



Great Southern Institute of Technology

'Swan Lake' Ecology Report Warriup Road, Green Range



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All unacknowledged photos in this report were taken by Sylvia Leighton and cannot be transferred into any other documents without permission.

Front page picture:

View in a south-easterly direction over Swan Lake with Warriup Hill in the background.

Executive Summary

Great Southern Institute of Technology Conservation and Land Management Certificate IV students undertook a 'snapshot' ecological survey of Swan Lake on the southern end of Warriup Rd., Green Range, Western Australia, in response to public request. Assistance was provided by the *Land For Wildlife* programme at the Department of Parks and Wildlife (DPaW), Albany, as Swan Lake is in the near vicinity of two properties registered with the (DPaW), *Land For Wildlife* programme.

The Swan Lake Ecological Survey presents the results for; a water depth survey, water quality measurements, lake edge flora survey and any background reference data that has been collected in the past for the site.

Swan Lake has an area of 57ha and is vested with the City of Albany: "For The Purpose of Water, Camping and Conservation of Flora and Fauna". Swan Lake is located in the vicinity of the junction of two recognised Interim Biogeographic Regions of Australia (IBRA) zones; Jarrah Forest & the Esperance Plain. The vegetation surrounding the lake is reflective of this influence.

A bird species list for the Mullocullop Nature Reserve was compiled from observations made by the Albany Bird Group between 2000 - 2011. Some of the species observed near Swan Lake include the Red-capped Plover, Hooded Plover, Sharp-tailed Sandpiper all of which are protected under the Environmental Protection and Biodiversity Conservation (EPBC) Act.

Swan Lake is also in the vicinity of the Cheyne Road wetlands suite which provide important wetland habitat for the extremely rare Australasian Bittern (*Botaurus poiciloptilus*). This species is protected by the Western Australian Wildlife Conservation Act 1950 and listed as '*Fauna that is rare or is likely to become extinct*' as recommended by the International Union for Conservation of Nature criteria for assigning species and communities to threat categories.

It is hoped that the future management of Swan Lake incorporates special protection for this unique wetland area of Green Range on the south coast of Western Australia.

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1.0 Introduction

1.1 Location

'Swan Lake' is located about 70 kilometres north east of Albany on the South Coast of Western Australia. The Lake can be accessed by driving east on Warriup Road. The Lake is at the south eastern end of the road near the southern coast. The Lake is accessed via a car and boat access area at the southern end of The Lake. The majority of Swan Lake sits inside Mullocullup Nature Reserve which has a reserve number: R16367 and was gazetted in 1981. The City of Albany has the management order for this 57ha reserve. It is a C class reserve: "For the Purpose of Water, Camping and Conservation of Flora and Fauna".

A north eastern arm of the water body is actually located on private property: P251218 (loc. 376 which is 40.5 ha in size). This property is a significant historical site as it contains the Hassell Family Farm Homestead located about 150 metres from the water's edge of Swan Lake. This old farm is one of the first titles settled by Europeans in the Green Range area.



Figure 1: Swan Lake location in South Coast region



Figure 2: Swan Lake in relation to surrounding landmark features

The Great Southern Institute of Technology decided to measure some of the ecological parameters of the lake and research any background reference material. This was in response to concerns from an adjoining *Land For Wildlife* landholder who was concerned about the increasing public recreational usage of the lake. This report will be submitted to the City of Albany to assist them with future management of Swan Lake. There is another smaller lake to the south west of Swan Lake. However, this other lake is wholly located on a private property title and much more difficult to gain access.

