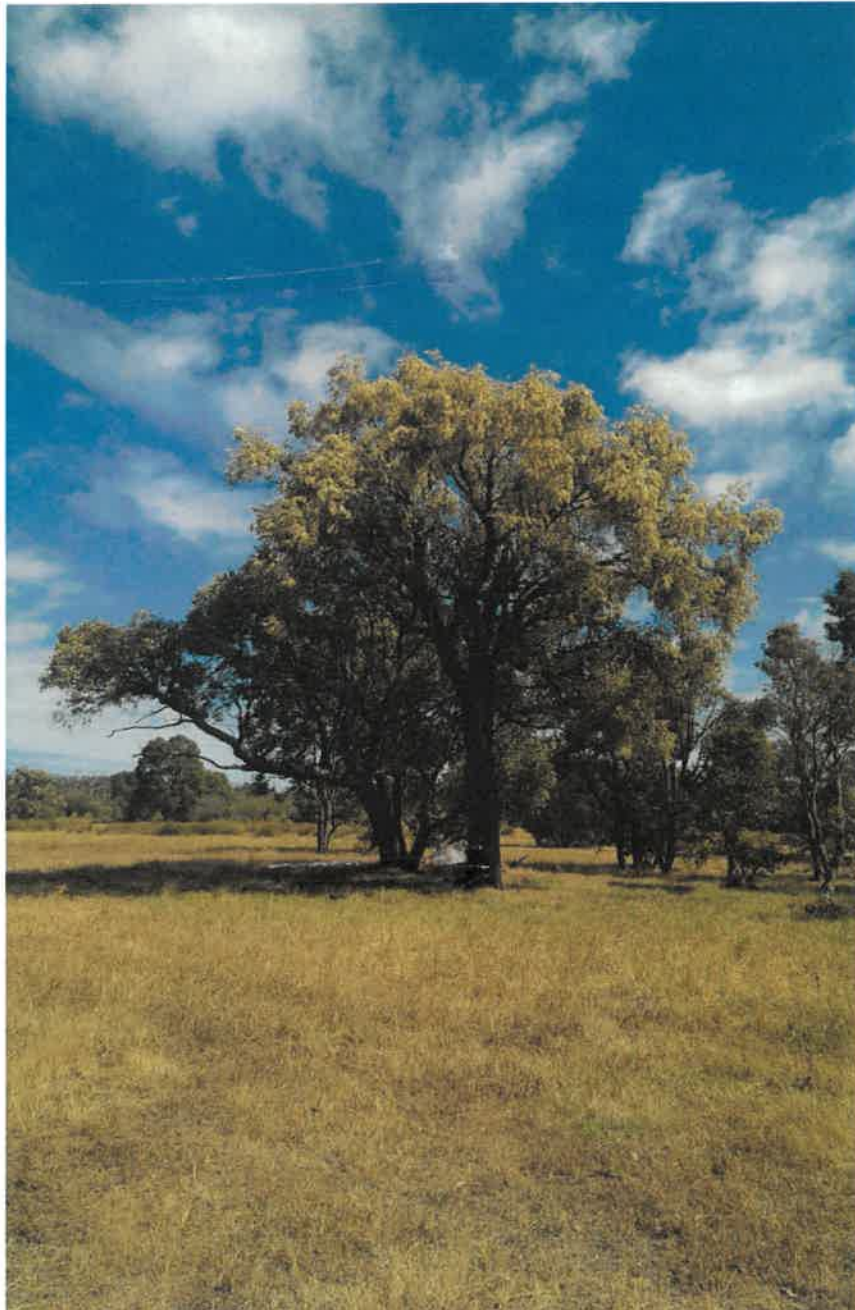Government of **Western Australia**
Department of **Parks and Wildlife**

