



Department of Biodiversity,
Conservation and Attractions



Review of old-growth forest status – Public nomination

Helms 0119



Forest Management Branch

March 2020



Department of **Biodiversity,
Conservation and Attractions**



Review of old-growth forest status – Public nomination

Helms 0119

Version: 1.0

Approved by: Manager, Forest
Management Branch

Last Updated:

Custodian: Manager, Forest Management Branch

Review date:

Version number	Date approved	Approved by	Brief Description
1.0	09 March 2020	Dr Martin Rayner, Manager FMB	Final report

Department of Biodiversity, Conservation and Attractions
Locked Bag 104
Bentley Delivery Centre WA 6983
Phone: (08) 9219 9000
Fax: (08) 9334 0498

dbca.wa.gov.au

© Department of Biodiversity, Conservation and Attractions on behalf of the State of Western Australia 2020

February 2020

This work is copyright. You may download, display, print and reproduce this material in unaltered form (retaining this notice) for your personal, non-commercial use or use within your organisation. Apart from any use as permitted under the *Copyright Act 1968*, all other rights are reserved. Requests and enquiries concerning reproduction and rights should be addressed to the Department of Biodiversity, Conservation and Attractions.

ISSN [ISSN] (print)

This report was prepared by Forest Management Branch

Questions regarding the use of this material should be directed to:

Manager
Forest Management Branch
Parks and Wildlife Service
Department of Biodiversity, Conservation and Attractions
Locked Bag 104
Bentley Delivery Centre WA 6983
Phone:
Email:

The recommended reference for this publication is:
Department of Biodiversity, Conservation and Attractions, 2019, *Review of Old-growth Forest Status – Public Nomination Helms 0119*, Department of Biodiversity, Conservation and Attractions, Perth.

This document is available in alternative formats on request.

Cover image: Jarrah forest within a portion of compartment 01, Helms forest block. *Photo - DBCA*

Contents

Summary.....	6
1 Introduction	7
2 Method.....	7
2.1 Systematic review of datasets and analysis steps	8
2.2 Field inspections and re-survey.....	8
3 Results.....	9
3.1 Systematic review of datasets and analysis steps	9
3.2 Field inspections and re-survey.....	9
4 Conclusion	12
Appendices	13
Appendix 1 Helms 01 review of old growth forest status report.....	13
Appendix 2 Helms 01 coupe extension stump map	26
Appendix 3 Targeted review areas.....	27
Appendix 4 Recheck stump survey	28
References.....	29
Figure 1 Depicts a forest stand heavily disturbed from previous timber harvests in the south-west cells of Helms 0119	9
Figure 2 Typical example of Phytophthora dieback disease expression within the target areas reviewed in Helms 0119.....	11

Summary

A public nomination to review the old-growth forest status of jarrah forest in a timber harvest coupe within Helms forest block was accepted by the Department of Biodiversity, Conservation and Attractions (DBCA) on 20 January 2020.

An earlier detailed review of the old-growth forest status within the coupe had been undertaken during the routine harvest planning and approvals process in 2018. A systematic review of the spatial datasets that informed that review and the analytical steps taken to determine old-growth forest status was conducted, and supplemented by targeted field inspection and re-survey of areas of concern in the nomination.

This review and field checks confirmed that the veracity of the original work and no additional areas of jarrah old-growth forest were identified.

1 Introduction

Areas of old-growth forest are not available for timber harvesting. The *Forest Management Plan 2014-2023* provides for the public to nominate to DBCA areas of forest which may be unmapped old-growth forest, for subsequent assessment to determine their old-growth forest status.

On 20 January 2020 the department received a public nomination requesting a review of the old-growth forest extent and boundaries within the timber harvest coupe of Helms 0119. The nomination identified broad geographical areas of concern and suggested the number of stumps (used as an indicator of previous harvest extent and intensity) in some areas may have led to an underestimation of the extent of old-growth forest. The nomination was accepted by the Department of Biodiversity, Conservation and Attractions (DBCA) and the Forest Products Commission (FPC) was advised to suspend operations in the coupe pending the outcome of this review.

The forest in Helms 0119 is dominated by a mixture of jarrah and marri. In this forest type 'old-growth forest' is defined as 'uncut (never harvested) forest or forest subject to minimal disturbance and that is not affected by *Phytophthora cinnamomi*' (see FEM075 *Procedures for the assessment, identification and demarcation of old-growth forest*).

As part of the routine coupe planning process an earlier assessment of the old-growth forest status of areas within the coupe had been undertaken following a formal referral of the area by FPC on 16 July 2018. That review (Appendix 1), conducted in accordance with DBCA procedure FEM 075, identified approximately 53 hectares of previously unmapped old-growth forest. The remaining area reviewed (comprising 123 hectares) remained available for harvest as it did not meet the criteria for old-growth forest.

In June 2019 a small extension to the western boundary of the coupe was approved by DBCA and a further survey for the presence of unmapped old-growth forest was conducted in the 12 hectare area. All patches that were uninfested by *Phytophthora dieback* within the extended area were surveyed, and no additional jarrah old-growth forest was identified (Appendix 2).

2 Method

Given the previous detailed assessment of old-growth forest status within the coupe, and the nature of the concerns raised in the public nomination, a two-stage, risk-based approach was adopted for this review.

In the first stage, a comprehensive, systematic review was undertaken of all the contributing datasets used to determine old-growth forest status, and their application in accordance with the procedures.

The second stage of the review involved field inspection and re-survey of target areas deemed to have most potential to change status from non old-growth to old-growth forest, based on the original stump frequency data and *Phytophthora dieback* mapping boundaries.

2.1 Systematic review of datasets and analysis steps

Old-growth forest status is determined through the intersection of multiple datasets describing land tenure, forest type, structure, harvest and other disturbance history, and disease occurrence. Datasets of stump location and number gathered from field surveys are also combined to inform old-growth forest status.

The version, integrity and completeness of each corporate spatial dataset was checked, while the raw spatial datasets captured in the field during the original assessment were re-examined. Attribute tables in these datafiles were checked for irregularities (e.g. duplicates or projection errors) that may have contributed to possible miscalculations or overestimation of stump counts.

Potential errors arising during the interpretation and analysis of disturbance indicator datasets were then checked by overlaying stump location datasets with key boundaries. These boundaries included all formal and informal reserves, harvest exclusion zones, *Phytophthora* dieback occurrence and the Forest Management Information System (FMIS) grid sampling frame (polygons and centroids).

2.2 Field inspections and re-survey

Experienced field officers from two separate Branches within DBCA undertook checks on the veracity of the original recorded location of tree stumps and dieback occurrence within the areas available for timber harvest. Dieback-free areas, and cells where fewer than 4 stumps per 2 hectares had been recorded were targeted for inspection.

As GPS co-ordinates for areas of concern were not available from the public nomination documentation, field officers concentrated their investigations on two main locations (Area 1 and Area 2) detailed in the proponents' submission, at clean on entry (CoE) points on Shunt 2, off Mowen Road and on McAtee Road off St John Road (Appendix 3). The focus was on FMIS polygons adjacent to where 2 or less stumps per 0.5 hectares were recorded, and uninfested patches on the edge of dieback boundaries.

Larger, previously surveyed cells in the south-west of the coupe were not rechecked. Intensive sampling in 2018 over several survey cycles had previously determined that the majority of these areas are highly disturbed (Figure 1) with stump numbers in most 0.5 hectare FMIS cells exceeding the minimal disturbance threshold of less than 2 stumps per 0.5 hectares.

Patches considered to be minimally disturbed had already been reclassified as old-growth forest and therefore did not require further investigation.