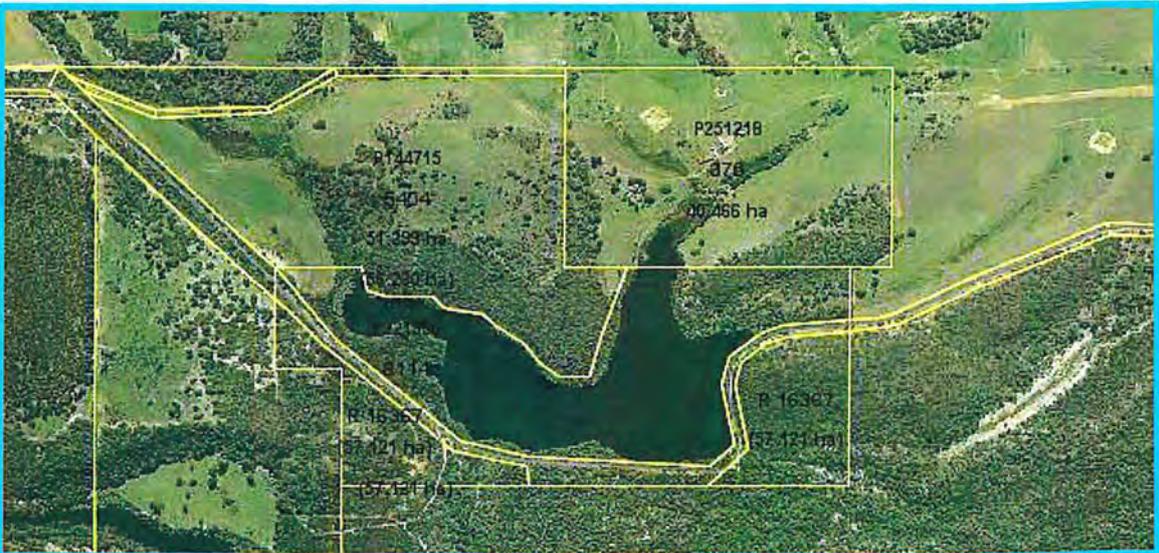


Figure 3: The water body of Swan Lake has two land titles that sit across its boundaries: R16367 & P251218

1.2 Geology and Geomorphology

Swan Lake sits within a regional scale geomorphic unit identified as the *Hassell Beach-Bremer Bay Coastal Zone* (Semeniuk, V. & C., 1998). This is identified as a coastal complex of local headlands, small inlets, short drainage lines, long sweeping beaches and barrier dunes

The regional geology has a major influence on the pattern of landforms in the area. Swan Lake has the Precambrian gneiss/granite hills (approx. 1200 million years ago) of Green Range bordering its eastern side from which most of its recharge water catchment flows. Plantagenet Siltstone is another geological rock unit which outcrops on the edges of the lake and influence the form and shape of Swan Lake. Plantagenet Group sediments sit on top of the older granite gneissic rocks and were deposited in the Late Eocene (about 40 million years ago) and are formed from marine based sediments during past higher sea level fluctuations.



Figure 4: Outcropping granites on the western side of Swan Lake

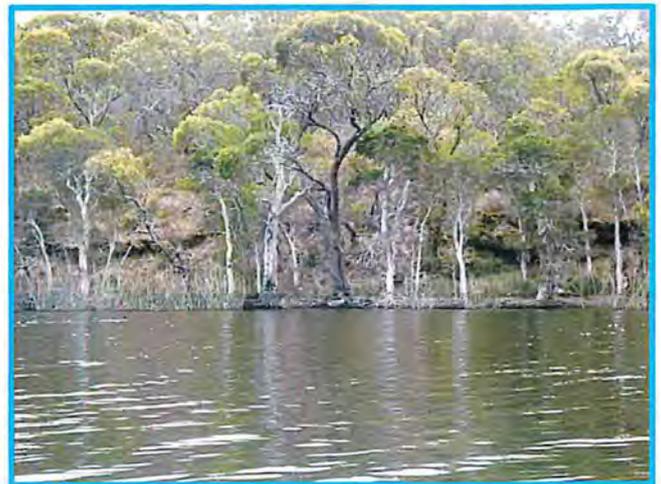


Figure 5: Plantagenet Siltstone forming steep banks on Swan Lake

The Lake has steep banks where it adjoins outcropping areas of Plantagenet Siltstone rocks. The slopes are less steep where the water body adjoins low lying sediment accumulation banks. To the south of the lake there are Pleistocene & Holocene barrier coastal sand dunes. At this stage it is not known how/if water discharges from Swan Lake to the coast through the land barriers. The valley tract systems in the area are underlain by sediments such as sand, mud and peat.

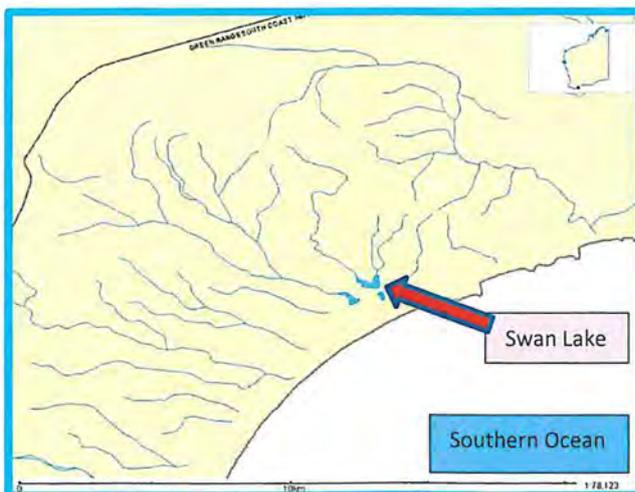


Figure 6: The hydrological network of creeklines in the vicinity of Swan Lake blocked off from the coast by sand dune barriers

