

Phytophthora cinnamomi (P.c.)

INTERPRETATION REPORT

CABLE SANDS

GWINDINUP

INTERPRETERS: A. Moylett

REPORT DATE: 11 July 2001

AUTHOR: A. Moylett

Total area interpreted (ha)	258.5ha
DRF - Yes / No	NO
DRA - Yes / No	yes
Method of interpretation 230 mm film / Stripline / Recheck / Road Alignment / Other	Stripline
Scale of film Date of photography	
Major tree species (eg. JMK)	Jarrah Marri
Commencement date	23 May 2001
Completion date	10 July 2001
Products	<i>Phytophthora cinnamomi</i> Occurrence Map, Report.

TABLE OF CONTENTS

TABLE OF CONTENTS	2
1 INTRODUCTION	3
2 BACKGROUND INFORMATION	3
2.1 PREVIOUS INTERPRETATION	3
2.2 LAND USE	3
2.3 LOGGING HISTORY	3
2.4 BURNING HISTORY	3
2.5 RAINFALL ZONE	3
3 METHOD	4
3.1 INTERPRETATION, INITIAL AND FIELD	4
3.2 DEMARCATION.....	4
3.3 SAMPLING	4
3.4 MAPPING.....	4
4. RESULTS	4
4.1 GPS SURVEY.....	4
4.2 DISEASE DISTRIBUTION.....	4
4.2.1 <i>Known Basic Raw Material Existing Pits</i>	5
4.3 DISEASE EXPRESSION	5
4.3.1 <i>Current disease expression</i>	5
4.3.2 <i>Other Phytophthora species</i>	5
4.3.3 <i>Drought and Fire Damage</i>	5
4.3.4 <i>Armillaria</i>	5
4.4 DISEASE OCCURRENCE AREA STATEMENT.....	6
4.5 SAMPLE RESULTS	6
5. DISCUSSION	6
6 CONCLUSION	6
7 RECOMMENDATIONS	7
8 REFERENCES	7
APPENDIX I	8
SAMPLE SUMMARY (<i>other Phytophthora species included as negative result</i>)	8
APPENDIX II	9
DEFINITIONS.....	9
<i>Phytophthora cinnamomi (P.c.)</i>	9
<i>Uninterpretable (UI)</i>	9
<i>Phytophthora cinnamomi Free</i>	9

1 INTRODUCTION

Cable Sands Gwindinup Mine Leases in Argyle Forest Block have been interpreted for *Phytophthora cinnamomi* (*P.c.*) disease presence using Strip Line Survey method. The area is located on the Kirup map sheet approximately 4 km from Argyle.

The interpreted area is bound by private property in the west, Gavins Road in the north and State Forest in the east and south. The total area interpreted is 258.5 ha.

This cell does occur within a Disease Risk Area.

The cell is not known to contain Declared Rare Flora (Department of Conservation and Land Management Records).

Interpretation began on 23 May 2001 and was completed on 10 July 2001 by Interpreter Alex Moylett.

2 BACKGROUND INFORMATION

2.1 PREVIOUS INTERPRETATION

The cell was previously interpreted in 1983 by Interpreters Kevin Helyar and John Gillard (Department of Conservation and Land Management unpublished). Another assessment of disease presence was made in 1993 by Casuarina Forest Services and another was attempted in 1998 but that was made difficult by recent prescribed burning over much of the area (Draft Gwindinup Minesite Rehabilitation Plan).

2.2 LAND USE

The designated land use for the cell is Multiple Use State Forest.

2.3 LOGGING HISTORY

The most recent logging occurred prior to 1980.

2.4 BURNING HISTORY

The cell was last burnt in the spring 1997 fire season.

2.5 RAINFALL ZONE

The cell is located between the 900 and 1000 mm rainfall isohyets.

3 METHOD

3.1 INTERPRETATION, INITIAL AND FIELD

Stripline methods of ground survey were used to determine disease distribution. Stiplines were walked by experienced Interpreters at a distance of no more than 50m apart.

All *P.c.* boundaries were mapped using a non-differential global positioning system (GPS) unit (GARMIN).

Sample points were recorded as individual GPS waypoints within the interpreted area.

3.2 DEMARCATION

Phytophthora cinnamomi (*P.c.*) infestations were demarcated using a single band of "Day-Glo orange" flagging tape. Knots in the tape are placed facing towards the infestation.

A variable buffer width was applied to every infestation depending on slope, drainage and other environmental factors. The minimum buffer width used was 15 metres. Downslope buffers are variable depending upon slope, drainage and soils.