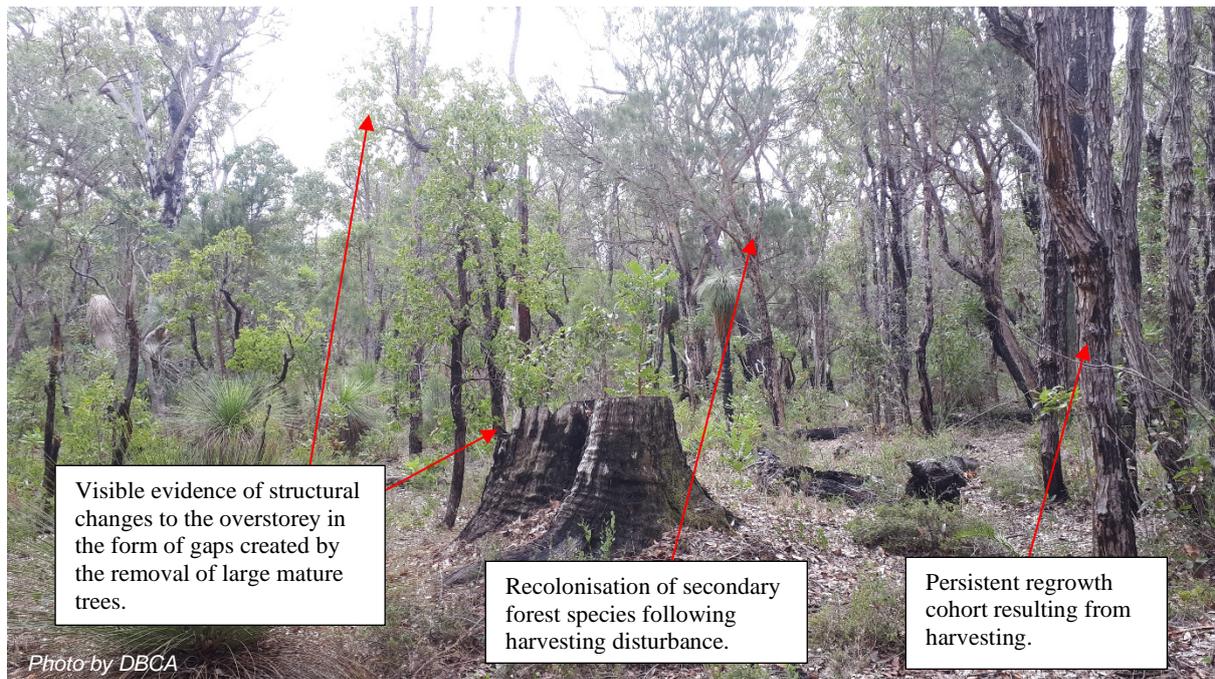


Figure 1 Depicts a forest stand heavily disturbed from previous timber harvests in the south-west cells of Helms 0119

3 Results

3.1 Systematic review of datasets and analysis steps

The recheck of corporate datasets found no errors or omissions had occurred when combining and deriving old-growth forest extent in the previous report (Appendix 1).

Nineteen separate stump survey datasets, including approximately 103 km of track files and 1339 stumps, recorded during the original assessment of the coupe were re-examined. No data corruptions or incongruities were detected. The amalgamated stump data file was also audited for duplication or other errors, and none were identified.

The overlay of the interpreted datasets, comprising the assessment area boundary (i.e. all areas available for harvest, uninfested by dieback), the 0.5 hectare cell FMIS grid and the stump location data, was re-analysed. All stump counts attributed in the 0.5 hectare FMIS grid cells accurately corresponded with the spatially mapped stump data. No errors were detected in the spatial analysis and interpretation of survey data that could have impacted the accuracy of either the extent or boundaries of old-growth forest.

3.2 Field inspections and re-survey

Targeted field checks were conducted in those areas with the highest likelihood of being reclassified to old-growth forest (i.e. containing minimally disturbed cells). Additional evidence of disturbance (i.e. presence of stumps) was identified and recorded in all the target areas (Appendix 2).

This resampling confirmed that due to the impaired visibility arising in pockets of dense understorey, stump decay and fire degrade, the initial stump enumerations were underestimated in many cells. No new candidate minimal disturbance forest stands containing fewer than 6 stumps per 2 hectares were detected.

The dieback boundaries were checked in the field by both Forest Management Branch and Ecosystem Health Branch staff in all targeted areas. Ground truthing confirmed that the dieback mapping within these areas was accurate with symptoms of *Phytophthora cinnamomi* infestation (often high impact) clearly noticeable in many of the target areas reviewed (Figure 2).

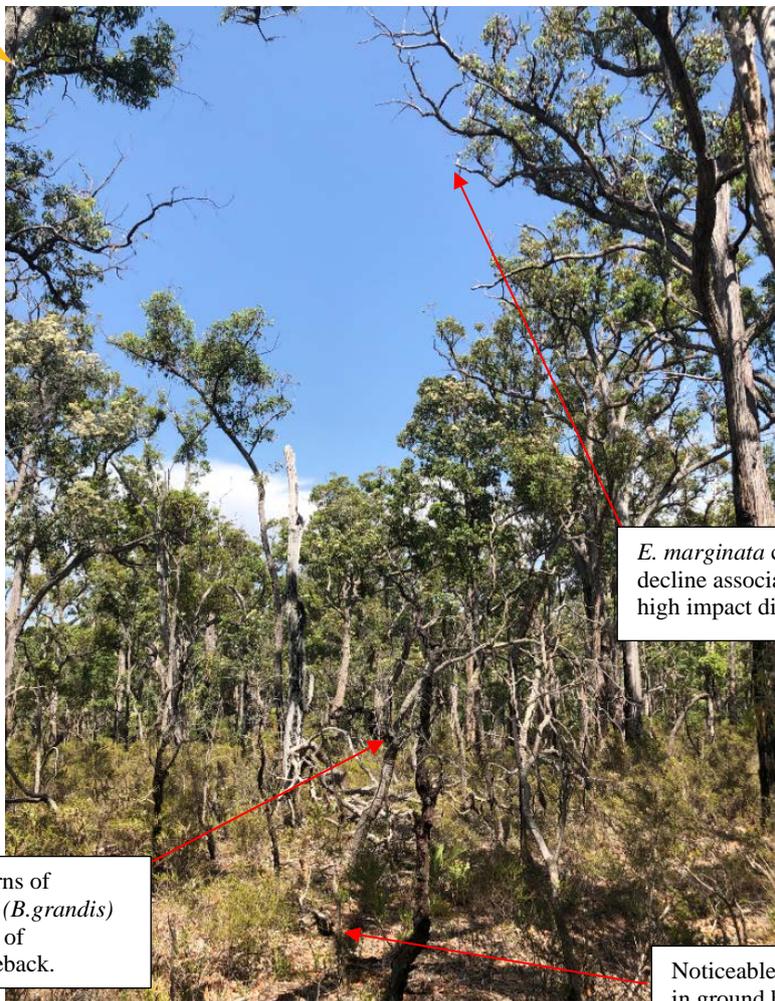
Field staff also observed that tree marking operations, which incorporate the retention of larger, veteran trees for fauna habitat, had not commenced in most of the coupe.



Infested

Uninfested

Photo by DBCA



Distinctive patterns of indicator species (*B. grandis*) deaths indicative of *Phytophthora* dieback.

E. marginata crown decline associated with high impact dieback.

Noticeable reductions in ground biomass.

Figure 2 Typical example of *Phytophthora* dieback disease expression within the target areas reviewed in Helms 0119

4 Conclusion

Both the review of spatial datasets and the targeted field rechecks indicate that the findings of the initial report compiled by DBCA in relation to the old-growth forest status of Helms 0119 were accurate. No additional stands of minimally disturbed forest were identified that complied with the jarrah old-growth forest definition of 'uncut forest or forest subject to minimal disturbance which is not known to be affected by *Phytophthora cinnamomi*' (RFA 1998). Therefore, no changes to the old-growth forest status of Helms 01, beyond those previously identified, are recommended.

The field checks confirmed a higher number of stumps in several cells of the mapped old-growth forest derived from the first assessment. These additional stumps (indicating more than minimal disturbance) would disqualify those cells from old-growth forest status. However, as this review was of the original decision which was based on the standard sampling frame and intensity routinely applied in the FEM075 *Procedures for the assessment, identification and demarcation of old-growth forest*, no changes to the original boundaries are recommended.

Appendices

Appendix 1 Helms 01 review of old growth forest status report

 GOVERNMENT OF WESTERN AUSTRALIA Department of Biodiversity, Conservation and Attractions	Review of old-growth forest status
---	---

Forest Block/ Compartment	Helms 01
Region	South West
District	Blackwood
Date of request	16 th July 2018
Origin of request	Forest Products Commission
Location	Helms 01 harvest coupe is approximately 10 kilometres ^{south} north-west of the township of Nannup. The coupe is bounded by Mowen Road in the north, Stoate Road and an unnamed stream system in the west, and St John Road in the east and south. McArtee Road extends centrally through the coupe, dividing several areas of "dieback free" cells. These cells are depicted as seven areas of interest (AOI) on the Base map in Appendix 1.
Forest type definition applied to assessment area	Jarrah and jarrah/tingle forest: "uncut forest or forest subject to minimal disturbance which is not known to be affected by <i>Phytophthora cinnamomi</i> "

Summary	<p>A review of the nominated area was conducted in accordance with the <i>Procedures for the assessment, identification and demarcation of old-growth forest</i> (FEM Procedure FEM075).</p> <p>As a result of this assessment, approximately 53 hectares of previously unmapped old-growth forest (including 1.5 hectares of forest incorrectly mapped as a diverse ecotype zone) was identified. These areas will be added to the old-growth forest layer and will not be available for timber harvesting. The remaining 123 hectares of the AOI reviewed, did not satisfy the criteria for old-growth forest and therefore remain available for harvesting.</p>
----------------	--

Report Reviewed	28 NOV 18
Endorsed	M. Rayner ✓ M.R.
	Manager, Forest Management Branch

Informal reserve assessment review- ID number: 588

1. Collation of background data and refinement of assessment area

1.1 Forest type and structure

Aerial photo interpretation (API) of imagery captured in 1955, indicated at the time of interpretation the coupe was predominantly a jarrah (J) forest type of varied structure and composition, with a typical height class of 20 – 24 metres (Appendix 2).