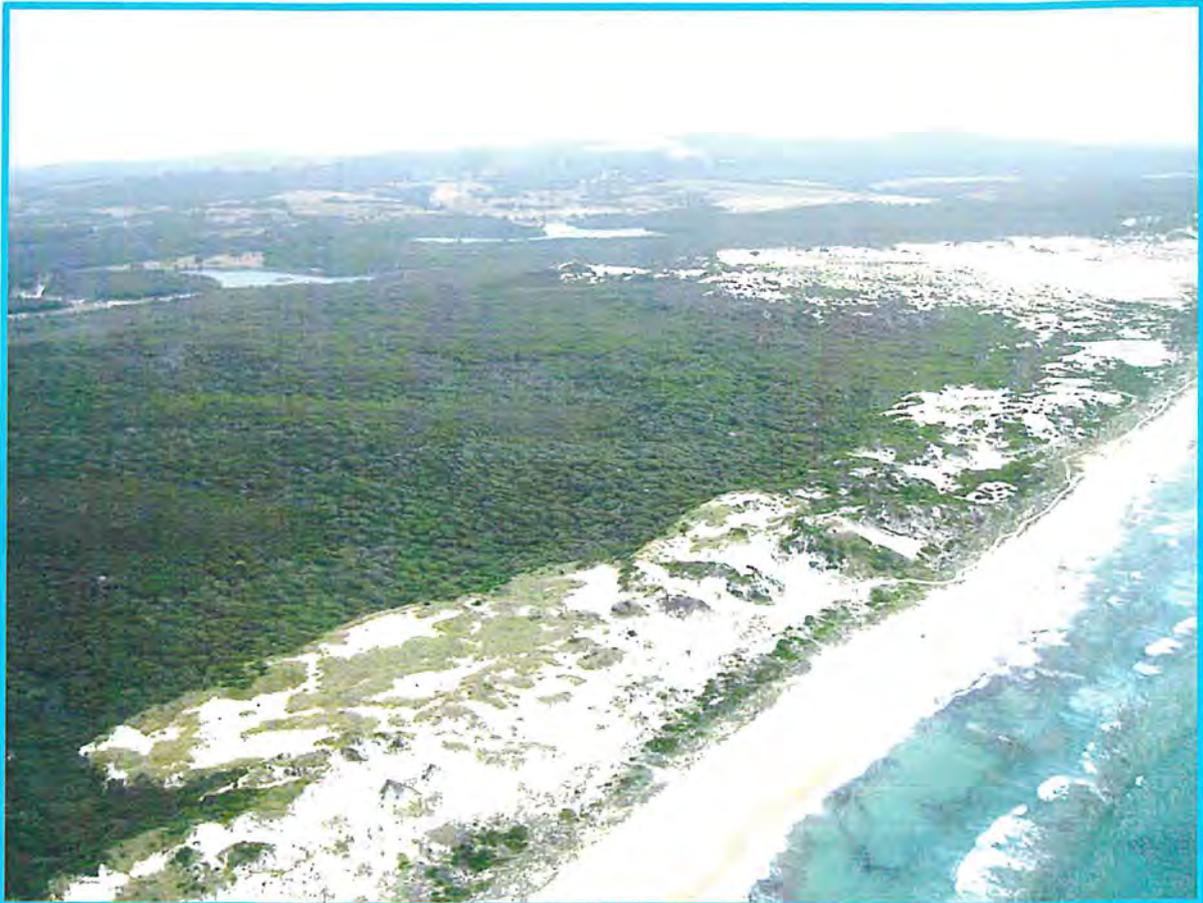


Figure 7: The Pleistocene & Holocene barrier coastal dunes to the south of Swan Lake adjoining Cheyne's Beach

1.3 Climate

Examining present day climate and climate history is important to understanding the characteristics of our local wetlands. Wetlands in the southcoast region are strongly influenced by climate. Rainfall, evaporation and wind strongly influence wetland hydrology, wetland formation and evolution of landform. Swan Lake is located in a part of the state that experiences a typically Mediterranean climate in relation to precipitation, evaporation, temperature and wind. Swan Lake experiences an average of about 700mm annual rainfall with evaporation around 800mm/year classifying it as subhumid to humid (Gentilli, 1972).

Many of the southcoast wetlands were formed in earlier arid stages in the Cainozoic and now exist in fairly humid climate regimes. Wind in the coastal zone has been an important influence in developing coastal landforms and their accompanying distinctive wetlands. Wind generate waves in standing lakes like Swan Lake and these waves effect sediment winnowing, transport and the development of sand bars and peripheral sand ridges(Semeniuk , 1988). Aerial images indicate Swan Lake has submerged sediment banks in its northern and eastern edges.

1.4 Hydrology

Many wetlands in the southcoast region of WA have been grouped into Consanguineous Suites (Semenuk, 1988). These inter-related wetlands have a similarity in geomorphic, geologic & hydrologic settings. One such suite is called the 'Swan Lake Suite' and includes our target wetland on the western side of Green Range adjacent to the coast. The Swan Lake Suite are representative of wetlands within Tertiary Rock settings. These wetlands are located in valleys and usually exhibit irregular branching shape, oriented north west to south east and can be micro to macro in scale. They are barred from the ocean by a Holocene or Pleistocene dune barrier and are therefore classified as closed. They are bordered by steep slopes cut into Pallinup Siltstone, granite and limestone. The water is sometimes hypo saline (Hodgkin and Clark, 1990).

