Assessing the Nature Conservation and Other Values of Crown Land Within the Shire of Kent

Department of Conservation and Land Management

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REPORT FOR Department of Conservation and Land Management
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Table of Contents

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

LIST OF TABLES

LIST OF FIGURES

Section One:
Report

Acknowledgments

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

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- Rachel Meissner (Consulting Botanist).

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Summary

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

The vegetation, weeds, soils, landforms and land-use of five Crown Land reserves within the Shire of Kent, Western Australia were surveyed to enable the assessment of conservation and other values of these reserves. A total of 21 quadrats were established to undertake this assessment.

The survey was conducted over a 10-day period in July 2000, using the methods of McDonald *et al.* (1998). In particular, the following features were surveyed:

- Vegetation floristics;
- Vegetation structure;
- Vegetation cover;
- Weed cover;
- Soil and landform characteristics;
- Adjacent land use;
- Cultural sites (indigenous and non-indigenous); and
- Reserve features (including natural resource use and man-made features).

A total of 25 new vegetation associations were identified based on a combination of structural and floristic information. A total of 17 vascular plant Families and 83 plant species were recorded, of which 74 were identified to at least species level.

1.0 Introduction

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

Ecoscape (Australia) Pty Ltd was commissioned by the Department of Conservation and Land Management (CALM) to undertake an assessment of the nature conservation and other values of selected Crown Lands in the Shire of Kent in the Wheatbelt Region of Western Australia. Information collected in this survey will assist CALM and other land management agencies to evaluate the relative values of the Crown lands assessed, and to make informed recommendations on future management options.

Over the next five years, a large number of reserves in agricultural areas will be assessed for changes in purpose and vesting. This is for a range of reasons including:

- Rationalisation of estate by Water Corporation, Water and Rivers Commission, and Office of Water Regulation;
- Continuing work by Department of Land Administration to have all reserves and unallocated land covered by management orders; and
- Rationalisation of estate by agencies preparing for the asset charges that Treasury is intending to levy over Crown lands

The reserves assessed in the Shire of Kent form part of this review of bushland reserves in agricultural areas. CALM is generally asked for comments on land identified as belonging to one of the above four categories. The information gathered in this survey will assist CALM with these comments, and to decide on the best use for unallocated lands, unwanted bushland reserves and proposed CALM reserves.

1.1 The Study Area

The Shire of Kent covers an area of 655,200 ha in the southern Wheatbelt region of Western Australia. Local industries in the Shire include the production of wheat and other grains, sheep and pigs. The principal towns include Nyabing in the west of the Shire and Pingrup in the centre of the Shire. Approximately 30 % of the Shire remains covered by original native vegetation, 10% of which is found on private land (Grein, 1994). The Shire has 10 'A' Class Nature Reserves, including Lake Magenta, Lake Chinocup and Lake Bryde Nature Reserves (Grein, 1994).

A total of five parcels of Crown Land within the Shire of Kent were assessed, totalling 1379 ha in area. The reserves ranged in size from 35.6 ha to 979.3 ha. The reserves surveyed and their purposes are listed in Table 1.

Table 1: Nominated Crown Lands in the Shire of Kent

Reserve No.	Purpose	Area (hectares)
10188	Water Supply/Rabbit Proof Fence	35.6
14417	Water - Dam Site	46.5
14522	Water and Conservation of Flora and Fauna	277.2
18803	Water and Conservation of Flora and Fauna	979.3
20961	Timber - Sandalwood	40.4

1.2 Climate

The Shire has a Mediterranean climate, with cool moist winters and hot dry summers and an average annual rainfall of 350 mm (Grein, 1994). Average maximum temperatures range from 32.3^{o}C in January to 14.8^{o}C in July, while average minimum temperatures range from 14.4^{o}C in January to 5.3^{o}C in July (Grein, 1994).

1.3 Vegetation

The Shire of Kent straddles the boundary between the Avon and Roe Botanical Districts within the South-West Botanical Province (Beard, 1981). Three vegetation systems occur within the study area: the Dumbleyung System within the Avon district, and the Hyden and Chidnup Systems within the Roe district. The Dumbleyung System corresponds roughly to the western fifth of the Shire, while the rest of the Shire can be approximately divided into the Hyden System in the north, and the Chidnup System in the south (Beard, 1981).

The **Hyden System** was described generally by Beard (1981) as kwongan (scrub-heath and thicket) on sandplain, mallee on slopes over most of the system, mallee with patches of woodland on upper valley soils, woodland on lower valley soils and in saline areas a mosaic of woodland, scrubland and samphire. The vegetation characteristically forms a mosaic of vegetation types, with plant cover frequently varying in structure and composition every few metres due to the highly variable soil types, a situation which often complicates vegetation mapping (Beard, 1981).

The landscape of the **Dumbleyung System** on the Yilgarn Plateau is gently undulating, with residual laterite cappings on uplands and salt flats and lakes in the principal valleys (Beard, 1981). The Dumbleyung System was described by Beard (1981) as having a general pattern of *Dryandra*-dominated heath on laterite residuals; woodland and low woodland of the Brown Mallet (*Eucalyptus astringens*), Silver Mallet (*E. falcata*) and Blue Mallet (*E. gardneri*) on degraded laterites and laterite wash; woodland of York Gum (*E. loxophleba*), Red Morrel (*E. longicornis*), Salmon Gum (*E. salmonophloia*) and Wheatbelt Wandoo (*E. capillosa*) on undulating country, generally with frequent small patches of the mallees Black Marlock (*E. redunca*), Tall Sand Mallee (*E. eremophila*), and Lerp Mallee (*E. incrassata*); teatree (*Leptospermum*) and samphire on salt-flats; and scrub-heath and low woodland on low-level sandplains. The boundary between the Dumbleyung System in the west to the Roe Botanical District in the east occurs where mallee becomes predominant in the vegetation (Beard, 1981).

The Chidnup System covers the high ground which forms the watershed between the south coastal rivers and the Swan-Avon basin. Relief is very subdued and the landscape is flat to gently undulating. Scrub heath, usually with conspicuous Tallerack (*Eucalyptus tetragona*), appears on broad sandy ridges. On laterite, low woodland of Silver Mallet occurs, although frequently burnt back to the stature of mallee. Small patches of woodland of Flat-topped Yate (*E. occidentalis*) and occasional Salmon Gum occupy depressions on winter wet grey clays and in swamps, with patches of low forest of Moort (*E. platypus*). Mallee predominates across the system, with a tendency to segregate into *E. eremophila-E. oleosa* and *E. redunca-E. uncinata* associations (Beard, 1981).

Beard (1981) mapped the vegetation of the Shire of Kent at a scale of 1: 250 000, discerning 21 major vegetation types plus granite outcrops. The most abundant vegetation type was mallee of Black Marlock and Tall Sand Mallee over shrubland. Other vegetation types occupying a significant area of land were woodland of Wheatbelt Wandoo, York Gum and Red Morrel, and mosaic vegetation of the above mallee/shrubland and woodland vegetation types (Beard, 1981).

1.4 Geomorphology and Soils

The geomorphology of the Shire of Kent is a mosaic of salt lake systems, ancient drainage flats, granite domes, flat outcrops and undulating sandplain (Grein, 1994). The western third of the Shire is within the catchment of the Blackwood River, and is drained by the Coblinine River system into Lake Dumbleyung, which overflows into the Blackwood System (Grein, 1994).

There are three chains of salt lakes within Kent Shire, trending north-north west and forming part of the Swan-Avon catchment. The most prominent chain within Shire of Kent occupies the centre of the Shire and includes Lake Chinocup, Lake Pingarnup and Lake Grace (South Lake). To the east of this chain, there is another series of salt lakes including Lake Bryde and East Lake Bryde, freshwater lakes at the head of a salt lake chain. The most easterly chain lies largely outside the Shire, and includes Lake Lockhart, which is part of the Lake Lockhart-Lake Magenta salt lake chain. The salt lake chains occupy broad, flat-floored valleys, which represent the channels of ancient northerly flowing rivers (Thom *et al*., 1984).

The study area encompasses three Plateau systems, which correspond to the vegetation systems: the Hyden Plateau carrying the Hyden vegetation system, the Ongerup Plateau carrying the Chidnup vegetation system, and the Yilgarn Plateau bearing the Dumbleyung vegetation system (Beard, 1981).

Beard (1981) described the landscape of the **Hyden Plateau** as very gently undulating, with wide flat valleys and long gentle slopes rising to broad interfluves. The interfluves are capped by residual laterite and sand, but there are seldom any definite margins such as breakaways between these areas and valley soils (Beard, 1981). The **Ongerup Plateau** represents an eastward extension of the Darling Plateau and forms a watershed between the rejuvenated streams of the south coast and the disorganised drainage of the interior. The plateau forms a very gently undulating or almost level plain which tends to become waterlogged in winter and is dotted with numerous circular depressions containing intermittent lakes or swamps (Beard, 1981). The **Yilgarn Plateau** is composed of wide, shallow valleys with sluggish drainage and very broad sandplain uplands. The landscape is gently undulating.

The soil systems of the Shire of Kent were described by Grein (1994). The eastern half of the Shire is dominated by hard setting loamy soils with yellow clayey subsoils, while the western half is dominated by hard setting loamy soils with mottled yellow clayey subsoils. The salt lake chain flowing northward through the middle of the Shire occurs on loamy soils of minimal development. There are also small areas of brown calcareous earths and sandy soils with an unbleached A_2 horizon (Grein, 1994). Beard (1981) described the soils of the

Hyden Plateau, in the northern half of the Shire, as very variable, reflected in variations to plant structure and composition every few metres over much of the Hyden Plateau.

1.5 Fauna

Butler (1972) conducted a six-day fauna survey of "the Chinocup Reserves" – Reserve No. 18803 and four blocks adjacent to Lake Chinocup in Reserve No. 28395 – in a six day period in February, 1972. He recorded 12 mammal species during the course of the survey, of which six were native species, including the Priority 4 Western Brush Wallaby (*Macropus irma)* and the Walyadji or Western Mouse (*Pseudomys occidentalis*). He reported that the Declared Threatened (Vulnerable) Numbats (*Myrmecobius fasciatus*) had been seen in Reserve 18803 about 15 years beforehand but have since apparently declined, and that the Conservation Dependent Tammar (*Macropus eugenii*) was seen soon after the survey in the same reserve. Sixty species of birds were recorded, including Mallee Fowl, and Western Rosella. There was evidence that three species had been breeding: Black Swan, Pacific Black Duck and Mallee Fowl. Reptiles were generally scarce, with the exception of Rosenberg's Monitor (*Varanus rosenberg).* One snake species, 12 lizards species and three frog species were trapped.