3.3 SAMPLING

Soil and root tissue samples were taken according to the method described in the "*Phytophthora cinnamomi* Interpretation Procedures Manual", Appendix 1, pp. 35 - 37 (Helyar, 1994 (Department of Conservation and Land Management internal document)).

3.4 MAPPING

Mapping was completed at Bunbury Forest Management Branch. Boundaries were downloaded from a Global Positioning System (GPS).

4. RESULTS

4.1 GPS SURVEY

The GPS method used in the interpreted area was non-differential, accuracy limits for this system are quoted at $\pm 30\text{m}$ 85% of the time and $\pm 100\text{m}$ for 15% of the time. Plotting of the waypoints and track files was much better than these figures and appeared to be in the order of $\pm 5\text{m}$.

4.2 DISEASE DISTRIBUTION

Disease distribution is extensive in the northern lease area and confined to one area in the southern lease area.

Uninfested areas in the northern area are fragmented with the largest being 31.70ha in the northwest corner, the eastern area being 29.77ha up to the interpretation boundary (uninfested continues outside the interpretation boundary and therefore this uninfested area will be much bigger), on the southern boundary 6.98ha (again the uninfested continues outside the interpretation boundary), near the western boundary is an area of 13.68ha and the smallest area is 3.93ha.

4.2.1 Known Basic Raw Material Existing Pits

There are a number of existing unused gravel pits in the northern area. They all have infestations within or around them and have been categorised accordingly. The pit in the north west corner had healthy indicators in the part adjacent to Gavin's Road and so disease demarcation delineated this part out into uninfested. However, given the proximity of Gavin's Road and drainage from the road into the pit together with the existing infestation in the pit it would be wise not to manage the uninfested part of the pit as part of the uninfested area immediately east of the pit.

4.3 DISEASE EXPRESSION

4.3.1 Current disease expression

Expression of disease in plant indicators was sufficient for interpretation of disease boundaries to be made relatively easily. Indicator species used included;

Banksia grandis, *B. attenuata*, *B. littoralis*, *Persoonia longifolia*, *Eucalyptus marginata*, *Isopogon sphaerocephalus*, *Pattersoonia spp*, *Xanthorrhoea preissii*, *X gracillis*.

Impact of the disease in most infested areas was high resulting in severe degeneration of vegetation communities. In one area (just north of spot height 159m and down to the creek west of the spot height in the northern area) expression was subtle probably due to a lack of large indicators (eg Banksias) and the recency of disease spread into that area (speculative).

4.3.2 Other Phytophthora species

Phytophthora citricola was recovered from a dead *Xanthorrhoea preissii* at 381281E 6287118N. Another *Phytophthora* species (identification still being carried out) was found at 381091E 6286042N on a dead *X. gracillis*. These are not shown as infestations but the yet to be identified *Phytophthora* occurs in a *P. cinnamomi* infested area.

4.3.3 Drought and Fire Damage

Deaths of indicators due to drought were not apparent. However, there were a few (insignificant) deaths that could be attributable to fire (blackened stems, fire scarring).

4.3.4 Armillaria

Evidence of the presence of the native fungal pathogen *Armillaria luteobubalina* was not observed.

4.4 DISEASE OCCURRENCE AREA STATEMENT

CATEGORY	AREA(ha)
Uninfested	141.2
Uninterpretable	0
<i>P. cinnamomi</i> infested	117.3
TOTAL AREA	258.5

4.5 SAMPLE RESULTS

Twenty soil and root tissue samples were taken during interpretation. The results are detailed in Appendix 1.

5. DISCUSSION

Disease has spread consistent with predicted spread patterns made in the 1983 mapping although it would still be some time before the whole area became infested. The autonomous spread has been consistent with drainage and slope.

Only one "new" infection site was found, that being in the southern area. The source of this infection could not be determined.

There are significant "downslope" boundaries of infestation (boundaries which are part the way down a slope with the infestation on the higher side of the boundary) in the northern section. The potential remains for autonomous spread of *P. cinnamomi* into the two uninfested areas west of the main ore bodies in the northern section. However, if the western pit edge in this area is managed such that there is no drainage from the pit or transport of soil from the pit into the uninfested areas then it may be possible to prolong the time that those two areas remain uninfested.

In the southern section a large area remains uninfested. Hygiene applied to maintain this area as uninfested would need to consider the management of the mine pit across the *P. cinnamomi* boundary.

Other *Phytophthora* species are not usually considered to be significant in terms of the need for hygiene management. The sample where the yet to be identified *Phytophthora* occurs is within a *P. cinnamomi* infested areas and so will be managed by default.

6 CONCLUSION

Cable Sands Proposed Gwindinup Mine in Argyle State Forest Block, has been interpreted for disease presence by Bunbury Forest Management Branch Interpreters. The Total interpreted area is 258.5 ha. The total area infested by *Phytophthora cinnamomi* is 117.3 ha.