The major drainage line of Mullocullop Creek enters the lake from the north west of the lake, and three other creek lines enter from the north, north east and easterly directions (refer to Fig. 7).



Figure 8: Four major creeklines flow into Swan Lake from the north west , north, north east and easterly directions.

1.5 Flora and Fauna

1.51 Flora

Swan Lake has a direct vegetation link to the Cheyne Beach Coastal Reserve which is an important corridor connection between Waychinicup National Park through to Fitzgerald River National Park. The Lake sits within a significant botanical area as it is located on the boundary of two biogeographic regions (IBRA) and has representative plant species from both botanical districts.

Fourteen Priority Flora have been located within a 10 kilometre radius to the Swan Lake catchment; *Banksia brownii* (Feather-leaved Banksia) **T**, *Calothamnus robustus* **P3**, *Chordifex abortivus* **T**, *Eucalyptus acies* (Woolburnup Mallee) **P4**, *Eucalyptus goniantha* subsp. *goniantha* (Jerdacuttup Mallee) **P4**, *Grevillea tetragonoloba* **P2**, *Hakea lasiocarpa* **P3**, *Jacksonia calycina* **P4**, *Leucopogon elegans* ssp. *psorophyllus* **P3**, *Melaleuca micromera* **P3**, *Prostanthera verticillaris* **P1**, *Stenanthemum sublineare* **P2**, *Stylidium daphne* **P2**

(Extracted from *Naturemap*, 2014. A detailed description of these species is presented in Appendix 1 with a definition of the Priority Coding).

1.52 Fauna

A bird species list for the Mullocullop Nature Reserve (entire reserve) was compiled from observations made by the Albany Bird Group between 2000 - 2011. No surveys other than recordings placed into the Atlas of Australian Birds database have ever been conducted at the reserve. A number of significant bird species such as the peregrine falcon, the wedge tailed eagle, sea eagle, Carnaby's cockatoo, Red tailed Black Cockatoo and the Baudins Cockatoo are recorded in the area.

Some of the species observed at Swan Lake such as the Red-capped Plover, Hooded Plover, Sharp-tailed Sandpiper are protected under the EPBC Act. Swan Lake is also in the vicinity of the Cheyne Road wetlands which provide important wetland habitat for the extremely rare Australasian Night Bittern. This species is in need of protection and is listed as Declared Rare Fauna on the Wildlife Conservation Act 1950. These wetlands may occasionally provide habitat for some of the international migratory wader bird species but the lake does not provide the tidal banks they require.



Figure 9: *Botaurus poiciloptilus* Australasian Bittern (Photo courtesy Birds Australia)



Figure 10: *Calidris acuminata* Sharp Tailed Sandpiper (Photo courtesy Birds Australia)

A comprehensive fauna survey has been carried out on Benmore Farming Property about 10 kilometers westward along Warriup Road (details can be sought from *Land for Wildlife*, DPaW)). This survey made the following recordings:

- Mammals - pygmy possums, honey possums and southern brown bandicoot
- Reptiles - 10 skink species, one goanna species and four snake species
- Amphibians - Bleating Froglet, Clicking frog, Banjo frog, Motorbike frogs, Slender Tree frogs, Quacking frog, Spotted Thigh Frog, Leah's Frog, Gunther's Toadlet, Moaning Frog
- Avifauna - 38 species of birds were recorded

Some other mammals that have been recorded on other neighbouring properties include; brush tailed possum, brush tailed wallaby, yellow footed antechinus, dunnarts and quite a few species of bat. It is possible that the Swan Lake also forms part of a home range for other rare or threatened wildlife. The following 'Priority' fauna are found in the area: *Hydromys chrysogaster* (Water-rat) (P4), Quokka (DRF- small possibility), Western Quoll (unlikely but Green Range has a recording for 2002), Western Ring Tailed Possums (DRF) – used to occur on the Hassell Farming Property in the 1940's (pers.comm. B. Hassell, 2013).

1.6 History

1.61 Indigenous

Unfortunately there is very little ethnographic information recorded about the lives and culture of the Noongar People in the Green Range area. The group that inhabited the district belonged to a branch of the *Menang or Minang*. Recently published Dreaming stories give us insights into the *Menang* culture. The stories provide an explanation for how the land was created and include rituals and ceremonies which ensured the land and its resources would be continually renewed.

During a community workshop held in 2011 at *Wait-A-While* Beach, local Menang Indigenous Elders informed participants that the Warriup Hill & Swan Lake area was significant country to their ancestors. Carol Peterson stated that her mother was born on 'Kathleen/Well Creek'. Carol stated that her grandmother used to walk from Israelite bay to Albany through this country. Lynette Knapp stated that this country was 'blood country' to her grandmother. Lynette had brought her father out to look at Swan Lake before he passed over. The Knapp/Coyne family claim long connection to this land and have the native title claim in this area.

