Report on the old-growth nomination within Helms forest block compartment 02

January 2013

Conservation Commission
WESTERN AUSTRALIA

Summary

On the 20th September 2012 the Conservation Commission accepted a request to review potential old-growth forest within Helms forest block compartment 02.

The subsequent assessment has shown:

- an area of approximately 209 hectares within Helms forest block compartment 02 meets the criteria for jarrah old-growth forest and is therefore unavailable for timber harvesting
- this leaves a remainder of approximately 350 hectares within the coupe that does not meet the criteria for old-growth forest or other informal reserve and remains available for timber harvesting.

1.0 Background

As outlined in the *Forest management plan 2004–2013* (FMP), the Conservation Commission is responsible for carrying out specific actions that relate to the management of old-growth forests. These actions were included in the FMP to address a high level of public concern about the reliability of old-growth forest mapping data. Therefore, in 2005, the Conservation Commission developed a process to provide transparency to old-growth forest assessments (see *Assessment criteria and process for the Conservation Commission review of old-growth amendments*). This process involves full public consultation and reporting. It enables members of the public to request the Conservation Commission to assess whether areas on the indicative timber harvesting plan should be classified as old-growth forest.

1.1 Definition of old-growth forest

The *National Forest Policy Statement* (Commonwealth of Australia 1992) defines 'old-growth forest' as forest that is ecologically mature and has been subjected to negligible unnatural disturbance such as logging, roading and clearing. The definition focuses on forest in which the upper stratum or overstorey is in a late mature or senescent growth stage. This definition implies that two conditions must be met for a stand to qualify as old-growth: (a) ecological maturity, and (b) minimal unnatural disturbance.

The Conservation Commission of Western Australia is guided by the definition of old-growth in the FMP, which is the same as that used in the *National Forest Policy Statement*. The FMP further details the criteria for inclusion of old-growth forest in the Department of Environment and Conservation's (DEC) corporate database:

> Areas greater than two hectares of ecologically mature forest, where the overstorey is in a late mature to senescent growth stage, and where the effects of disturbance (e.g. dieback, timber production, grazing) are either absent or now negligible.

Under the *Western Australian Regional Forest Agreement* (RFA 1998), the working definition for old-growth jarrah forest is uncut forest or forest subject to minimal disturbance and that is not affected by *Phytophthora cinnamomi*. This definition is a notable departure from the *National Forest Policy Statement*—the requirement for ecological maturity has been omitted. The working definition was developed as a pragmatic response to the constraints posed by available spatial information; in particular, the limitations of growth-stage mapping undertaken in the 1960s for timber assessment. It also has a reasonable biological basis—most jarrah stands that meet the minimal disturbance criterion also have a high proportion of ecologically mature stems. However, regrowth-dominated stands with minimal unnatural disturbance are occasionally observed. Under a strict interpretation of the RFA working definition, these stands would be considered old-growth forest.

The Conservation Commission's assessment process for old-growth jarrah forest uses the FMP's definition of old-growth. According to the Commission's established process (*Assessment criteria and process for the Conservation Commission review of old-growth amendments*), the effects of disturbance are considered more than minimal where changes to the structure of the overstorey caused by these disturbances are still evident, or where changes to the overstorey or understorey are irreversible. To qualify as old-growth a stand must satisfy a disturbance threshold *and* an ecological maturity threshold.

In this report the descriptors of disturbance are dieback status and the density of stumps. For ecological maturity, stands must comprise a high proportion of mature or senescent stems in the upper stratum. Thresholds for these two attributes are described in this report as well as the assessment methodology and the data collected by the assessment team.

2.0 Assessment

This report summarises the Conservation Commission's findings based on its consideration of available records and inputs, as well as on field sampling undertaken by Conservation Commission audit staff.

2.1 Public nomination of old-growth

As required in the FMP and further detailed in the Conservation Commission's paper *Assessment criteria and process for the Conservation Commission review of old-growth amendments*, there is a process for members of the public to request that the Conservation Commission assess whether areas on an indicative timber harvest plan should be classified as old-growth forest in DEC's corporate database. Such a request was received on the 10th September 2012 in relation to Helms forest block – compartment 02.