McKenzie (1973) carried out a fauna survey of five blocks of reserves within the Shire of Kent, which included one reserve in the present study – Reserve No. 18803. Ten species of mammal were recorded from this reserve, six of which were native, including the Western Brush Wallaby. Unconfirmed records included the Tammar and, notably, the Numbat. Birds were not recorded from Reserve 18803, but 100 species were recorded from the total study area in the Shire of Kent, including the Mallee Fowl, Australian Bustard, Western Rosella and Gilbert's Whistler. From this total study area, McKenzie also reported seven species of snake, including the Carpet Python (*Morelia spilotes),* (Other Specially Protected Fauna), 33 species of lizard and seven species of frogs.

Grein (1994) reports that commonly seen animals in the Shire include the Western Grey Kangaroo (*Macropus fuliginosus*), the Short-beaked Echidna (*Tachyglossus aculeatus*), the Bobtail (*Tiliqua rugosa*), the Dugite (*Pseudonaja affinis*), the Mulga Snake (*Notechis australis*) and a number of gecko species.

2.0 Objectives

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

The general objective of this survey was to provide information on the nature conservation and other values (e.g. water catchment, resource extraction, recreational areas, and indigenous and non-indigenous cultural heritage sites) of Crown Lands within the Kent Shire. The specific objectives of the study were to:

- Describe and characterise vegetation units, noting areas of degraded or modified vegetation and the likely cause(s), and map their occurrence at a scale of 1:5000;
- Describe and map the extent and severity of weed invasion within reserves at a scale of 1:5000;
- Describe and map human influence and cultural features within reserves, including: internal vehicle tracks, boundary fence condition, artificial water features, constructed drainage, non-indigenous cultural heritage sites and Aboriginal sites, at a scale of 1:5000;
- Assess land use within reserves, including extractive industries, recreation, water resources and natural resources; and
- Gather detailed data on vegetation, soil and landform characteristics within survey sites (quadrats) considered representative of vegetation mapping units.

This information is ultimately to assist Department of CALM in deciding on the most appropriate uses for the reserves and whether or not they should be included in the conservation estate, and to contribute to baseline data on Crown bushland remnants for long-term conservation trends.

3.0 Methods

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

3.1 Collection of Data

All data collected followed the methods of McDonald *et al*. (1998) (soils and vegetation) and (modified) Safstrom (1995) (land use and other reserve data). The use of these methods ensured that the data collected as part of this study is compatible with previous studies. Both these methods have been used to assess the nature conservation and other values of reserves in other parts of Western Australia.

Data was collected through field assessment of five reserves and recorded on standard data sheets. Three different data sheets were used (Appendix One):

- **Reserve Data** sheets (for information on DRF plants, serious weeds, heritage sites, fauna, land uses etc – one sheet per reserve);
- **Quadrat Vegetation Data** (botanical and ecological information, fire history, disturbance, photograph details, etc – one sheet per quadrat); and
- **Quadrat Soil and Landform Data** sheets (details on soils and landform –one sheet per quadrat).

Data management is discussed below.

3.2 Data Storage and Database Structure

A Microsoft® Access 97® relational database was used as the prime means of storing all survey data -and a single ESRI® ArcView® 3.2 project containing multiple themes was created as the main interface through which spatial data can be queried. Photos were stored digitally on Kodak® Photo CD®, and were hotlinked to relevant ESRI® ArcView® themes.

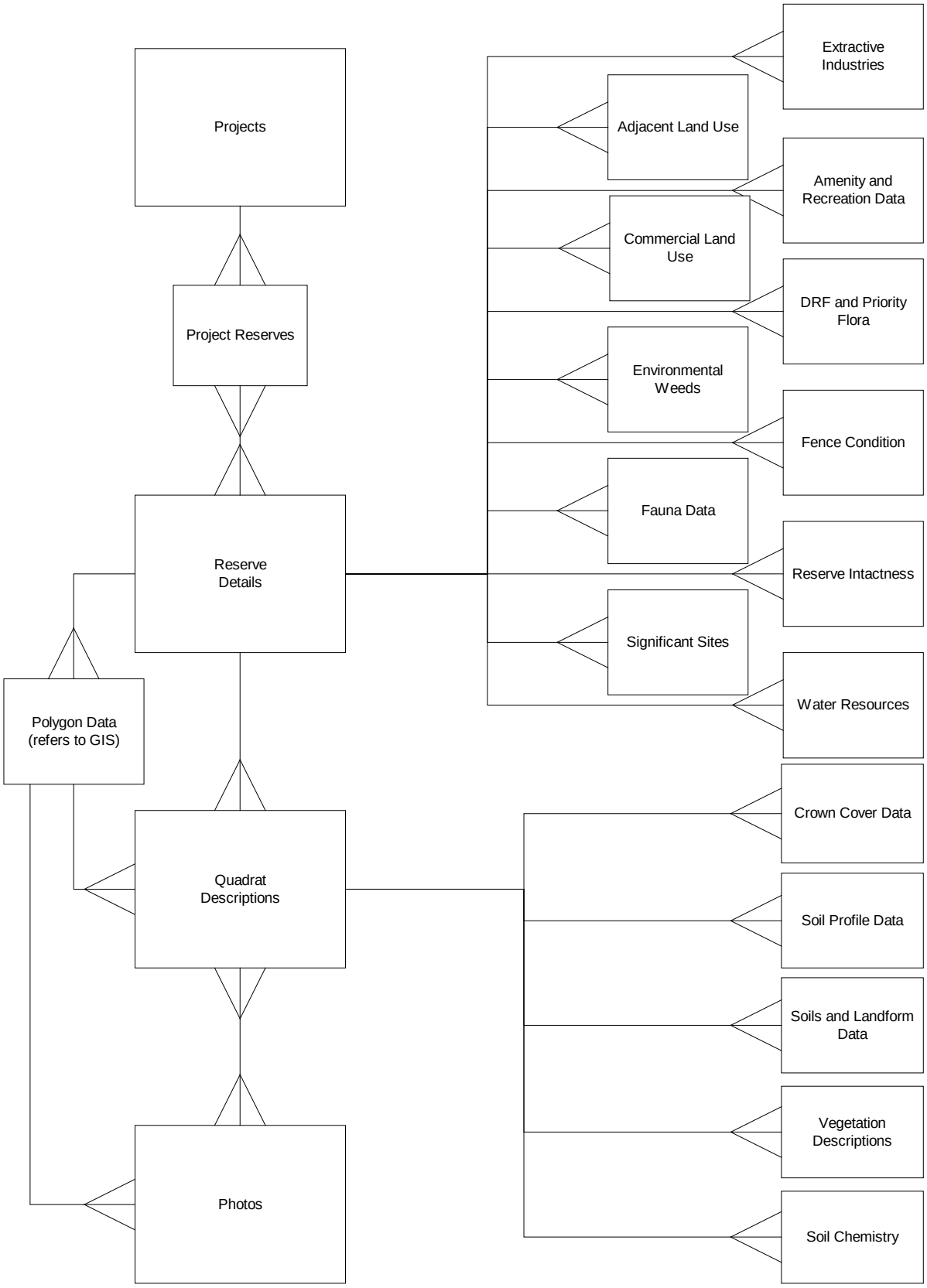
Survey data was entered into the database in the following tables:

- **Project Reserves** (reserves surveyed in each project);
- **Photos** (type and filename of photos);
- **Extractive Industry** (type of industry, area and current activity);
- **Projects** (provides bibliographical information on this (and other) projects);
- **Codes** (provides the codes for all types of data recorded);
- **Polygon Data** (provides the corresponding Polygon Identification Numbers for each reserve);
- **Quadrat Descriptions** (location and characteristics within Quadrats);
- **Vegetation Descriptions** (floristic and structural formation data within Quadrats);
- **Crown Cover Data** (data relating to vegetation cover within Quadrats);
- **Soil Profile Data** (data relating to soil horizons within Quadrats);
- **Soils and Landform Data** (data relating landform and soil surface conditions within Quadrats);
- **Reserve Details** (data on soils and geology within reserves);

- **Reserve Intactness** (degradation within reserves);
- **Fauna Data** (fauna data within reserves);
- **Amenity and Recreation Data** (access and recreation within reserves);
- **Water Resources** (natural and artificial within reserves);
- **Commercial Land Use** (timber and wildflower harvesting within reserves);
- **Adjacent Land Use** (cropping, grazing and bushland adjacent to reserves);
- **Significant Sites** (Aboriginal and non-indigenous cultural; sites within reserves);
- **Declared Rare Flora and Priority Flora** (significant flora recorded within reserves)
- **Fence Condition** (boundary fence condition); and
- **Environmental Weeds** (cover/abundance of significant environmental weeds).

Each table was linked via common fields, and each field in each table was linked to a separate Access table in which data codes were defined. The database was constructed as a normalised database, using codes rather than English descriptions. The relationship between each table is shown in Figure 1.

Figure 1: Entity Relationship Diagramme for Database



3.3 Reserves

The 5 reserves surveyed within the Shire of Kent are listed in Table 1. Figure 2 provides an overview of their location within the Shire of Kent. The following information provides a description of the reserve-level data collected.

3.3.1 Reserve Details

Each reserve was located using a combination of maps and cadastral information provided by the Department of CALM. The following information was recorded for each reserve (where the information was available):

- Shire;
- Reserve number;
- Land district;
- Lot number;
- Location;
- CALM district name and district number;
- Locality or reserve name;
- Survey date;
- Surveyor name;
- The appropriate 1:25 000 or 1:50 000 Topographic Survey mapsheet name and number;
- The appropriate 1:250 000 Geology mapsheet name and number;
- Underlying reserve geology and approximate percentage of the reserve occupied by each geological unit identified;
- The presence of any non-indigenous cultural heritage sites; and
- The presence of any Aboriginal sites.

3.3.2 Vegetation Associations

Vegetation associations within each reserve were identified and mapped as a series of vegetation units at a scale of 1:5000 (Map 1). Each vegetation unit was depicted as one or more separate and numbered polygons within each reserve. Preliminary mapping was based on vegetation structural boundaries interpreted from colour aerial photographs, which was further supplemented with information on topographic position and underlying geology. These boundaries were verified and refined in the field during site reconnaissance and weed mapping (see Section 3.3.4 below). Areas of granite outcrop were mapped as a separate vegetation unit. The locations of any new populations of Declared Rare or Priority Flora identified in the field were recorded using GPS (where already known), and a voucher specimen collected.

Areas where the original floristic composition or structure of vegetation was significantly degraded or modified were mapped. The map output for this study indicates all such degraded vegetation units as being “Degraded”. However, information as to the likely original vegetation type, and the type(s) of degradation or modification visible have been recorded in the accompanying Access database and Arcview files (see Section 3.3.3 below).

Figure 2: Reserves Surveyed in Kent Shire

3.3.3 Reserve Intactness

The intactness of each reserve was mapped at a scale of 1:5 000 based on the extent and severity reserve intactness was indicated by the extent of degraded vegetation units and the level of grazing within reserves.

For each area of degraded vegetation identified, the following information was recorded:

- The type of degradation or modification (presence of salt-tolerant species, salt scalds, bare ground, decline/stress and/or death/loss of overstorey vegetation, decline/stress and/or death/loss of understorey vegetation, all vegetation removed, regenerating vegetation, other);
- The likely cause of degradation or modification (dieback, waterlogging, salinity, clearing for roaded catchment, clearing for gravel/sand extraction, other clearing, fire); and
- The likely original vegetation type.