The Hassell family said that the Warriup Hill farming property had regular Menang families staying at the property where they would provide shepherding/shearing services and would be paid with food. It was stated that they visited 'seasonally' and these families would move on along the coast (Hassell. B., pers. Comm., 2013)



Figure 11: GSIT Certificate IV students at a possible 'significant' site

The GSIT students examined an aeolian eroded granite boulder (this is quite an unusual feature for this part of the south coast). The rock is located only about 200 metres to the west of the lake. It had an old fireplace inside it and was definitely rain proof. The students intend to do a 'site visit' with Noongar representative, Larry Bligh, to record important indigenous cultural features of the site.

1.62 European

Cooper was the name of the settler who lived on the first land title released before 1870 in the Warriup Hill area. The title was sold to John Wray in 1870. Wray built the first stone house on the Warriup property. In 1895 John Hassell became the owner of the Warriup property. John Hassell eventually sold Warriup to his brother Albert. The Hassell family lived on the Warriup Hill property right up to the 1990's.



Figure 12: The old Hassell Homestead located on the eastern arm of Swan Lake

2.0 Methodology

On April 7th, 2014, the Certificate IV Conservation and Land Management students of the Great Southern Institute of Technology, Albany, drove 90 kilometres east of Albany and reached Swan Lake. The students used Canadian canoes to travel over Swan Lake and explore the boundaries of the waterbody. Each boat carried a Geographical Positioning Device (GPS), a measuring stick to measure accurate depth readings up to 2.4 metres and then a weighted string for any deeper readings required.

An opportunistic survey of the flora around the lake was undertaken by the TAFE students. Plant species were photographed in the field and named back in the class room, a list of 30 species was recorded.

A water sample was collected from Swan Lake and water quality measurements were undertaken back at the laboratory at the GSIT College. The equipment was calibrated and probes provided EC & pH readings.

Important reference material was sourced from the Department of Water and enquiries were made to try and locate any other previous water quality data collected for Swan Lake (University of Western Australia etc).



Figure 13: The boat launching area on south eastern side of lake



Figure 14: GSIT students carrying out depth & GPS measurements from the canoes



Figure 16: Exposed roots on northern shore



Figure 15: Sedge lined shores of the Lake

3.0 Results

3.1 Water Quality Measurements

Date of readings: 7/04/2014

PH of water sample was: 8.37 (the equipment was calibrated prior to use and during use)

Conductivity (total dissolved salts) 8ppt (parts per thousand)

