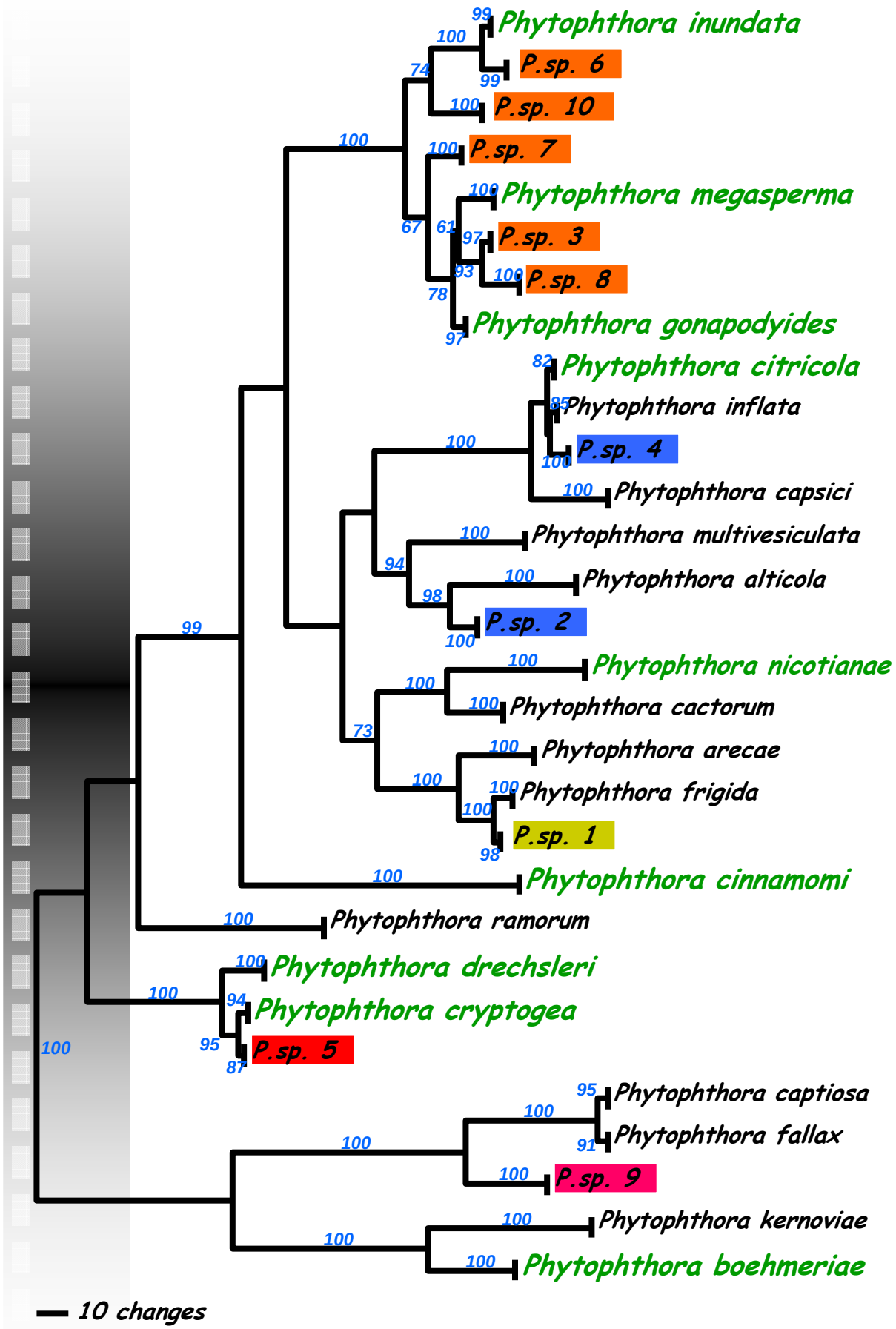
New projects 2007
CPSM

1. Ph D – Alex Rea

Classical and molecular taxonomy and pathogenicity testing of *Phytophthora* species

2. Hons

"*P. megasperma*-like" pathogen (P.sp. 3/8)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P.sp. 6
P.sp. 10
P.sp. 7
Phytophthora megasperma
P.sp. 3
P.sp. 8
Phytophthora gonapodyides
Phytophthora citricola
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Phytophthora capsici
Phytophthora multivesiculata
Phytophthora alticola
P.sp. 2
Phytophthora nicotianae
Phytophthora cactorum
Phytophthora arecae
Phytophthora frigida
P.sp. 1
Phytophthora cinnamomi
Phytophthora ramorum
Phytophthora drechsleri
Phytophthora cryptogea
P.sp. 5
Phytophthora captiosa
Phytophthora fallax
P.sp. 9
Phytophthora kernoviae
Phytophthora boehmeriae
10 changes

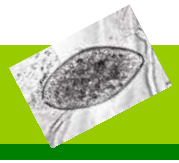
CPSM
MURDOCH UNIVERSITY
CRC NATIONAL PLANT BIOSECURITY

Terror Alert:

Australasia at high risk of *Phytophthora ramorum* epidemic

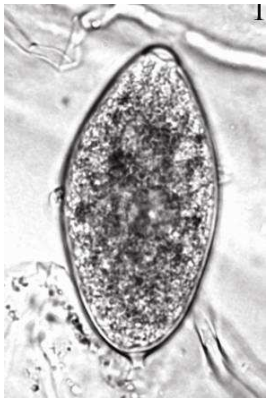
Kylie Ireland

Giles Hardy, Daniel Hüberli, Bernard Dell



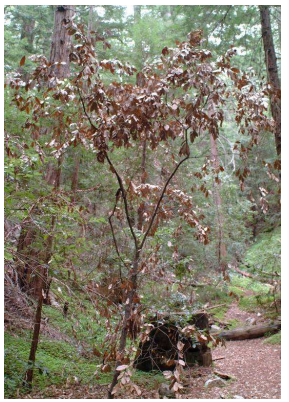
Phytophthora ramorum

What is *Phytophthora ramorum*?



- Category 1 emergency pest pathogen
- Aerially dispersed
  - Caducous sporangia – rain splash
  - Thick walled chlamydospores – survival structure
  - Heterothallic – needs both mating types (A1 & A2)

- Sudden Oak Death - California
  - Severe mortality of forest native tree species
  - Some sites: tanoaks (100%) & coast live oak (45%) deaths
  - Changing forest structure



- Spread through international nursery trade

Major Nursery in California: Infected Camellia's shipped all over USA


All Camellia's
DESTROYED

Phytophthora ramorum

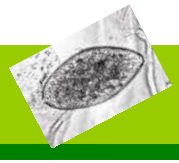
SYMPTOMS

Stem cankers (Sudden Oak Death)

- Girdling of phloem
- Bleeding (oozing sap)
- Fatal on adult plants

Foliar blight & twig dieback

- Spots & blotches on leaves
- Twig & branch dieback
- Occasional death

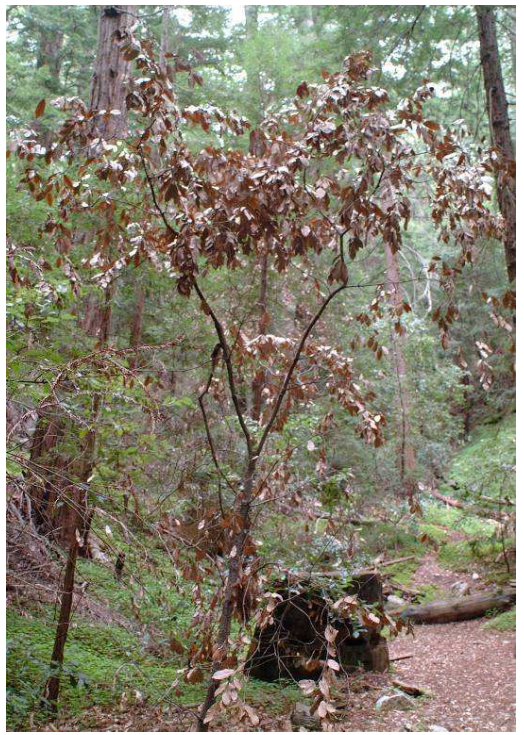


Phytophthora ramorum

EPIDEMIOLOGY

Sporulating (foliar) hosts

- Drive epidemics by producing inoculum
- *Rhododendron*, *Viburnum*, *Camellia*
- California bay laurel (*Umbullaria californica*)

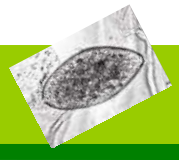


Dead end (canker) hosts

- Tree mortality
- Tanoak (*Lithocarpus densiflora*), Coast Live Oak (*Quercus agrifolia*), Black Oak (*Quercus kelloggii*)

Large host range

- Trees, shrubs & herbs
- >100 species, 54 genera, 26 families
- Fagaceae (Oaks), Lauracea, Ericaceae, Caprifoliaceae



Phytophthora ramorum

HOSTS

Natural

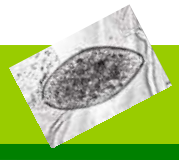
LETHAL	NON-LETHAL
Oaks:	Bay laurel
Coast live oak	Bigleaf maple
CA black oak	Douglas-fir
Shreve oak	Honeysuckle
Canyon live oak	Huckleberry
Tanoak	Maidenhair ferns
Nothofagus obliqua	Wood Rose

Nursery

Rhododendron
Camellia
Viburnum
Pieris

Australian Hosts

- **Scribbly Gum** ***Eucalyptus haemastoma*** **- yellowing leaves**
- **Victorian Box** ***Pittosporum undulatum*** **- dying leaves**
- **Cider Gum Tree** ***Eucalyptus gunnii*** **- leaf necrosis** **(artificial inoculation)**



Phytophthora ramorum

DISTRIBUTION

North America

Nurseries
- 16 US States
- British Columbia

Wildlands
- California & Oregon
- Mediterranean climate
- Distribution is patchy

Europe

Nurseries

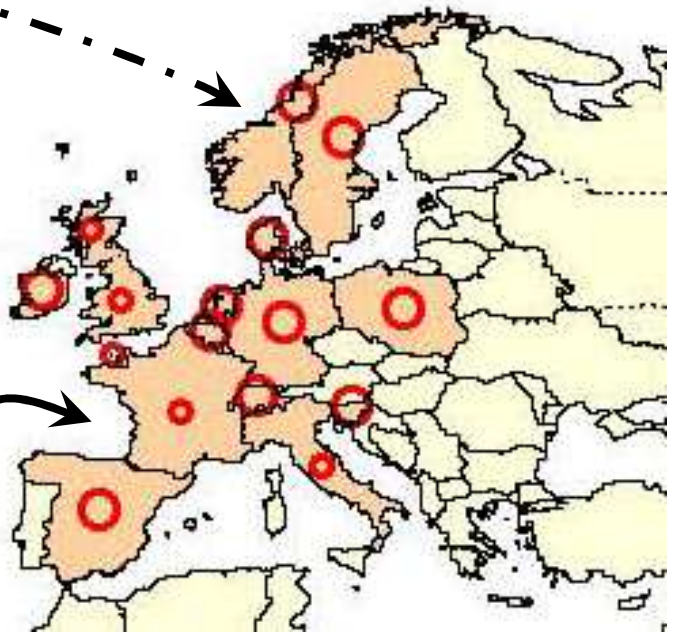
Managed gardens/ woodlands

- Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, UK

Origin

Unknown

China?



THE WEST AUSTRALIAN

Oak tree killer may reach WA: experts

ALISON BATCHELER

Plant scientists are bracing to repel a foreign type of dieback which has killed century-old oak trees in the US in weeks and threatens to breach Australia's border.

Phytophthora ramorum can spread rapidly through air and water, unlike WA's soil-spread variety, and has cut a path of destruction through the nursery industries in Europe and California and caused widespread deaths of oak trees along the Californian coast in the past decade.

Scientists will tell a Perth conference this week that if introduced into Australia by travellers carrying cuttings from infected areas or by infected soil on shoes, the fungal-like disease may flourish in predicted warmer, wetter conditions in the South-West, devastating many native and nursery plants and commercial crops.

The local dieback variety, Phytophthora cinnamomi, which affects up to 45 per cent of WA's native plant species, is endemic along wetter coastal areas between Perth and Albany and has wiped out big tracts of banksia woodland and jarrah forests.

Murdoch University centre for phytophthora science and management director Giles Hardy said massive oak trees from Oregon to California were succumbing to sudden oak death — called SOD — as the disease infiltrated root systems and stripped foliage.

"Once infected, it can knock off a 500-year-old oak tree in weeks," Associate Professor Hardy said.

Although it killed in the same way, by "girdling" or "ringbarking" trees, he said the rampant spread of the overseas variety would make it harder to contain.

The centre's research fellow, Dr Daniel Huberli, has studied ramorum dieback in the US and said that it also had the potential to hit the home garden by killing rhododendrons, azaleas, camellias and roses.

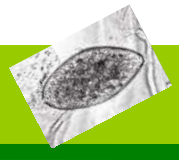
Research was continuing to assess whether WA's karri, jarrah and marri forests were susceptible but Victorian box trees and scribbly gum eucalypts were likely to succumb to the dieback, Dr Huberli said.

"It could have a greater impact than jarrah dieback — in areas down south that are very moist, it could really take off," he said.

In addition to strict quarantine measures, travellers should clean footwear when returning from infected overseas areas.

Associate Professor Hardy said changing climate conditions could also favour a greater spread of cinnamomi dieback in the Stirling Range and along the coast from Walpole to Albany.

Native mammals faced greater destruction of their habitats and possible extinction.



Phytophthora ramorum

Epidemic if….