Access is not currently controlled on tracks within the area. Gavin's Road can not be regarded as uninfested. Similarly the track adjacent to private property, and the track situated in the middle of the northern area running approximately NW-SE must be considered in the same way. The track running north from the NW-SE track to Gavin's Road appears to be uninfested but would need access control to maintain this classification.

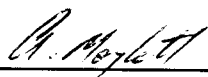
The *Phytophthora cinnamomi* Occurrence Map produced for the area has proposed age limits. Map boundaries should be checked before operations proceed if the map is older than one year (July 2002). The map should not be used if it is older than three years (July 2004). Areas that have had any soil moving operation in them become unreliable and should be checked prior to further/new activities.

7 RECOMMENDATIONS

1. Develop a mine site hygiene management plan with the aims of protecting the significant areas of uninfested as per recommendations below.
2. Obtain input and approval of the mine site hygiene management plan from the District Manager of the Department of Conservation and Land Management Blackwood District via the Departmental Officer with whom Cable Sands liases with within The Department.
3. Apply hygiene to protect the two western areas and the north eastern area in the northern section from infection by mining activities.
4. Apply hygiene to protect the uninfested area in the southern section.
5. Control access as soon as possible as part of the hygiene strategy.

8 REFERENCES

Helyar, K. (1994) "*Phytophthora cinnamomi* Interpretation Procedures Manual", Internal Document, Department of Conservation and Land Management, Bunbury.



DATE: 13/8/01

INTERPRETER

APPENDIX II

DEFINITIONS

***Phytophthora cinnamomi* (P.c.)**

Forest areas that show current *Phytophthora cinnamomi* symptoms and are supported by laboratory recoveries of *Phytophthora cinnamomi* from soil and tissue samples.

***Uninterpretable* (UI)**

Forest in which susceptible plants are absent or too few to enable the interpretation of *Phytophthora cinnamomi* presence or absence. The Uninterpretable category can also apply in the following situations;

1. Non forest areas such as powerlines, rock outcrops and areas of cleared forest.
2. Areas of dense vegetation that obscure indicator plants e.g. dense Karri understorey.

***Phytophthora cinnamomi* Free**

Forest areas apparently free of *Phytophthora cinnamomi* symptoms.

BLACKWOOD DISTRICT CABLE SANDS GWINDINUP

PHYTOPHTHORA CINNAMOMI OCCURRENCE MAP

MAP LEGEND

- UNINFESTED (PROTECTABLE)**
Determined by a qualified interpreter to be free of plant disease symptoms which indicates the presence of *Phytophthora*
- UNINTERPRETABLE (PROTECTABLE)**
Where susceptible plants are absent or too few to enable the interpretation of *Phytophthora* presence or absence.
- INFESTED**
Determined by a qualified interpreter to have plant disease symptoms consistent with the presence of *Phytophthora*

— BOUNDARY OF INTERPRETATION

*NB - Boundaries determined from field interpretation by qualified interpreters and transferred from GPS.
Interpreted areas mapped in Geocentric Datum of Australia 94 (GDA 94) grid system.

Map Limitations - The smallest areas of interpretation that can be portrayed on this map are 1 millimetre in diameter, representing 20 metres diameter on the ground. Areas less than this are symbolised to this size.

Interpreted & Compiled By - A.M., C.R., A.R., D.T. & L.S.
Completed - 10 JULY 2001
Digitized By - J. W. 11 JULY 2001

INTERPRETED USING STRIP LINE SURVEY.
BOUNDARIES CAPTURED USING GPS.

This File - gwindinup.dgn
Related Files - cablesands gwindinup.doc
Print File - gwindinup.ps

AREA STATEMENT

Categories	Area ha	Notes
UNINFESTED	141.2	
UNINTERPRETABLE		
INFESTED	117.3	
UNPROTECTABLE		
TOTAL AREA	258.5	

