Working towards Phytophthora Dieback Standards in Revegetation

Kat Sambrooks - Dieback Working Group

The Dieback Working Group is supported by

- Chittering Landcare
- City of Kwinana
- City of Melville
- City of South Perth
- Department of Parks and Wildlife
- Dieback Treatment Services
- GHD Consulting
- Glevan Consulting
- Hanson
- Limestone Park
- Leave No Trace
- Murdoch University
- NACC NRM
- Perth NRM
- Richgro
- South Coast NRM
- SWCC NRM
- Terratree
- UWA

Talk outline

- About the DWG
- What is Phytophthora Dieback
- Significance of PD
  - Locally
  - Globally
- How is PD spread during revegetation
- Managing the spread of PD in reveg
  - Site preparation
  - Sourcing plants
  - Planting
  - Maintenance
- Threats to PD management in revegetation
- A ‘world’s best-practice’ standards system for revegetation

About the DWG

Formed in **1996** in response to the serious threat of Phytophthora Dieback to the native ecosystems of Western Australia.

Concerned members of resources industry, local government, state government, research and the community came together to develop a coordinated response to the threat and form the Dieback Working Group.

Why a Dieback Working Group in WA

- Susceptibility of species (More than 40%).
- Potential impact
- Many rare and engendered plant species at risk
- Many endemic plant species and communities and animal species at risk.
- Concerned community.
- Informed industry.
- WA leading the world in research and management.
- Dedicated people like Ian Colquhoun and Giles Hardy

What is Phytophthora Dieback

- Disease in native vegetation caused by water moulds called *Phytophthoras*
- ***Phyton*** *= plant* ***Phthora*** *= destroyer*

Main species responsible: ***Phytophthora cinnamomi***

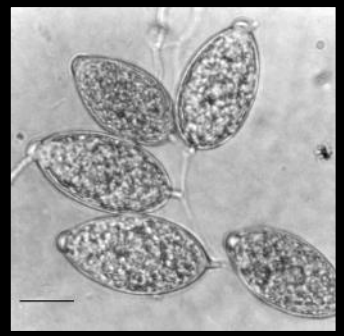
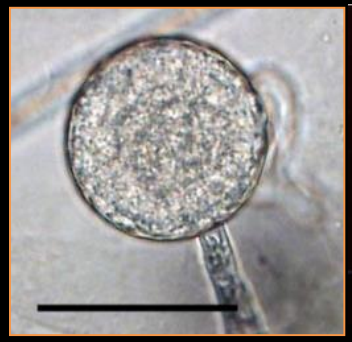
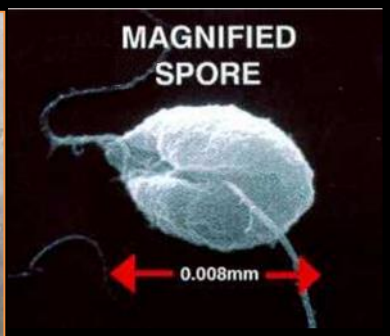
- Plant pathogen affecting thousands of susceptible plant species (hosts) around the world
- Native to South East Asia
- Spread to every continent except Antarctica
- Most mapping, protocols and management plans based on *Pc*
- Introduced into Australia early 1900's

- More than 200 described *Phytophthora* species
- At least 20 species in Western Australia

What is Phytophthora Dieback

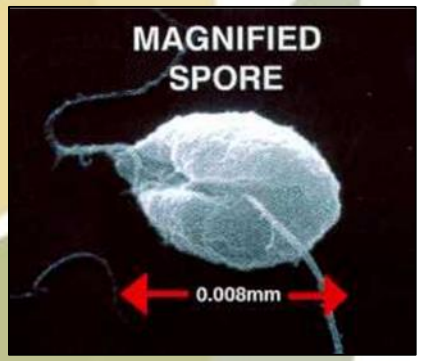
- **Phytophthoras** are:
  - Microscopic
  - Colourless
  - Fungal-like
  - The most destructive group of primary plant pathogens on the planet!
  - The cause of many root and stem rots and stem blights
  - Pathogens to many ornamental, agricultural, horticultural and ecologically significant plants