Water surface did have algae on it

Fish up to 10cm in length were observed in the water

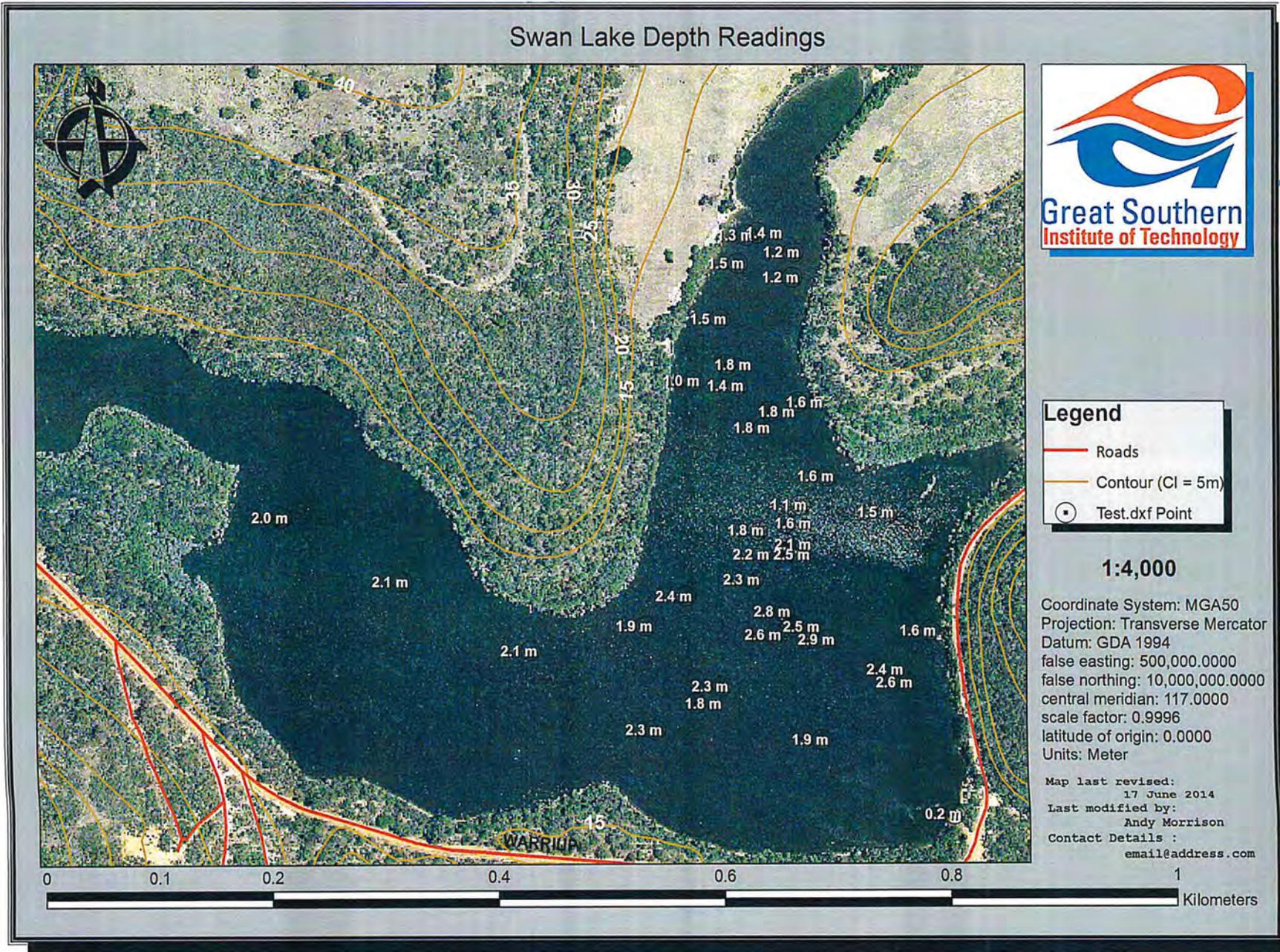


Figure 17: Swan Lake depth readings



Figure 18: Young *Melaleuca cuticularis* bordering Swan Lake showing past flood levels

3.3 Flora

3.3.1 Vegetation Communities

Swan Lake has a mix of structured plant species groupings representative of six major vegetative communities described in the *Albany Regional Vegetation Survey* by Sandiford & Barrett (2010);

- *Eucalyptus cornuta* / *Eucalyptus occidentalis* open woodland,
- *Corymbia calophylla* marri open forest,
- *Banksia littoralis* low open woodland,
- Wet shrub land over sedgeland
- *Melaleuca cuticularis* low open woodland, and
- Riparian vegetation

The Lake has banks of many different directional aspects and each is unique in species composition reflective of the complex geology and soils surrounding the site. The main eucalypts surrounding the lake are; *Eucalyptus cornuta*, *Eucalyptus occidentalis* and *Corymbia calophylla*. Further up slope on the Plantagenet Siltstone area *Eucalyptus* species including; *Eucalyptus goniantha*, *Eucalyptus tetragona* & *Eucalyptus falcata*.

In the western arm of Swan Lake where Mullocullop Creek enters the waterway there is evidence of large stands of dead *Melaleuca cuticularis*. It is assumed that these tree deaths are caused by 'flooding events' when wetter seasons have caused the 'closed' water body to increase in water level over quite long periods of time and cause the drowning of these plants.



Figure 19: A reed meadow in front of Melaleuca and Eucalypt woodland



Figure 20: Saltwater Paperbarks (*Melaleuca cuticularis*) closed woodland on a north eastern bank.



Figure 21: Marri (*Corymbia calophylla*) woodland at an outcropping Plantagenet Siltstone site



Figure 22: Swamp Banksia (*Banksia littoralis*) on the western banks of Swan Lake

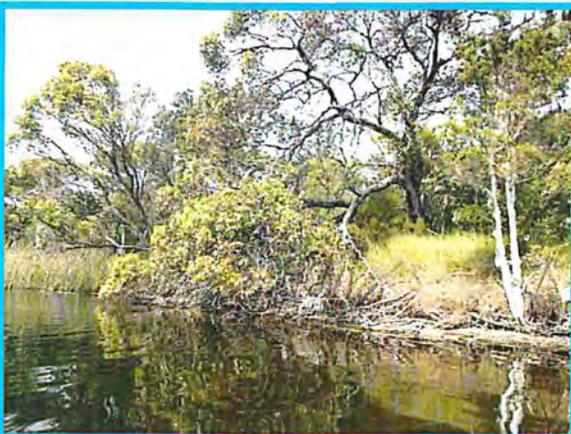


Figure 24: River yate (*Eucalyptus cornuta*) on the western side of the Lake



Figure 23: The paperbark open woodland just upslope on the eastern side of the Lake

3.32 Flora species sighted on field trip

Figure 25: Flora species opportunistically surveyed, photographed and identified on the field trip