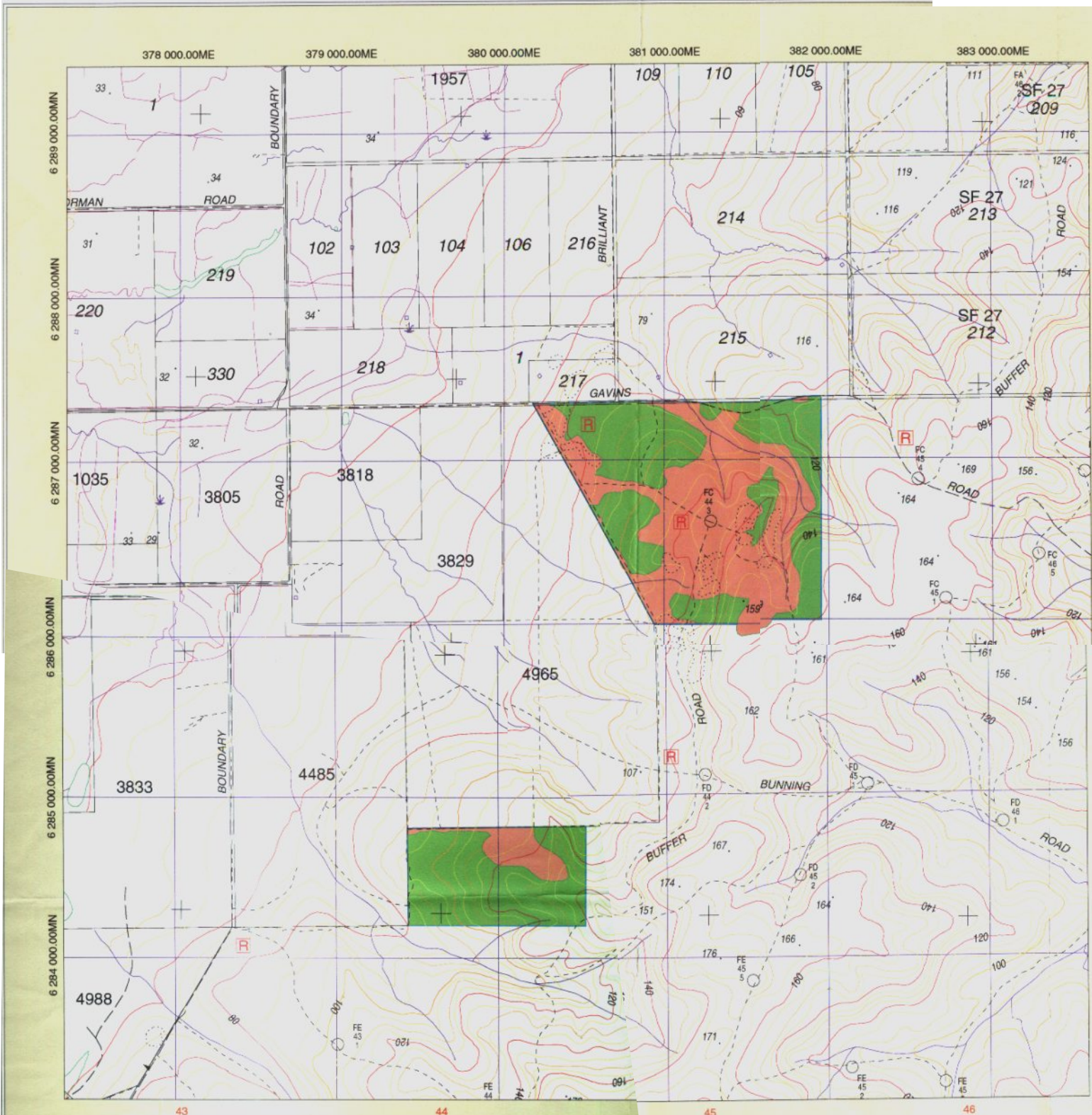
AGE LIMITS FOR THIS MAP

Map Boundaries should be checked before Operations proceed if this map is older than 1 year (July 2002)
This map should not be used if it is older than 3 years (July 2004)
Areas that have had an Operation in them become unreliable and should be checked prior to Further / New activities.

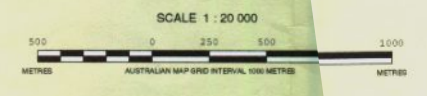


DEPARTMENT of
CONSERVATION and LAND MANAGEMENT

PREPARED BY THE FOREST MANAGEMENT BRANCH UNDER THE DIRECTION OF DR WALLY COX, EXECUTIVE DIRECTOR OF THE DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT, WESTERN AUSTRALIA.
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- LEGEND**
- 2 LANE SEALED ROAD
 - 1 LANE SEALED ROAD
 - 1 LANE UNSEALED ROAD
 - VEHICULAR TRACK
 - POWERLINE Pylon No.
 - REFERENCE TREE
 - HYDROLOGY
 - CONTOUR (5 metre intervals)
 - SWAMP
 - DAM
 - LANDFILL/RAIMP
 - WATER POINT
 - SPOT HEIGHT



PROJECTION: TRANSVERSE MERCATOR G.M. 117 E
HORIZONTAL DATUM: GEOCENTRIC DATUM OF AUSTRALIA 1984
VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM 1971