What is Phytophthora Dieback

- **The zoospore**



Significance of Phytophthora Dieback

Significance of Phytophthora Dieback in south-west of WA

- Impact seen within 400mm+ isohyet and 300mm+ with high summer rainfall
- More than 40% of native plant species are susceptible
- More than 14% of native plant species are highly susceptible
- Banksia woodlands, jarrah forest, Banksia-dominated heathlands, shrublands and ironstone communities are just some susteptible ecosystems.
- Many TECs, PECs and DRF susceptible
- Contributing to decline of many threatened fauna species
- Afftects whole ecosystems – susceptible plants, resistant plants, animals, insects, soil, water, landscapes

Significance of Phytophthora Dieback

Will cost Australia in excess of **$160 million** per year (2005 est)

Reduces profitability of many industries

- Forestry, mining & extractive industries, horticulture nurseries, tourism (wildflowers)

The pathogen also impacts:

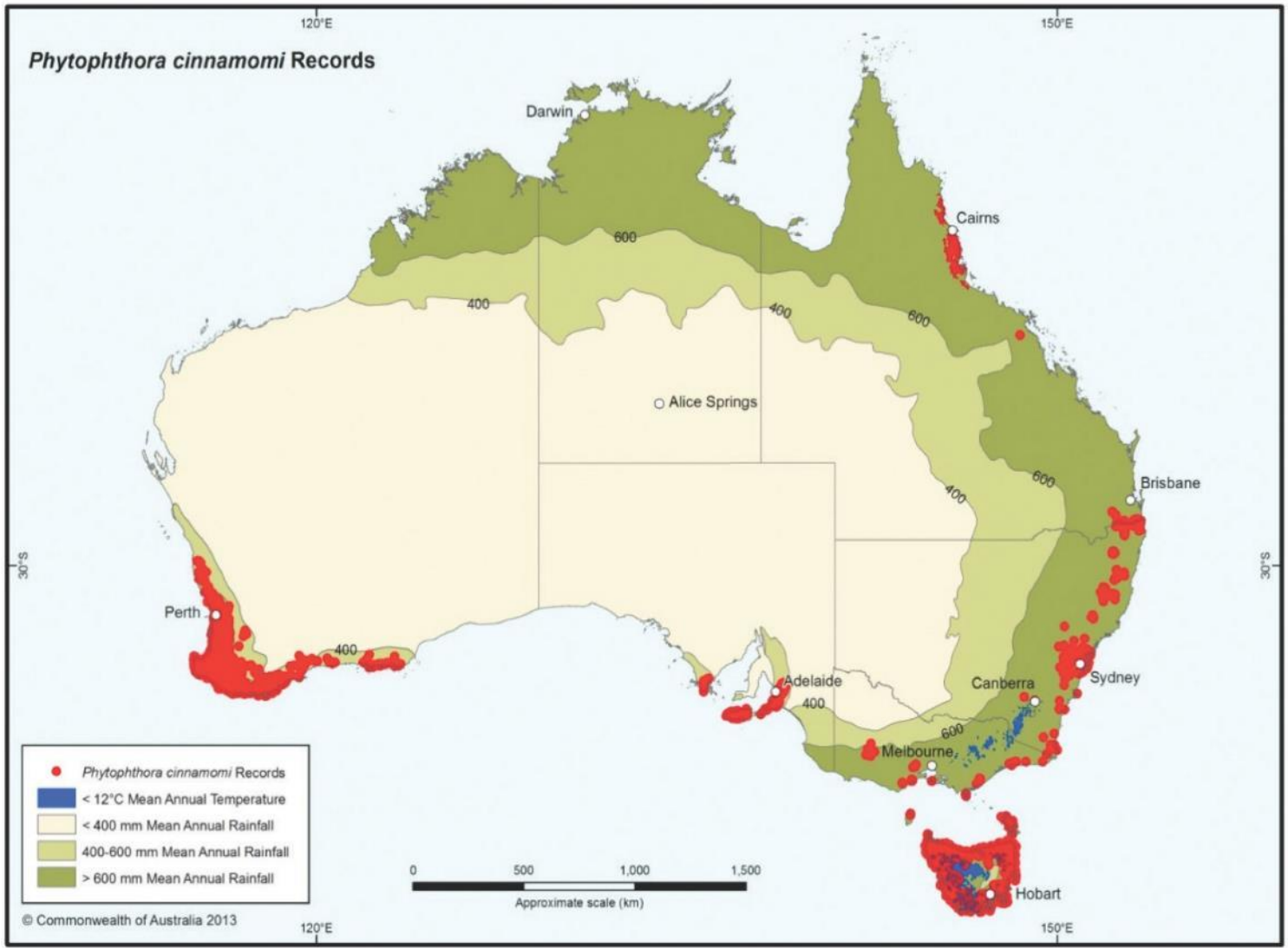
- Indigenous culture
- Home gardens
- Recreational bush users
  - Four wheel drives
  - Trail bikes
  - Horse riders
  - Bicycles
  - Bush walkers