Where the likely cause of degradation or modification was from waterlogging or salinity, it was noted whether the source was rising water tables, discharge from constructed drains or surface run-off.

Degraded vegetation units are shown on Map 1.

3.3.4 Environmental Weeds

Weed infestations within each reserve was mapped at a scale of 1:5000 based on the extent and severity of infestations of weeds and exotic grasses and forbs.

Weed cover maps (Map 2) were created by surveying each reserve, paying particular attention to reserve edges, drainage lines and sites which had undergone some form of disturbance. A series of cover classes were used (<20%, 20-50%, 50-80% or >80%) to describe the extent of weed cover in each reserve. Access to reserves was by both vehicle (where possible) and on foot, and weed assessments were made by walking through areas and mapping weed cover.

The occurrence of any serious environmental weeds incidentally observed was noted. If the infestation was isolated (rather than widespread), the following information was recorded:

- Date observed;
- Location of the approximate centre of infestation using a GPS;
- Duration of GPS averaging;
- Species;
- Degree of infestation at that location; and
- A brief comment.

Grazing pressure was estimated visually, based on damage to vegetation and soil disturbance.

3.3.5 Social, Cultural and Economic Attributes

Information on a range of social, cultural and economic attributes were gathered for each reserve, with selected features mapped at a scale of 1:5000 (Map 3). The features identified on these maps, from aerial photograph interpretation and field observation, were:

- Internal vehicle tracks;
- Artificial water features;
- The presence and condition of boundary fences;
- Constructed drains entering or draining into the reserve; and
- Indigenous and Non-indigenous cultural heritage sites.

Any Aboriginal sites or non-indigenous cultural heritage sites that were incidentally encountered during fieldwork were recorded, photographed and the appropriate forms were completed. The GPS location of these sites and the duration of GPS averaging was also recorded.

Within each reserve, the presence and attributes of the following uses and values were recorded, on the basis of aerial photo interpretation and field observation:

Recreation/Amenity/Tourism

The following information relating to reserve amenity was recorded:

- Condition of external road access (2WD, 4WD or none) (Map 2);
- Condition of internal vehicle access (2WD, 4WD or none) (Map 3); and
- Current recreation activities

Water Resources

The following information relating to water resources was recorded:

- Natural surface water features; and
- Artificial water features (tanks, dams, wells) (Map 3).

Extractive Industries

The following information relating to extractive industry was recorded:

- Type of extractive industry;
- Area (hectares) occupied by the extractive industry;
- Quantity of the resource remaining (ha), estimated from soil data and general observations

Direct Production

The following information relating to direct production was recorded:

- Presence of timber cutting, the intensity in relation to the extent of the desired species, and an estimate of the number of years since the most recent harvest;
- Presence of wildflower harvesting, the intensity in relation to the extent of the desired species, and an estimate of the number of years since the most recent cutting; and
- Sandalwood (*Santalum spicatum*) presence and abundance.

Adjacent Land Use

For land uses adjacent to reserves, the following information was recorded:

- Types of land use (cropping/grazing, agroforestry/plantation, extractive, urban, industrial, remnant vegetation, revegetation, utility/transport (road, rail or easement), water production/conservation, other);
- The percentage of the total reserve perimeter adjoining each land use identified above;
- The length of boundary fencing for each reserve that fits into the quality classes of none, poor or good; and
- The presence/absence of any constructed drains that either enter, or terminate at and drain into, the reserve.

3.3.6 Fauna

Evidence of native and introduced vertebrate fauna was recorded and the type of observation noted (e.g. sighting, hearing, animal remains, tracks, scats and diggings). All animals were identified to species level. Observations made were incidental and not a result of a systematic search of the area. Wherever, possible, fauna were identified to species level.

3.4 Quadrats

A total of 21 survey sites or quadrats were established on 5 reserves in the Shire of Kent to enable detailed assessment of vegetation, soil and landform characteristics in areas representative of each vegetation unit identified.

Survey sites consisted of two quadrats of 100m^2 (10m x 10m) and 400m^2 (20m x 20m), with the 100m^2 quadrat nested within a corner of the 400m^2 quadrat. Wherever possible, quadrats were aligned north-south and east-west, with the north west corner as the common corner between the two quadrats. Any variations from this orientation were noted. The common corner was marked with a galvanised steel star picket with a stamped aluminium plate to identify the site number. The corners of the 100 m^2 quadrat were marked with galvanised fence droppers. A transect was established that diagonally intersected both nested quadrats, with its origin in the north-west corner. The locations of survey quadrats were plotted onto the same map as vegetation associations (Map 1).

A photograph was taken of each quadrat to illustrate the vegetation and general topography. All photographs were taken from the north-west corner showing the star picket and, in this survey, showing the tape measure laid out from the north-west corner to the south-east.

3.4.1 Quadrat Location

A quadrat was placed in each vegetation unit identified during preliminary and field mapping of vegetation associations. Quadrats were not placed in significantly degraded or modified vegetation units. Sites were chosen within homogenous areas subjectively considered to be characteristic of the vegetation unit at the selected location. As far as possible, quadrat locations were chosen to avoid vegetation boundaries and areas of local disturbance, such as roads, tracks and gravel pits.

3.4.2 Quadrat Description

Through a combination of office and field based assessments, the following information was recorded for each quadrat:

- Date;
- Surveyor name;
- Unique site identifier (Quadrat number);
- Reserve details as per Section 3.3.1;
- GPS location, including averaging time (minutes);
- An aerial photo reference;
- Aspect (cardinal directions);
- Elevation;
- Disturbance of site, based on the degree of clearing, cultivation and soil disturbance;
- Abundance and size of surface coarse fragments;
- Landform element, slope class and morphological type;
- Vegetation name (both full and brief descriptions, and using McDonald Muir and Beard);
- Evidence/lack of evidence of fire, and an estimate of the number of years since the most recent fire;
- Percentage cover of plant litter;
- Percentage cover of bare ground; and
- Any other features of ecological relevance.

The methods and coding of McDonald *et al.* (1998) were used to describe site disturbance, the abundance and size of surface coarse fragments, landform element, slope class and morphological type; and vegetation name.

Evidence of fire was determined through observation of charred wood and vegetation. The period since the fire has occurred was estimated based on the degree of litter present, the degree of decomposition of fallen timber and the height of regrowth vegetation. The degree of litter present was not used as a sole indicator because of variable litter decomposition rates in different vegetation communities and climatic regimes.

A colour photograph was taken of the site from the north west corner of the quadrat looking in a south-easterly direction. Each photograph shows the general appearance of the vegetation at the survey site.

3.4.3 Vegetation Description

Within each quadrat, the floristics, vertical structure and cover of the vegetation were recorded, following the minimum vegetation description guidelines provided in McDonald *et al.* (1998). This information was combined for all strata to give a detailed vegetation name. Vegetation name was determined using the vegetation structural formation, height class and floristic associations in each stratum present within a quadrat.

To determine vegetation floristics, the dominant/co-dominant vascular plant species in each strata within or overhanging the 100m^2 quadrat, were identified to species and subspecies level (where possible). Additional dominant/co-dominant plant species in the tallest stratum within or overhanging the 400m^2 quadrat were also identified. The stratum and quadrat in which each species occurred also were recorded.

The vertical structure of the vegetation was determined by recording the growth form, average height, height class and height class name for each of the dominant/co-dominant species in the tallest stratum within the 400m^2 quadrat, following the method and descriptions of McDonald (1998).

The transect was used to assess the vegetation cover of the tallest strata using the method of McDonald *et al*. (1998). Crown width and the distance between plant crowns within each strata were measured along the transect. Twelve measurements were taken where possible. For some sites, large distances between plants in some strata (e.g. very scattered mallee in heath formations or sparse middle storey under woodlands) meant that it was not possible to take 12 measurements along the transect before intercepting another vegetation type or disturbed area such as an access track.

For the tallest stratum, data gathered was used to calculate the following information using the method of McDonald *et al*. (1998):

- Average crown width and gap;
- Crown separation ratio;
- Percentage crown cover; and
- Crown cover class.

For the remaining strata, the crown cover class of dominant and co-dominant species was visually estimated according to the method of McDonald *et al*. (1998).

Plant nomenclature and taxon identification codes followed the MAX Collecting Book database produced by the Western Australian Herbarium. Duplicate voucher specimens were collected for all dominant/co-dominant species surveyed within quadrats. Voucher specimens were only collected if fertile material (buds, flowers and fruit) were available or if positive identification could be made without fertile material. These voucher specimens were mounted to Herbarium standards for lodgement at CALM Herbaria at Como and Katanning. In addition to the voucher specimens, plant specimens that did not have fertile material were collected for identification purposes. All specimens were identified at the WA Herbarium, with reference to collections and experts as required.

Where populations of declared rare or priority flora were identified from voucher specimens and not in the field, their location was estimated using the GPS readings from the quadrat that the specimen originated from.

Vegetation units were named according to McDonald *et al.* (1998), Muir (1977) and Beard (1981).

3.4.4 Soil Description

The A and B horizons of the soil profile were described from a soil pit adjacent to, but outside the common quadrat corner (north-west). Information recorded for each quadrat followed the methods and coding of McDonald (1998) and was as follows:

- Upper and lower depth of each horizon (distance from the soil surface)
- Moist soil colour (using a Munsell Soil Colour Chart);
- Field texture grade;
- Abundance, size and lithology of coarse fragments;

- Soil dainage;
- Effervescence of carbonates (based on the reaction of HCl added to dry soil); and
- Soil pH.

Soil pH was measured using a portable pH meter. Two measurements were made – the first based on an extract of 5g of soil added to 25mL of pH neutral water, and the second based on the addition of 0.5 mL $CaCl_2$ to the original soil/water mixture. The second measurement is preferable as it more accurately reflects the pH in soil solutions as the addition of $CaCl_2$ releases bound hydrogen in the soil.

Soil Supergroup and Soil Group classifications were identified and coded in accordance with Schoknecht (1999) for each quadrat.

3.5 Map Production and Arcview Themes

The following section describes the methods used in the preparation of the three maps outlined in Sections 3.3.2., 3.3.4. and 3.3.5.

3.5.1 Metadata

Each spatial dataset used information on the following core metadata elements provided. These follow the ANZLIC metadata guidelines:

- Title;
- Custodian;
- Description (abstract);
- Date currency;
- Access (stored data format);
- Projection;
- Datum;
- Data quality (lineage, positional accuracy, attribute accuracy, completeness); and
- Metadata date.

A brief written summary was provided for each dataset. The summary contained information about how it was created, any limitations, and any other information that will assist third parties to access the dataset.