A description of specific structural classifications for the seven AOI at the time of interpretation are as follows:

AOI 1 - Two-layered forest stand, comprising of a pole (P) understorey with 40 per cent total crown cover, and an upper strata crown cover of 20 per cent.

AOI 2 - Two-layered forest stand, comprising of a pole understorey with between 40 – 60 per cent total crown cover, and 20 per cent upper strata crown cover.

AOI 3 - Two-layered forest stand, comprising of a pole understorey, with between 40 - 60 per cent total crown cover, and 20 per cent crown cover in the upper strata.

AOI 4 - Two-layered forest stand, comprising of a pole understorey with between 50 - 60 per cent total crown cover, with an upper strata crown cover of between 20 - 30 per cent. Severe fire damage (SFD) recorded in the upper cells.

AOI 5 – Severely fire damaged, one-layered massed stand (M), comprising of 40 per cent crown cover.

AOI 6 – Consists of both a massed forest stand, of 40 per cent crown cover, and several pole forest stands ranging between 30 – 80 per cent total canopy cover with between 20 – 30 per cent crown cover in the upper strata.

AOI 7 – A pole forest stand of 30 per cent upper strata crown cover and 60 per cent total crown cover.

Most of the cells demarcated for harvest exclusion were generally non-forest (less than ²⁰⁻³⁰ 30 per cent crown cover) vegetation associated with streams and upland depressions. Non-forest areas are typically identified by DBCA as informal reserve type; diverse ecotype zones and are unavailable for harvesting.

Inconsistency between DEZ boundaries classified in corporate data records and harvest exclusion boundaries demarcated in the field were identified in AOI 4 and 5. Analysis of recently acquired high-resolution stereo imagery and historical forest mapping indicated that several cells categorised as non-forest contain canopy cover 30 per cent or greater and therefore do not qualify as DEZ. These cells are depicted in Appendix 2¹. ✓

¹ For more detail on the DEZ amendment recommendation for this coupe, please refer to section B in the Informal Reserve Amendment Request form.

1.2 Harvest history

Historical harvest records indicate that AOI 1,2,3,4,5,7 and most of AOI 6 had been cut over once in the decade of 1930 – 1939. A few of the eastern cells within the AOI 6 recorded a second harvest event in the decade of 1960 – 1969 (Appendix 3).

1.3 *Phytophthora* dieback status

Recent mapping of *Phytophthora* dieback disease occurrence, indicated that 512 hectares of the 740.5 hectares assessed, was infested with *Phytophthora cinnamomi*. Several isolated cells, totalling 228 hectares, remained dieback free. The uninfested dieback cells, that were available for harvest, were targeted as AOI and reviewed for the presence of old-growth forest (Appendix 4).

1.4 Fire history

The first recorded incident of fire occurrence within the coupe, was a summer wildfire in 1941. It is possible that this event was the source of the severe fire damage identified in the 1955 API. The next recorded fire event was a prescribe burn in 1957, with regular successive control burns recorded up until 2008.

2. Stratification of disturbance history using aerial photograph interpretation and other datasets

Historical aerial photography, within 10 years post-harvest, was unavailable and consequently could not be used to measure disturbance levels. Alternatively, high-resolution stereo imagery (captured in 2014) was analysed to determine disturbance history and regrowth persistence. However, time elapsed since the last harvest occurrence, frequent fire events and the selective style in which the coupe was harvested, made it difficult to clearly distinguish extent and level of disturbance. Therefore, a full stump survey was required.

3. Field survey of stump occurrence

Comprehensive field surveys for stump occurrence and other disturbance indicators was conducted in all AOI.

A 0.5 hectare cell FMIS grid provided a systematic sample frame for survey transects to ensure full coverage of each AOI. In each cell surveyed, disturbance indicators were marked using white paint and recorded on GPS device. A map of disturbance indicator locations was prepared from the GPS data and is depicted in Appendix 5.

Evidence of disturbance, in the form of large jarrah stumps, was clear in the higher quality forest extents of the AOI. In these cells, stumps displaying the characteristic axe marks of 1930s axe and crosscut saw felling techniques (Figure 1), were easily identified. Indication of sleeper cutting activity was also recorded in AOI 7 (Figure 2 & 3).



Figure 1. Depicts axe marks typical of 1930s harvesting.



Figure 2 & 3. Remnants of sleeper cutting in AOI 7.

A significant reduction in stump intensity was noticeable in marginal forest stands (Figure 4) within AOI 2, 4 and 5. In these areas, the lower quantity and poorer quality of the timber appeared to reflect limited timber harvesting in the past. In addition, severe fire damage recorded post-harvest in AOI 5 and most of AOI 4 may also have severely impacted the condition of stumps, making identification more challenging. Consequently, in these areas it is possible that the location and number of stumps recorded is an underestimate.



Figure 4. Depicting marginal timber stands within the northern parts of AOI 4. These open forest areas consisted of mostly stunted jarrah, woody pear (*Xylomelum occidentale*), kingia (*Kingia australis*) and balga (*Xanthorrhoea preissii*) on sandy, gravelly, ironstone soils.

4. Analysis of stump and other data to determine old-growth forest status

A GIS filter technique using the 0.5 hectare FMIS grid and spatial stump enumerations was used to objectively analyse each AOI and assist in defining old-growth forest boundaries. A minimal disturbance stump threshold of 2 or less stumps per 0.5 hectares and six or less stumps per 2 hectares (four combined 0.5 hectare cells) was applied to delineate 2 hectare cells (the minimum mappable area for old-growth forest) where stump numbers and pattern indicated minimal disturbance, and hence potential old-growth forest (Appendix 6). ✓

Minimal disturbance cells were identified in all AOI surveyed, with the exception AOI 3. These cells were often associated with marginal forest adjacent to stream zones and DEZ. The limited evidence of previous harvest disturbance and lack of *Phytophthora* dieback occurrence qualifies these areas to be reclassified as jarrah old-growth forest.

AOI where stump counts exceeded the minimal disturbance threshold, were categorised as being more than minimally disturbed and are therefore to remain as non old-growth forest.

5. Recommendations

Recommendation	Area (ha)	Classification	Map colour
5.1	53	Old-growth forest	Brown
5.2	123	Non old-growth forest	Yellow

The boundaries of the previously unmapped old-growth forest identified in this assessment process will need to be demarcated in the field prior to the commencement of harvesting activities. The exemption being 2 hectares identified in AOI 1, as the centroids of these cells already occur within the boundaries of previously demarcated harvest exclusion areas.

6. Proposed corporate data amendments

- | | | |
|-----|--|---|
| 6.1 | Amendment of the corporate informal reserve dataset. | Y |
| 6.2 | Amendment of the corporate harvest history dataset. | N |
| 6.3 | Amendment of the corporate old-growth forest dataset | Y |
| 6.4 | A revised harvest coupe map depicting the additional informal reserves and reclassified old-growth forest. | Y |

7. Appendices

- Appendix 1 Harvest coupe base map.
- Appendix 2 Section of original API map and/ or recent aerial interpretation
- Appendix 3 Harvest history from FMIS database.
- Appendix 4 Section of the *P.cinnamomi* protectable areas map
- Appendix 5 Disturbance locations map depicting areas surveyed and GPS location of stumps and other disturbance indicators.
- Appendix 6 Disturbance levels map.
- Appendix 7 Old-growth forest status map, depicting the area to be classified as old-growth forest.