Significance of Phytophthora Dieback

Significance of Phytophthora diseases in Australia

- Highest number of species at risk in WA but the disease has a significant impact outside of WA
- Greater Blue Mountains World Heritage Area has serious infestation
- Wollemi Pine is susceptible and only known wild population has become infected with the disease
- Wilsons Promontory National Park is infested
- Many parts of Tasmania including World Heritage Area
- Some infestations in Queensland
- Kangaroo Island and mainland SA infested

Significance of Phytophthora Dieback



Significance of Phytophthora Dieback

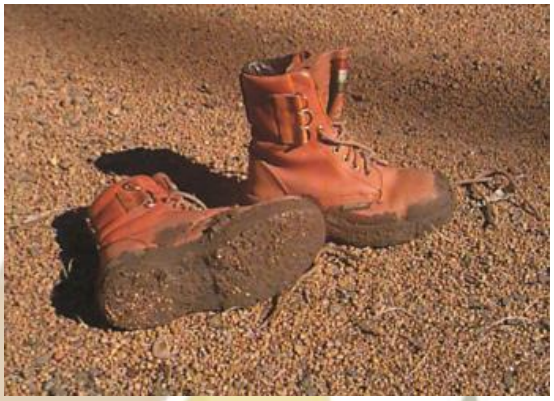
Significance of Phytophthora diseases globally

- Chestnut Ink Disease - France
- Ink Disease in red oaks - France
- Responsible for Oak Decline - Europe
- Sudden Oak Death – USA
- Phytophthora Disease of Alder – UK
- Phytophthora diease in Eucalypts – South Africa
- Dano Foliar Del Pino – Chile
- Kauri Dieback – New Zealand
- Mal del cipres – Argentina
- Phytophthora disease on Cocoa - Papua New Guinea


D. Guest

How is PD spread in revegetation

Any action that involves the transfer of soil, soil water or plant material from one place to another risks the spread of Phytophthora diseases.



Phytophthoras can be spread by:

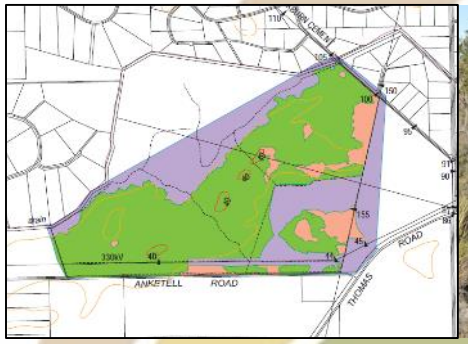
- Infected plants
- Infected soil amenders
- Infected mulch
- Infected soil/ soil water/ plant material on:
  - Vehicles (including ute tray) and trailers
  - Machinery (augers, diggers, backhoes, rippers)
  - Equipment (shovels, trowels, pottaputkies, buckets)
  - PPE (boots, gloves, knee pads)