3.5.2 Vegetation Associations Map

Vegetation associations (including degraded areas and granite outcrops) were provided as single ESRI® ArcView® 3.2 shapefiles (polygon themes). Each polygon was attributed with a unique polygon identifier, reserve number, land district, lot number, class/type/value, area (ha) and perimeter (m) value. All themes were stored in decimal degrees (4 decimal places). Quadrat locations were also included with this map.

Each occurrence of the same vegetation unit within a reserve was mapped as a separate polygon. However, as each not every vegetation unit was surveyed in each reserve, each polygon was attributed with features that corresponded to that vegetation unit from elsewhere within the Shire. For each vegetation polygon mapped, the following information was recorded:

- Polygon Number;
- Reserve Number;
- Land District;
- Location Number;
- Lot Number;
- The area of the polygon (ha), and the percentage of the reserve's area the polygon occupies;
- For degraded or modified vegetation polygons, a name describing the unit in terms of the likely original vegetation and type of degradation;
- For all remaining vegetation polygons, a site identifier (quadrat number) and a vegetation name; and
- A brief comment, where appropriate.

There were four vegetation units which were identified within the Shire but not found to contain quadrats. These vegetation units were included in the mapping and database, to ensure all vegetation types are adequately represented. However, these vegetation units do not have detailed vegetation or soil information associated with them. Instead, they were allocated a nominal quadrat number (non-existent). In addition, three vegetation units which were mapped but not sampled in 2000 (2000 nominal quadrats), were sampled in 2001.

3.5.3 Reserve Intactness Map

Weed cover classes were mapped as separate polygons, and each had the following information recorded:

- Reserve Number;
- Land District;
- Location Number;
- Lot Number;
- Weed cover class (<20%, 20-50%, 50-80% or >80%);
- The area of the polygon (ha);
- The percentage of the reserve's area occupied by that polygon; and
- A brief comment, where appropriate.

3.5.4 Social, Cultural and Economic Attributes Map

Reserve boundary fences, vehicular tracks and drains entering the reserve or terminating at the boundary were mapped as separate ESRI® ArcView® 3.2 shapefiles (line themes). Each of the line feature themes were attributed with a unique line identifier, reserve number, land district, lot number, class/type/value and length (m) values.

Water tanks, bores, dams and wells were mapped as single ESRI® ArcView® 3.2 shapefiles (point themes). Each point theme was attributed with a unique identifier, reserve number, land district, lot number, class/type/value, latitude and longitude (decimal degrees to 4 decimal places). Large dams were mapped as polygons.

3.6 Timing of Survey

The fieldwork was undertaken over a 10-day period in mid-winter, from July 2nd to 11th, 2001 (inclusive).

4.0 Results

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

The following sections provide summary information for each reserve surveyed within the Shire of Kent, as well as a Species by Site table, which lists the occurrence of species within each Quadrat surveyed.

Complete fauna and flora species lists are provided in Appendices 2 and 3 respectively.

4.1 Species by Site

The distribution of plant species across the survey quadrats is illustrated in Table 2.

Table 2: Flora Species Occurrence across Quadrats

Quadrat Number / Species Name	KS0039	KS0042	KS0048	KS0054	KS0055	KS0056	KS0057	KS0058	KS0059	KS0060	KS0061	KS0062	KS0063	KS0064	KS0065	KS0066	KS0067	KS0068	KS0069	KS0070	KS0071	Total
Acacia acanthaster	*																					1
Acacia acuminata					*						*											2
Acacia erinacea															*							1
Allocasuarina campestris				*																		1
Allocasuarina huegeliana			*		*						*											3
Allocasuarina microstachya				*		*								*								3
Amphipogon strictus					*																	1
Anarthria polyphylla				*																		1
Austrostipa sp.1					*																	1
Banksia sphaerocarpa subsp *sphaerocarpa*									*	*							*					3
Banksia violaceae																	*					1
Beaufortia incana										*												1
Borya sphaerocephala								*			*											2
Callitris roei						*																1
Calothamnus quadrifidus														*								1
Cautis dioica																	*					1
Dampiera juncea										*												1
Desmocladus asper											*											1
Dodonaea bursariifolia															*							1
Dodonaea humifusa												*										1
Dodonaea viscosa													*									1
Dryandra cirsioides						*	*		*													3
Dryandra conferta var *parva*									*													1
Dryandra ferruginea subsp *ferruginea*							*			*												2
Dryandra pallida						*																1
Eremea pauciflora																	*					1
Eucalyptus albida						*	*															2
Eucalyptus annulata																		*			*	2
Eucalyptus celastroides subsp *virella*																				*		1
Eucalyptus eremophila subsp *eremophila*															*					*		2
Eucalyptus falcata							*		*													2
Eucalyptus flocktoniae																					*	1
Eucalyptus gratiae													*									1

Table 2: Flora Species Occurrence across Quadrats (continued)

Quadrat Number / Species Name	KS0039	KS0042	KS0048	KS0054	KS0055	KS0056	KS0057	KS0058	KS0059	KS0060	KS0061	KS0062	KS0063	KS0064	KS0065	KS0066	KS0067	KS0068	KS0069	KS0070	KS0071	Total
Eucalyptus incrassata						*	*															**2**
Eucalyptus longicornis		*										*										**2**
Eucalyptus phaenophylla subsp *phaenophylla*															*	*				*		**3**
Eucalyptus phenax															*	*				*		**3**
Eucalyptus platypus subsp *platypus*																		*			*	**2**
Eucalyptus salmonophloia		*																				**1**
Eucalyptus scyphocalyx																				*		**1**
Eucalyptus wandoo subsp *wandoo*								*			*	*										**3**
Gahnia aristata		*																				**1**
Gahnia drummondii																*						**1**
Gastrolobium parviflorum																				*		**1**
Gastrolobium spinosum							*															**1**
Grevillea sp.1																			*			**1**
Hakea cygna subsp *cygna*														*								**1**
Hakea lissocarpha								*								*						**2**
Hakea marginata	*																					**1**
Hakea obliqua subsp *parviflora*																	*					**1**
Hakea pandanicarpa subsp *crassifolia*																	*					**1**
Hakea subsulcata										*												**1**
Hibbertia exasperata						*																**1**
Hibbertia pungens																*						**1**
Hibbertia verrucosa	*																					**1**
Lepidosperma brunonianum			*						*		*			*								**4**
Lepidosperma sp.14										*												**1**
Lepidosperma sp.2																				*		**1**
Lepidosperma sp.3						*											*					**2**
Lepidosperma sp.5	*																					**1**
Lepidosperma sp.8												*										**1**
Lepidosperma sp.A2 Island Flat(G.J.Keighery 7000)						*	*					*				*						**5**
Leptospermum erubescens						*										*			*			**3**
Leucopogon sp.1																				*		**1**
Lomandra effusa								*				*			*							**3**
Loxocarya striata								*											*			**1**

Table 2: Flora Species Occurrence across Quadrats (continued)

Quadrat Number / Species Name	KS0039	KS0042	KS0048	KS0054	KS0055	KS0056	KS0057	KS0058	KS0059	KS0060	KS0061	KS0062	KS0063	KS0064	KS0065	KS0066	KS0067	KS0068	KS0069	KS0070	KS0071	Total
Melaleuca elliptica			*																			1
Melaleuca laxiflora																				*		1
Melaleuca pauperiflora																					*	1
Melaleuca societatis ms																			*			1
Melaleuca subtrigona																	*		*			2
Melaleuca uncinata	*												*		*					*		4
Melaleuca undulata															*							1
Mesmolaena preissii				*																		1
Mesmolaena stygia																			*			1
Olearia dampieri subsp *eremicola*												*										1
Petrophile ericifolia subsp *ericifolia*																	*					1
Poaceae sp.1													*									1
Santalum acuminatum													*									1
Templetonia sulcata		*																				1
Ursinia anthemoides													*									1
Verticordia chrysantha				*										*								2
Xanthorhea drummondii						*	*	*		*												4
Total Species per Quadrat	**5**	**4**	**3**	**5**	**4**	**11**	**9**	**6**	**5**	**7**	**6**	**7**	**6**	**5**	**8**	**7**	**9**	**2**	**6**	**10**	**4**	**129**

4.2 Reserve and Quadrat Descriptions

Section 2 of this report provides a summary description (in tabular form) of the features of individual reserves, along with the following maps for each reserve:

- Map 1: Vegetation and Quadrat Locations
- Map 2: Weed Cover
- Map 3: Reserve Features

4.2.1 Vegetation Associations

A total of 25 new and four old vegetation associations were identified based on a combination of structural and floristic information. Appendix 4 provides vegetation descriptions for each quadrat.

4.2.2 Flora

A total of 17 vascular plant Families and 83 plant species were recorded, of which 74 were identified to at least species level.

Two Priority Flora species were found during the field survey. The Priority 2 species *Dryandra conferta* var. *parva* was located in quadrat KS0059, Reserve 14522, and the Priority 3 species *Grevillea newbeyi* was opportunistically collected on the north side of the dam, between the dam and the overflow channel of Reserve 18803.

Also of note was the presence of isolated plants of Sandalwood (*Santalum spicatum*) in Reserves 10188 and 14417, and scattered plants in Reserve 20961.

A total of 93 vouchers and duplicates were collected for mounting and lodgement at the WA Herbarium and the Katanning Regional Herbarium, respectively.

4.2.3 Fauna

A list of fauna recorded in the reserves surveyed is given in Appendix 2. This list is based on opportunistic observations, comprising mainly of sightings and calls heard for birds, and scats and other signs (for example, diggings) for other fauna. The single frog species was heard calling from the study area, but heard and seen (caught) outside the study area. A total of 56 fauna species were recorded in the reserves, which included 50 species of birds, five species of mammal and one species of amphibian. No reptiles were observed, which is not surprising given the time of the year.

A Mallee Fowl (Declared Threatened Fauna) was seen in Reserve 18803, and Western Rosellas were seen in Reserve 14522. The rosellas were apparently of the inland subspecies, *Platycercus icterotis xanthogenys* (Priority 2 Fauna). The Painted Button-quail was also seen on several occasions in Reserve 18803 (including one particularly good sighting); this species was not recorded by Butler (1972) nor McKenzie (1973) but was on Grein's (1994) bird list for the Shire of Kent.

In addition to the fauna observations above, scats resembling those of Tammar Wallabies were collected from the western side of Reserve 18803 on the grassy area adjacent to the firebreak and fence. These scats were mixed with those of Western Grey Kangaroos on the

heavily-grazed grass. They have a slightly squared shape and pointed end typical of many wallaby scats; they are only a fraction of the size of Grey Kangaroo scats but larger than rabbit scats. A spotlight search was conducted in this area on one night, but no Tammar Wallabies were seen. The Tammar Wallaby is classed as Conservation Dependent Fauna; it is known to have occurred in this reserve in earlier years (Butler, 1972; McKenzie, 1973).