Appendix 1

Old-Growth Forest Status Review

Helms 0119

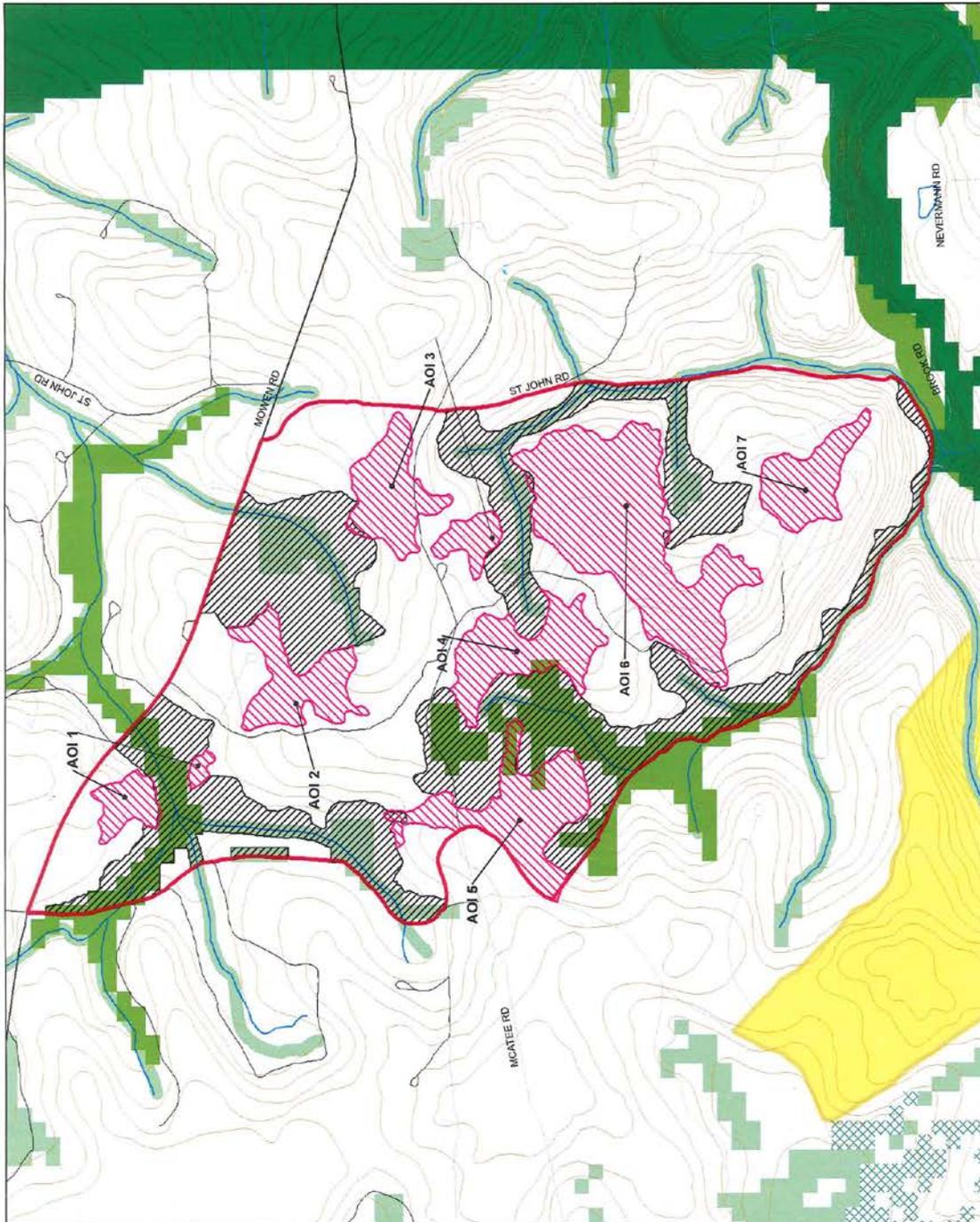
Base Map

LEGEND

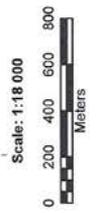
-  Proposed Harvest Coupe
-  Areas of Interest (AOI)

EXCLUSION AREAS

-  Demarcated areas excluded from harvesting
-  Existing and Proposed Conservation Reserves
-  CAR Informal Reserves
-  Other Informal Reserves
-  Old Growth Forest
-  Final Fauna Habitat Zones
-  Indicative Fauna Habitat Zones
-  Interim Fauna Habitat Zones



Map created: 2018



Projection: Universal Transverse Mercator, MGA Zone 50, Datum: GDA 94

Produced by the Forest Management Branch, Under the direction of the Director General, Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity, Conservation and Attractions does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence which may arise from relying on any information depicted.



Appendix 2

Old-Growth Forest Status Review

Helms 0119

Aerial Photography Interpretation

LEGEND

-  Proposed Harvest Coupe
-  Areas of Interest
-  Demarcated for harvest exclusion.
-  CAR Informal Reserves DEZ.
-  Digitised boundary of the CAR Informal Reserve DEZ.
-  Cells with canopy cover > 30% requiring amendment.

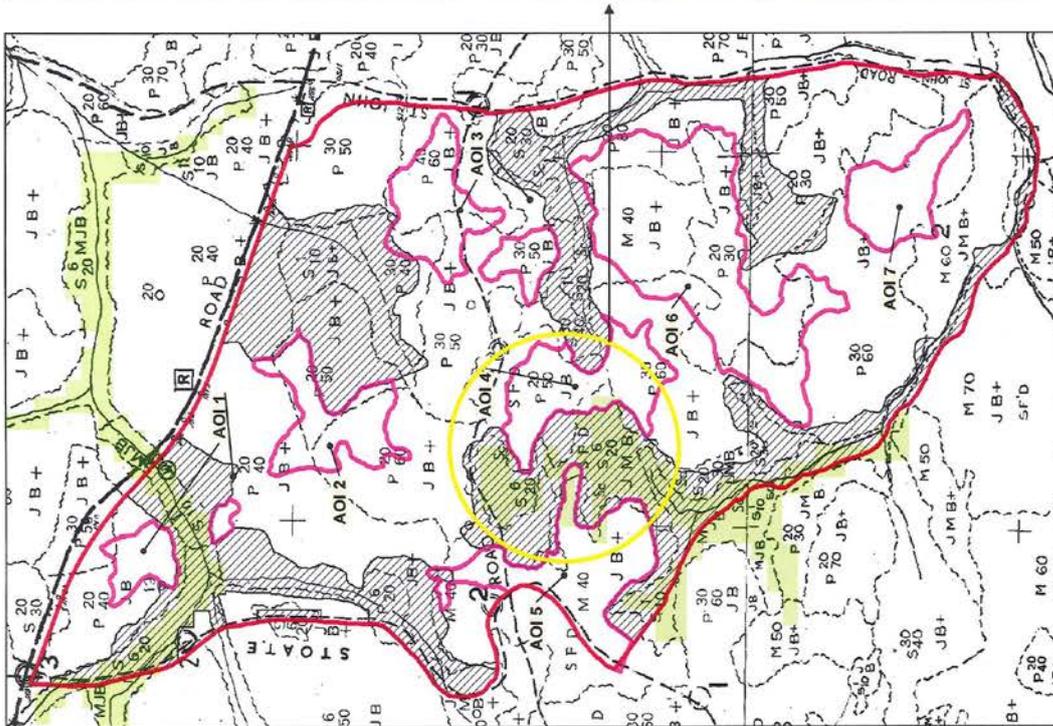
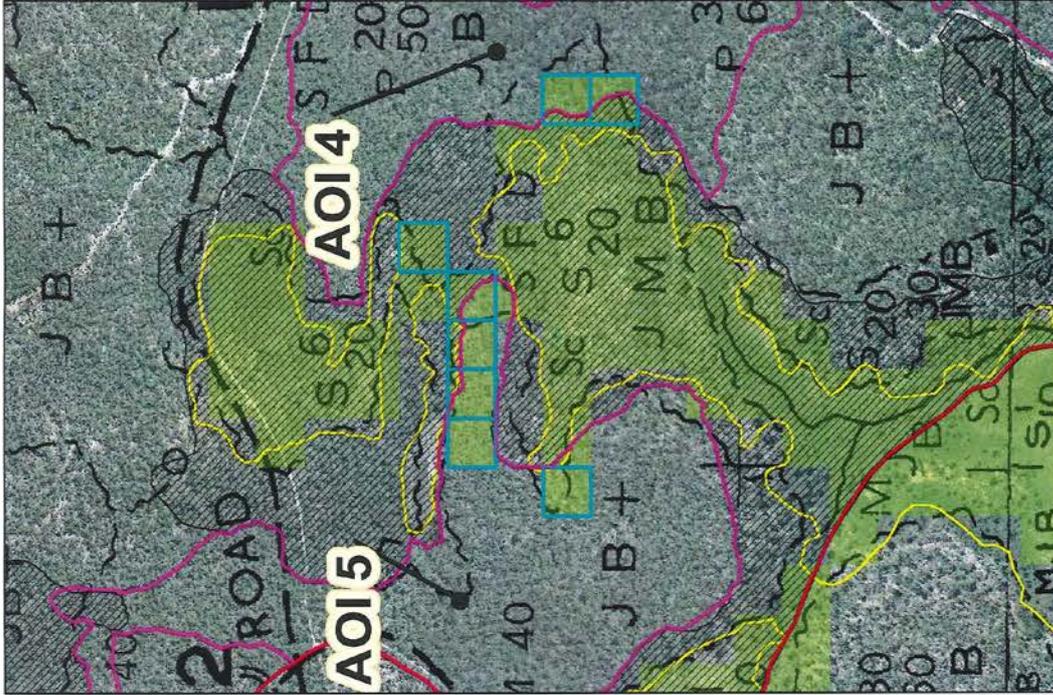
API Map: 113 & 116

Photography: Bellingup, 1955

Interpretation: MJP WPO, 1960

Map created: 2018

Scale: 1:18 000



Produced by the Forest Management Branch,
Under the direction of the Director General,
Department of Biodiversity, Conservation and Attractions

Projection: Universal Transverse Mercator,
MGA Zone 50, Datum: GDA 94

The Department of Biodiversity, Conservation and Attractions does not guarantee that this map is without flaw of any kind and disclaims all liability for any errors, loss or other consequence which may arise from relying on any information depicted.