Managing the spread of PD in reveg

Site Preparation

Interpretation

- Before you prepare your site it helps to know the disease status of your site.
- *Pc* can hang around in resistant annual herbs
- If there are enough indicator species on your site you may be able to get an DPaW-registered interpreter to map and interpret the site
- It may require many samples if there isn't much vegetation left
- Visit www.dwg.org.au for a list of current DPaW-Registered interpreters



Managing the spread of PD in reveg

Site Preparation

DIDMS Mapping

Dieback Information Data and Management System

- Sample point and survey data for:
  - *Phytophthora cinnamomi*
  - *Phytophthora multivora*
  - *Phytophthora inundata*
  - *Phytophthora nicotianae*
  - *Armillaria luteobubalina*
- Management points
- Priority Protection Areas (PPAs)
- Register for free now –

https://didms.gaiaresources.com.au

Managing the spread of PD in reveg

Site Preparation

Habitat creation

- Logs and rocks can carry infected dirt.
- If preparing your site by adding logs and rocks or other roughage, source them from an area nearby to your reveg site or a know uninfested site.

Shaping and Ripping

- Clean-down machinery before taking onto site
- For a partially infested site, employ split-phase operations, working in the clean part first.

Managing the spread of PD in reveg

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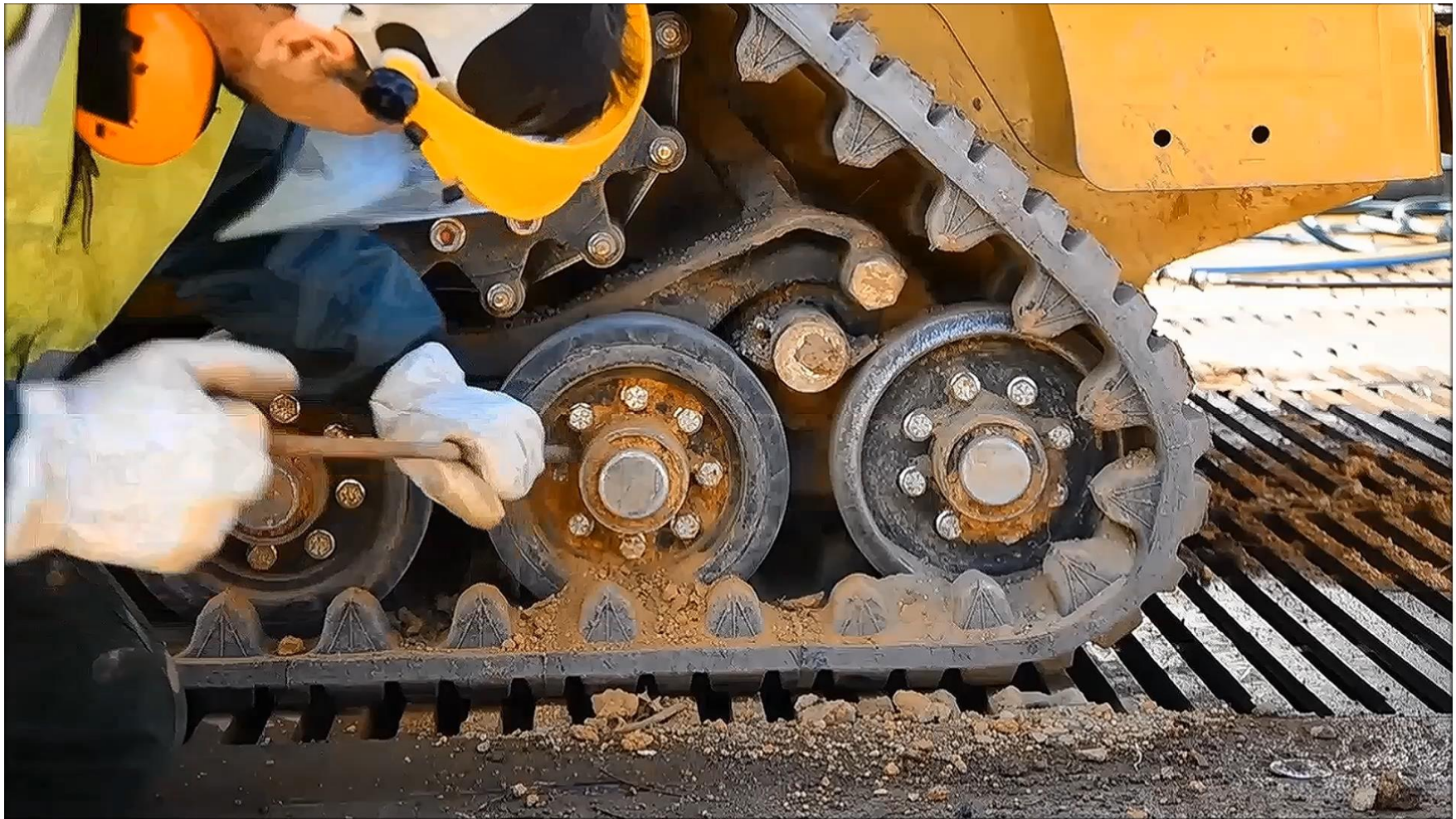
Site Preparation – cleaning down machinery