A very distinctive bird call resembling that of the Western Whipbird was heard on two different occasions on consecutive days, both in Reserve 18803 during cool, overcast weather. The first call was heard in tall, scrubby heath, from a distance of approximately 10 meters away, the second was in mallee, calling at a distance of about 30 meters. No sightings were made, despite the closeness of the bird in the first instance. Further investigation is necessary for a positive identification. The Western Whipbird is classified as Declared Threatened Fauna.

Fairy-wrens were seen on several occasions in Reserve 18803 but were not entered onto data sheets. This is because only females and uncoloured eclipse males were seen, causing difficulty with identification. It was felt that these were either Blue-breasted Fairy-wrens or Splendid Fairy-wrens.

Birds seen in the Shire of Kent but not noted from within the study area included the Yellow-throated Miner (common around Nyabing township), Australian Hobby and Barn Owl. The only mammal commonly seen within the study area was the Western Grey Kangaroo; 17 were seen during one night's spotlighting on Reserve 18803.

4.2.4 Soils and Landforms

All of the 21 quadrats surveyed were categorised as pediment landform element type, most of which one were regarded as being lower slope landform morphology (one was regarded as being flat) with gently inclined, very gently inclined or level slope classes. Eleven different soil types were encountered:

- Brown loamy earth (5 quadrats);
- Yellow/brown shallow sandy duplex (4 quadrats);
- Shallow gravel (4 quadrats);
- Acid shallow duplex (1 quadrat);
- Brown sandy earth (1 quadrat);
- Loamy gravel (1 quadrat);
- Pale deep sand (1 quadrat);
- Reticulated deep sandy duplex (1 quadrat);
- Alkaline grey shallow loamy duplex (1 quadrat);
- Red/brown non-cracking clay (1 quadrat); and
- Unclassified shallow loam over granite (1 quadrat).

Subsoils were generally hard and clayey to some degree, their hardness being exacerbated by rainfall that was well below average at the time.

4.2.5 Weed Cover

The extent and degree of weed infestations in the reserves surveyed is illustrated in Map 2. Reserves that have been more exposed to disturbances showed greater levels of

degradation through weed invasion. This was very noticeable in the south-east section of Reserve 14522 in the vicinity of the main road and railway, gravel pits, rubble from old buildings and deep-ripping of previously disturbed areas. *Romulea rosea* and a number of grassy weeds were abundant in large areas here.

The bushblock comprising Reserves 14417 and 10188 had large areas of weeds in the central section in the vicinity of the two dams, several tracks, old constructed drains, woodland that had been heavily logged and other obvious disturbances.

Reserve 20961 is the smallest of the reserves in the study area and is more or less surrounded by farmland. Severe weed infestations were extensive in the cleared sections of the south-east corner and along the eastern boundary, where disturbance was continuing. Weed incursions were a prominent feature of much of the vegetation in the eastern half of this reserve, largely because of previous fires and the close proximity of agricultural weeds.

Reserve 18808, being much larger than any of the other reserves, has extensive areas of undisturbed vegetation which are largely free of weeds. Weed-degraded areas were prominent around the dam, along tracks, and along the cleared areas of the western perimeter adjacent to the firebreak and fence.

Of the serious environmental weeds, Bridal Creeper (*Asparagus asparagoides*) was found in Reserve 18803, Reserve 10188 and in four different localities of Reserve 14417. Freesias (*Freesia* sp.) were found in two localities in Reserve 14522 and in Reserve 20961. African Lovegrass (*Eragrostis curvula*) was found near the old railway siding in Reserve 14522 in small patches.

4.2.6 Cultural Sites

All cultural sites are detailed in the assessment sheets in Appendix 5

Non-indigenous Cultural Heritage Sites

Two non-indigenous cultural heritage sites were found during fieldwork. In Reserve 18803, the original sections of the dam with its stone-lined wall and overflow channel and old wooden “pier” are possibly of heritage value. Extensions to the dam and considerable work on catchment drains appear to be more recent . The old railway siding with the dam and tank stands in Reserve 14522 also appears to be of heritage value. This dam also appears to have had more recent modification work, and is in continuing use to supply water to farmers. The large wooden tank stands are in relatively sound condition.

Aboriginal Cultural Site

One site appeared to be of Aboriginal origin. Rounded piles of similar-sized stones on top of a small rocky hill in Reserve 18803 may be a burial site. There are at least 16 or 17 stone piles.

4.2.7 Other Human Influences and Impacts

A series of human activities resulting in disturbances or impacts on the bushland over the years were noted from the five reserves. These are detailed in the assessment sheets in Appendix 1 and include clearing within reserve boundaries (sometimes in association with

adjacent farmland or in association with dam catchments, early buildings/railway sidings, etc), construction of tracks through or around the reserves, construction of drains, timber cutting (extensive in places), quarrying, verge effects of roads and railways, and dumping of rubbish and dead livestock and garden waste in bushland. Weed infestations were invariably associated with these activities. In several cases, a combination of these activities was evident, for example, timber cutting, dumping of rubbish and dead livestock and disturbance from vehicle use of nearby tracks (as seen on the south side of Reserves 10188 and 14417).

4.3 Discussion of Methods

The timing of the survey was perhaps the only area where any significant limits or deficiencies were imposed. Work was carried out in early July (mid-winter) which meant that many plant species were not yet in flower and that some identifications would be difficult. The implications of this on vegetation descriptions should be minimal as only dominant species are recorded, but must not be overlooked. Additionally, lack of winter rainfall had possibly hindered flowering and development of certain winter-flowering species.

Overall, no significant problems were encountered in the field or in the subsequent collation of data during the course of this survey. This suggests that refinement of methods from previous surveys (notably *Assessing Nature Conservation and Other Values of Crown Lands Within the Shire of Kent*, November 2000) had been beneficial, and that previous problems have been corrected. Furthermore, vegetation units described in the above report were recognisable during fieldwork for this (current) project, suggesting reasonable accuracy in these descriptions.

References

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

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Appendix One:
Reserve and Quadrat Survey Sheets

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

Reserve and Quadrat Data Sheets provided with Draft Report

Appendix Two:
Fauna Species List

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

Common Name	Taxonomic Name	
Mammals		
Brushtail Possum	*Trichosurus vulpecula*	
European Rabbit	*Oryctolagus cuniculus*	
European Red Fox	*Vulpes vulpes*	
Short-beaked Echidna	*Tachyglossus aculeaatus*	
Tammar Wallaby	*Macropus eugenii*	Unconfirmed
Western Grey Kangaroo	*Macropus fuliginosus*	
Amphibians		
Granite Froglet	*Crinia pseudinsignifera*	
Birds		
Australasian Grebe	*Tachybaptus novaehollandiae*	
Australian Magpie	*Gymnorhina tibicen*	
Australian Raven	*Corvus coronoides*	
Australian Ringneck	*Barnardius zonarius*	
Australian Shelduck	*Tadorna tadornoides*	
Australian Wood Duck	*Chenonetta jubata*	
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	
Black-winged Stilt	*Himantopus himantopus*	
Brown-headed Honeyeater	*Melithreptus brevirostris*	
Common Bronzewing	*Phaps chalcoptera*	
Crested Bellbird	*Oreoica gutturalis*	
Crested Pigeon	*Ocyphaps (Geophaps) lophotes*	
Dusky Woodswallow	*Artamus cinereus*	
Elegant Parrot	*Neophema chrysostoma*	
Galah	*Eolophus (Cacatua) roseicapilla*	
Grey Butcherbird	*Cracticus torquatus*	
Grey Currawong	*Strepera versicolor*	
Grey Fantail	*Rhipidura fuliginosa*	
Grey Shrike-thrush	*Colluricincla harmonica*	
Jacky Winter	*Microeca fascinans*	
Laughing Kookaburra	*Dacelo novaeguineae*	
Malleefowl	*Leipoa ocellata*	
Painted Button-quail	*Turnix varia*	
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	
Purple-gaped Honeyeater	*Lichenostomus keartlandi*	
Red Wattlebird	*Anthochaera paradoxa*	
Red-capped Robin	*Petroica goodenovii*	
Regent Parrot	*Polytelis anthopeplus*	
Restless Flycatcher	*Myiagra inquieta*	
Richard's Pipit	*Anthus novaeseelandiae*	

Common Name	Taxonomic Name	
Rufous Treecreeper	*Climacteris picumnus*	
Southern Scrub-robin	*Drymodes brunneopygia*	
Spotted Pardalote	*Pardalotus punctatus*	
Striated Pardalote	*Pardalotus striatus*	
Tawny Frogmouth	*Podargus strigoides*	
Tree Martin	*Hirundo nigricans*	
Varied Sitella	*Daphoenositta chrysoptera*	
Wedge-tailed Eagle	*Aquila audax*	
Weebill	*Smicrornis brevirostris*	
Welcome Swallow	*Hirundo neoxena*	
Western Rosella	*Platycercus icterotis*	
Western Whipbird	*Psophodes nigrogularis*	Unconfirmed
Western Yellow Robin	*Eopsaltria griseogularis*	
White-browed Babbler	*Pomatostomus superciliosus*	
White-browed Scrubwren	*Sericornis frontalis*	
White-cheeked Honeyeater	*Phylidonyris nigra*	
White-eared Honeyeater	*Lichenostomus leucotis*	
Willie Wagtail	*Rhipidura leucophrys*	
Yellow-plumed Honeyeater	*Lichenostomus ornatus*	
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	

Appendix Three:
Flora Species List

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

Family	Taxonomic Name
Asteraceae	*Olearia dampieri* subsp *eremicola*
Asteraceae	*Ursinia anthemoides*
Boryaceae	*Borya sphaerocephala*
Casuarinaceae	*Allocasuarina campestris*
Casuarinaceae	*Allocasuarina huegeliana*
Casuarinaceae	*Allocasuarina microstachya*
Cupressaceae	*Callitris roei*
Cyperaceae	*Caustis dioica*
Cyperaceae	*Gahnia aristata*
Cyperaceae	*Gahnia drummondii*
Cyperaceae	*Lepidosperma brunonianum*
Cyperaceae	*Lepidosperma* sp.14
Cyperaceae	*Lepidosperma* sp.2
Cyperaceae	*Lepidosperma* sp.3
Cyperaceae	*Lepidosperma* sp.5
Cyperaceae	*Lepidosperma* sp.8
Cyperaceae	*Lepidosperma* sp.A2 "Island Flat" (Keighery 7000)
Cyperaceae	*Mesomelaena preissii*
Cyperaceae	*Mesomelaena stygia*
Dilleniaceae	*Hibbertia exasperata*
Dilleniaceae	*Hibbertia pungens*
Dilleniaceae	*Hibbertia verrucosa*
Dilleniaceae	*Lomandra effusa*
Epacridaceae	*Leucopogon* sp.1
Goodeniaceae	*Dampiera juncea*
Mimosaceae	*Acacia acanthaster*
Mimosaceae	*Acacia acuminata*
Mimosaceae	*Acacia erinacea*
Myrtaceae	*Beaufortia incana*
Myrtaceae	*Calothamnus quadrifidus*
Myrtaceae	*Eremaea pauciflora*
Myrtaceae	*Eucalyptus albida*
Myrtaceae	*Eucalyptus annulata*
Myrtaceae	*Eucalyptus celastroides* subsp *virella*
Myrtaceae	*Eucalyptus eremophila* subsp *eremophila*
Myrtaceae	*Eucalyptus falcata*
Myrtaceae	*Eucalyptus flocktoniae*
Myrtaceae	*Eucalyptus gratiae*
Myrtaceae	*Eucalyptus incrassata*
Myrtaceae	*Eucalyptus longicornis*