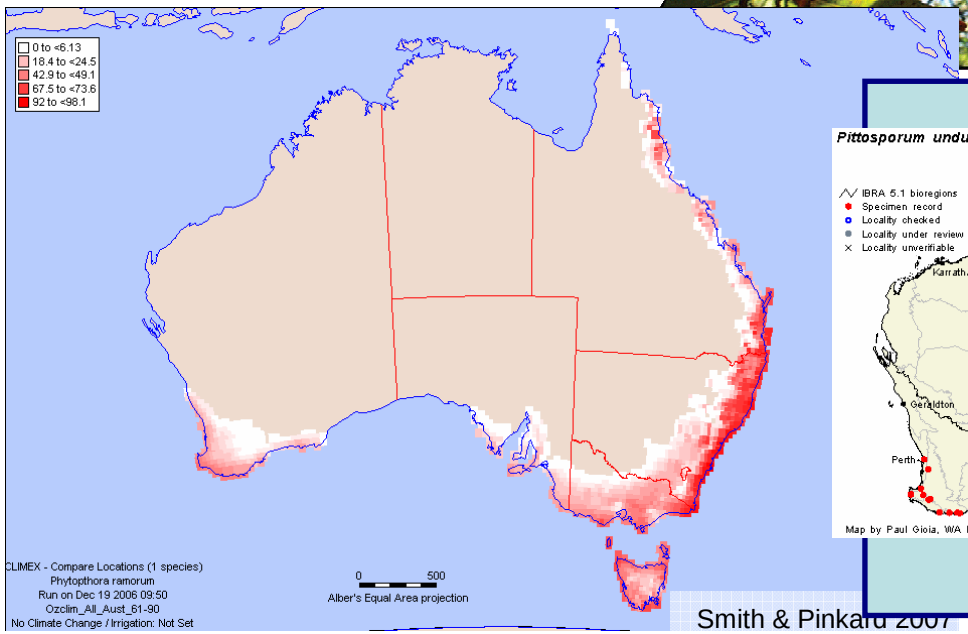
P. ramorum

International Plant Trade

- Exotic nursery plantings in urban/forest interfaces (i.e. Dandenong Ranges, Vic)
- e.g. Infested plant shipments within USA

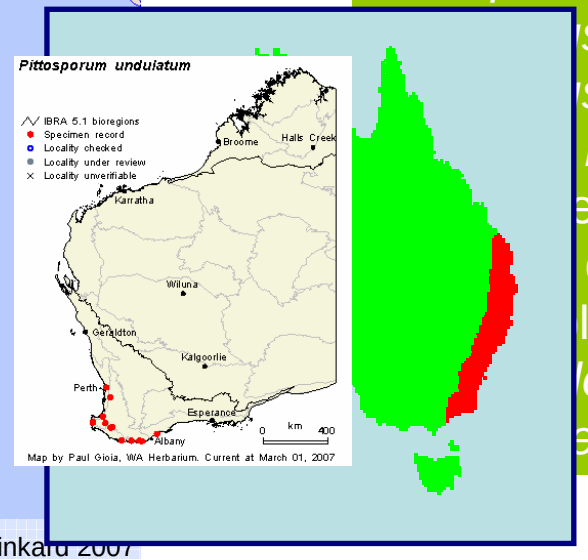
Dirty hiking boots

Favorable environment

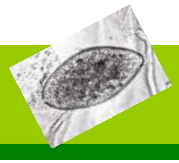


Susceptible hosts

Pittosporum undulatum



Smith & Pinkard 2007



Phytophthora ramorum

Being prepared - PhD Project

Susceptibility & sporulation potential of Australian plants

- foliar & stem inoculations
- keystone/widely distributed species within climatic zone
- UC Davis, California, starts in August

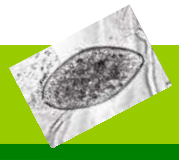
Identify asymptomatic hosts

Model risk & spread

- CLIMEX
- Rule-based modelling: hosts & climate & spread

Compare politics & policy for management

- Europe vs. USA vs. Australia



Phytophthora ramorum

COLLABORATION

Here in WA

PhD Student

- Kylie Ireland

Supervisors

- Giles Hardy
- Daniel Hüberli
- Bernard Dell

DAFWA

- Alison Mackie

Funding

- Department of Environment & Water
- CRC National Plant Biosecurity
- Murdoch University

Interstate

Vic DSE/Melb. Uni

- Ian Smith

ENSIS/CSIRO

- Darren Kriticos

USA

UC Davis

- Dave Rizzo
- Elizabeth Fichtner

USDA

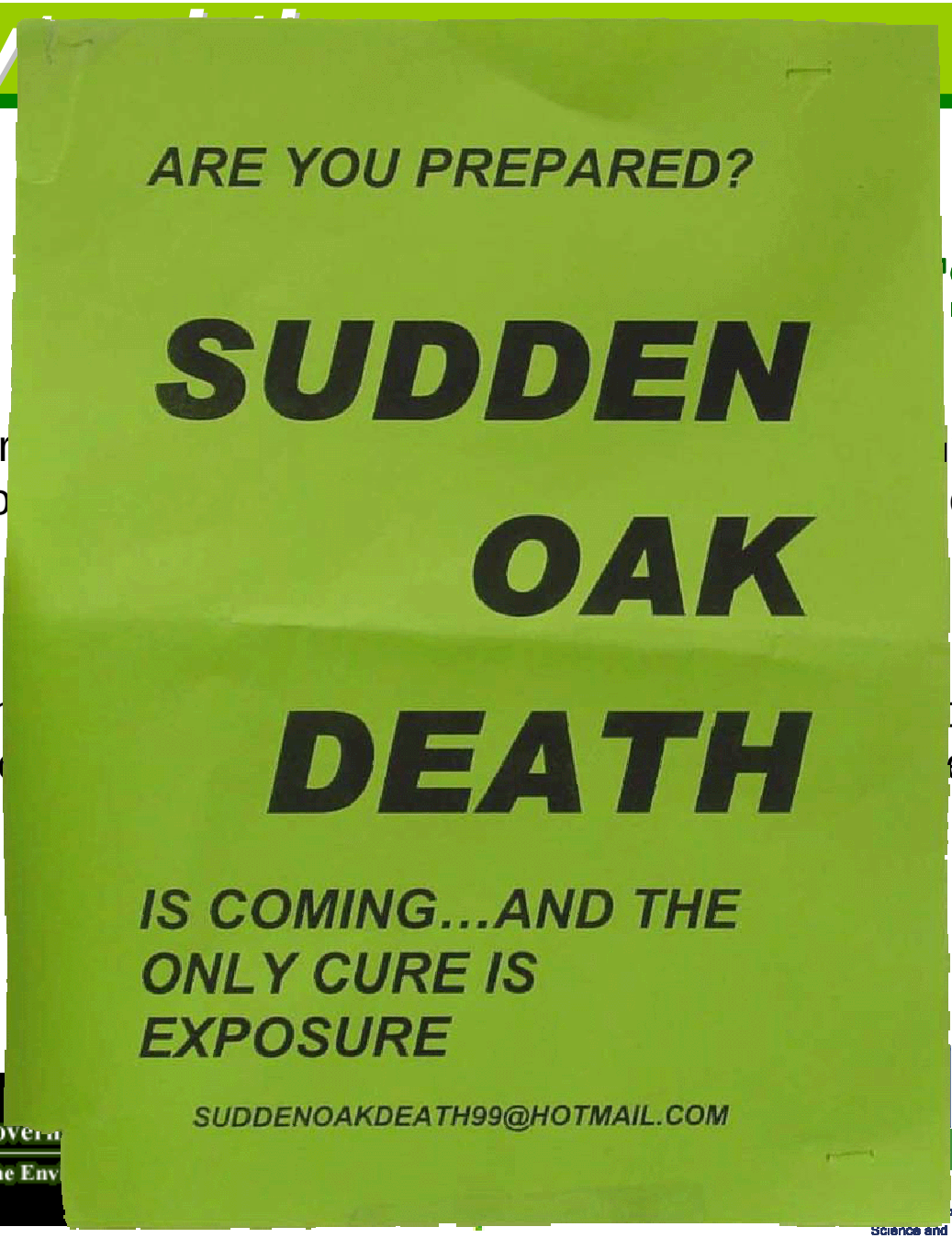
- Susan Frankel

UK

Forest Research

- Sandra Denman

Phy



This mater rants from the
Australian Go erative Research

The views ar ose of the author
and do not ne ent or the Minister

Australian Gover
Department of the Env

SM
Phytophthora
Science and Management

MURDOCH
UNIVERSITY
PERTH, WESTERN AUSTRALIA

Acidification and calcium depletion – potential effects on woodland health on the Swan Coastal Plain

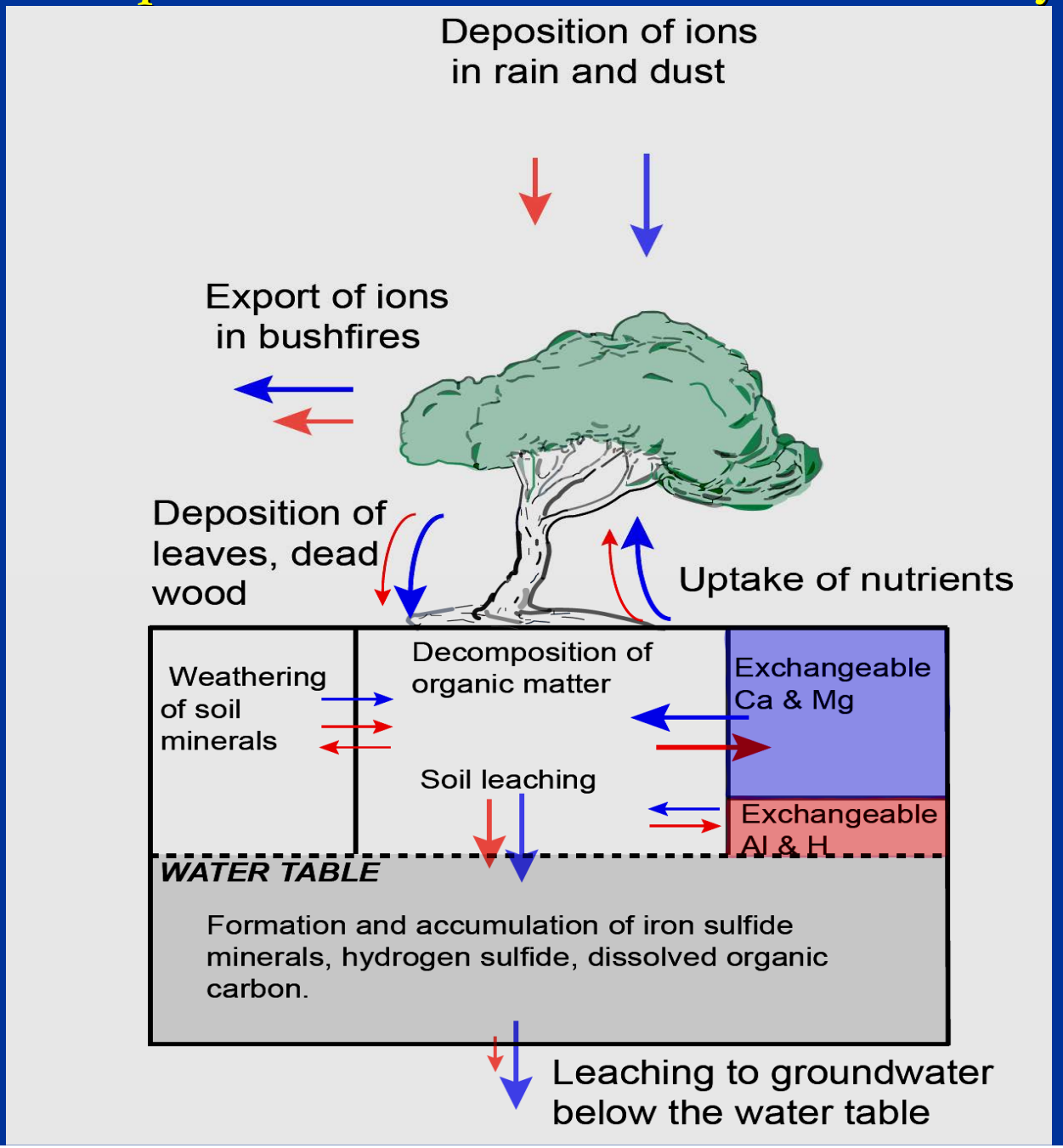
Overview

- Soil and groundwater acidification and links to falling water tables
- Environmental impacts of acidification
- Role of land and water uses in causing acidification
- Possible ways forward

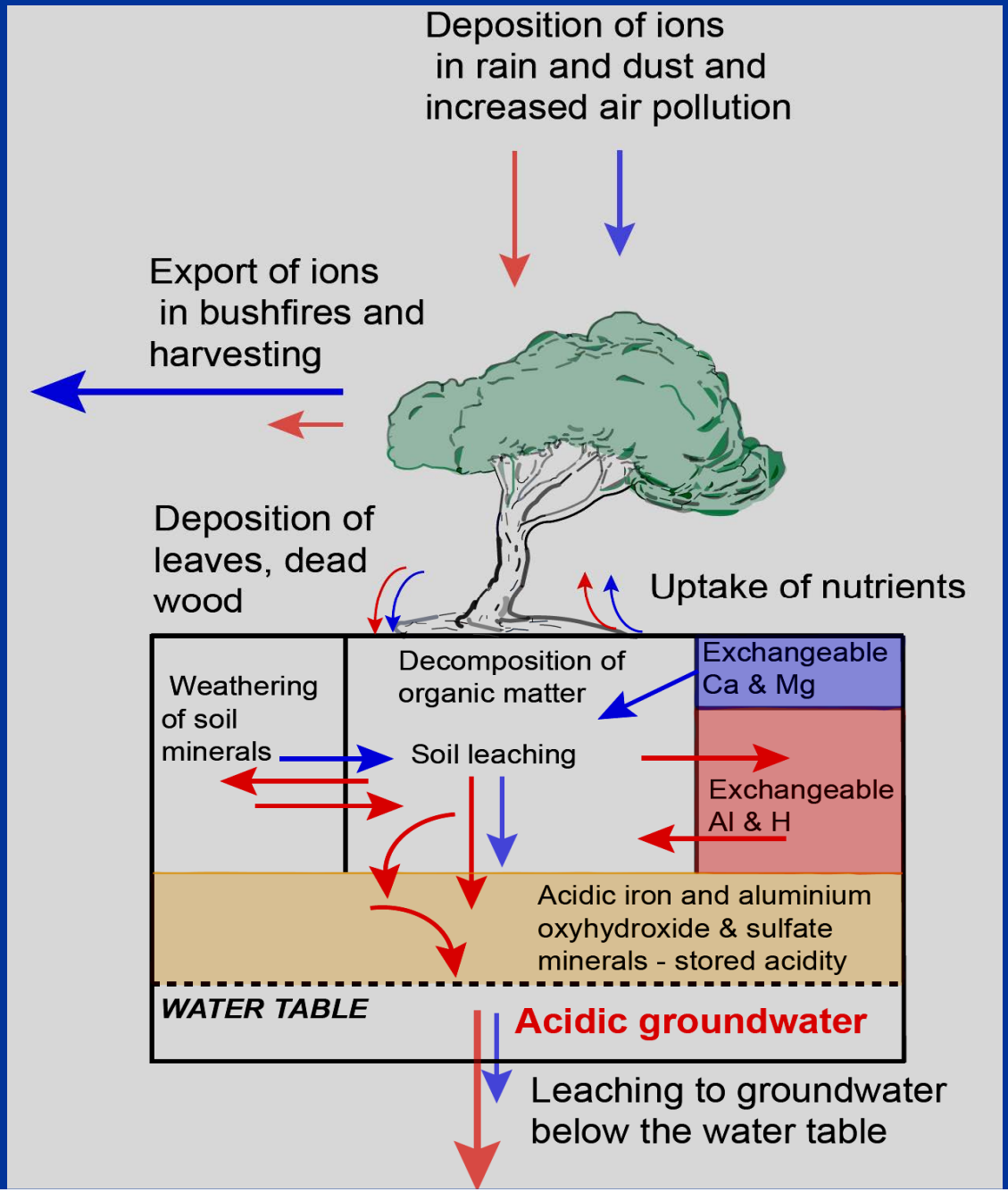
Woodland health depends on soil and groundwater quality