Managing the spread of PD in reveg

Site Preparation – cleaning down machinery

<u>Key points to hygienically cleaning machinery or vehicles</u>

- Use a suitable clean-down site.
- Adhere to person and vehicle/ machinery safety requirements.
- Inspect using a checklist and record details of vehicle and inspector.
- Physically remove soil, weeds, animal pests and soil water.
- Use high pressure water sprayer, compressed air or vacuum to remove remainder.
- Follow up with spray of disinfectant, such as Phytoclean.
- Clean down suitable to protect against range of pests and diseases.

Managing the spread of PD in reveg

Sourcing Plants

- We always recommend using a **NIASA accredited nursery** to source your plants.
- Scheme helps to ensure no plant pathogens are transmitted through plant or soil stock.
- Fill list of accredited businesses at NGIA website www.ngia.com.au
- We also recommend using as **RIAWA accredited seed collector** to source your seeds:
  - Comply with RIAWA industry guidelines for harvesting, processing, storing and supplying
  - Adhere to accreditation dieback standards

Managing the spread of PD in reveg

Sourcing Plants

- Source pathogen free mulch through NIASA scheme
- ‘Free’ mulch may give you much more than you bargain for – Armillaria, marri canker, etc.
- Same for soil products

Managing the spread of PD in reveg

Planting

- Supporting policies and procedures
- Management plants, guidelines and checklists
- Trained and informed staff – Green Card Training
- Clean and inspection points for boots, equipment,

Machinery and vehicles

- Avoid taking vehicles on-site
- **Avoid wet soil conditions**
- Hygiene infrastructure
  - Boot clean
  - Vehicle clean

Managing the spread of PD in reveg

Planting

- In infested sites use plant species or variations resistant to the Phytophthora species present
- Visit www.dwg.org.au for CPSM lists of susceptible and resistant species

Western Australian natives resistant to Phytophthora cinnamomi

Compiled by E. Groves, G. Hardy & J. McComb, Murdoch University

Information used to determine resistance to P. cinnamomi : 1a- field observations, 1b- field observation and recovery of P.cinnamomi, 2a- glasshouse inoculation of P. cinnamomi and recovery, 2b- field inoculation with P. cinnamomi and recovery.
Not Provided- no information was provided from the reference.