Phytophthora Dieback Assessment Report
LOWLANDS NATURE RESERVE

FOREST MANAGEMENT BRANCH

Department of Parks and Wildlife

Release 1.0

Contents

1 SUMMARY

Assessment objective	Comprehensive dieback assessment
Client	SWAN COASTAL DISTRICT
Project area	1146.8ha
Method of assessment	Modified transect survey
Date commenced	24/10/14
Date completed	5/12/14
Interpreters	Jake Cortis, Nathan Ashburner, Joel Chick, Ian Moore
Project area access	Lowlands road
Previous assessment	2007
Past disturbances	Livestock grazing, land clearing and mechanical disturbances (farm machinery and vehicles)
Current disease distribution	Serpentine River and adjacent areas. Areas south of the Serpentine River. Areas North of the Serpentine River
Disease expression	Subtle-obvious
Predicted impact	High
Sampling strategy	Areas of low interpretability and "positive recovery" of obvious dieback to lower the occurrence of "false negative" sample results
Management recommendations	As decided at Hygiene management meeting.
Protectable / unprotectable	Protectable
Other key points	
Products	Occurrence map Assessment report
Map revalidation	5th of December 2015

2   INTRODUCTION

2.1   Background

Phytophthora Dieback disease caused by the pathogen *Phytophthora cinnamomi* (*P.c.*) is a major threat to the biodiversity of south-western Australia. The spread of this water mould is facilitated by the movement of soil infested with spores, particularly under warm, moist conditions. Consequently, a major component in the strategy to constrain this disease involves managing access and soil-disturbance activities within native vegetation. Knowledge of the occurrence of the disease in the landscape is therefore an essential prerequisite to formulating suitable hygiene management practices.

Forest Management Branch (FMB) has offered to map the occurrence of *Phytophthora cinnamomi* within Lowlands Nature Reserve for Swan Coastal district for the purposes of hygiene management and disease mitigation.

Interpretation commenced on the 24/10/14 and was completed 5/12/14.

2.2   Location and Size of Areas

Lowlands Nature Reserve is located on the Swan Coastal Plain, adjacent to the Serpentine River south of Perth and is within the shire of Serpentine-Jarrahdale. Private properties surround the area. The total area of the reserve is 1146.8ha

2.3   Historical Land Use and Past Disturbances

The assessment area is located within a nature reserve. DPaW records show:

- Previous assessment-GLEVAN 2007
- Rainfall: 900-1000mm (historical average)
- Disease Risk Area (DRA) – No

3 METHODS

3.1 Interpretation

Field interpretation followed the standard methods and operating procedures described in the document titled "Manual for detecting and mapping Phytophthora dieback disease (Procedures for DPAW-managed estate) 2013"

A modified assessment method was used given the limited amount of time available to survey such a large area. Known infested areas where mapped first followed by secondary infestations that had not been previously mapped. Uninfested areas adjacent to infested areas are assumed to be uninfested to the best of our ability without fully surveying these areas.

The presence or absence of the pathogen was determined through field observations of disease symptomology in conjunction with soil and tissue sampling of dead plants.

Non-differential, hand-held Global Positioning System (GPS) receivers were used for navigation and to record survey boundaries and waypoints within the assessment area that are of significant value.

3.2 Demarcation

The infested areas were demarcated using 25mm "Day-Glo orange" tape, tied with knots facing in to the infestation/category

"Uninterpretable" and "temporary uninterpretable/unmappable" areas were demarcated using 25mm pink and black "tiger tape", tied with knots facing in to the category

"Excluded unprotectable" areas have been demarcated with 25mm 'Day-Glo orange' tape, tied with knots facing in to the category.

3.3 Soil and Tissue Sampling

35 soil and tissue samples were taken from dead or dying plants to confirm the presence or absence of *Phytophthora cinnamomi*. Samples were sent to the Vegetation Health Service (VHS) laboratory at Kensington where diagnostic baiting was conducted. Sample results will be used as evidence for the dieback assessment and reporting.

The sample point locations were recorded with GPS receivers. Appendix 8.1 summarizes the laboratory results of the sampling.

3.4 Mapping

The field observations, boundaries, waypoints and survey data were downloaded into a Geographic Information System (GIS) from a GPS to generate a P.c. occurrence map for the area.