2.2 Site description

The area of Helms forest block – compartment 02 is approximately 700 hectares and is situated 13 kilometres west of the town of Nannup within the Blackwood Plateau. The western edge of the coupe is situated on the border of the Whiltshire-Butler National Park which contains existing mapped old-growth forest. Butler Plot 4, a small pine plantation, is also located on the western edge of the coupe. The coupe is otherwise surrounded by State forest. The coupe ranges between 100 and 150 meters above sea level. The site is characterized by a mixture of gently sloping ridges with shallow rocky soils some breakaways and upland sandy depressions. The type and size class of forest varies across the coupe.

2.3 Forest types

The broad description of forest type is jarrah forest - Blackwood plateau. Finer scale vegetation mapping[1] across the coupe shows areas of Kingia, Telerah, Coate and Bidella vegetation complexes as depicted in Map 1. Broad descriptions of these vegetation complexes are provided in Appendix 1.

3.0 Sampling process

3.1 Analysis

The sampling method is based on the process outlined in *Assessment criteria and process for the Conservation Commission review of old-growth amendments*. The nomination area was reviewed and a sample area was chosen using the following background information:

1 *Delineation of landscape conservation units in southwest region of Western Australia*, CALM 2004 referred to as vegetation complexes in this report

- digitized aerial photos and data layers—used to confirm forest and non-forest structural boundaries and make general observations in relation to forest structure
- the latest available records of harvesting, soil types and vegetation types—provided by DEC
- the latest available dieback sampling and mapping—provided by DEC
- historical aerial photo imagery—provided by DEC
- a full stump location enumeration—undertaken by the Conservation Commission for the 500 hectares of forest not identified as dieback infested or informal reserve.
- canopy sampling undertaken by the Conservation Commission

DEC harvest records indicate the area was harvested in the 1930s and 1940s. The absence of snig tracks throughout the coupe indicates more recent logging operations have not occurred since then which is consistent with DEC harvest records.

The most recent mapping of *Phytophthora cinnamomi* occurrence shows most of the coupe boundary is infested with *Phytophthora cinnamomi*. These infestations appear to be associated with Jalbarragup road, Stoate road, St John road and creek vegetation in the south western corner which together forms the coupe boundary. Smaller areas were classed as uninterpretable—one area on the western boundary and two on the southern boundary associated with creek vegetation. All other areas were classed as uninfested.

Ground evidence of disturbance (the presence of stumps) is clear in some parts of the coupe and indicates that harvesting activity was focused primarily in the Kingia and Telerah vegetation complexes. Evidence of low intensity harvesting was observed within the Coate and Bidella vegetation complexes and their margins.

3.2 Stratification

In order to estimate and record changes to the structure of the overstorey caused by this disturbance, the Conservation Commission has undertaken canopy sampling. When identifying potential sampling locations, the Conservation Commission stratified site components of similar type to reduce sampling error. The types were stratified as follows:

- **locations of known stump intensity.** In measuring ground disturbance at Helms, the Conservation Commission completed a full stump enumeration. With known stump numbers it was possible to target sampling in particular areas of the coupe.

- **vegetation complex.** A reduction in stump intensity is observable between vegetation complexes. This reduction is most likely a reflection of the lower quantity and poorer

quality of timber (in areas of the Coate and Bidella vegetation complexes) and hence limited timber harvesting in the past. Similar observations have been made in a number of previous assessments undertaken by the Conservation Commission. There are also areas of non-forest vegetation around upland depressions and streams. These non-forest areas are normally identified by DEC as diverse ecotype zones (DEZ). Both old-growth forest and DEZ are types of informal reserves unavailable for harvesting. Informal reserves unavailable for harvesting within the coupe as shown in Map 2 include:

- shrub herb and sedgeland
- jarrah <30% canopy cover
- stream zones

This report uses the proportion of mature or senescent stems in the upper crown as an indicator of ecological maturity. Sites must satisfy a threshold figure of 50 per cent mature or senescent crown cover to be considered ecologically mature (and can be considered old-growth if they also satisfy the minimal disturbance criterion). The threshold figure was derived using data captured at uncut old-growth forest benchmarking sites (see graph below).