Family	Taxonomic Name
Myrtaceae	*Eucalyptus phaenophylla* subsp *phaenophylla*
Myrtaceae	*Eucalyptus phenax*
Myrtaceae	*Eucalyptus platypus* subsp *platypus*
Myrtaceae	*Eucalyptus salmonophloia*
Myrtaceae	*Eucalyptus scyphocalyx*
Myrtaceae	*Eucalyptus wandoo* subsp *wandoo*
Myrtaceae	*Leptospermum erubescens*
Myrtaceae	*Melaleuca elliptica*
Myrtaceae	*Melaleuca laxiflora*
Myrtaceae	*Melaleuca pauperiflora*
Myrtaceae	*Melaleuca societatis* ms
Myrtaceae	*Melaleuca subtrigona*
Myrtaceae	*Melaleuca uncinata*
Myrtaceae	*Melaleuca undulata*
Myrtaceae	*Verticordia chrysantha*
Papilionaceae	*Gastrolobium parviflorum*
Papilionaceae	*Gastrolobium spinosum*
Papilionaceae	*Templetonia sulcata*
Poaceae	*Amphipogon strictus*
Poaceae	*Austrostipa* sp.1
Poaceae	Poaceae sp.1
Proteaceae	*Banksia sphaerocarpa* subsp *sphaerocarpa*
Proteaceae	*Banksia violacea*
Proteaceae	*Dryandra cirsioides*
Proteaceae	*Dryandra conferta* subsp *parva*
Proteaceae	*Dryandra ferruginea* subsp *ferruginea*
Proteaceae	*Dryandra pallida*
Proteaceae	*Grevillea* sp.1
Proteaceae	*Hakea cygna* subsp *cygna*
Proteaceae	*Hakea lissocarpha*
Proteaceae	*Hakea marginata*
Proteaceae	*Hakea obliqua* subsp *parviflora*
Proteaceae	*Hakea pandanicarpa* subsp *crassifolia*
Proteaceae	*Hakea subsulcata*
Proteaceae	*Petrophile ericifolia* subsp *ericifolia*
Restionaceae	*Anarthria polyphylla*
Restionaceae	*Desmocladus asper*
Restionaceae	*Loxocarya striata*
Santalaceae	*Santalum acuminatum*
Sapindaceae	*Dodonaea bursariifolia*
Sapindaceae	*Dodonaea humifusa*
Sapindaceae	*Dodonaea viscosa*
Xanthorrhoeaceae	*Xanthorrhoea drummondii*

Appendix Four: Vegetation Associations

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

Quadrat #	Vegetation Association
KS0039	Tall mallee shrubland of *Melaleuca uncinata* over mid-high sparse shrubland of *Hakea marginata* over mid-high open heath of *Hibbertia verrucosa* and low open shrubland of *Acacia acanthaster* over low sparse sedgeland of *Lepidosperma* sp.5.
KS0042	Tall open forest of *Eucalyptus salmonophloia* and mid-high closed forest of *Eucalyptus longicornis* over mid-high open shrubland of *Templetonia sulcata* over mid-high sparse sedgeland of *Gahnia aristata*.
KS0048	Mid-high open forest of *Allocasuarina huegeliana* over tall sparse shrubland of *Melaleuca elliptica* over tall open sedgeland of *Lepidosperma brunonianum*.
KS0054	Very tall open shrubland of *Allocasuarina campestris* over mid-high open heath of *Verticordia chrysantha* and low open heath of *Allocasuarina microstachya* over low open rushland of *Anarthria polyphylla* and low open sedgeland of *Mesomelaena preissii*.
KS0055	Mid-high open forest of *Allocasuarina huegeliana* and *Acacia acuminata* over grassland of mid-high *Austrostipa* sp.1 and low *Amphipogon strictus*.
KS0056	Very tall open mallee woodland of *Eucalyptus incrassata* and *Eucalyptus albida* emergent over dwarf open forest of *Callitris roei* over tall open shrubland of *Leptospermum erubescens*, *Dryandra cirsioides* and *Dryandra pallida* and very tall *Xanthorrhoea drummondii* over low shrubland of *Hibbertia exasperata* and low heathland of *Allocasuarina microstachya* over open sedgeland of tall *Lepidosperm*a sp.A2 "Island Flat" (Keighery 7000) and low *Lepidosperma* sp.3.
KS0057	Very tall mallee woodland of *Eucalyptus falcata* with *Eucalyptus incrassata* and *Eucalyptus albida* over tall open shrubland of *Dryandra cirsioides* over sparse shrubland of tall *Gastrolobium spinosum* and mid-high *Dryandra ferruginea* subsp *ferruginea* and tall *Xanthorrhoea drummondii* over sparse sedgeland of tall *Lepidosperma* sp.A2 "Island Flat" (Keighery 7000).
KS0058	Emergent mid-high isolated trees of *Eucalyptus wandoo* subsp *wandoo* over very tall sparse *Xanthorrhoea drummondii* over low sparse shrubland of *Hakea lissocarpha* over low sedgeland of *Lomandra effusa*, *Borya sphaerocephala* and *Loxocarya striata*.
KS0059	Very tall mallee woodland of *Eucalyptus falcata* emergent over tall shrubland of *Banksia sphaerocarpa* subsp *sphaerocarpa* and *Dryandra cirsioides* over mid-high sparse shrubland of *Dryandra conferta* subsp *parva* over mid-high sparse sedgeland of *Lepidosperma brunonianum*.

Quadrat #	Vegetation Association
KS0060	Tall open shrubland of *Hakea subsulcata*, *Banksia sphaerocarpa* subsp *sphaerocarpa* and *Beaufortia incana* with very tall *Xanthorrhoea drummondii* over mid-high shrubland of *Dryandra ferruginea* subsp *ferruginea* over mid-high sparse sedgeland of *Lepidosperma* sp.14 and mid-high sparse forbland of *Dampiera juncea*.
KS0061	Low open forest of *Eucalyptus wandoo* subsp *wandoo*, *Allocasuarina huegeliana* and *Acacia acuminata* over mid-high sedgeland of *Lepidosperma brunonianum* and low sedgeland of *Desmocladus asper* and *Borya sphaerocephala*.
KS0062	Tall open forest of *Eucalyptus wandoo* subsp *wandoo* and *Eucalyptus longicornis* over tall sparse shrubland of *Olearia dampieri* subsp *eremicola* over dwarf sparse shrubland of *Dodonaea humifusa* over low open rushland of *Lomandra effusa* and low open sedgeland of *Lepidosperma* sp.A2 "Island Flat" (Keighery 7000) and *Lepidosperma* sp.8.
KS0063	Extremely tall open mallee forest of *Eucalyptus gratiae* over dwarf open forest of *Santalum acuminatum* over tall mallee shrubland of *Melaleuca uncinata* and sparse mallee shrubland of *Dodonaea viscosa* over mid-high open grassland of Poaceae sp.1 and low open forbland of *Ursinia anthemoides*.
KS0064	Very tall sparse shrubland of *Hakea cygna* subsp *cygna* and *Calothamnus quadrifidus* over low sparse heath of *Allocasuarina microstachya* and *Verticordia chrysantha* over mid-high sedgeland of *Lepidosperma brunonianum*.
KS0065	Very tall open mallee forest of *Eucalyptus eremophila* subsp *eremophila* with *Eucalyptus phaenophylla* subsp *phaenophylla* and *Eucalyptus phenax* over tall open mallee shrubland of *Melaleuca uncinata* over very tall sparse shrubland of *Melaleuca undulata* over sparse shrubland of low *Dodonaea bursariifolia* and dwarf *Acacia erinacea* over mid-high sparse sedgeland of *Lomandra effusa*.
KS0066	Extremely tall open mallee forest of *Eucalyptus phaenophylla* subsp *phaenophylla* and *Eucalyptus phenax* over tall sparse shrubland of *Hakea lissocarpha* and *Leptospermum erubescens* over mid-high open shrubland of *Hibbertia pungens* over mid-high open sedgeland of *Lepidosperma* sp.A2 "Island Flat" (Keighery 7000) and *Gahnia drummondii*.
KS0067	Very tall isolated shrubs of *Hakea obliqua* subsp *parviflora* emergent over very tall sparse shrubland of *Hakea pandanicarpa* subsp *crassifolia*, *Eremaea pauciflora*, *Banksia sphaerocarpa* subsp *sphaerocarpa* and *Petrophile ericifolia* subsp *ericifolia* over low sparse shrubland of *Banksia violacea* and low sparse heath of *Melaleuca subtrigona* over low sparse sedgeland of *Caustis dioica* and *Lepidosperma* sp.3.
KS0068	Mid-high isolated trees of *Eucalyptus annulata* over mid-high open forest of *Eucalyptus platypus* subsp *platypus*.

Quadrat #	Vegetation Association
KS0069	Tall open mallee shrubland of *Leptospermum erubescens* over tall sparse shrubland of *Melaleuca societatis* ms over low open shrubland of *Grevillea* sp.1 and low open heath of *Melaleuca subtrigona* over open sedgeland of tall *Mesomelaena stygia* and low *Loxocarya striata*.
KS0070	Very tall mallee woodland of *Eucalyptus scyphocalyx*, *Eucalyptus phenax*, *Eucalyptus eremophil*a subsp *eremophila*, *Eucalyptus phaenophylla* subsp *phaenophylla* and *Eucalyptus celastroides* subsp *virella* over tall shrubland of *Melaleuca uncinata* and *Melaleuca laxiflora* over tall sparse heath of *Leucopogo*n sp.1 and mid-high sparse shrubland of *Gastrolobium parviflorum* over low sparse sedgeland of *Lepidosperma* sp.2.
KS0071	Mid-high woodland of *Eucalyptus annulata* with *Eucalyptus flocktoniae* over low woodland of *Eucalyptus platypus* subsp *platypus* over tall mallee shrubland of *Melaleuca pauperiflora*.

Appendix Five:
Sites of Cultural Significance

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

Heritage and indigenous site sheets provided with Draft Report.