4 RESULTS

4.1 Hygiene Category Distribution

Infested areas exist throughout the reserve primarily throughout southern areas, along the Serpentine river alignment and surrounding areas. There are also infestations near the northern boundary of the reserve and along the western boundary north of the river.

Uninterpretable:

One uninterpretable area has been identified within reserve. This area is uninterpretable due to its species composition, lacking sufficient numbers of indicator species to be able to determine the presence of *P.c.*

Temporarily Uninterpretable areas: (Unmappable)

Three temporarily uninterpretable (unmappable) areas have been identified. These areas have been disturbed by grazing or mechanical means and do not contain a sufficient amount of indicator species to determine the presence of *P.c.*at the time of assessment. However, it is expected that these areas will regenerate over time and will eventually be assessable for the presence of *P.c.*

Unprotectable areas:

Five unprotectable areas have been identified. They are adjacent to infested areas and are either highly likely to be infested or are likely to become infested due to their proximity to infested areas.

Refer to table below for category sizes.

Table 1: Hygiene Category Area Statement – Version 1

Primary Categories	Area Ha	Uprotectable	Predicted High Impact
Infested	307.9		0
Uninfested	698.3		
Uninterpretable	28.4		
Assesses Area	1034.6	0.0	0.0
Excluded	112.2	88.8	
Project Area	1146.8		

4.2 Disease Expression

Disease expression varied significantly throughout all infested areas of the reserve. Subtle disease expression was observed along the western infested boundary north of the serpentine river and along an infested seasonal creek south of the Serpentine River and along the river itself. Few, recent "Indicator Species Deaths" (ISDs) were present at these locations.

The remaining infested sites throughout the reserve displayed obvious symptoms of disease including moderate numbers of recent ISDs and a greatly reduced Biomass. A chronology of ISDs was evident throughout these infested sites with more recent deaths at the disease edge and older deaths (stags) away from the disease edge.

Indicator species used for this assessment included *Banksia menziesii, Banksia attenuata, Banksia ilicifolia, Banksia grandis, Eucalyptus marginata, Xanthorrhoea preissii* and *Stirlingia latifolia.*

Infested area adjacent to Serpentine River

A disease edge can be seen here, with healthy vegetation on the right of image

4.3 Current Disease Impact

A moderate to high disease impact was observed at Lowlands Nature Reserve. Biomass and species diversity has been greatly reduced in some areas, particularly throughout southern areas of the reserve. Bare, sandy patches can be observed at high impact sites were the disease has been present for many years.

4.4 Predicted Disease Impact

The predicted impact for infested areas and areas yet to be infested is high, based on the fact a high disease impact has already been observed at sites were the infestation has been present for many years. Lowlands reserve has a high number of species susceptible to *P.c.*, particularly Banksias, and as such the biomass and biodiversity of the reserve will be significantly reduced in infested areas.

Many infested areas throughout the reserve will eventually look like this; low species diversity and a heavily reduced biomass

5 DISCUSSION

5.1 Disease Expression

Disease expression was sporadic and patchy throughout the reserve. It was often difficult to identify a disease edge due to the numerous other degrading processes observed throughout vegetation of the reserve, such as drought, livestock damage and mechanical disturbances (vehicles). Vegetation types with low numbers of indicator species and/or with degraded understoreys also added to the complexity of identifying dieback within the reserve. In particular areas dominated by Kunzea ericifolia would fall in to this category and as a result some of these areas are uninterpretable.

Infestations where in most cases initially identified by a loss of biomass and low species diversity, however only in areas that were interpretable such as Banksia woodland and/or vegetation types that had multiple indicator species present. Large infested areas exhibited many older dead plants (stags) and open sandy areas with a sparse understorey.

5.2 Sampling

An extensive sampling strategy was employed at Lowlands Nature Reserve primarily due to the difficult conditions that interpreters where faced with while assessing the reserve. Many samples were taken to aid in the decision making of category assignment, as it was often difficult to distinguish infested areas, from drought stricken areas. Moreover other degrading processes such as livestock grazing and clearing increased the need for sampling as these processes can display similar symptoms to that of infested sites.