PLANT SPECIES	COMMON NAME	ASSESSMENT	NURSERY AVALABILITY	REFERENCES
Acacia barbinervis Benth.		1b		12, 15
Acacia baxteri Benth.	Baxter's Wattle	1a		19
Acacia browniana H.L.Wendl.		1b		15
Acacia browniana var. *intermedia* (E.Pritz)Maslin.		1a		20
Acacia cyclops G.Don.	Coastal Wattle	1a	A	20
Acacia drummondii Lindl.	Drummond's Wattle	1b	A	15
Acacia extensa Lindl.	Wiry Wattle	1b		15
Acacia huegelii Benth.		1b		16
Acacia lateritícola Maslin	Rib Wattle	1b		12, 15
Acacia nervosa DC.		1b		12, 15
Acacia preissiana (Meisn.) Maslin		1b		15
Acacia pulchella R.Br.	Prickly Moses	1a	A	5
Acacia saligna (Labill.) H.L.Wendl.	Orange Wattle	1b	A	16
Acacia semitrullata Maslin.		1b		16
Acacia urophylla Lindl.		1b	A	12, 14, 15
Agonis flexuosa (Willd.) Sweet.	Peppermint	1b	A	16
Agonis juniperiana Schauer.	Wattle	NP		10
Allocasuarina lehmanniana (Miq.) L.A.S.Johnson	Dune Sheoak	1a		20
Allocasuarina humilis (Otto & F.Dietr.) L.A.S.Johnson	Dwarf Sheoak	1a	A	20
Allocasuarina microstachya (Miq.) L.A.S.Johnson		1a		20
Anarthria gracilis R.Br.		1a		20
Anarthria prolifera R.Br.		1a		20
Anarthria scabra R.Br.		1a		20
Anigozanthos flavidus DC.	Tall Kangaroo Paw	1b	A	17
Anigozanthos manglesii D.Don.	Mangle's Kangaroo Paw	1b	A	16
Anigozanthos rufus Labill.	Red Kangaroo Paw	1b		17
Asartea heterantheta		1a	A	5, 10
Astartea fascicularis (Labill.) DC.		1a	A	20
Astroloma pallidum R.Br.	Kick Bush	1b		12, 15
Baeckea pachyphylla (Benth.)		1a		20
Baeckea camphorosmae Endl.	Camphor Myrtle	1b	A	5, 12, 15, 16
Billardiera drummondiana (Putt.) E.M.Benn.		1b		15
Billardiera variifolia DC.		1b		16
Boronia crenulata (Sm.)	Aniseed Boronia	1a	A	20
Boronia spathulata Lindl.	Boronia	1b		15
Bossiaea linophylla R.Br.		1a		20

Western Australian natives susceptible to Phytophthora cinnamomi.

Compiled by E. Groves, G. Hardy & J. McComb, Murdoch University

Information used to determine resistance to P. cinnamomi : 1a- Field observations, 1b- Field observation and recovery of P.cinnamomi, 2a- glasshouse inoculation of P. cinnamomi and recovery, 2b- Field inoculation with P. cinnamomi and recovery.
Not Provided- no information was provided from the reference.