Section Two:
Reserve Summaries

Reserve Summaries

Assessing the Nature Conservation and Other Values of Crown Lands Within the Shire of Kent

Reserve Name:	N/A	**Purpose:**	Water, Conservation of Flora and Fauna
Reserve #:	18803	**Area:** 979.3 ha	**Perimeter:** 27,039m
Shire:	Kent	**Polygon Identification Numbers:**	661087, 661089, 661090
Location:		**CALM District:** Katanning	**#:** 32

Fence Condition (% of Reserve Perimeter):

No Fence: 18% **Fence in Poor Condition:** 0% **Fence in Good Condition:** 82%

Fauna

Birds: Grey Butcherbird, Yellow-rumped Thornbill, Southern Scrub-robin, Dusky Woodswallow, Tree Martin, Australian Raven, Weebill, Crested Bellbird, White-browed Babbler, Western Yellow Robin, Australian Ringneck, Crested Pigeon, Restless Flycatcher, Grey Shrike-thrush, Painted Button-quail, Willie Wagtail, Grey Currawong, Red Wattlebird, White-browed Scrub-wren, Australian Shelduck, Purple-gaped Honeyeater, Malleefowl, White-cheeked Honeyeater, Wedge-tailed Eagle, Black-winged Stilt, Australasian Grebe, Brown-headed Honeyeater, Grey Fantail, Tawny Frogmouth, Welcome Swallow, Striated Pardalote, Australian Wood Duck, Spotted Pardalote, Common Bronzewing.

Other Fauna: European Rabbit, European Red Fox, Short-beaked Echidna, Granite Froglet (*Crinia pseudinsignifera*).

Probable: Western Whipbird (heard only, reasonably close, repeated), Tammar Wallaby (distinctive scats, collected).

Water Resources: Large dam, roaded catchment (extensive), constructed drains, underground pipe from dam leading NW out of reserve (to stand-pipe?).

Weed Cover:

Area <20%: 72% **Area 50-80%:** 17%

Area 20-50%: 4% **Area >80%:** 7%

Adjacent Land Use (% of Reserve Perimeter):

Cropping/grazing: 77% **Utility/transport:** 8%

Remnant Vegetation: 15%

Grazing Pressure: Light

Access: Unsealed external, 2WD and 4WD internal.

Degraded Vegetation: Some understorey degradation of bushland fringing cleared areas due to weed invasion, particularly south of dam in vicinity of roaded catchment, adjacent to cleared areas on western boundary and adjacent to cleared area on northern boundary of "Eastern Block". Death of sheoaks fringing granite outcrops also noted, apparently through drought stress.

Comments: 11 quadrats in this reserve, i.e. KS0039, KS0048, KS0063, KS0064, KS0065, KS0066, KS0067, KS0068, KS0069, KS0070, KS0071.

Minimal timber cutting noted – Jam Wattle (*Acacia acuminata*); gravel quarrying localised, mimimal. One area on side of small breakaway, close to northern track, appears to have been disturbed/quarried many years ago, but origins unknown. Much of northern boundary adjoins privately-owned bushland stretching towards Lake Chinocup Reserve. Local information suggests many Malleefowls have been seen in this bushland in past years.

Reserve 18803

Quadrat KS0039

Tall mallee shrubland of *Melaleuca uncinata* over mid-high sparse shrubland of *Hakea marginata* over mid-high open heath of *Hibbertia verrucosa* and low open shrubland of *Acacia acanthaster* over low sparse sedgeland of *Lepidosperma* sp.5 on acid shallow duplex soils.

Quadrat KS0048

Mid-high open forest of *Allocasuarina huegeliana* over tall sparse shrubland of *Melaleuca elliptica* over tall open sedgeland of *Lepidosperma brunonianum* on shallow loam over granite bedrock.

Reserve 18803

Quadrat KS0063

Extremely tall open mallee forest of *Eucalyptus gratiae* over dwarf open forest of *Santalum acuminatum* over tall mallee shrubland of *Melaleuca uncinata* and sparse mallee shrubland of *Dodonaea viscosa* over mid-high open grassland of Poaceae sp.1 and low open forbland of *Ursinia anthemoides* on yellow/brown shallow sandy duplex soils.

Quadrat KS0064

Very tall sparse shrubland of *Hakea cygna* subsp *cygna* and *Calothamnus quadrifidus* over low sparse heath of *Allocasuarina microstachya* and *Verticordia chrysantha* over mid-high sedgeland of *Lepidosperma brunonianum* on shallow gravel.

Reserve 18803

Quadrat KS0065

Very tall open mallee forest of *Eucalyptus eremophila* subsp *eremophila* with *Eucalyptus phaenophylla* subsp *phaenophylla* and *Eucalyptus phenax* over tall open mallee shrubland of *Melaleuca uncinata* over very tall sparse shrubland of *Melaleuca undulata* over sparse shrubland of low *Dodonaea bursariifolia* and dwarf *Acacia erinacea* over mid-high sparse sedgeland of *Lomandra effusa* on yellow/brown shallow sandy duplex soil.

Quadrat KS0066

Extremely tall open mallee forest of *Eucalyptus phaenophylla* subsp *phaenophylla* and *Eucalyptus phenax* over tall sparse shrubland of *Hakea lissocarpha* and *Leptospermum erubescens* over mid-high open shrubland of *Hibbertia pungens* over mid-high open sedgeland of *Lepidosperma* sp.A2 "Island Flat" (Keighery 7000) and *Gahnia drummondii* on loamy gravel.

Reserve 18803

Quadrat KS0067

Very tall isolated shrubs of *Hakea obliqua* subsp *parviflora* emergent over very tall sparse shrubland of *Hakea pandanicarpa* subsp *crassifolia*, *Eremaea pauciflora*, *Banksia sphaerocarpa* subsp *sphaerocarpa* and *Petrophile ericifolia* subsp *ericifolia* over low sparse shrubland of *Banksia violacea* and low sparse heath of *Melaleuca subtrigona* over low sparse sedgeland of *Caustis dioica* and *Lepidosperma* sp.3 on pale deep sand.

Quadrat KS0068

Mid-high isolated trees of *Eucalyptus annulata* over mid-high open forest of *Eucalyptus platypus* subsp *platypus* on red/brown non-cracking clay..

Reserve 18803

Quadrat KS0069

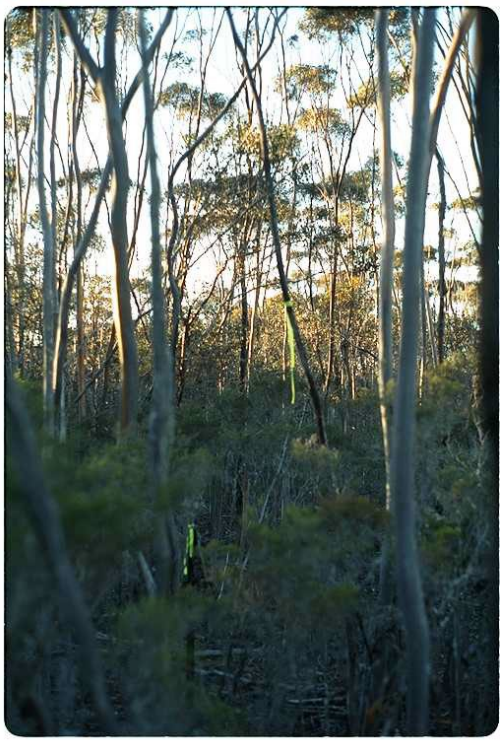
Tall open mallee shrubland of *Leptospermum erubescens* over tall sparse shrubland of *Melaleuca societatis* ms over low open shrubland of *Grevillea* sp.1 and low open heath of *Melaleuca subtrigona* over open sedgeland of tall *Mesomelaena stygia* and low *Loxocarya striata* on reticulite deep sandy duplex soils.

Quadrat KS0070

Very tall mallee woodland of *Eucalyptus scyphocalyx*, *Eucalyptus phenax*, *Eucalyptus eremophila* subsp *eremophila*, *Eucalyptus phaenophylla* subsp *phaenophylla* and *Eucalyptus celastroides* subsp *virella* over tall shrubland of *Melaleuca uncinata* and *Melaleuca laxiflora* over tall sparse heath of *Leucopogon* sp.1 and mid-high sparse shrubland of *Gastrolobium parviflorum* over low sparse sedgeland of *Lepidosperma* sp.2 on yellow/brown shallow sandy duplex soils.

Reserve 18803

Quadrat KS0071



Mid-high woodland of *Eucalyptus annulata* with *Eucalyptus flocktoniae* over low woodland of *Eucalyptus platypus* subsp *platypus* over tall mallee shrubland of *Melaleuca pauperiflora* on alkaline grey shallow loamy duplex soil.

Map 1 Reserve 18803

Map 2 Reserve 18803

Map 3 Reserve 18803

Reserve Name:	N/A	**Purpose:**	Water, Conservation of flora and fauna
Reserve #:	14522	**Area:** 277.2 ha	**Perimeter:** 10,865 m
Shire:	Kent	**Polygon Identification Numbers:**	661598,662213, 662220, 663100
Location:		**CALM District:** Katanning	**#:** 32

Fence Condition (% of Reserve Perimeter):

No Fence: 49.5% **Fence in Poor Condition:** 0% **Fence in Good Condition:** 50.5%

Fauna

Birds: Australian Ringneck, Australian Raven, Australian Magpie, Regent Parrot, Yellow-rumped Thornbill, Dusky Woodswallow, Western Yellow Robin, Striated Pardalote, White-eared Honeyeater, Red Wattlebird, Western Rosella, White-browed Scrubwren, Galah, Restless Flycatcher, Weebill, Elegant Parrot, Rufous Treecreeper, Willie Wagtail, Varied Sitella.

Other Fauna: Western Grey Kangaroo, Short-beaked Echidna.

Water Resources: Natural drainage line, constructed drains, dam, large bituminised catchment surface.

Weed Cover:

Area <20%: 87% **Area 50-80%:** 2%

Area 20-50%: 9% **Area >80%:** 2%

Adjacent Land Use (% of Reserve Perimeter):

Cropping/grazing: 56% **Remnant Vegetation:** 15%

Revegetation: 17% **Utility/transport:** 14%

Grazing Pressure: Light

Access: Unsealed and sealed external, 2WD and 4WD internal.

Degraded Vegetation: Woodland in south of reserve has large areas of degraded understorey due to a variety of past disturbances associated with roads, the railway, the dam and catchment etc and subsequent weed invasions. Other peripheral areas of woodland have weed incursions from adjacent farmland contributing to degradation of understorey, particularly in the north-west section where past timber cutting was evident. A localised area of regrowth Wandoo (*Eucalyptus wandoo* subsp *wandoo*) in the south-west corner has an unknown history.

Comments: 6 quadrats in this reserve, i.e. KS0057, KS0058, KS0059, KS0060, KS0061, KS0062.

The railway, roads and dam/catchment in the south of the reserve have had an obvious impact on the bushland in this area, particularly with respect to weeds and understorey disruption.

The revegetation in the adjacent areas to the west of the reserve refers to CALM trials with sandalwood and various host species such as Jam Wattle (*Acacia acuminata*) and *Casuarina obesa*.

No sandalwood was recorded.