Appendix 4

Old-Growth Forest Status Review

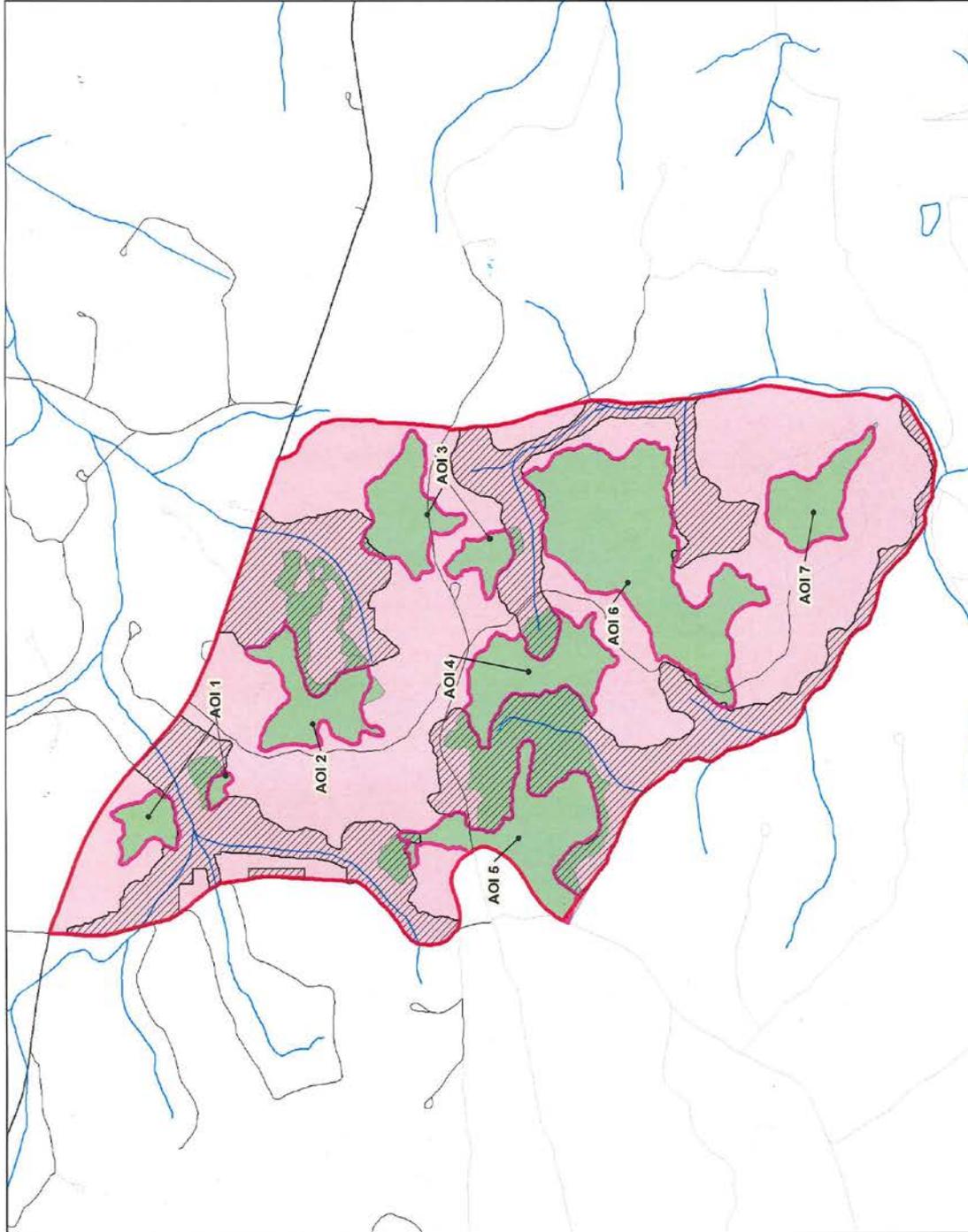
Helms 0119

Phytophthora cinnamomi
Occurrence

LEGEND

-  Proposed Harvest Coupe
-  Area of interest
-  Delineated harvest exclusion area.

-  Uninfested
-  Uninterpretable
-  Infested



Map created: 2018



Scale: 1:18 000



Meters



Projection: Universal Transverse Mercator,
MGA Zone 56, Datum: GDA94

Produced by the Forest Management Branch,
Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity, Conservation and Attractions does not guarantee that this map is without error or any error and disclaims all liability for any errors, loss or other consequences which may arise from relying on any information depicted.

Appendix 3

Old-Growth Status Review

Helms 0119

Harvest History

LEGEND

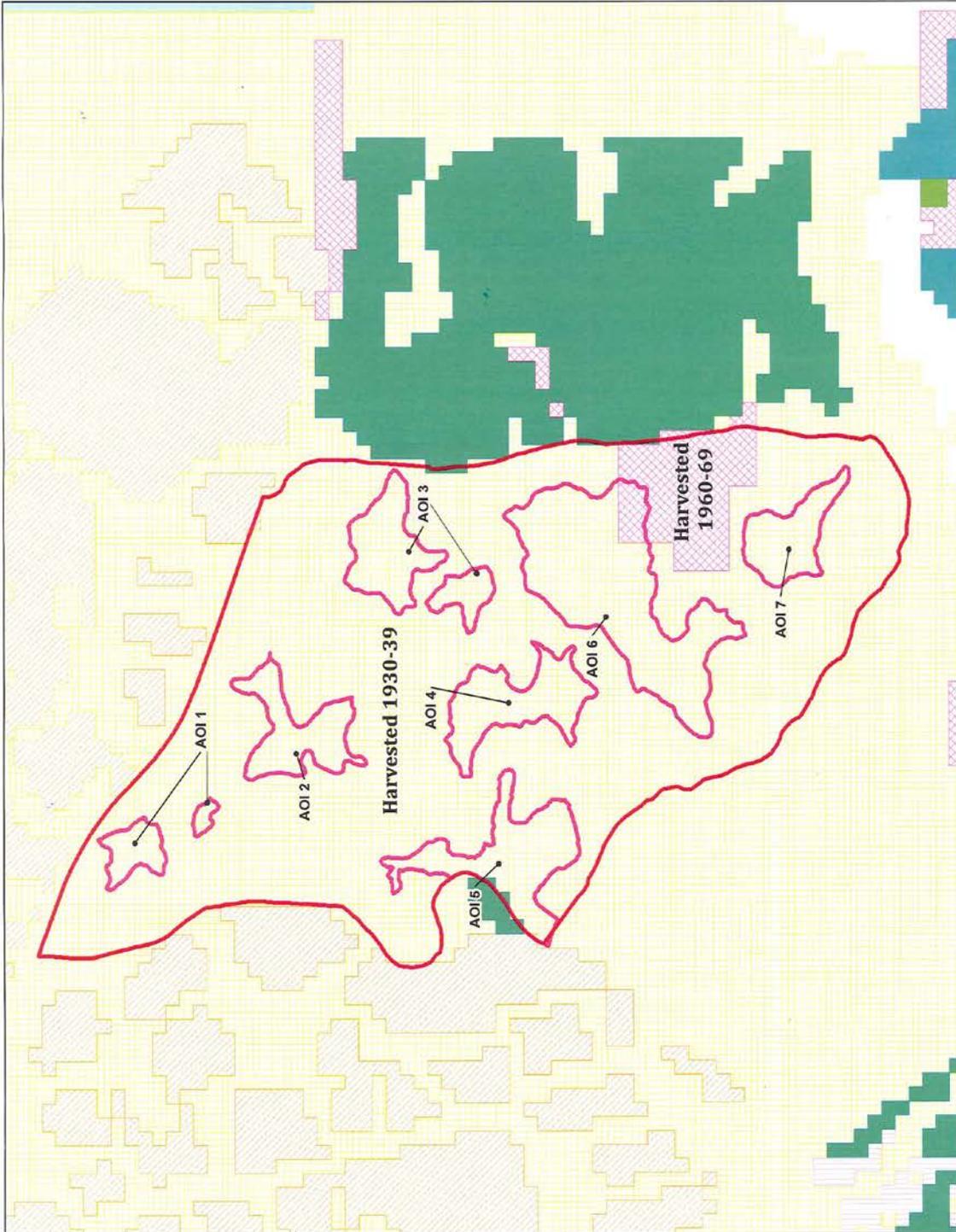
-  Proposed Harvest Coupe
-  Area of interest

-  No record of harvesting
-  Harvested before 1920
-  Harvested 1920-29
-  Harvested 1930-39
-  Harvested 1940-49
-  Harvested 1950-59
-  Harvested 1960-69
-  Harvested 1970-79
-  Harvested 1980-89
-  Harvested 1990-99
-  Harvested 2000-2009
-  Harvested 2010 and after

Map created: 2018



Scale: 1:18 000



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

Prepared by the Forest Management Branch, Under the direction of the Director General, Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity, Conservation and Attractions does not guarantee that this map is free of errors, omissions, or other consequences which may arise from relying on any information depicted.