- Can not view woodlands in isolation from soil and groundwater quality on the Swan Coastal Plain
- Soil quality very dynamic, affected by land use, atmospheric inputs, position of the water table

Conceptual model of acidification – 1. Healthy system



Conceptual model of acidification – 2. Acidifying system

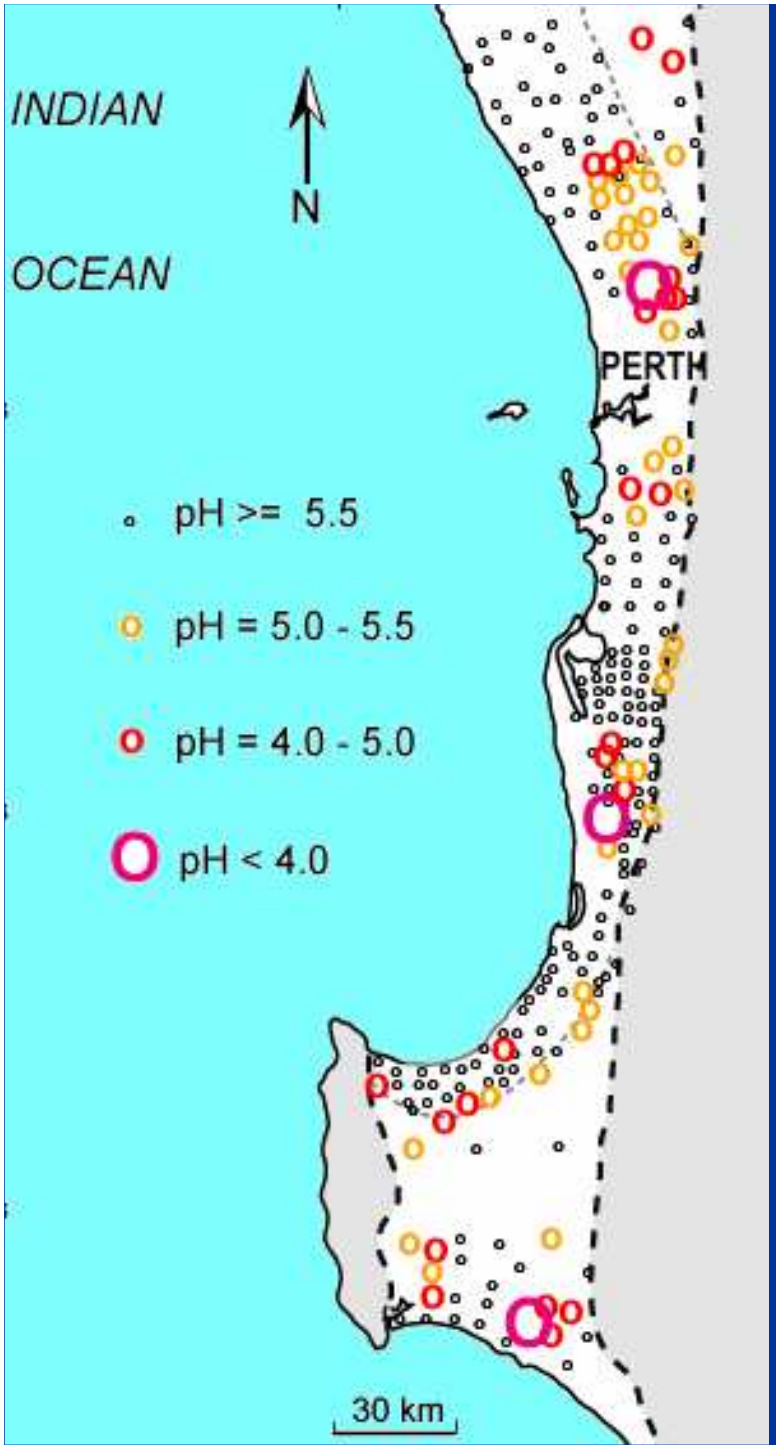


Release of acidity to groundwater

- Often triggered by falling water tables:

  - Increasing groundwater abstraction
  - Excessive drainage
  - Declining rainfall

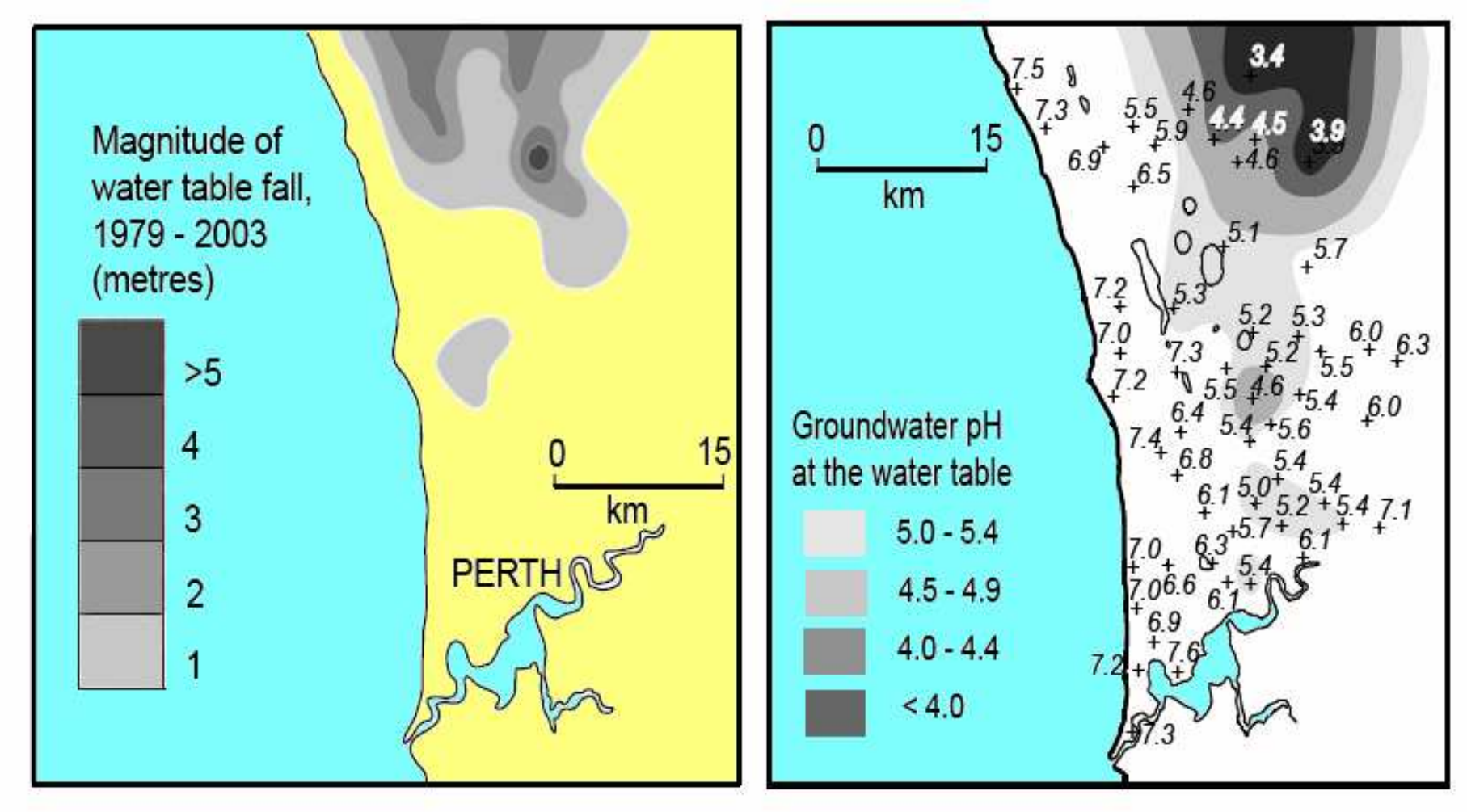
- Causes oxidation of chemical compounds containing carbon, sulfur, nitrogen and iron which releases acidity
- Disruption of the natural balance between acid-forming and acid-consuming processes
- Subsidence of peat



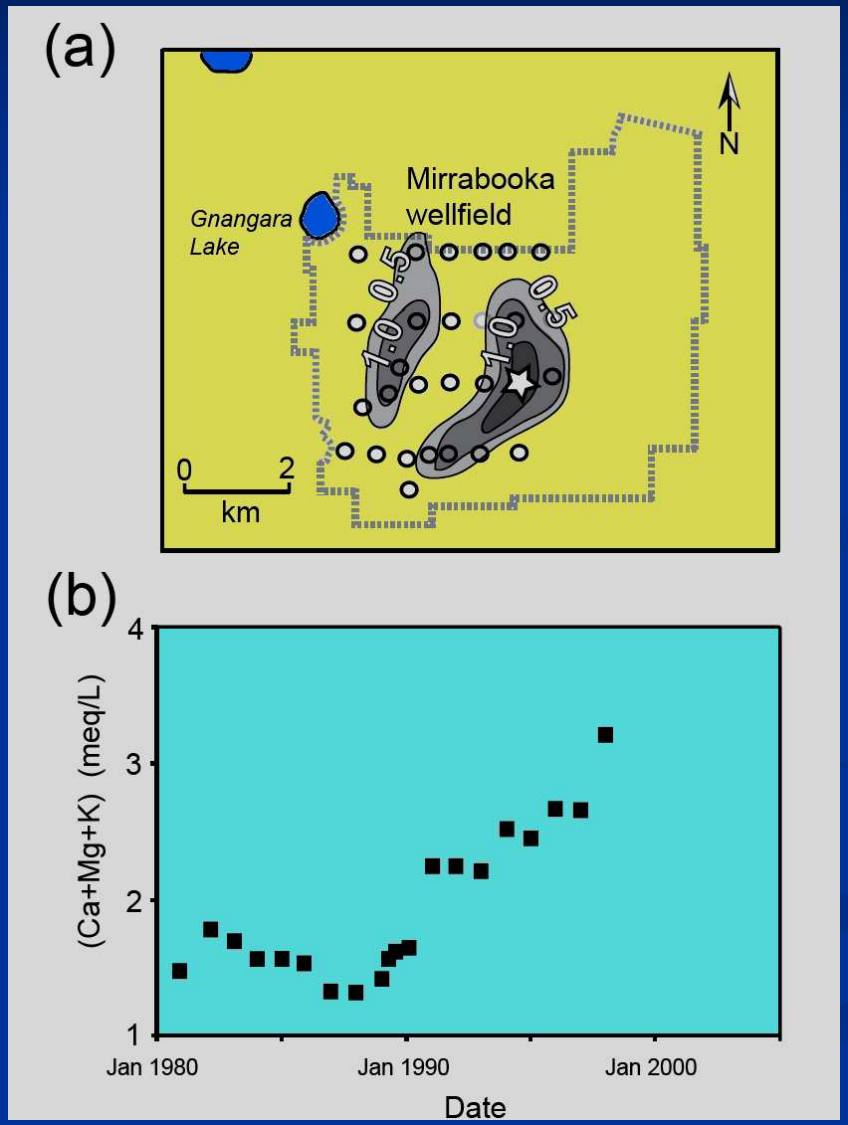
Evidence of an emerging regional acidity problem – regional snapshot of pH at the *water table*, Swan and Scott Coastal Plains:

Associated with areas of intensive groundwater use and dewatering of mineral sand deposits

Relationship between water table decline and pH of shallow groundwater, Gnangara Mound