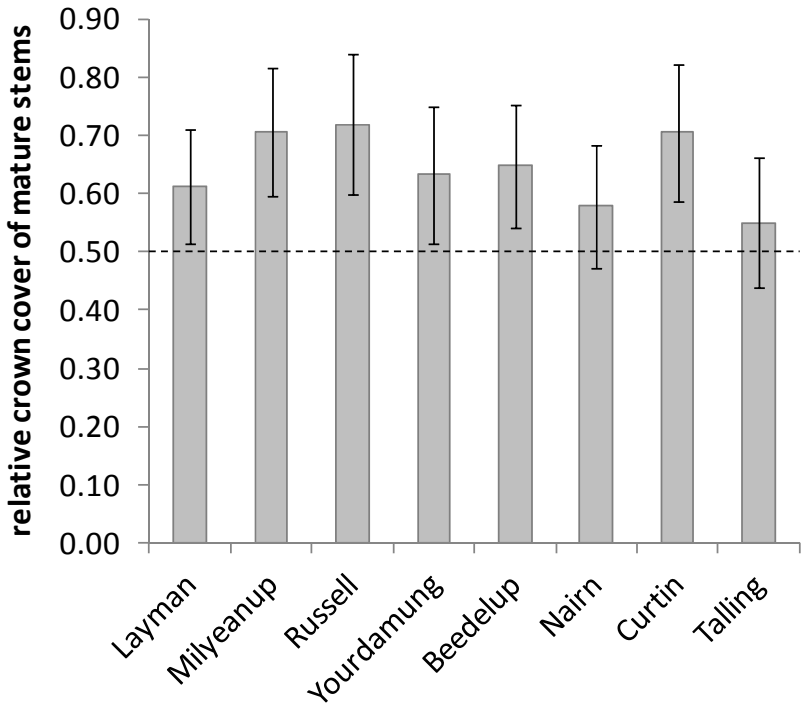


Figure 1. The relative crown cover of mature and senescent stems in uncut forest used for benchmarking. Error bars are 95 per cent confidence intervals. The dashed line at 50 per cent represents the threshold for ecological maturity.

As can be seen on the graph, best estimates for the sampling in the locations depicted above exceeded 50 per cent. Based on these sites, the Conservation Commission determined that, for delineating old-growth, the threshold for the proportion of mature or senescent stems in the upper crown should be 50 per cent. Sites with a value less than 50 per cent are non old-growth.

3.3 Field results

The stump location data provided by the Conservation Commission provides an overview of past harvesting intensity and gives a basis for canopy sampling stratification (as outlined above in section 3.2 – Stratification). The Coate and Bidella vegetation complexes are generally situated lower in the landscape and associated with the minor watercourses as depicted in Map 1. There are few or no stumps associated with these vegetation complexes, with some low-intensity harvesting apparent on the margins between Kingia and Coate, Kingia and Bidella, Telerah and Coate and the Telerah and Bidella. Two areas of higher-intensity stump presence (group 1 sampling sites), and three areas of lower-intensity stump presence (group 2 sampling sites) were selected for comparison. The main sampling effort was applied in areas with low stump numbers (group 2 sampling sites). Results of this sampling are presented in Appendix 2 and summarised in tables 1 and 2 below.

Table 1: Field check results for groups 1 and 2 sampling sites

	Average stumps per hectare within sampling sites	Estimated proportion of mature or senescent trees in upper crown
Group 1 sampling sites	6.03	41.4%
Group 2 sampling sites	3.45	52%

As shown above, the sample sites within group 2 averaged 3.45 stumps per hectare. The estimated proportion of mature or senescent trees in the upper crown for the group 2 sampling sites is 52 per cent, which meets the criteria for ecological maturity. With an average of 6.03 stumps per hectare and an estimated proportion of mature or senescent trees in the upper crown at 41.4 per cent, the group 1 sampling sites did not meet the criteria. Visual observation of forest structure in these areas supported the results of sampling. Further detail on the group 2 results is provided in Appendix 2 and in Table 2.

While the stump enumeration is an actual count, there is a sampling error associated with the canopy measurement (plus or minus 6% based on 95% confidence intervals). Field sampling is costly and time-consuming and in the interests of efficiency the Conservation Commission has stratified the area to measure a representative but relatively small area of canopy within the nominated area. The decision to accept the derived stump threshold is based on the results of

the sampling at this site, field observations at this site and the observations and results of assessments in previously assessed sites.