Appendix 5

Old-Growth Forest Status Review

Helms 0119

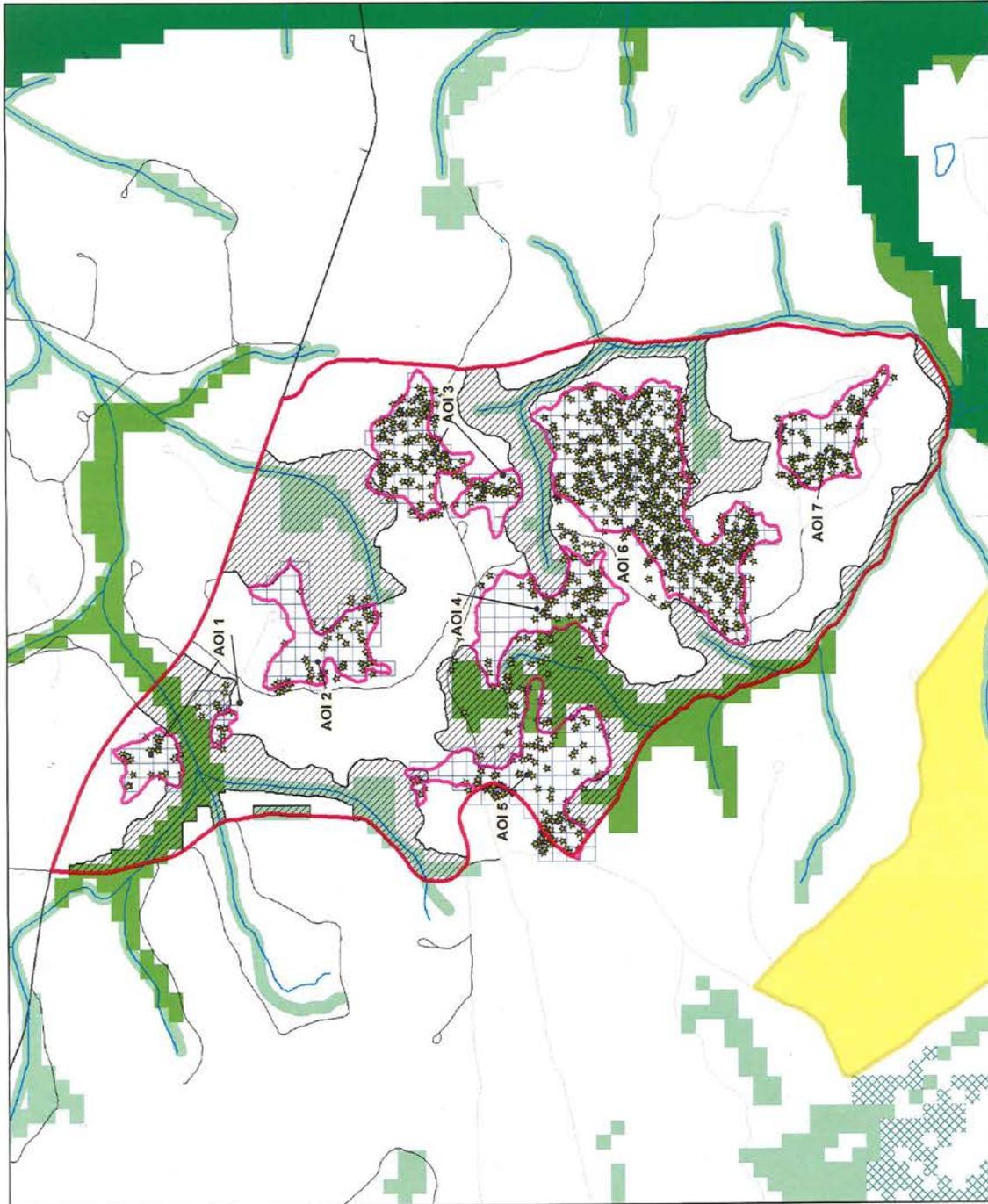
Disturbance Locations

LEGEND

-  Proposed Harvest Coupe
 -  Areas of interest
 -  Harvest exclusion areas
 -  0.5 ha cell FMIS grid
- Disturbance indicators
-  Stumps



Map created: 2018



Projection: Universal Transverse Mercator,
MGA Zone 50, Datum: GDA 94

Produced by the Forest Management Branch,
Under the direction of the Director General,
Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity, Conservation and Attractions does not guarantee that this map is without flaw or error and disclaims all liability for any errors, loss or other consequences which may arise from relying on any information depicted.

Appendix 6

Old-Growth Forest Status Review

Helms 0119

Disturbance Levels

LEGEND

-  Proposed Harvest Coupe
-  Areas of interest
-  Harvest exclusion zone
-  Minimal disturbance area
-  Photo point

DISTURBANCE LEVEL PER HALF HECTARE

-  0 stumps per half hectare
-  2 or less stumps per half hectare
-  3 or more stumps per half hectare

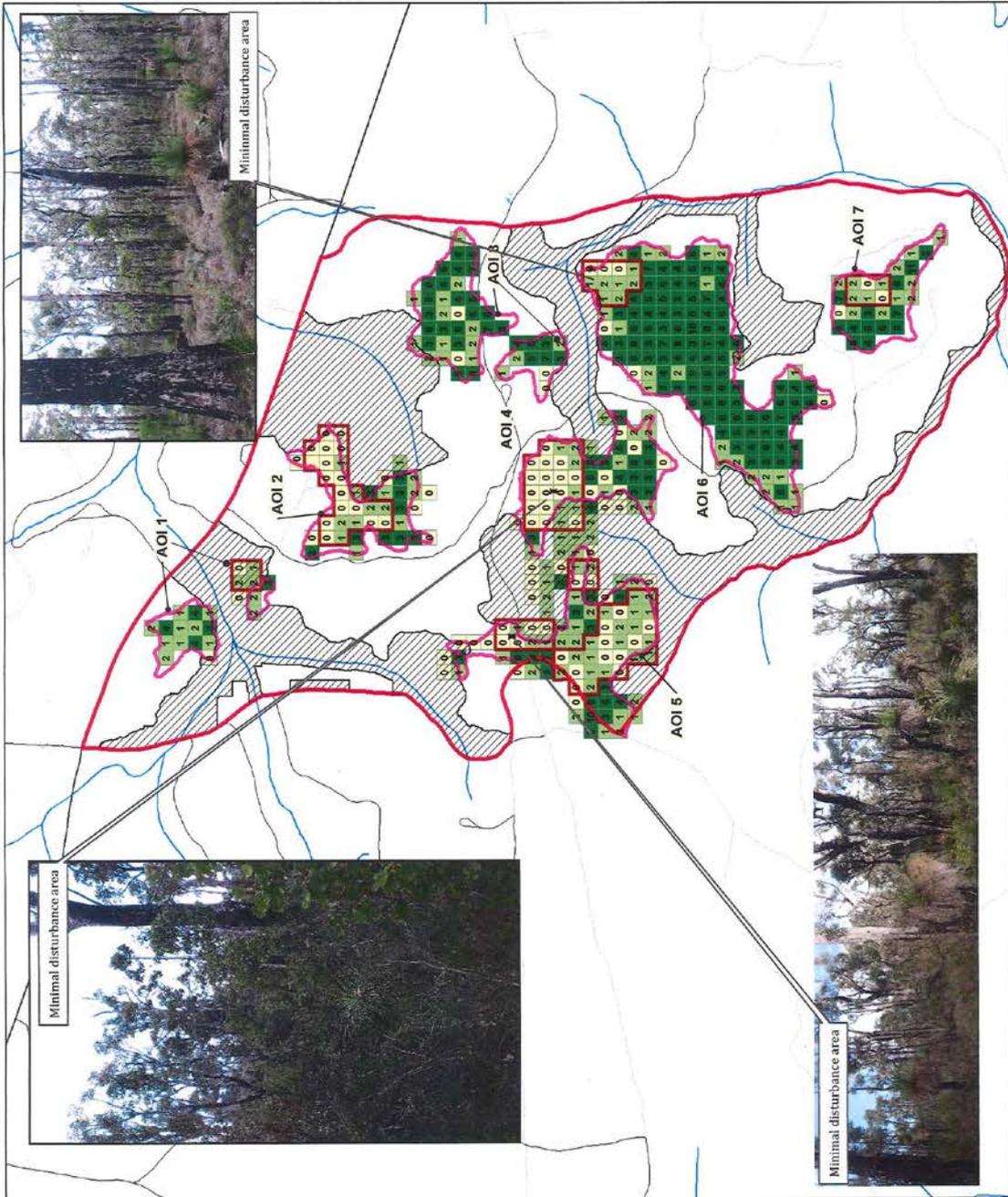
Note: Candidate old-growth forest patches are identified at a minimum 2 ha scale.