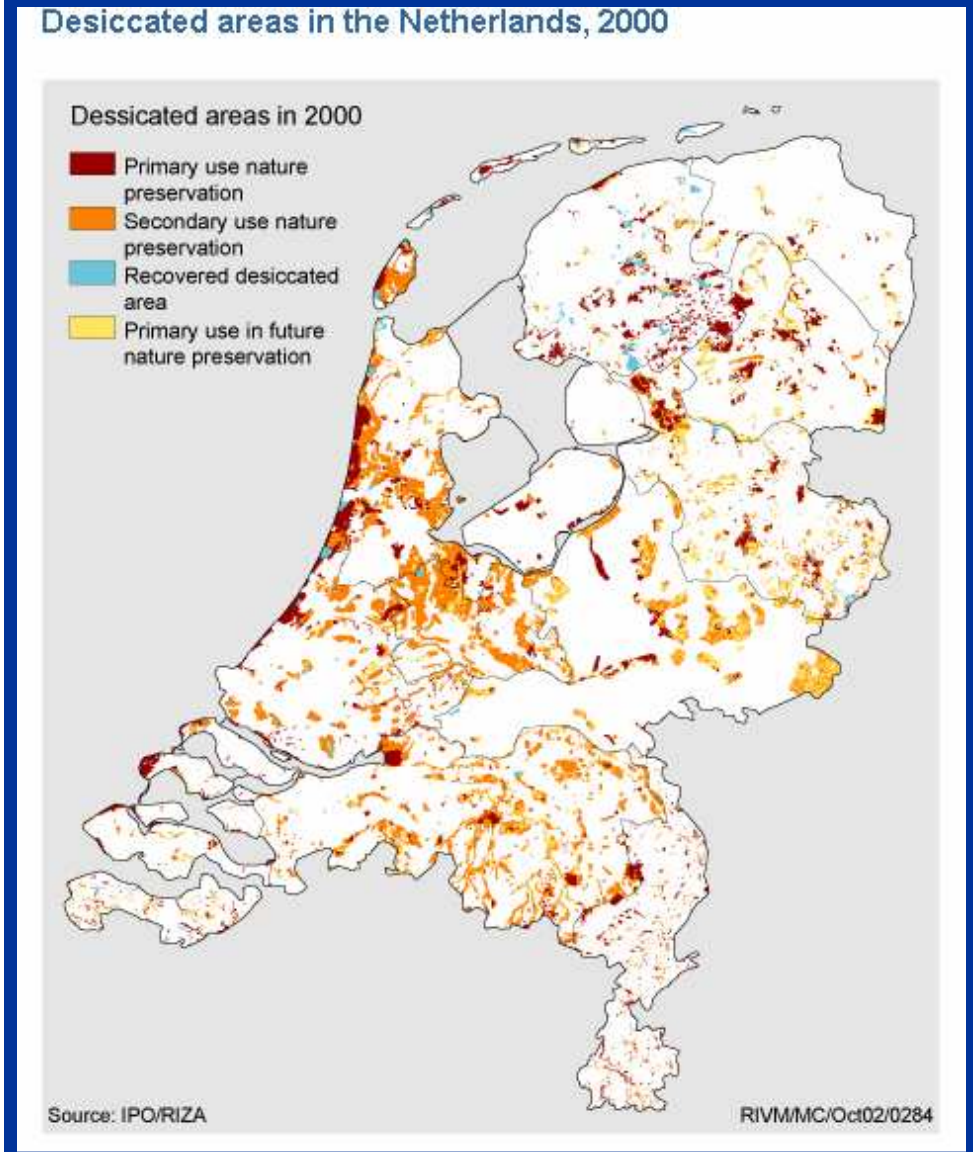
Falling water tables can cause calcium leaching from soil



Potential impacts of acidification on woodlands – tree dieback due to increasing aluminium, decreasing calcium & magnesium in soil

Loss of bird species due to calcium depletion by acid leaching – decline of the Wood Thrush in NE USA (Cornell Uni research)

The same issue has occurred in the Netherlands due to drought, excessive groundwater use – called "Desiccation" ("Verdroging")



Like us, the Dutch had a major decline in rainfall in 1976. Also major increase in gwater abstraction

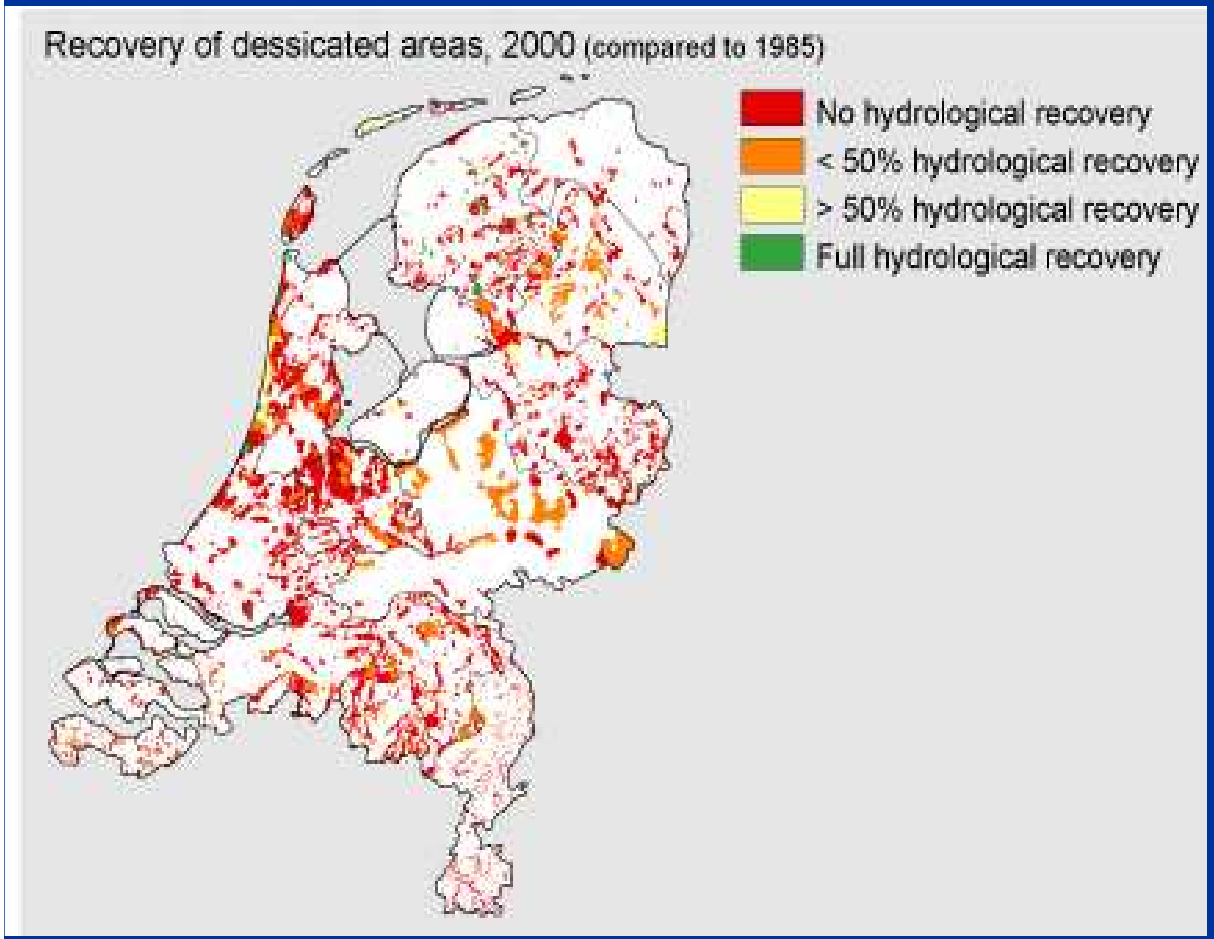
600 000 ha affected in 2000

40% of terrestrial plant species under threat

Loss of animal species

Harm caused by a national decline in water table by an average of 35 cm

Recovery from desiccation is difficult and expensive



Problem recognised in 1985

National changes to land and water management policies needed to tackle problem

Target was for 25% reduction of affected area in 2000

3% actually achieved

Next target is 40% reduction by 2010

But there are huge information gaps, including:

- Lack of detailed information on soil chemistry, especially storage of base cations
- Limited information on contaminants other than nutrients and their distribution
- Limited information on current health of ecosystems other than trophic status

Possible ways forward

- Replace “dewater, dig and dump” style of development with less intrusive methods
- Reduce the intensity of drainage
- Reprioritize groundwater use in critical areas
- Change pumping regimes to reduce cones of depression (lower pumping rates for longer etc)

Possible ways forward

- Dialogue with community about water use priorities (lawns versus wetlands?, which wetlands to keep, what to let go?).
- Implement Integrated Water Resource Management – water part of all aspects of our society and greater community ownership of difficult decisions about how we live here in a drying climate.

To end with some positives…

- Regional acidification can be managed – international cooperation on acid rain management is a major success story, as is the way the Dutch have dealt with groundwater drawdown.
- ***We*** get to choose how things turn out through how we adapt our land and water use to a drying climate – **there is no-one else to blame, the buck stops with *US*.**
- Opportunity for real dialogue with public about how we use land and water
- The quicker we start to make changes, the better – there may never be enough information to convince some people that climate, and soil and water chemistry changes are real (balancing the Precautionary Principle against "certainty")

STANDARD DIEBACK SIGNAGE SYSTEM

Developed by:

Department of Environment and Conservation

Project DIEBACK

GREAT SOUTHERN TAFE

Dieback WORKING GROUP

Concept Endorsed by:

DIEBACK CONSULTATIVE COUNCIL WESTERN AUSTRALIA

Funded by:

Government of Western Australia

Australian Government

DIEBACK PROTECTION AREA

This protection area has values threatened by Phytophthora Dieback.
Please help prevent further spread of dieback by human activity.

Phytophthora Dieback is an introduced plant killing water-mould
that lives in soil and roots.

It is devastating the natural heritage of southwest Australia,
threatening not only plants but also many animal habitats.
Banksia communities are particularly susceptible.

Phytophthora Dieback can be transported in soil, mud and plant material.

You can help prevent the further spread of dieback:

- Stay on tracks and trails.
- Clean all soil from your footwear and vehicle.
- Avoid wet soil conditions.

THIS AREA IS
MANAGED BY

Albany

www.dieback.org.au

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These symbols marked in the field denote the dieback status of areas:

DIEBACK FREE

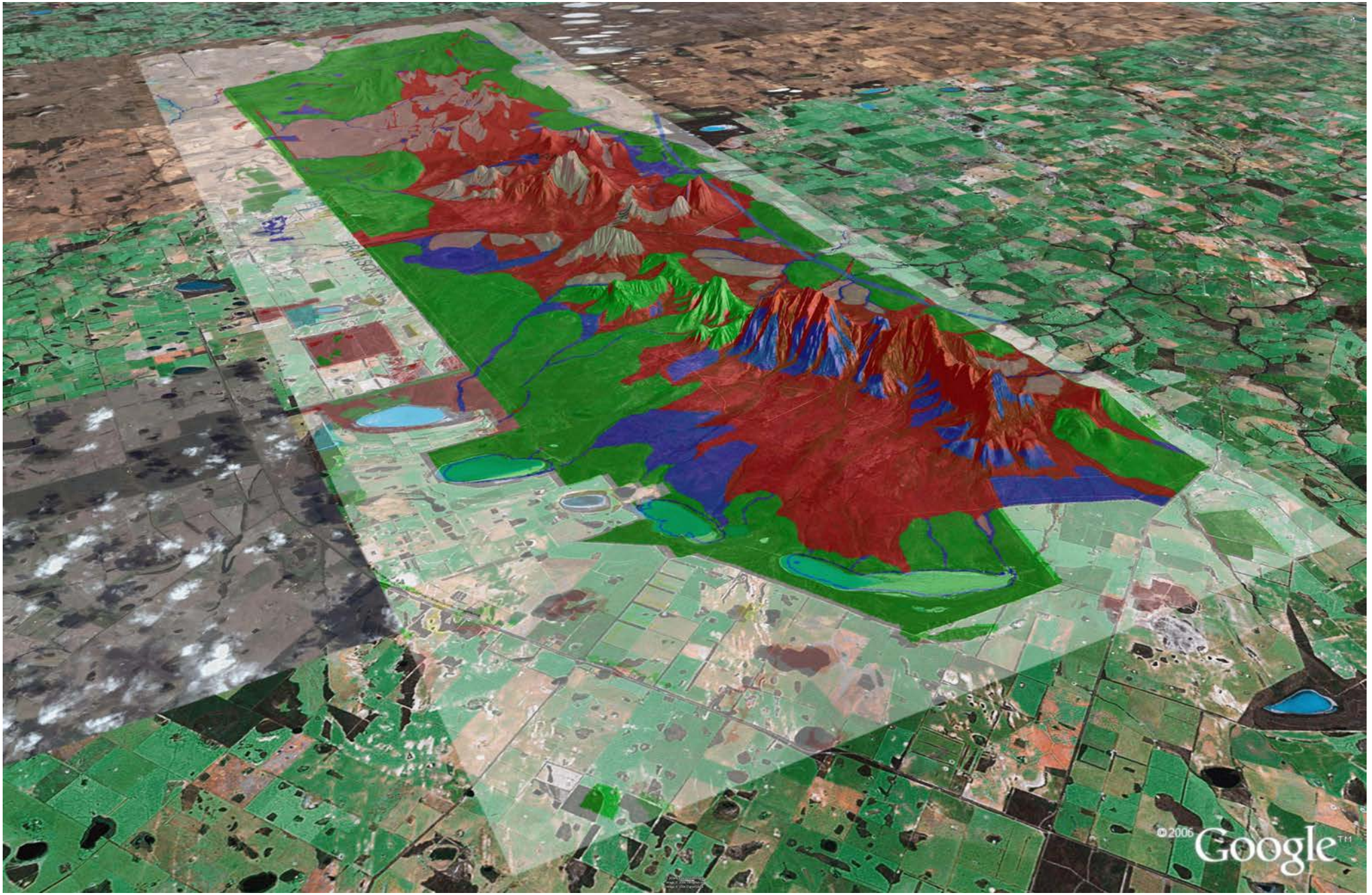
DIEBACK INFESTED

DIEBACK UNKNOWN

THIS AREA IS MANAGED BY

Albany

www.dieback.org.au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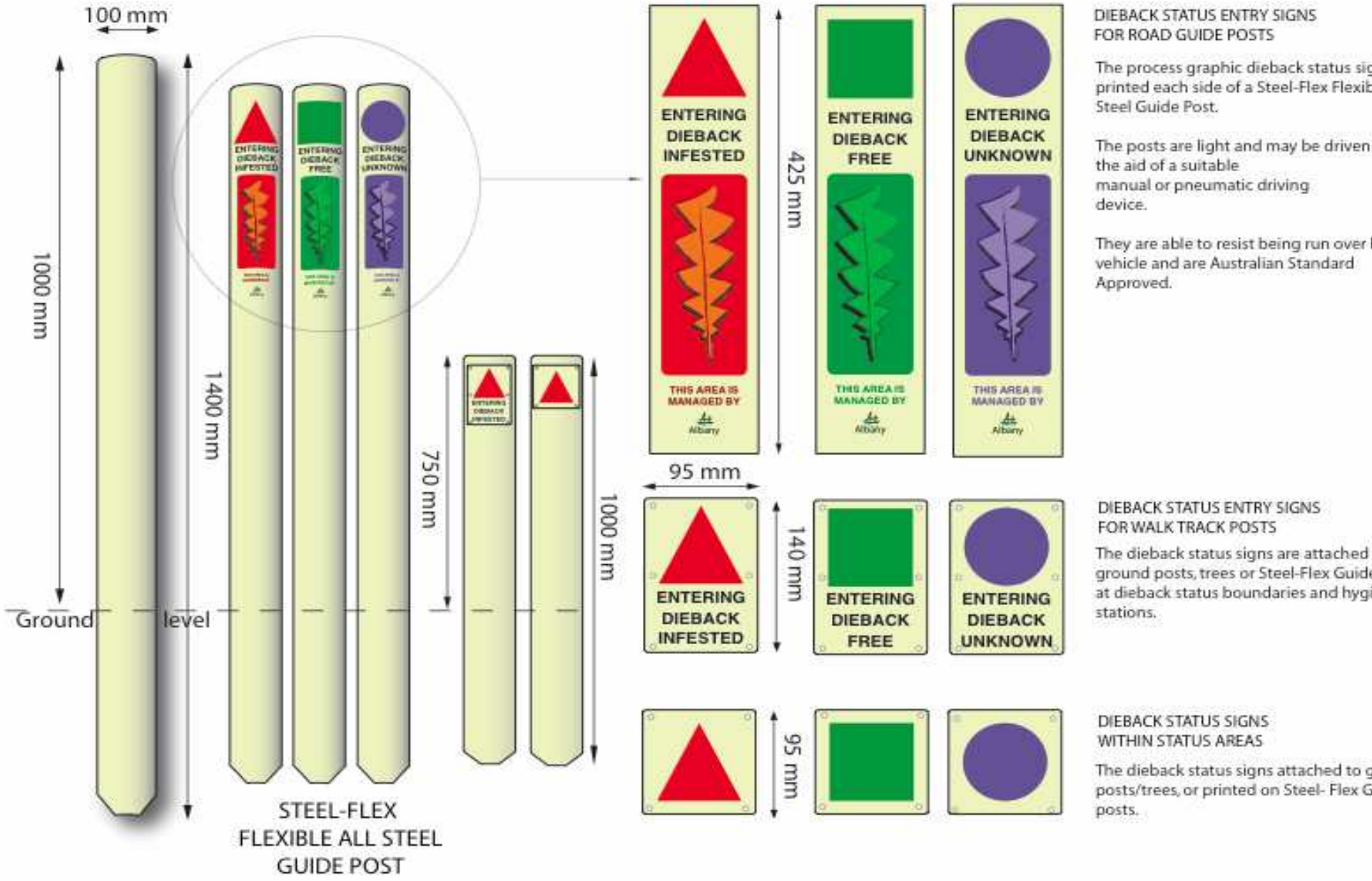
STANDARD DIEBACK SIGNAGE SYSTEM



DIEBACK STATUS ENTRY SIGNS
FOR ROAD GUIDE POSTS

The process graphic dieback status signs are printed each side of a Steel-Flex Flexible All Steel Guide Post.

The posts are light and may be driven with the aid of a suitable manual or pneumatic driving device.

They are able to resist being run over by a vehicle and are Australian Standard Approved.

DIEBACK STATUS ENTRY SIGNS
FOR WALK TRACK POSTS

The dieback status signs are attached to ground posts, trees or Steel-Flex Guide Post at dieback status boundaries and hygiene stations.

DIEBACK STATUS SIGNS
WITHIN STATUS AREAS

The dieback status signs attached to ground posts/trees, or printed on Steel- Flex Guide posts.


DIEBACK
INFESTED
BOUNDARY

DIEBACK PROTECTION AREA

Boot Cleaning Station

Phytophthora Dieback is an introduced plant killing water mould that lives in soil and plant roots.

Spreading dieback threatens not only plants but also many animal habitats.

Your footwear can pick up carry infested soil.

Please clean all soil from your footwear here.

THIS AREA IS MANAGED BY

Albany

www.dieback.org.au

DIEBACK PROTECTION AREA

Access By Permit Only

This protection area has special values threatened by Phytophthora Dieback.

A permit system is in place to help prevent further spread of dieback by human activity.

Phytophthora Dieback can be transported in soil, mud and plant material.

Spreading dieback threatens not only plants but also many animal habitats.

Contact management for more information and permits.

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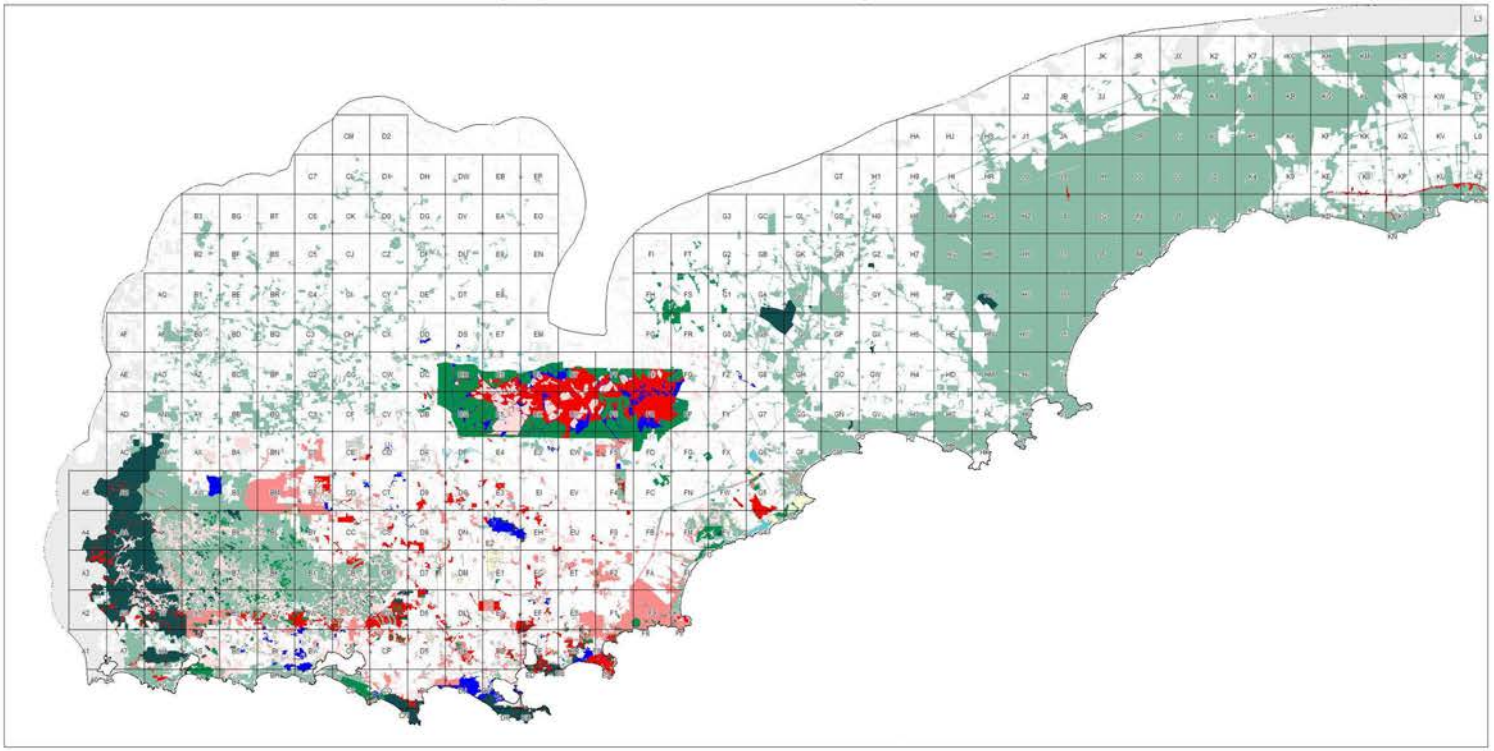
Regional Phytophthora Dieback Management Plan for the South Coast NRM Region 2008-2015

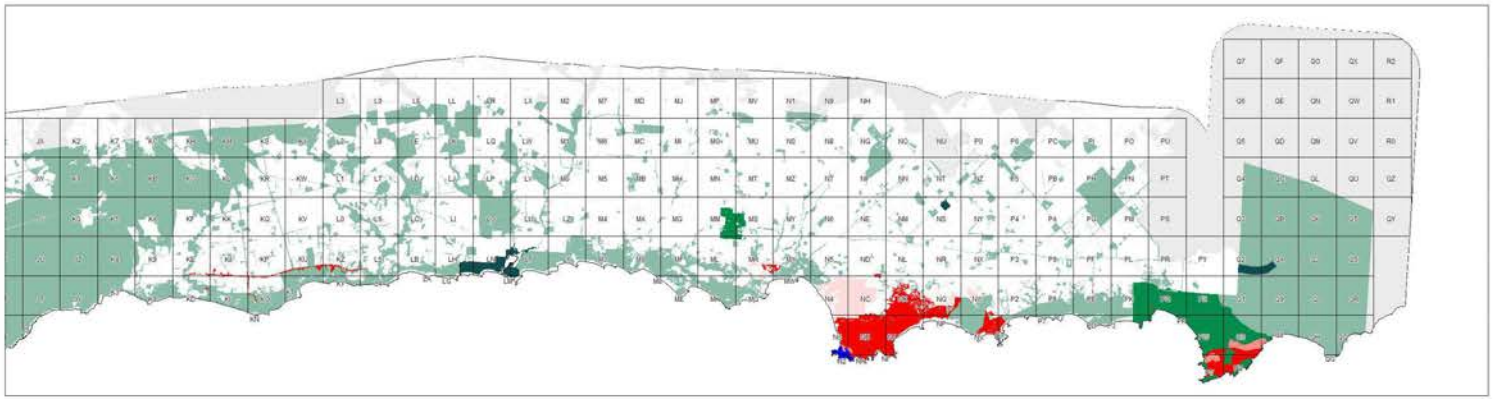
DIG ’07 - 13th July

Viv Read

SCRIPT Dieback Risk Analysis

Phytophthora cinnamomi interpretation





LEGEND

Grid tile (10km x 10km)

Point feature

Relevant to declared rare flora, priority flora, endemic non-listed flora, and threatened fauna. Overlaps may be hidden.

Dieback Interpretation

- INFESTED (high confidence)
- INFESTED (medium confidence)
- INFESTED (low confidence)
- UNINFESTED (low confidence)
- UNINFESTED (medium confidence)
- UNINFESTED (high confidence)
- unmappable
- uninterpretable
- not interpreted
- not interpreted
- permanent water (relevant to buffering)
- clearing

Predicted autonomous spread of Pc

- 0-35 yrs
- 36-70 yrs
- 71-105 yrs
- 106-140 yrs
- 141-175 yrs
- 176-210 yrs
- 211-245 yrs
- 246-280 yrs
- 281-315 yrs
- 316-350 yrs

- Sealed roads
- Unsealed roads
- Vehicular tracks

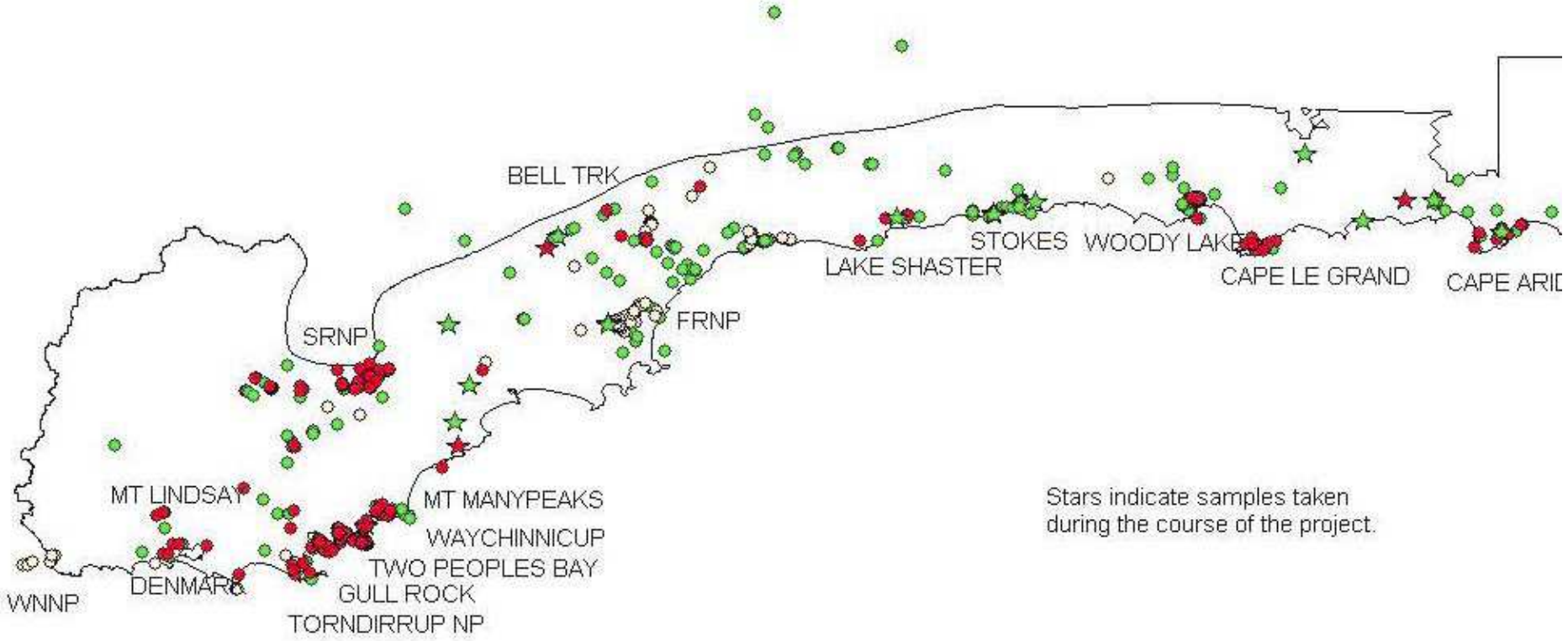
Projection: Universal Tranverse Mercator, MGA Zone 50. Datum: GDA 94

Produced by the Forest Management Branch
Under the Direction of Keiran McNamara Director General
Department of Environment and Conservation.

Project DIEBACK
Protecting biodiversity from Phytophthora Dieback
NATURAL RESOURCE MANAGEMENT WESTERN AUSTRALIA

Department of Environment and Conservation

SCRIPT
Australian Government


BELL TRK
STOKES
WOODY LAKE
LAKE SHASTER
CAPE LE GRAND
CAPE ARID
SRNP
FRNP
MT LINDSAY
MT MANYPEAKS
WAYCHINNICUP
TWO PEOPLES BAY
DENMARK
GULL ROCK
WNNP
TORNDIRRUP NP
Stars indicate samples taken
during the course of the project.