Table 2: Detailed results for group 2 sampling sites

Estimated number of stumps per hectare	Estimated proportion of mature or senescent trees in upper crown	Estimated proportion of regrowth trees in upper crown	Estimated total upper crown cover
3.45	**52%**	48%	67%

4.0 Finding

In summary, stratified canopy measurements have been used to estimate the relationship between stump density and the proportion of mature or senescent stems in the upper stratum. Data from this assessment—along with data obtained by the Conservation Commission in previous assessments—implies a stump threshold of 3.45 stumps per hectare as the threshold for old-growth forest at this site.

By applying this stump threshold to the stump distribution, an area of previously unmapped old-growth forest has been determined. This additional area of old-growth forest is depicted in Map 2.

The 209 hectares identified as additional old-growth forest will be added to the old-growth forest layer and will not be available for timber harvesting. This leaves a remainder of approximately 350 hectares within the coupe that does not meet the criteria for old-growth forest or other informal reserve and remains available for timber harvesting.

Appendix 1

Descriptions of vegetation and soils for those landscape conservation units within the assessment area are described below. The codes are as follows: Bidella (BD), Coate (CE), Kingia (KI) Telerah (TL)

29. B P – BLACKWOOD PLATEAU

B P - A – Shallow Valleys and Uplands

Bk7 Component vegetation complexes ***BD, CE, JN, Nw, Tw*** and ***Yw.***
Shallow valleys in the humid, perhumid zone of the Blackwood Plateau, predominantly with humus podzols on floors and sandy yellow duplex soils on slopes. Vegetation is mainly Woodland of *Eucalyptus patens - Allocasuarina fraseriana - Agonis flexuosa - Hakea lasianthoides - Eucalyptus marginata* subsp. *marginata - Corymbia calophylla - Melaleuca preissiana - Banksia littoralis*. Shrub and herb species are *Mirbelia dilatata, Taxandria linearifolia, Agonis parviceps, Hakea lissocarpha, Podocarpus drouynianus, Acacia divergens, Dasypogon hookeri, Kingia australis* and *Adenanthos obovatus*.

Jg5 Component vegetation complexes ***BN, GA, KI, N, T, TL*** and ***Y***.
Undulating uplands and upper slopes in the humid-perhumid zones, with yellow duplex and humus podzol soils. Dominant vegetation is Open Forest of *Eucalyptus marginata* subsp. *marginata - Corymbia calophylla*, with second storey of *Banksia grandis, Allocasuarina fraseriana, Persoonia longifoli and, Xylomelum occidentale*. Shrub and herb storey consists of *Bossiaea ornata, Hovea chorizemifolia, Isopogon sphaerocephalus, Podocarpus drouynianus, Adenanthos obovatus, Leucopogon australis, Lindsaea linearis, Leucopogon verticillatus* and *Dasypogon hookeri*.