35 samples were taken in total from most areas of the reserve covering a range of different vegetation types. Banksias were the most common genus sampled, primarily due to their susceptibility to *P.c.* and because Banksias are spread throughout the entire reserve.

More samples would have been taken particularly throughout the south western area of the reserve if time permitted due to the difficulty faced while interpreting that area. This area has been significantly modified by livestock grazing and drought leaving the vegetation in an unnatural state.

6 CONCLUSION

Lowlands Nature Reserve was interpreted from 24/10/2014 to 5/12/2014 for the presence of *Phytophthora cinnamomi*. The total interpreted area is 1034.6. The total area infested by *Phytophthora cinnamomi* is 307.9ha.

698.3ha of the reserve is uninfested and protectable.

An Occurrence Map has been prepared to show disease boundaries. *P.c.* has the ability to spread autonomously and through vectors such as machinery, vehicles and animals therefore assessment area boundaries should be revalidated if the map is older than 1 year (5th December 2015). A full re-interpretation will be required after three years (5th December 2017) if there is continuing or new disturbance activities within the assessment area.

7   RECOMMENDATION

7.1 Hygiene Management

Phytophthora management tactics should be devised with consideration to protectable areas. Swan Coastal District should formulate tactics in consultation with Forest Management Branch, Kensington. The Department's Phytophthora management proforma will identify necessary steps in prescribing effective Phytophthora management strategies and tactics.

Jake Cortis

Kensington FMB

22/01/2015

8 REFERENCES

- Department of Conservation and Land Management (2013) Manual for detecting and mapping Phytophthora dieback disease (Procedures for DPAW-managed estate)

- Havel, J.J. (1975) Site Vegetation Mapping in the Northern Jarrah Forest (Darling Range). 2. Location and Mapping of Site-Vegetation Types.