Purpose of the SCDMP?

- *to provide strategic context for investment in Dieback response within the region, and*

- *to engage stakeholders at all relevant levels for effective participation in response activities.*

SCOPE

Boundary – SCNRM, 400mm isohyet

Period – 7 years (2008 – 2015)

Range of assets - public and private native vegetation, horticulture (especially avocado enterprises, nurseries) and ecotourism facilities,

Scale – (cross -) regional with local operations,

Climate change – run-off, soil moisture and temperature

EXPECTED OUTCOMES

- Provide a **strategic approach** for management,
- **Attract and direct investment** through partnership arrangements for investment in research, management and communications,
- Identifying **priority areas** for management,
- Provide **‘best practice’ management** guidelines at a range of levels,
- **Integrate management** with state and national frameworks and with other regional NRM.

Strategic Context

Preliminary Vision

"…To protect valued asset areas (or 'high conservation value areas') of the South Coast region in the long term threatened by Phytophthora Dieback."

Program Logic Map for the South Coast Dieback Management Plan

25-year VISION (100 year horizon) (~ RCT)

7-year OBJECTIVES (➔Key Management Activity Areas➔ MAT's)

Expected Program Outputs/Outcomes

South Coast Regional Dieback Situation Statement

Key Management Activity Areas (key issues, strategies and actions)

1.	2.	3.	4.	5.	6.
Local Area Asset/Threat Assessment	**Management response strategies**	**Integrated local area planning**	**Operational capacity development**	**Communication and engagement**	**Monitoring and response**

Program Delivery Mechanisms

A. **Setting priorities for management** (areas, timing, activities)

B. **Stakeholder engagement for practice change** (range of voluntary through to regulatory)

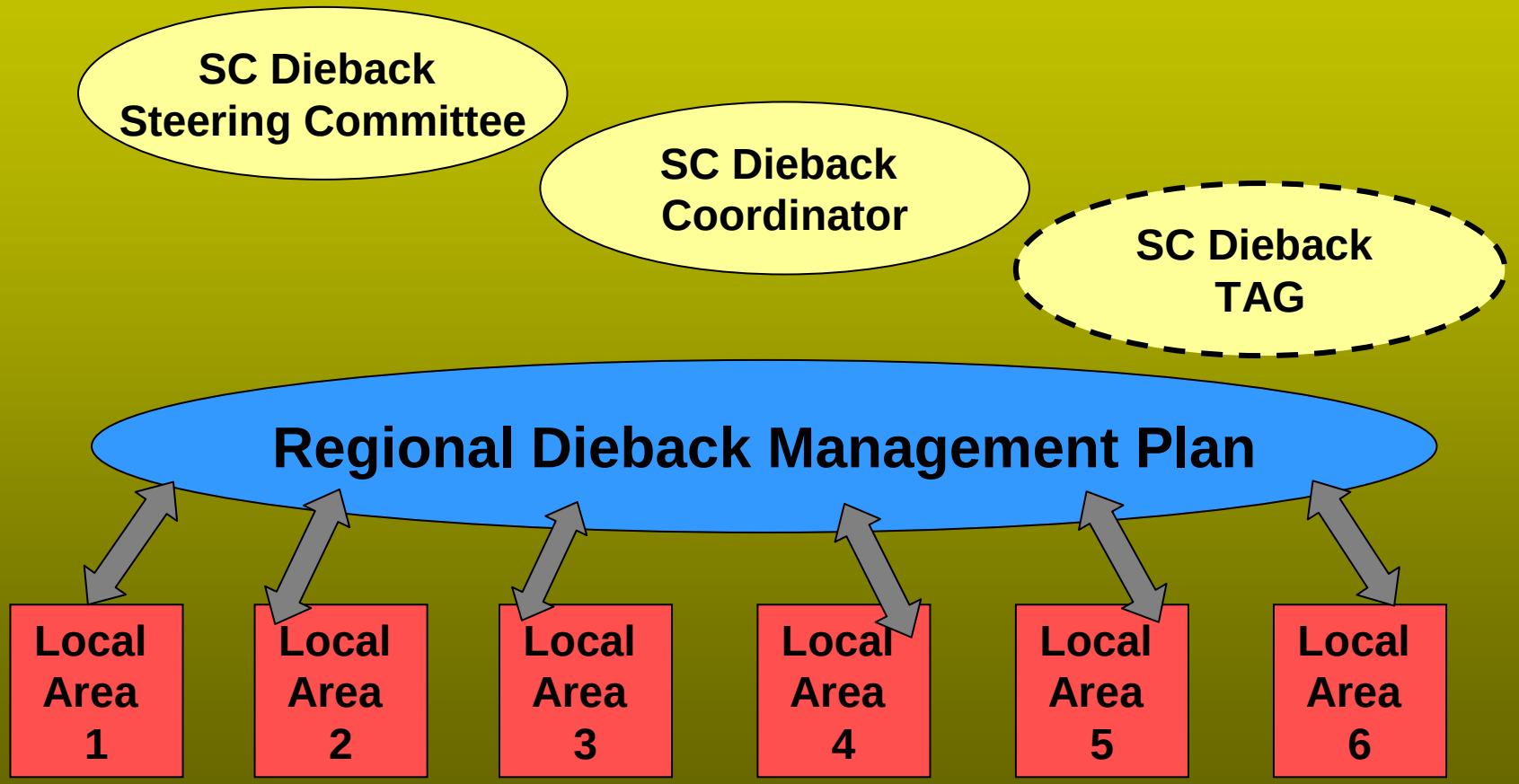
C. **Knowledge and information management** (R&D, database)

D. **Regional management and coordination** (roles and responsibilities, partnership and institutional arrangements)

E. **Investment planning** (total resource needs, BCA, optimal funding requirements)

F. **Program performance monitoring and reporting** (adaptive management processes)

REGIONAL DIEBACK DELIVERY



TOUGH ISSUES

1. How to manage a ‘complex system’?,
2. Scale of threat – where to focus?
3. Change and uncertainty of risk,
4. Protection vs. Recovery?
5. Threatened species/communities vs. high value landscape assets?
6. Attribution of responsibility ($’s & actions)?
7. What can we realistically expect to achieve in 7 years?


Western pygmy possum

Lost 16 native mammal species to extinction!

Poor record for recent mammal extinctions

100 species that have suffered significant declines in distribution

Clearing and modification of natural habitats

Cats and foxes

Jarrah forest, associated woodlands, refuges for several nearly extinct species

chuditch

woylie

Phytophthora cinnamomi

Impact of Phytophthora dieback on the mardo (*Antechinus flavipes leucogaster*)

Rod Armistead, Trish Fleming, Bernie Dell and Giles Hardy

Areas severely affected

Areas Moderately affected

Areas not affected

Trapping data

321 captures from 79 mardos during 4320 trap nights

Severely affected sites

49 captures from 17 mardos during 2139 trap nights

Moderately affected sites

93 captures from 23 mardos during 1125 trap nights

Healthy forest sites

179 captures from 39 mardos during 1056 trap nights

Habitat selection by the mardo

Areas not affected by *P. cinnamomi*

Dense patches of *Xanthorrhoea preissii*

Large logs

Litter cover

Nesting

Forage with protection from predators

Increased food resources

South Coast NRM Inc & Project Dieback Activities

Annabelle Bushell, Phytophthora Dieback Co-ordinator

South Coast NRM Inc

Joanna Young, Project Dieback Manager for South Coast NRM Inc

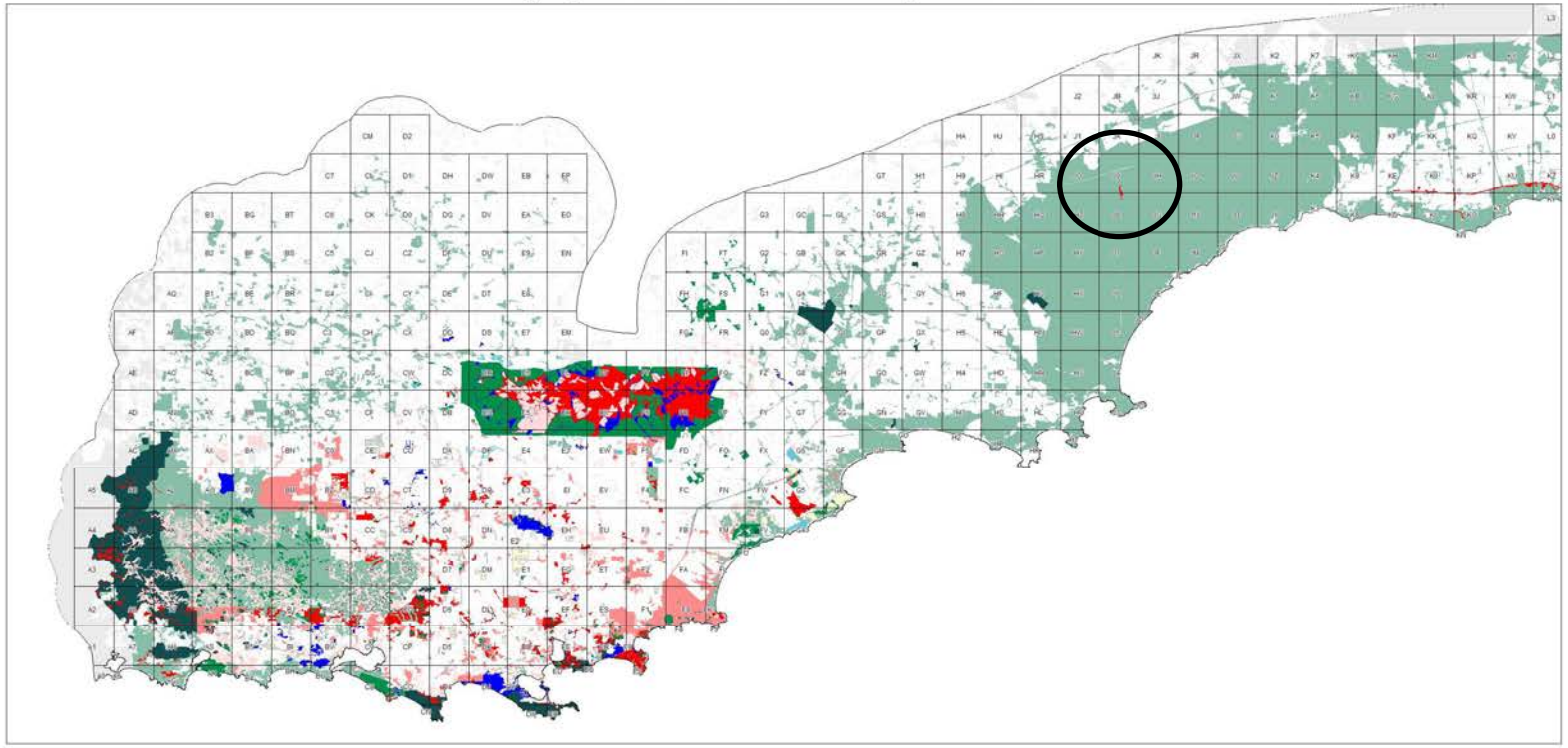
Funding provided by the Australian and Western Australian Governments through the joint National Action Plan for Salinity and Water Quality programme and the Natural Heritage Trust.

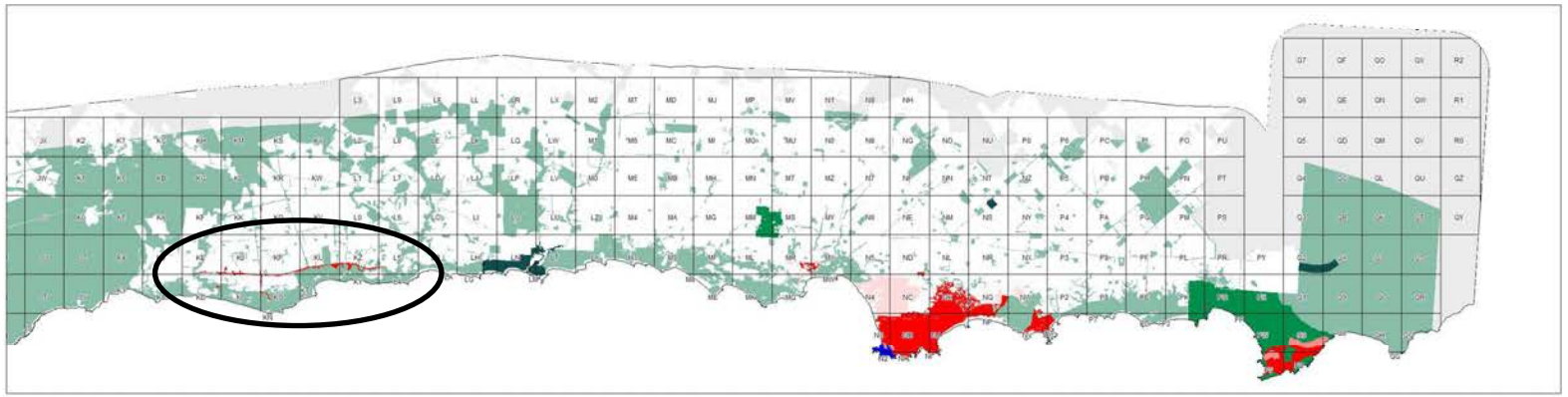
Project Dieback - South Coast Pilot Study Outputs

- Strategic Dieback Occurrence Map
- Risk Assessment Methodology for Regional Planning
- List of Susceptible Species
- Autonomous Spread Model