Appendix 2

Field observations for group 1 sampling sites

Sample number	Canopy	Species	Diameter (cm)	Development	Qualitative
843	YES	JARRAH	80	MATURE/SEN	MOSTLY UPPER
844	YES	JARRAH	60	MATURE/SEN	MIXED
845	NO	GAP	0	GAP	MOSTLY LOWER
846	YES	MARRI	30	REGROWTH	MIXED
847	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
848	YES	JARRAH	90	MATURE/SEN	MOSTLY UPPER
849	NO	GAP	0	GAP	GAP
850	YES	JARRAH	40	REGROWTH	MOSTLY LOWER
851	NO	GAP	0	GAP	MOSTLY LOWER
852	YES	JARRAH	80	MATURE/SEN	MOSTLY UPPER
853	YES	MARRI	80	MATURE/SEN	MOSTLY UPPER
854	YES	JARRAH	40	REGROWTH	MOSTLY LOWER
855	NO	GAP	0	GAP	GAP
856	YES	MARRI	30	REGROWTH	MIXED
857	YES	JARRAH	40	REGROWTH	MIXED
858	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
859	YES	MARRI	30	REGROWTH	MOSTLY LOWER
860	YES	MARRI	30	REGROWTH	MIXED
861	NO	GAP	0	GAP	MOSTLY LOWER
862	NO	GAP	0	GAP	MOSTLY LOWER
863	YES	JARRAH	40	REGROWTH	MOSTLY LOWER
864	NO	GAP	0	GAP	GAP
865	YES	MARRI	30	REGROWTH	MOSTLY LOWER
866	NO	GAP	0	GAP	MOSTLY LOWER
887	YES	JARRAH	30	REGROWTH	MOSTLY LOWER
888	YES	JARRAH	30	REGROWTH	MOSTLY LOWER
889	YES	JARRAH	80	MATURE/SEN	MIXED
890	YES	JARRAH	40	REGROWTH	MOSTLY LOWER
891	NO	GAP	0	GAP	GAP
892	NO	GAP	0	GAP	MOSTLY LOWER
893	YES	JARRAH	30	REGROWTH	MIXED
894	YES	JARRAH	90	MATURE/SEN	MOSTLY UPPER
895	NO	GAP	0	GAP	MOSTLY LOWER
896	NO	GAP	0	GAP	MOSTLY LOWER
897	NO	GAP	0	GAP	MOSTLY LOWER
898	YES	MARRI	30	REGROWTH	MOSTLY LOWER

899	NO	GAP	0	GAP	GAP
900	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
901	NO	GAP	0	GAP	GAP
902	NO	GAP	0	GAP	MOSTLY LOWER
903	YES	JARRAH	60	MATURE/SEN	MIXED
904	NO	GAP	0	GAP	MOSTLY LOWER
905	NO	GAP	0	GAP	MOSTLY LOWER
906	NO	GAP	0	GAP	MOSTLY LOWER
907	YES	JARRAH	40	REGROWTH	MIXED
908	YES	JARRAH	50	REGROWTH	MOSTLY UPPER
909	YES	JARRAH	70	MATURE/SEN	MIXED
910	YES	JARRAH	40	REGROWTH	MOSTLY LOWER