PLANT SPECIES	COMMON NAME	ASSESSMENT	RARE SPECIES	NURSERY AVALABILITY	REFERENCES
Acacia campylophylla Benth.		1b			15
Acacia myrtifolia (Sm.) Willd.		1b		A	9
Acacia stenoptera Benth.	Narrow Winged Wattle	1b			16
Actinostrobus pyramidalis Miq.	Swamp Cypress	2a			17
Adenanthos barbiger Lindl.		1a		A	1, 13, 16
Adenanthos cunninghamii Meisn.	Albany Woolly Bush	NP		A	4, 8
Adenanthos cuneata Labill.	Coastal Jugflower	1a		A	1, 6
Adenanthos cygnorum Diels.	Common Woolly Bush	2			1, 7
Adenanthos detmoldii F. Muell.	Scott River Jugflower	1a			1
Adenanthos obtegii E.C. Nelson	Fitzgerald Jugflower	NP	R		4,8
Adenanthos stipitatus A.S. George	Oval Leafed Adenanthos	NP			8
Adenanthos triflorus Benth.		1a			19
Adenanthos velutinus E.C. George	Club Leafed Adenanthos	NP			8
Adenanthos meisneri Lehm.		1a		A	1
Adenanthos obovatus Labill.	Basket Flower	1b		A	1, 7 14,16
Adenanthos oreophilus E.C. Nelson		1a			19
Adenanthos pungens ssp. *effusus*	Spiky Adenanthos	NP	R		4
Adenanthos pungens ssp. *pungens*		NP	R		4
Adenanthos sericeus Labill.	Woolly Bush	1a		A	1
Agonis linearifolia (DC) Sweet *Taxandria linearifolia* (DC.) J.R. Wheeler & N.G Marchant	Swamp Peppermint	1b			6
Agrostocrinum scabrum (R.Br) Baill.	Blueyeas	1			12
Allocasuarina fraseriana (Miq.) L.A.S. Johnson	Sheoak	1b		A	1, 6, 14
Allocasuarina humilis (Otto & F.Dietr.) L.A.S. Johnson	Dwarf Sheoak	1a		A	1, 7 14
Allocasuarina thuyoides (Miq.) L.A.S. Johnson	Horned Sheoak	1a			19
Andersonia astiflora (Stschegl) Druce	Giant Andersonia	NP	R		4
Andersonia caerulea R.Br.	Fairbells	1a			1, 6
Andersonia heterophylla Sond.		2			1, 7
Andersonia lehmanniana Sond.		1a			1, 7
Andersonia pinaster Lemson.		1a	R		20
Andersonia simplex (Stschegl.) Druce	Spiked Andersonia	1b			6
Astus pezantesiana Nelson.		1a			14, 17
Astroloma ciliatum (Lindl.) Druce	Candle Cranberry	1b			3
Astroloma xanthinum (DC) Sond.		2			1, 7, 18
Banksia aculeata A.S.George		1a			20

Managing the spread of PD in reveg

Planting – Green Cards Training

- DWG runs Green Card Training Program for Phytophthora Dieback hygiene
- Certificate II level equivalent
- Ideal for on-ground staff working in Phytophthora Dieback disease risk areas
- Gives the skills and knowledge to manage threat of spreading the disease
- Includes vehicle clean-down demonstration
- Contact a trainer at www.dwg.org.au/green-card

Open Green Card Training
11th October @ DPaW Kensington

Check website for more info

Managing the spread of PD in reveg

Planting – cleaning down boots

- Require that all workers/ volunteers come to site with clean boots
- Set up an inspection point and temporary hygiene point
- Hygiene point should have:
  - Tray
  - Shoe brushes
  - Disinfectant
    - 70% methylated spirits
    - 5% bleach
    - Phytoclean
  - instructions

Managing the spread of PD in reveg

Maintenance

General

- Apply same hygiene principles to site entry for maintenance.
- Ensure tree guards and stakes are free of soil, plant and animal material.
- Ensure staff and trained and informed – Green Card Training.
- Ensure adequate policies, procedures, management plans, maps and checklists are available.

Monitor and treat

- Monitor plant health and survival
- Treat with phosphite if necessary.

Managing the spread of PD in reveg

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Maintenance

<u>Weed removal</u>

- Bag your weeds and remove from site
- Dispose of weeds from infested sites in sanitary way
- Ensure weed removal tools are clean before and after use.

Threats to PD management in reveg

1. **Complacency**

- Not concerned about the threat to native ecosystems and <u>your revegetation</u>
- Can't justify spending funds on managing
- Not being held to account for non-management
- They way things have always been done

2. **Misinformation**

- Isn't it cured?
- Doesn't if only affect Jarrah?
- It's everywhere, why bother

3. **Lack of a current system for Best-Practice Phytophthora Dieback Management in Revegetation**

A worlds best-practice standards system for Revegetation

- Requires industry consultation and buy-in
- Should be driven by industry
- Partnership with the DWG
- Best-practice organisations promoted through industry groups and DWG
- The next step?

Questions?

More info at www.dwg.org.au

Contact DWG via info@dwg.org.au