SCRIPT Dieback Risk Analysis

Phytophthora cinnamomi interpretation





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Project DIEBACK

Protecting biodiversity from Phytophthora Dieback

NATURAL RESOURCE MANAGEMENT WESTERN AUSTRALIA

Department of Environment and Conservation

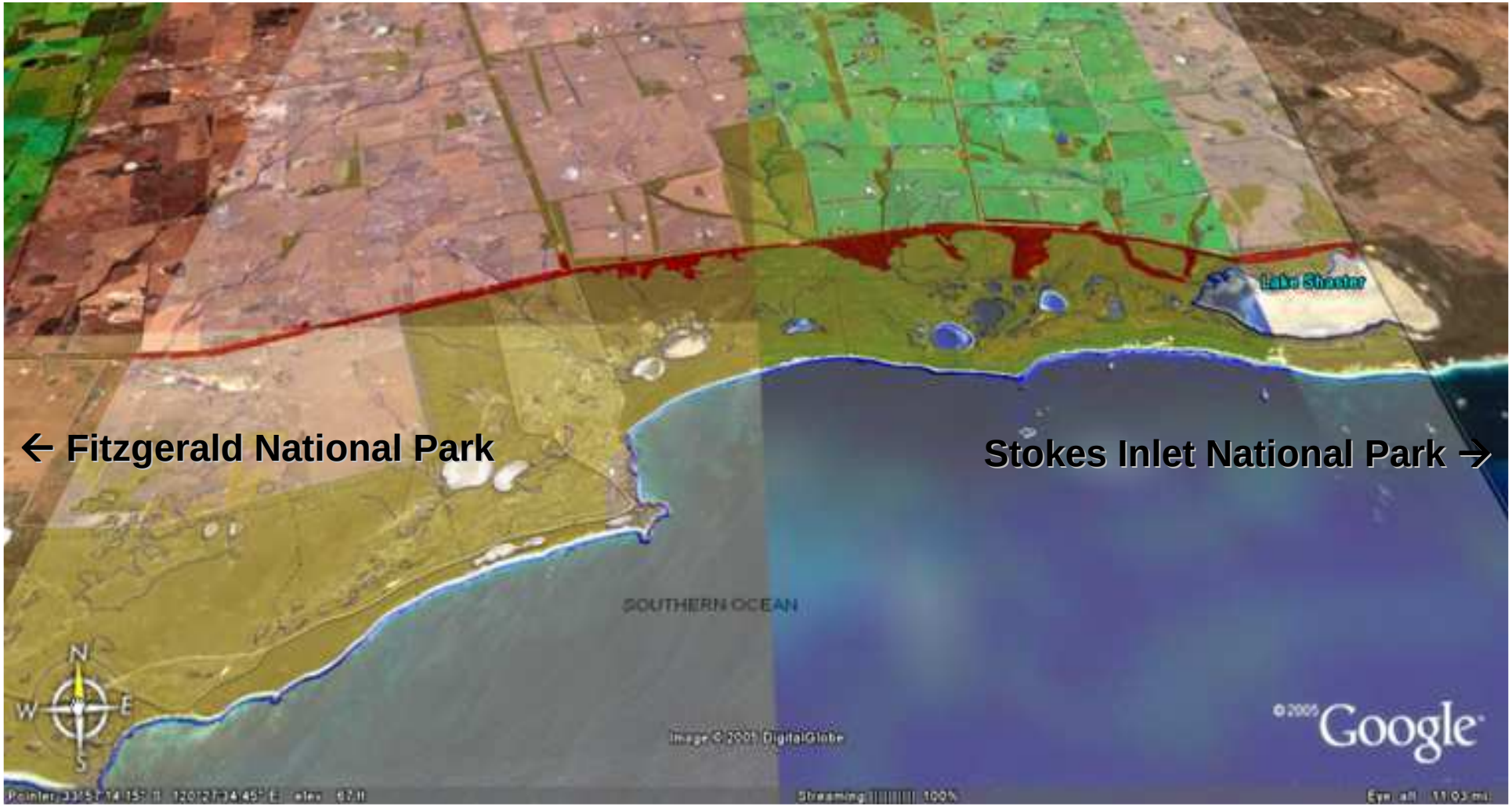
SCRIPT

South Coast Regional Initiative Planning Team

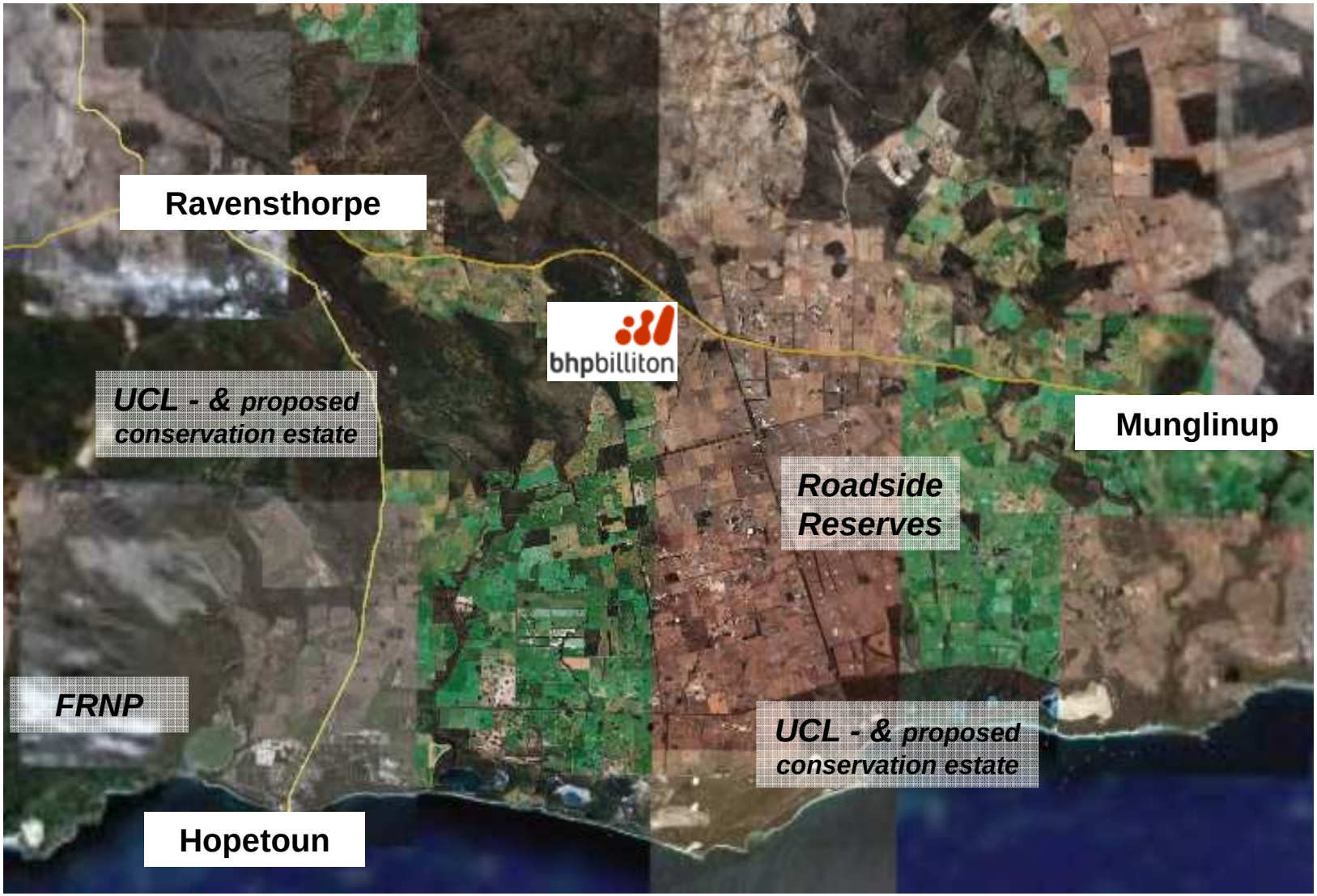
Australian Government

Integration – Ravensthorpe/Hopetoun Area

Springdale Road infection from diseased gravel pit

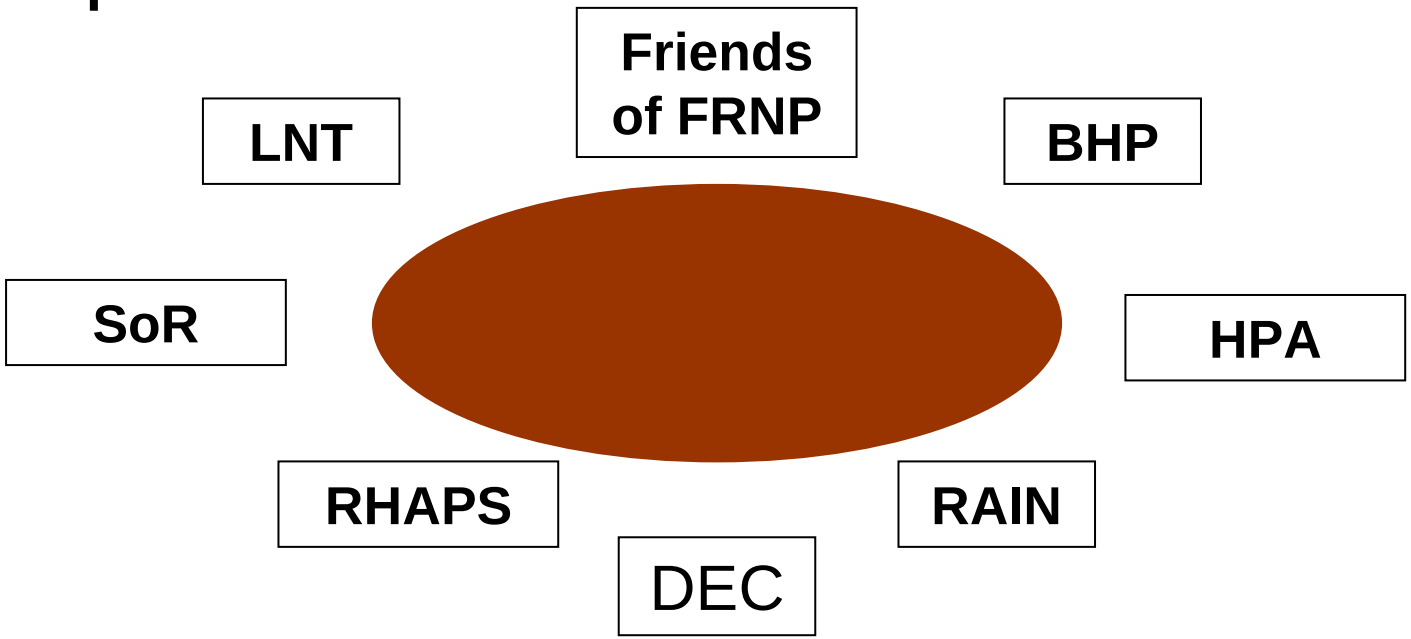


Integration – Ravensthorpe/Hopetoun Area



Integration – Ravensthorpe/Hopetoun Area

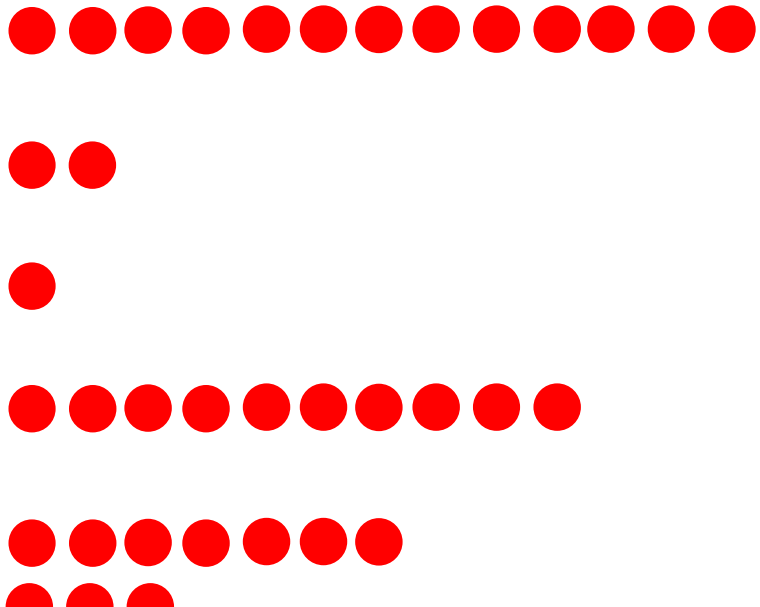
- South Coast NRM co-ordinated a workshop to identify major concerns in relation to the environmental impacts in the Shire



- Focus on 1 or 2 priorities to undertake some planning to develop some immediate actions

Integration – Ravensthorpe/Hopetoun Area

- Fire Management
- Infrastructure (water and power)
- Dieback Management
- Sustainable & Safe Recreation
- Upper Catchment Management
- Feral Animals
- Weed Control
- Reconstruction of Micro-corridors
- Coastal & Marine Management
- FRNP
- Land Use Planning
- Rem Veg Mngmt On & Off Reserve
- Water Extraction & Disposal
- Protection of Wetlands & Rivers
- Disposal of Litter/Oil/Chemicals
- Plus … several overarching issues



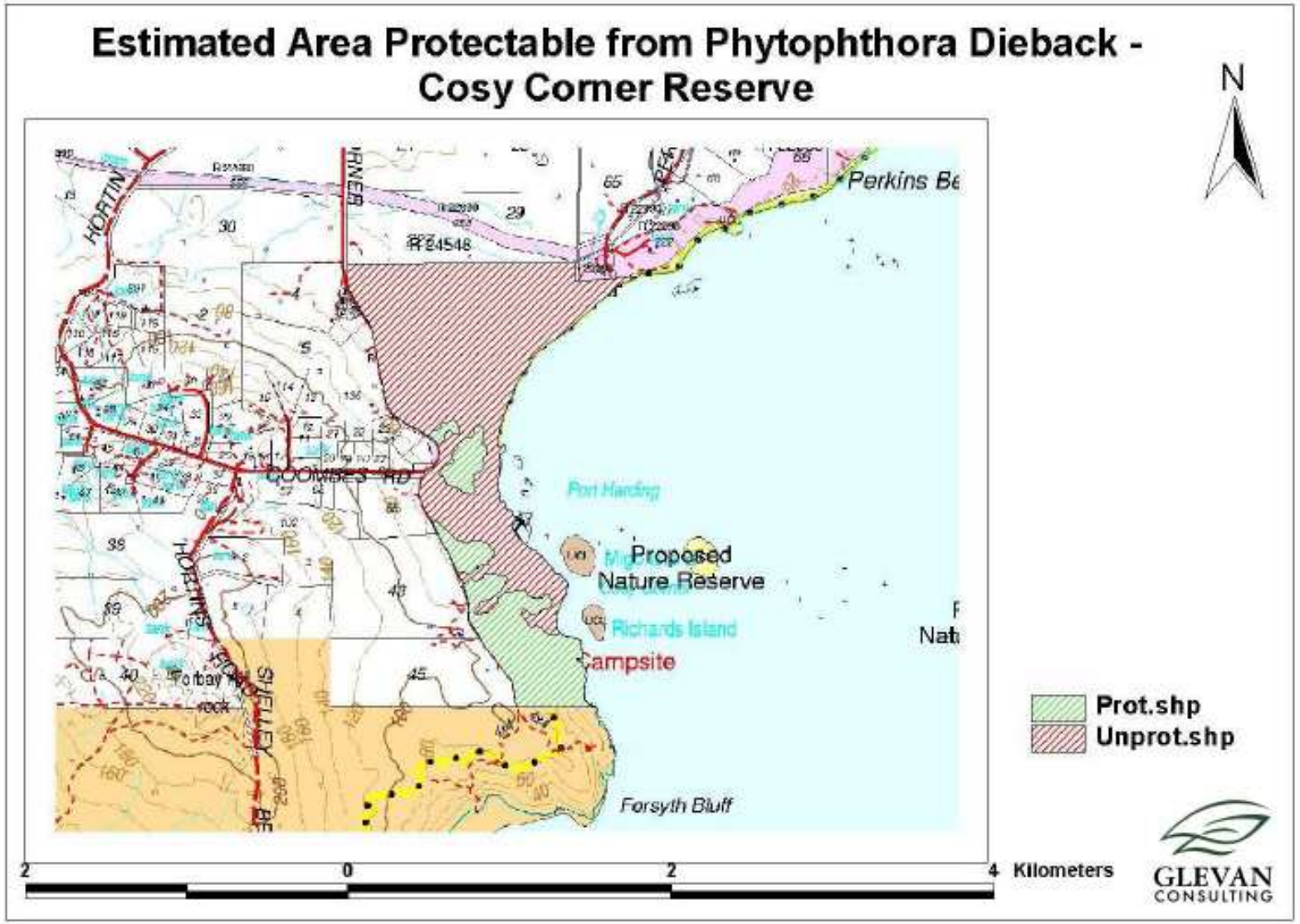
Integration – Ravensthorpe/Hopetoun Area