Field observations for group 2 sampling sites

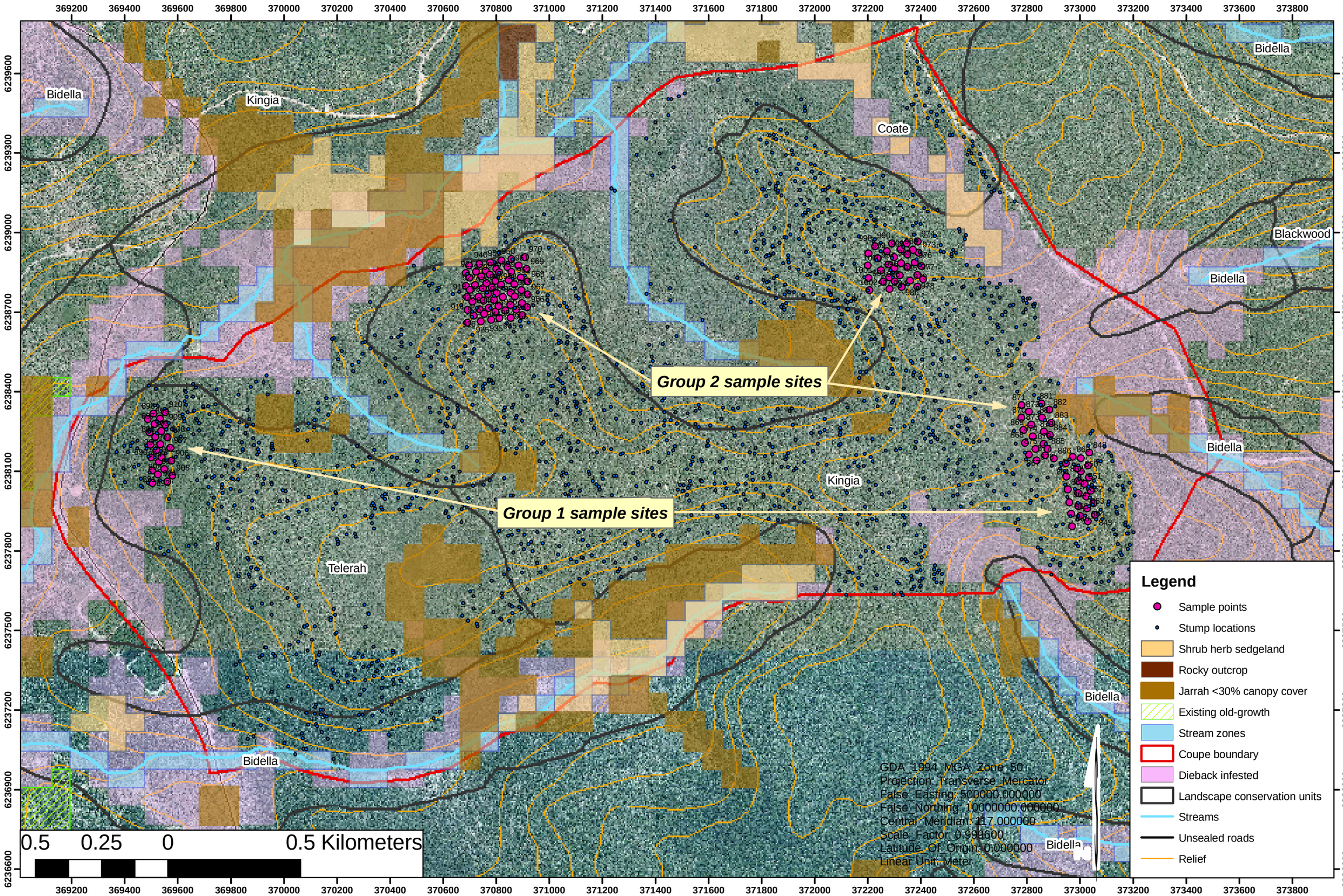
Sample number	Canopy	Species	Diameter (cm)	Development	Qualitative
867	YES	JARRAH	50	REGROWTH	MIXED
868	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
869	YES	MARRI	40	REGROWTH	MOSTLY LOWER
870	YES	JARRAH	80	MATURE/SEN	MOSTLY UPPER
871	YES	JARRAH	110	MATURE/SEN	MOSTLY UPPER
872	NO	GAP	0	GAP	MOSTLY LOWER
873	YES	JARRAH	40	REGROWTH	MIXED
874	YES	JARRAH	40	REGROWTH	MIXED
875	NO	GAP	0	GAP	MOSTLY LOWER
876	YES	MARRI	100	MATURE/SEN	MOSTLY UPPER
877	YES	JARRAH	80	MATURE/SEN	MOSTLY UPPER
878	YES	MARRI	70	MATURE/SEN	MOSTLY UPPER
879	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
880	NO	GAP	0	GAP	GAP
881	NO	GAP	0	GAP	MOSTLY LOWER
882	YES	MARRI	25	REGROWTH	MIXED
883	YES	JARRAH	50	REGROWTH	MOSTLY UPPER
884	YES	JARRAH	100	MATURE/SEN	MOSTLY UPPER
885	YES	JARRAH	50	REGROWTH	MOSTLY UPPER
886	NO	GAP	0	GAP	GAP
911	NO	GAP	0	GAP	MOSTLY LOWER
912	NO	GAP	0	GAP	MOSTLY LOWER
913	NO	GAP	0	GAP	MOSTLY LOWER