Saltwater paperbark - *Melaleuca cuticularis*



Leucopogon obovatus



Common clematis creeper - *Clematis pubescens*



Acacia urophylla



The buds of a yate tree - *Eucalyptus cornuta*



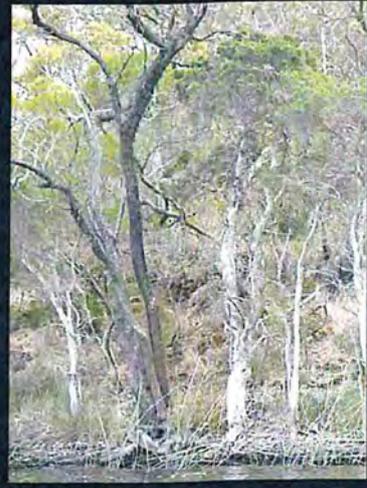
The nut of a marri tree - *Corymbia calophylla*



The buds and flowers of a river yate tree - *Eucalyptus cornuta*



The buds and nuts off a river yate tree - *Eucalyptus cornuta*



A flat topped yate on the eastern shore - *Eucalyptus occidentalis*



The buds of a river yate tree - *Eucalyptus cornuta*



The buds of a flat topped yate tree - *Eucalyptus occidentalis*



The flower stem of the balga *Xanthorrhoea platyphylla*



The buds of a salt water paperbark- *Melaleuca cuticularis*



The coastal woolly bush on the western side of the lake – *Adenanthos sericeus*



The swamp willow on the western side of the Lake *Callistachus lanceolata*



The drooping leaves of a *Trymalium sp.*

The prickly stem of *Acacia pulchella*

The red stems of – *Acacia subcaerulea*



The distinctive prickly leaf of - *Banksia sessilis*

The unique looking leaves of one of the snottygobblers - *Persoonia elliptica*

Common clematis creeper - Clematis pubescens

3.4 Fauna

Swan Lake has a diversity of fauna species which use the waterbody and its surrounds as habitat to feed, shelter and breed. There was no opportunity to carry out an indepth fauna survey specific to the site but over two hundred birds were observed on the Lake during the GSIT field trip. Birds Australia kindly provided a Bird List compiled for Mullucollup Nature reserve (see in Appendix 2). A Fauna Survey was also carried out over a two year time period on Benmore Farm about 10 km west of Swan Lake (results presented in Appendix 3).

Figure 26: Fauna evidence at Swan Lake



Western grey kangaroo tracks on the edge of the Lake



Suspected echidna diggings in the side of the termite mounds



Swan Lake is home to a diverse range of waterbirds



The Australian white ibis roosting in a tree

4.0 Discussion

The results from this survey reveal that Swan Lake is a permanent water body with depths exceeding three meters even at the end of a dry summer. The evidence of water staining on the lower trunks of the *Melaleuca cuticularis* stands on the fringe of The Lake are caused by seasonal flooding events and provide the evidence of higher lake water levels in the recent past. The large stands of dead *Melaleuca cuticularis* at the western end of the lake are evidence where the trees were exposed to a long period of higher water levels causing them to drown.

The water quality measurements of Swan Lake revealed it to be fairly alkaline with a pH of 8.37. This is probably reflective of the Plantagenet Siltstone base rock of the Swan Lake catchment. Due to the closed nature of this lake there is no winter flushing of water and sediments accumulate over many thousands of years. The conductivity (total dissolved salts) to measure salinity levels were 8 parts per thousand which places Swan Lake in the 'brackish' category.

The complex flora communities and species surrounding Swan Lake are reflective of the unusual geology influencing the landform of the catchment. There is a mix of plant species from the two IBRA regions with at least six Eucalypt species in the near vicinity of The Lake. There are Proteaceous species like; *Banksia littoralis* and *Adenanthos sericeus*, located near the access road way which are prone to Dieback (*Phytophthora cinnamomi*) Disease.

The collated fauna species lists indicate that there is a wide range of animal species from all major groups that inhabit this area. There are historical records of Declared Rare Fauna mammal species like quokka, western ring tailed possums and chuditch residing recently in the Green Range District. There are specially protected migratory birds that have also been recorded in this locality and Swan Lake may provide these bird species with occasional refuge. There is large community of wetland birds that feed, roost and nest on Swan Lake and these can be seen in all parts of The Lake.

There is rich cultural history surrounding Swan Lake. It is place rich in food sources and shelter. There is physical evidence of artifacts in the granite rock outcropping areas within a few hundred meters of Swan Lake. Local Menang Elders have spoken of strong heritage and family connection to the lake and the surrounding district. The north eastern arm of the Swan Lake water body also sits on one of the oldest land titles released in early European settlement of the District. The old Hassell Homestead sits within a few hundred meters of Swan Lake and overlooks this spectacular waterbody.

Due to the increasing population along the southcoast of Western Australia there is increasing recreational pressure on Swan Lake. It is recommended that Management Guidelines for Swan Lake are created within the near future to protect all the special components of this special wetland.