Stump thresholds for western jarrah old-growth forest is less than 3 stumps per 0.5 ha and 6 or less stumps per 2 ha.

Map created: 2018



Scale: 1:18 000



Projection: Universal Transverse Mercator, MGA Zone 50, Datum: GDA 84

Produced by the Forest Management Branch, Under the direction of the Director General, Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity, Conservation and Attractions does not guarantee that this map is without flaw or any kind and disclaims all liability for any errors, loss or other consequences which may arise from relying on any information depicted.

Appendix 7

Old-Growth Forest Status Review

Helms 0119

Old-Growth Forest Status

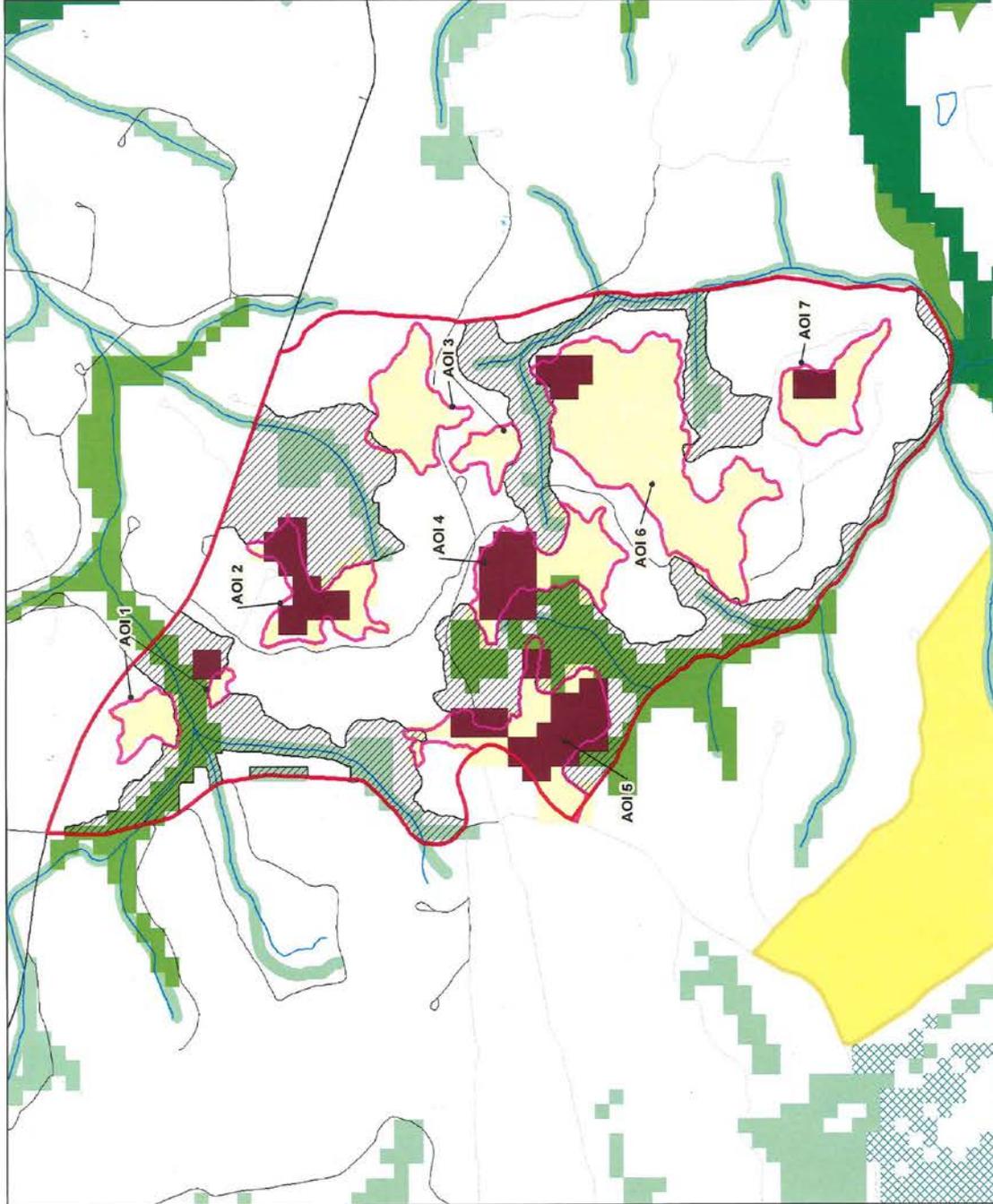
LEGEND

-  Proposed Harvest Coupe
-  Areas of interest
-  Harvest exclusion area
-  Reclassify to old-growth forest
-  Retain as non old-growth forest