Key Tasks Identified from the Workshop …

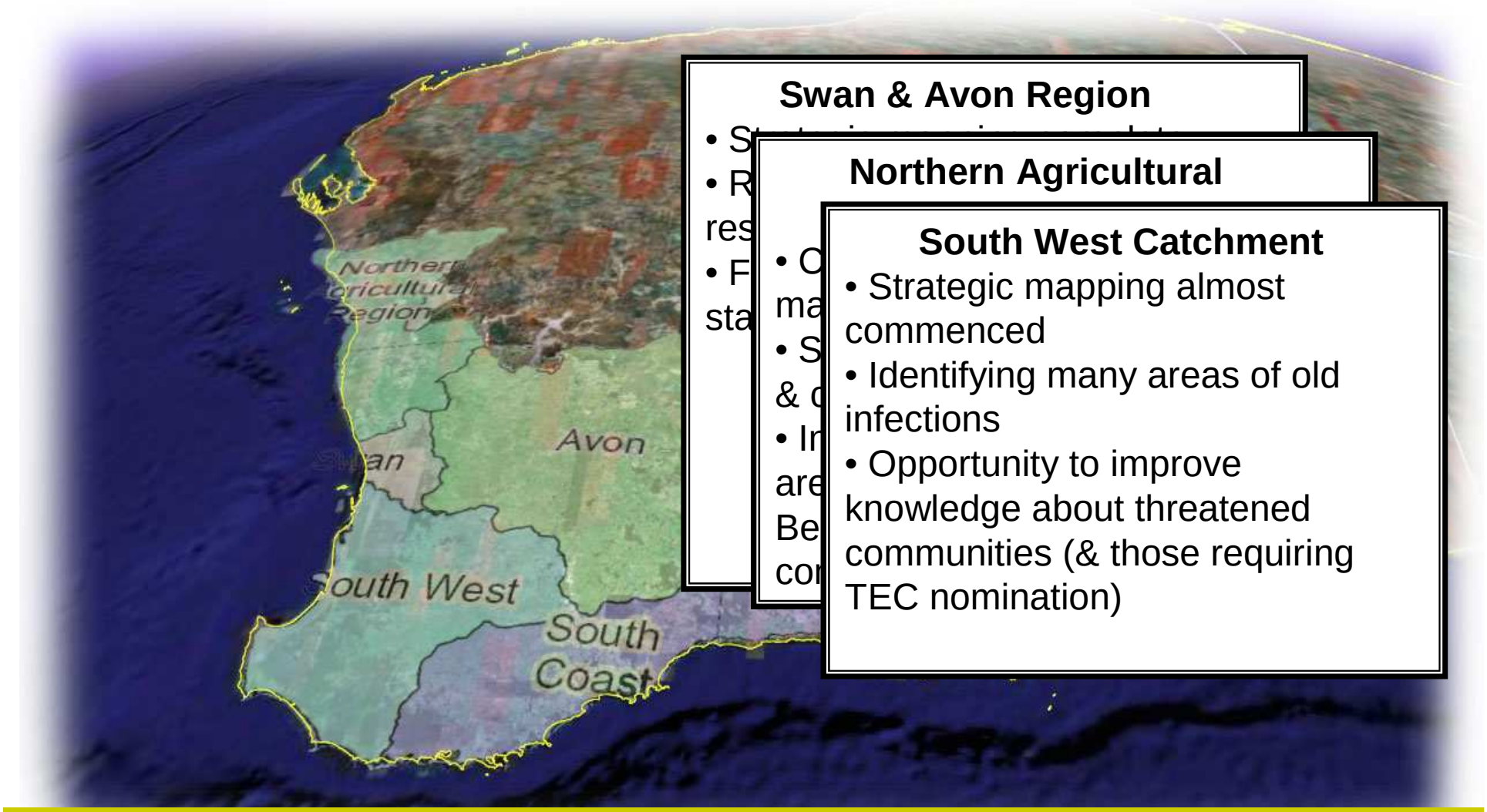
- Ravensthorpe Stakeholder Reference Group
- Develop a local area communication plan for dieback and incorporate other issues

  (eg coastal access & management)
- Development of a Local Area Plan/Strategy for Ravensthorpe

Integration – City of Albany



Project Dieback – progress in other regions…



Project Dieback Information Day – Bunbury, 27th July

Thankyou…

- **Annabelle Bushell**

South Coast NRM Inc

annabelleb@southcoastnrm.com.au

Esperance – (08) 9071 7685

- **Joanna Young**

Project Dieback Manager for South Coast NRM Inc

young@denmarkwa.net.au

Mobile – 0429 364 900

- **Lindy Twycross**

Swan & South West Project Officer – Project Dieback

lindy.twycross@water.wa.gov.au

(08) 9374 3333

- **Jenna Brooker**

Northern Agricultural Region Project Officer – Project Dieback

jennab@southcoastnrm.com.au

Mobile – 0417 960 737

The Dieback Communication Strategy

Harnessing community-based social marketing for behaviour change

EMRC-65955

Introduction

- Partners
- Objectives
- **Methodology**
- **Process**
- **Where we’re at**
- Next steps

Dieback Communication Strategy Partners

- Dieback Working Group
- Swan Catchment Council
- Eastern Metropolitan Regional Council
  - Project host: 0.2 FTE (Leah Pearson)
- Steering Group with all three partners
- Lotterywest funding support (thank you!)

Dieback Communication Strategy Objectives

- Increase level of awareness of Dieback as a major environmental priority
- Identify key target groups
- Identify ideal behaviours for each group
- Identify & develop actions to evoke measurable changes in behaviour
- Guidance: Don’t duplicate
  Build from existing communications & actions
  Develop partnerships for implementation

Our Community

Stakeholder Groups Identified in Dieback Communication Strategy and Plans

1. **Regional and Local Government**
2. **Community**
3. **NRM Catchment Groups**
4. Political Agencies
5. Industry
6. NGO
7. Gov. Agencies
8. Utilities

Why use Community Based Social Marketing?

Because it isn't clear whether brochures and web-sites have had much impact on what people actually do…

Community-based Social Marketing

- **“Fostering Sustainable Behaviour”**
- **Doug McKenzie-Mohr et al:**

www.cbsm.com

- **Social psychology methods and tools**
- **Powerful driver for real behaviour change**
- **Based on observed and measurable**

Examples…

- **Travel Smart**
- **Waterwise program**
- **Living Smart**
- **Domestic waste recycling**
- **Keep Australia Beautiful**
- **Clean Up Australia Day**
- **Life be in it.**
- **Slip Slop Slap (okay, not sustainability, but…)**

Tools of Change

- Obtaining commitments
- Build motivation over time
- Provide feedback
- Local leaders
- Norms
- Prompts (visual aids)
- Vivid, personalised communication
- Mass media
- Financial incentives/disincentives

Process

- **Four steps**
  - **Identifying behaviours, barriers & benefits for specific activities**
  - **Developing a strategy using behaviour change ’tools’**
  - **Piloting Strategy**
  - **Evaluation**

Where we're at now

- **Identifying Barriers and Behaviours**
  - **Input from DWG members**
  - **Staff research**
  - **Stakeholder workshop (June 2007)**
  - ***Relevant*** **components of this afternoon's workshop**

Next Steps

- **Analyse all results**
- **Survey to explore attitudes and actions**
- **Focus groups to fine tune understanding**
- **Identify specific actions to address specific barriers**

On to the nitty gritty…

Partnerships>>>>Pilot>>>>Evaluate>>>>Share

Where this afternoon's workshop fits in

- Identify a range of current behaviours you have observed in different land user groups.
- Provide your views on actions to overcome barriers and help these land user groups *really* do the 'right thing'.

Where this afternoon's workshop fits in

- Get your views on the behaviours of community and government groups.
- Get your views on actions to overcoming biases stopping people doing the 'right thing'.

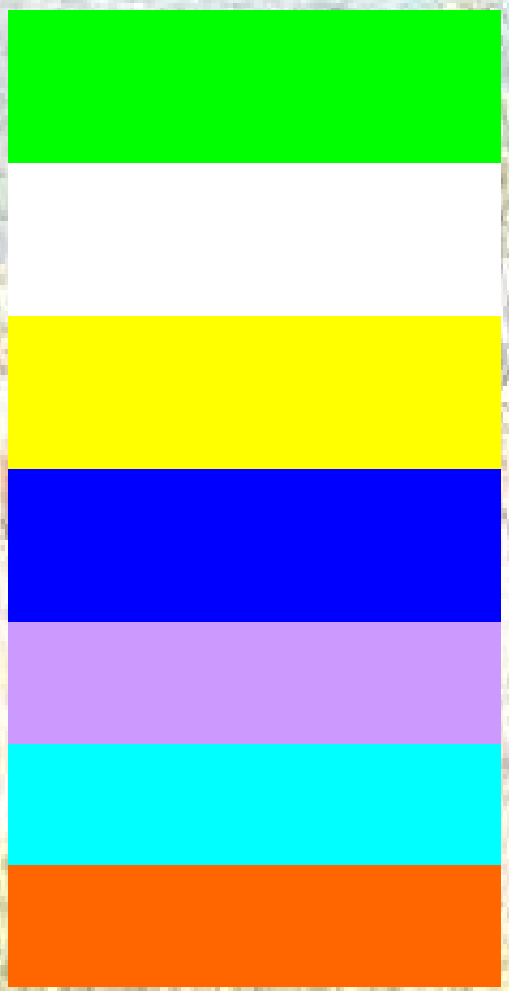
Target Group

IDEAL BEHAVIOURS	PERCEIVED CURRENT BEHAVIOUR	RANK THE IMPORTANCE OF PERCEIVED CURRENT BEHAVIOUR	IDENTIFY BARRIERS	ACTIONS
(i.e. what would be the ideal behaviour that would reduce/avoid spread and maximise effective management of dieback)	(i.e. What, in your opinion, do people actually do instead of the ideal?)	(Rank the top three behavioural issues you see as most important to address from 1 to 3)	(i.e. What are the barriers that stop people practising the ideal behaviours?)	(What actions do you think could/ would move people from the 'current' behaviour to the 'ideal' behaviour). Please be specific.

Target Groups

- Nurseries
- Bush Walkers
- Bushcare/ Friends Groups
- Botanists
- Local Government
- Consultants
- Private Landowners

Group colours



Bushcare groups

Nurseries

Private Landholders

Consultants

Local Government

Bushwalkers

Botanists

DIEBACK INFORMATION GROUP CONFERENCE WORKSHOP RESULTS - 13TH JULY 2007

Bushcare Groups

IDEAL BEHAVIOURS	PERCEIVED CURRENT BEHAVIOUR	IMPORTANCE RANKING OF PERCEIVED CURRENT BEHAVIOUR		BARRIERS IDENTIFIED	ACTIONS
		Total Responses	Overall Rank		
Assess risk - season, location, known disease area	Rush in, not planned, uniformed, impatient	6	**2**	**Rushing in, not planned activities, impatient. Need better planned activities** - planting season is short - lack of technical support - volunteers - short on time, money, people - champions are over-burdened - it's all too hard - focus on more desirable activities e.g. planting - don't know who to contact for assistance/advice	
Keen, positive energetic passing on messages to other members in their community					
Lead by example	Only focus on their own patch/own problems				
Source dieback free material	Local soil e.g. growing/sourcing cheap material, green mulch from local govts.				
Conduct/abide by hygiene principles	Don't follow hygiene practices, stick to paths clean shoes etc./	9	**1**	**Don't follow hygiene practices** - lack of technical support - hard to access dieback free material - local and state govt. agencies are not being exemplary e.g. Local govt. authorities providing mulch, graders dumping dirt - don't understand risk of their activities - lack of dieback in risk analysis - lack of knowledge and awareness of dieback - hygiene practices aren't always clear - it's too hard - funding too tight - more likely to spend money on other activities e.g. seedlings rather than hygiene gear - don't understand its importance	
Inform relevant land managers of suspect areas	Not contacting relevant authorities for help or information - state govt or local govt	3			Contact relevant land managers before they go into areas
DEC's seven step activities					
Plan bottom up					
Plan - modify according to conditions					
Be aware of suspect sites/areas they're going into	Not enough reporting of inappropriate activities	5	**3**	**Not reporting (enough) inappropriate activities** - lack of response from authorities - penalties don't fit crime - why stick your neck out - feel like a dobber - lack of confidence - don't know who to report to or process too slow - no evidence/feedback that their report has been actioned - don't know what to report	
Stick to the path/understand their impacts					