Reserve 14522

Quadrat KS0057

Very tall mallee woodland of *Eucalyptus falcata* with *Eucalyptus incrassata* and *Eucalyptus albida* over tall open shrubland of *Dryandra cirsioides* over sparse shrubland of tall *Gastrolobium spinosum* and mid-high *Dryandra ferruginea* subsp *ferruginea* and tall *Xanthorrhoea drummondii* over sparse sedgeland of tall *Lepidosperma* sp.A2 "Island Flat" (Keighery 7000) on shallow gravel.

Quadrat KS0058

Emergent mid-high isolated trees of *Eucalyptus wandoo* subsp *wandoo* over very tall sparse *Xanthorrhoea drummondii* over low sparse shrubland of *Hakea lissocarpha* over low sedgeland of *Lomandra effusa*, *Borya sphaerocephala* and *Loxocarya striata* on brown sandy earth.

Reserve 14522

Quadrat KS0059

Very tall mallee woodland of *Eucalyptus falcata* emergent over tall shrubland of *Banksia sphaerocarpa* subsp *sphaerocarpa* and *Dryandra cirsioides* over mid-high sparse shrubland of *Dryandra conferta* subsp *parva* over mid-high sparse sedgeland of *Lepidosperma brunonianum* on shallow gravel.

Quadrat KS0060

Tall open shrubland of *Hakea subsulcata*, *Banksia sphaerocarpa* subsp *sphaerocarpa* and *Beaufortia incana* with very tall *Xanthorrhoea drummondii* over mid-high shrubland of *Dryandra ferruginea* subsp *ferruginea* over mid-high sparse sedgeland of *Lepidosperma* sp.14 and mid-high sparse forbland of *Dampiera juncea* on shallow gravel.

Reserve 14522

Quadrat KS0061

Low open forest of *Eucalyptus wandoo* subsp *wandoo*, *Allocasuarina huegeliana* and *Acacia acuminata* over mid-high sedgeland of *Lepidosperma brunonianum* and low sedgeland of *Desmocladus asper* and *Borya sphaerocephala* on brown loamy earth.

Quadrat KS0062

Tall open forest of *Eucalyptus wandoo* subsp *wandoo* and *Eucalyptus longicornis* over tall sparse shrubland of *Olearia dampieri* subsp *eremicola* over dwarf sparse shrubland of *Dodonaea humifusa* over low open rushland of *Lomandra effusa* and low open sedgeland of *Lepidosperma* sp.A2 "Island Flat" (Keighery 7000) and *Lepidosperma* sp.8 on brown loamy earth.

Map 1 Reserve 14522

Map 2 Reserve 14522

Map 3 Reserve 14522

Reserve Name:	N/A	**Purpose:**	Water
Reserve #:	14417	**Area:** 46.5 ha	**Perimeter:** 4,102 m
Shire:	Kent	**Polygon Identification Numbers:**	651537, 651538
Location:		**CALM District:** Katanning	**#:** 32

Fence Condition (% of Reserve Perimeter):

No Fence: 80% **Fence in Poor Condition:** 0% **Fence in Good Condition:** 20%

Fauna

As for Reserve 10188 (reserves treated as single block for fauna observations)

Birds: Galah, Weebill, White-browed Babbler, Elegant Parrot, Grey Shrike-thrush, Black-faced Cuckoo-shrike, Laughing Kookaburra, Crested Pigeon, Jacky Winter, Willie Wagtail, Grey Fantail, Varied Sitella, White-eared Honeyeater, Richard's Pipit, Grey Currawong, Yellow-plumed Honeyeater, Yellow-rumped Thornbill, Western Yellow Robin, Australian Ringneck, Rufous Treecreeper, Australian Raven, Purple-crowned Lorikeet, Red-capped Robin, Regent Parrot, Tree Martin.

Other Fauna: Western Grey Kangaroo, European Red Fox, European Rabbit, Brush-tailed Possum.

Water Resources: Natural drainage line, constructed drainage, two dams, roaded catchment

Weed Cover:

Area <20%: 54% **Area 50-80%:** 14%

Area 20-50%: 31% **Area >80%:** 1%

Adjacent Land Use (% of Reserve Perimeter):

Remnant Vegetation: 31% **Utility/transport:** 7%

Cropping/grazing: 62%

Grazing Pressure: Light

Access: Unsealed external, 2WD and 4WD internal.

Degraded Vegetation: Large areas of this reserve have degraded, weedy understorey, largely due to extensive timber cutting (*Acacia acuminata*, *Eucalyptus longicornis* and *Eucalyptus capillosa*) and the proximity of farmland weeds in adjacent areas. Several dead trees were noted from peripheral areas and in the vicinity of the larger dam.

Comments: 2 quadrats in this reserve, i.e. KS0042, KS0055.

Note part of "No Fence" perimeter is shared with Reserve 10188.

Reserves 10188 and 14417 have been treated as a single block for fauna records due to the movement of wildlife between the reserves (particularly birds) and the difficulty in establishing boundary definition with respect to wildlife sightings while in the field.

Bridal Creeper was recorded from scattered locations, mainly in the north-west part of the reserve.

Sandalwood was present but with isolated distribution.

Dumping of rubbish, dead livestock and building/fencing materials was evident in several different locations, particularly in the north between the dams and near the south boundary.

Reserve 14417

Quadrat KS0042

Tall open forest of *Eucalyptus salmonophloia* and mid-high closed forest of *Eucalyptus longicornis* over mid-high open shrubland of *Templetonia sulcata* over mid-high sparse sedgeland of *Gahnia aristata* on brown loamy earth.

Quadrat KS0055

Mid-high open forest of *Allocasuarina huegeliana* and *Acacia acuminata* over grassland of mid-high *Austrostipa* sp.1 and low *Amphipogon strictus* on brown loamy earth.

Reserve Name:	N/A	**Purpose:**	Water supply
Reserve #:	10188	**Area:** 35.6ha	**Perimeter:** 4,575 m
Shire:	Kent	**Polygon Identification Number:**	651534, 651540
Location:		**CALM District:** Katanning	**#:** 32

Fence Condition (% of Reserve Perimeter):

No Fence: 69% **Fence in Poor Condition:** 0% **Fence in Good Condition:** 31%

Fauna

As for Reserve 14417 (reserves treated as single block for fauna observations)

Birds: Galah, Weebill, White-browed Babbler, Elegant Parrot, Grey Shrike-thrush, Black-faced Cuckoo-shrike, Laughing Kookaburra, Crested Pigeon, Jacky Winter, Willie Wagtail, Grey Fantail, Varied Sitella, White-eared Honeyeater, Richard's Pipit, Grey Currawong, Yellow-plumed Honeyeater, Yellow-rumped Thornbill, Western Yellow Robin, Australian Ringneck, Rufous Treecreeper, Australian Raven, Purple-crowned Lorikeet, Red-capped Robin, Regent Parrot, Tree Martin.

Other Fauna: Western Grey Kangaroo, European Red Fox, European Rabbit, Brush-tailed Possum

Water Resources: Natural drainage line, constructed drainage, roaded catchment.

Weed Cover:

Area <20%: 76% **Area 50-80%:** 5%

Area 20-50%: 17% **Area >80%:** 2%

Adjacent Land Use (% of Reserve Perimeter):

Cropping/grazing: 35% **Utility/transport:** 13%

Remnant Vegetation: 52%

Grazing Pressure: Light

Access: Unsealed external access, 2WD and 4WD internal access.

Degraded Vegetation: Several wooded areas of this reserve have degraded, weedy understorey, largely due to timber cutting (mostly *Acacia acuminata,* some *Eucalyptus longicornis*) and the proximity of farmland weeds, particularly in the northern and south-western sections of the west block and the south-east corner of the east block. (This degradation is not as widespread as in Reserve 14417).

Comments: One quadrat in this reserve, i.e. KS0056.

Note part of "No Fence" perimeter is shared with Reserve 14417.

Reserves 10188 and 14417 have been treated as a single block for fauna records due to the movement of wildlife (particularly birds) and the difficulty in establishing boundary definition with respect to wildlife sightings while in the field.

Bushland in the east block is generally less disturbed/more intact than bushland in the west block (the main exception being the south-east corner).

Isolated occurrences of sandalwood were noted from the west block only.

Reserve 10188

Quadrat KS0056

Very tall open mallee woodland of *Eucalyptus incrassata* and *Eucalyptus albida* emergent over dwarf open forest of *Callitris roei* over tall open shrubland of *Leptospermum erubescens*, *Dryandra cirsioides* and *Dryandra pallida* and very tall *Xanthorrhoea drummondii* over low shrubland of *Hibbertia exasperata* and low heathland of *Allocasuarina microstachya* over open sedgeland of tall *Lepidosperma* sp.A2 "Island Flat" (Keighery 7000) and low *Lepidosperma* sp.3 on brown loamy earth.

Map 1 Reserves 14417 and 10188

Map 2 Reserves 14417 and 10188

Map 3 Reserves 14417 and 10188

Reserve Name:	N/A	**Purpose:**	Timber, sandalwood
Reserve #:	20961	**Area:** 40.4 ha	**Perimeter:** 2,580 m
Shire:	Kent	**Polygon Identification Numbers:**	643850
Location:		**CALM District:** Katanning	**#:** 32

Fence Condition (% of Reserve Perimeter):

No Fence: 8 % **Fence in Poor Condition:** 12 % **Fence in Good Condition:** 80%

Fauna

Birds: Weebill, Galah, Regent Parrot, Australian Raven, Crested Pigeon, Australian Ringneck.

Other Fauna: Western Grey Kangaroo, European Rabbit

Water Resources: Natural catchment (large, shallow seasonal pool – "Rock Dam"), constructed drainage (roadside).

Weed Cover:

Area <20%: 72% **Area 50-80%:** 3%

Area 20-50%: 22% **Area >80%:** 3%

Adjacent Land Use (% of Reserve Perimeter):

Cropping/grazing: 54% **Utility/transport:** 34%

Remnant Vegetation: 12%

Grazing Pressure: Light

Access: Unsealed and sealed external access, 2WD internal access.

Degraded Vegetation: Badly degraded understorey in central/eastern section largely due to cutting of *Acacia acuminata* and burning; also some death/loss of trees.

Comments: One quadrat in this reserve, i.e. KS0054.

Farm activities appear to encroach onto reserve, south side (poultry enclosures, etc). North-eastern section of mallee bushland burnt in recent years, some resultant weed incursions noted.

Freesias on verges of track, north of homestead – scattered clumps.

Sandalwood scattered, localised.

Acacia acuminata "cut for farm use 1911" (Mrs Hicks, neighbouring farm).

Burn-off on south side conducted "about April 1998" (Mrs Hicks). This was followed by poor rains and a very poor natural recovery.

Reserve 20961

Quadrat KS0054

Very tall open shrubland of *Allocasuarina campestris* over mid-high open heath of *Verticordia chrysantha* and low open heath of *Allocasuarina microstachya* over low open rushland of *Anarthria polyphylla* and low open sedgeland of *Mesomelaena preissii* on yellow/brown shallow sandy duplex soils.

Map 1 Reserve 20961

Map 2 Reserve 20961

Map 3 Reserve 20961