Map created: 2018



Scale: 1: 18 000

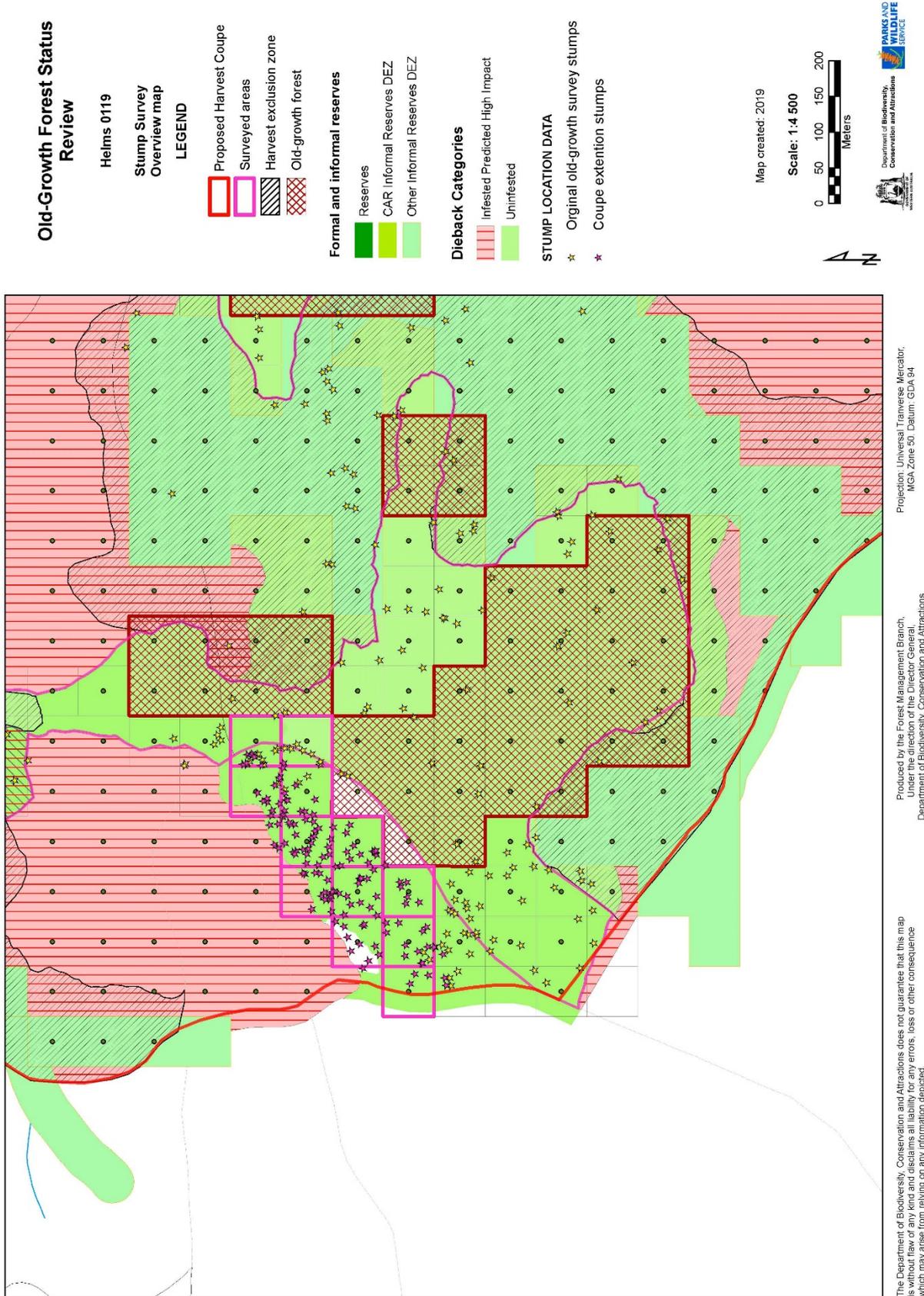


Projection: Universal Transverse Mercator,
MGA, Zone 50, Datum: GDA 94

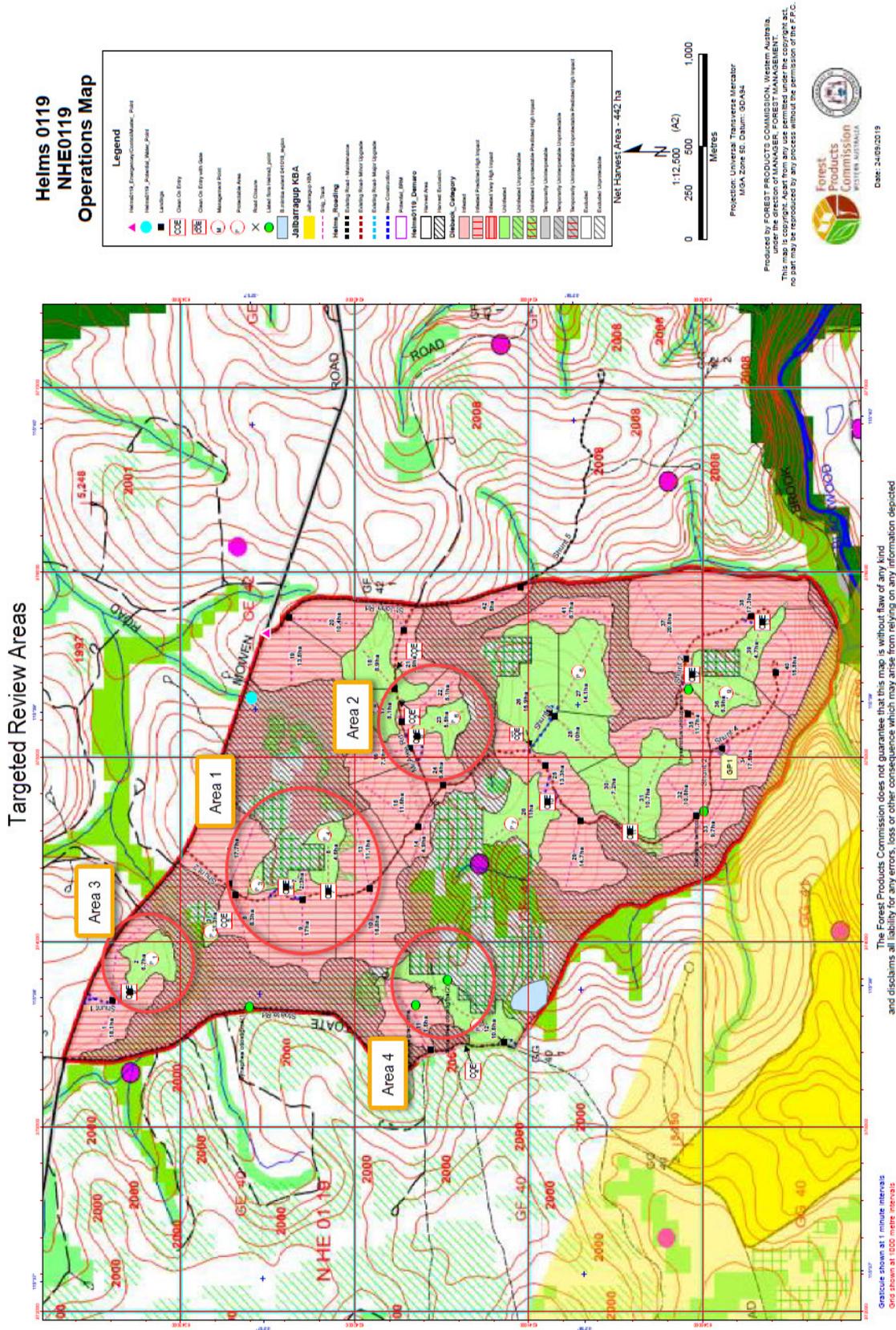
Produced by the Forest Management Branch,
Under the direction of the Director General,
Department of Biodiversity, Conservation and Attractions

The Department of Biodiversity, Conservation and Attractions does not guarantee that this map is free from errors, omissions, or other inaccuracies, which may arise from relying on any information depicted.

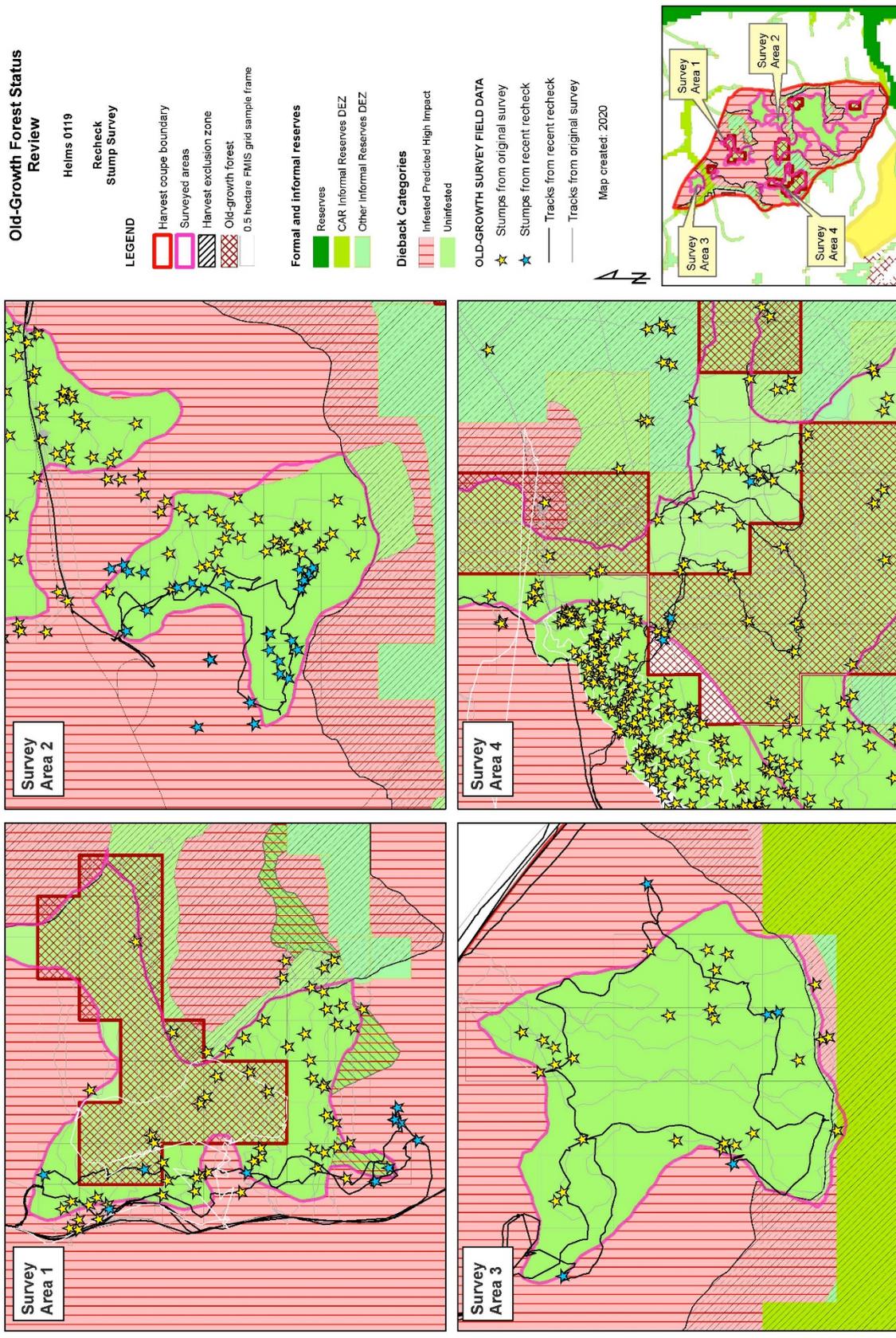
Appendix 2 Helms 01 coupe extension stump map



Appendix 3 Targeted review areas



Appendix 4 Recheck stump survey



References

Department of Parks and Wildlife, 2017, *Procedures for the assessment, identification and demarcation of old-growth forest* FEM Procedure No FEM075, Department of Parks and Wildlife, Perth.

RFA (1998). Comprehensive Regional Assessment. A Regional Forest Agreement for Western Australia. Maps. Vol. 2. Joint Commonwealth and Western Australian RFA Steering Committee, Perth. 185 pp.