914	YES	MARRI	30	REGROWTH	MOSTLY LOWER
915	YES	JARRAH	40	REGROWTH	MIXED
916	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
917	YES	MARRI	70	MATURE/SEN	MIXED
918	YES	JARRAH	50	REGROWTH	MOSTLY LOWER
919	NO	GAP	0	GAP	MOSTLY LOWER
920	NO	GAP	0	GAP	MOSTLY LOWER
921	NO	GAP	0	GAP	MOSTLY LOWER
922	YES	JARRAH	40	REGROWTH	MIXED
923	YES	JARRAH	90	MATURE/SEN	MOSTLY UPPER
924	NO	GAP	0	GAP	GAP
925	YES	MARRI	40	REGROWTH	MOSTLY LOWER
926	NO	GAP	0	GAP	MOSTLY LOWER
927	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
928	YES	MARRI	80	MATURE/SEN	MIXED
929	YES	JARRAH	120	MATURE/SEN	MOSTLY UPPER
930	YES	JARRAH	80	MATURE/SEN	MOSTLY UPPER
931	NO	GAP	0	GAP	MOSTLY LOWER
932	NO	GAP	0	GAP	MOSTLY LOWER
933	YES	JARRAH	60	MATURE/SEN	MIXED
934	NO	GAP	0	GAP	GAP
935	YES	JARRAH	40	REGROWTH	MIXED
936	NO	GAP	0	GAP	GAP
937	YES	JARRAH	50	REGROWTH	MIXED
938	YES	JARRAH	90	MATURE/SEN	MOSTLY UPPER
939	NO	GAP	0	GAP	GAP
940	YES	JARRAH	30	REGROWTH	MOSTLY LOWER
941	YES	JARRAH	30	REGROWTH	MOSTLY LOWER
942	NO	GAP	0	GAP	GAP
943	YES	JARRAH	60	MATURE/SEN	MIXED
944	YES	JARRAH	40	REGROWTH	MIXED
945	NO	GAP	0	GAP	GAP
946	YES	JARRAH	50	REGROWTH	MOSTLY UPPER
947	NO	GAP	0	GAP	GAP
948	YES	JARRAH	30	REGROWTH	MIXED
949	NO	GAP	0	GAP	MOSTLY LOWER
950	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
951	YES	JARRAH	50	REGROWTH	MIXED
952	YES	JARRAH	80	MATURE/SEN	MOSTLY UPPER
953	NO	GAP	0	GAP	GAP
954	NO	GAP	0	GAP	MOSTLY LOWER

955	NO	GAP	0	GAP	GAP
956	NO	GAP	0	GAP	GAP
957	YES	JARRAH	80	MATURE/SEN	MIXED
958	NO	GAP	0	GAP	GAP
959	YES	JARRAH	30	REGROWTH	MOSTLY LOWER
960	NO	GAP	0	GAP	GAP
961	YES	JARRAH	30	REGROWTH	MIXED
962	NO	GAP	0	GAP	MIXED
963	NO	GAP	0	GAP	MIXED
964	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
965	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
966	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
967	NO	GAP	0	GAP	MOSTLY LOWER
968	YES	JARRAH	30	REGROWTH	MIXED
969	YES	MARRI	70	MATURE/SEN	MIXED
970	YES	JARRAH	50	REGROWTH	MIXED
971	YES	JARRAH	40	REGROWTH	MIXED
972	NO	GAP	0	GAP	GAP
973	YES	MARRI	30	REGROWTH	MOSTLY LOWER
974	YES	JARRAH	110	MATURE/SEN	MOSTLY UPPER
975	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
976	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
977	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
978	YES	MARRI	30	REGROWTH	MOSTLY LOWER
979	YES	JARRAH	50	REGROWTH	MIXED
980	YES	JARRAH	50	REGROWTH	MIXED
981	NO	GAP	0	GAP	MIXED
982	NO	GAP	0	GAP	MIXED
983	YES	JARRAH	80	MATURE/SEN	MOSTLY UPPER
984	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
985	YES	JARRAH	40	REGROWTH	MOSTLY UPPER
986	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
987	NO	GAP	0	GAP	MIXED
988	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
989	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
990	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
991	YES	JARRAH	50	REGROWTH	MOSTLY UPPER
992	YES	JARRAH	50	REGROWTH	MOSTLY UPPER
993	YES	JARRAH	70	MATURE/SEN	MOSTLY UPPER
994	YES	JARRAH	40	REGROWTH	MIXED
995	NO	GAP	0	GAP	GAP

996	NO	GAP	0	GAP	GAP
997	YES	JARRAH	80	MATURE/SEN	MOSTLY UPPER
998	YES	JARRAH	60	MATURE/SEN	MOSTLY UPPER
999	YES	JARRAH	40	REGROWTH	MIXED
1000	YES	JARRAH	70	MATURE/SEN	MIXED
1001	YES	JARRAH	40	REGROWTH	MIXED
1002	YES	JARRAH	30	REGROWTH	MIXED

Map 1 - Sampling locations



Map 2 - Old-growth forest additions