- Botanic Gardens Trust Sydney NSW. Armillaria root Rot – fact sheet. http://www.rbgsyd.nsw.gov.au/information_about_plants/pests_diseases/fact_sheets/armillaria_root_rot
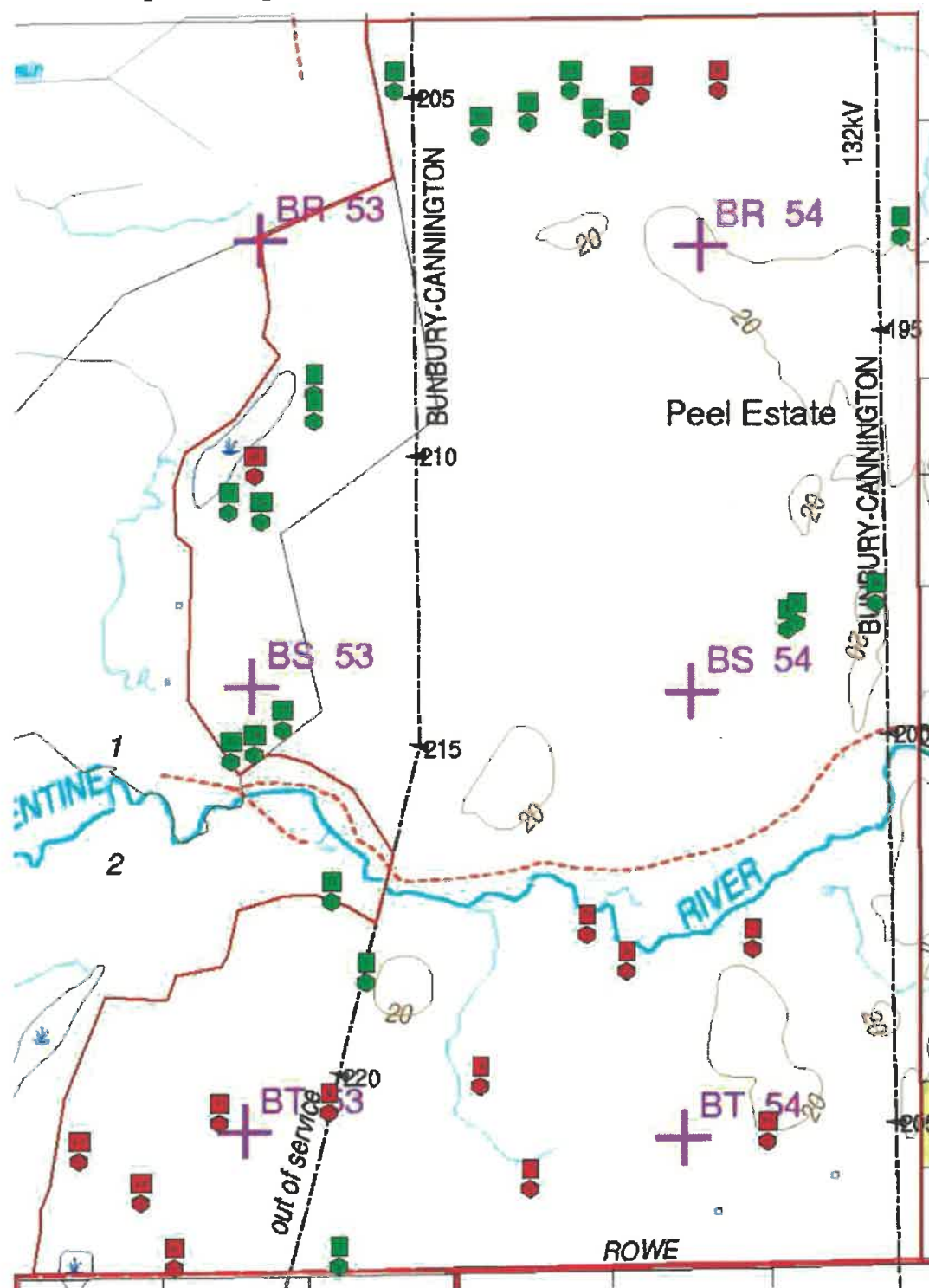
9 APPENDICES

9.1 Summary of Soil and Tissue Samples
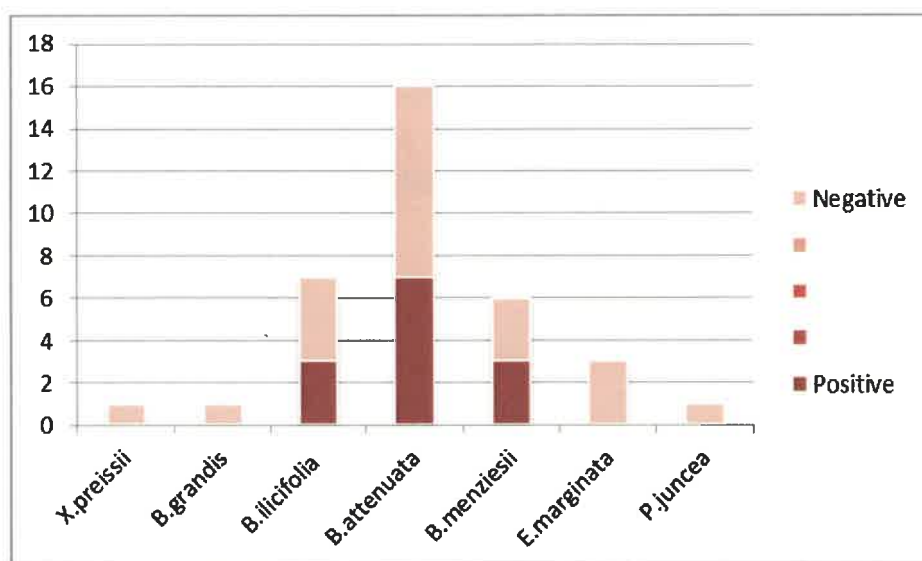
9.2 Map of Sample Locations

Positive *P.c.* sample

Negative *P.c.* sample