5.0 Conclusions

The snapshot data in this report of some of Swan Lakes ecological features has been compiled in the hope that future management decisions for this reserve can be drawn from a wider base of information. We also hope this report forms a base structure to encourage future researchers to collect more data in the vicinity of Swan Lake to increase our knowledge on landscape functioning of this unique area. There is definitely scope to return to Swan Lake to build on water quality data including macroinvertebrates and other aquatic fauna.

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Appendix

1. Priority Flora Descriptions For Area near Swan Lake
2. Birds Australia Sighting List for Mullocullup Nature reserve
3. Fauna Survey List for Benmore Farm

Appendix 1 - Rare or Unusual Flora in the Area – all photos and information extracted from the Florabase WA website

Rare or locally unusual flora within a 10 kilometres radius of the property

Site No.	Rare or unusual flora present (or possible)
All sites	Plant species which are on the Declared rare list within a 10 kilometres buffer of the property include: <u>Banksia brownii</u> Feather-leaved Banksia T , <u>Calothamnus robustus</u> P3 , <u>Chordifex abortivus</u> T , <u>Eucalyptus acies</u> Woolburnup Mallee P4 , <u>Eucalyptus goniantha subsp. goniantha</u> Jerdacuttup Mallee P4 , <u>Grevillea tetragonoloba</u> P2 , <u>Hakea lasiocarpa</u> P3 , <u>Jacksonia calycina</u> P4 , <u>Leucopogon elegans ssp psorophyllus</u> P3 , <u>Melaleuca micromera</u> P3 , <u>Prostanthera verticillaris</u> P1 , <u>Stenanthemum sublineare</u> P2 , <u>Stylidium daphne</u> P2

Declared Rare Flora - Presumed Extinct: taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee

Declared Rare Flora - Extant: (T) which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee. (= *Threatened Flora = Endangered + Vulnerable*)

Priority One - Poorly Known: taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey

Priority Two - Poorly Known: taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey

Priority Three - Poorly Known: taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey

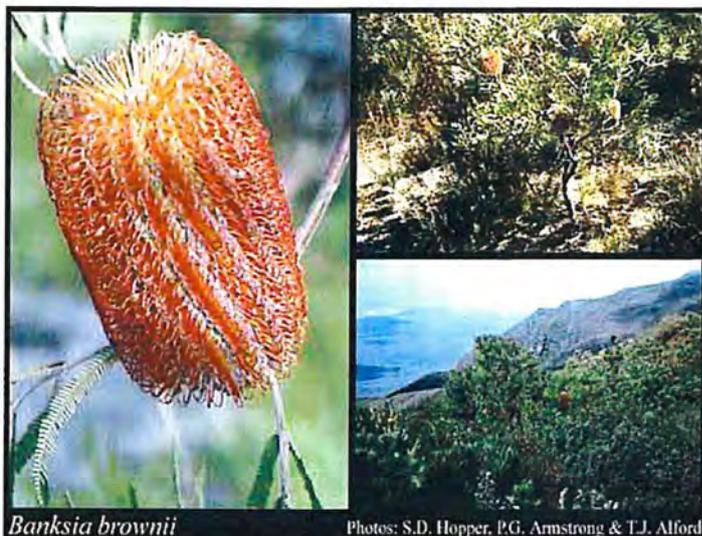
Priority Four - Rare: taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years

***Banksia brownii* Feather-leaved Banksia** Conservation Code: Threatened

Flora (Declared Rare Flora — Extant), Naturalised Status: Native to Western Australia

Bushy, non-lignotuberous shrub or tree (small), 1-6 m high. Fl. cream & brown/orange-red, Mar to Jul. Sand over laterite, gravel, loam over granite. In gullies.

Local Government Areas (LGAs): Albany, Cranbrook, Gnowangerup, Plantagenet.



Calothamnus robustus - Conservation Code: Priority Three

Naturalised Status: Native to Western Australia

Erect, compact shrub, 0.5-1.5 m high. Fl. red, Feb or Jul or Sep to Nov. Rocky quartzite or granitic soils. Low hills.

Distribution Local Government Areas (LGAs): Albany.



Chordifex abortivus - Conservation Code: Threatened Flora (Declared Rare Flora — Extant) Naturalised Status: Native to Western Australia Rhizomatous, erect perennial, herb, to 0.5 m high. Fl. brown, Sep to Oct. Sand. Low rises & undulating areas. Local Government Areas (LGAs): Albany.



Chordifex abortivus

Photo: E. Hickman

Eucalyptus acies - Woolburnup Mallee Conservation Code: Priority Four
Naturalised Status: Native to Western Australia
Name Status: Current Local Government Areas (LGAs): Albany, Gnowangerup, Ravensthorpe.



Eucalyptus acies

Photos J.A. Cochrane & S.D. Hopper

Eucalyptus goniantha subsp. *goniantha* - Jerdacuttup Mallee

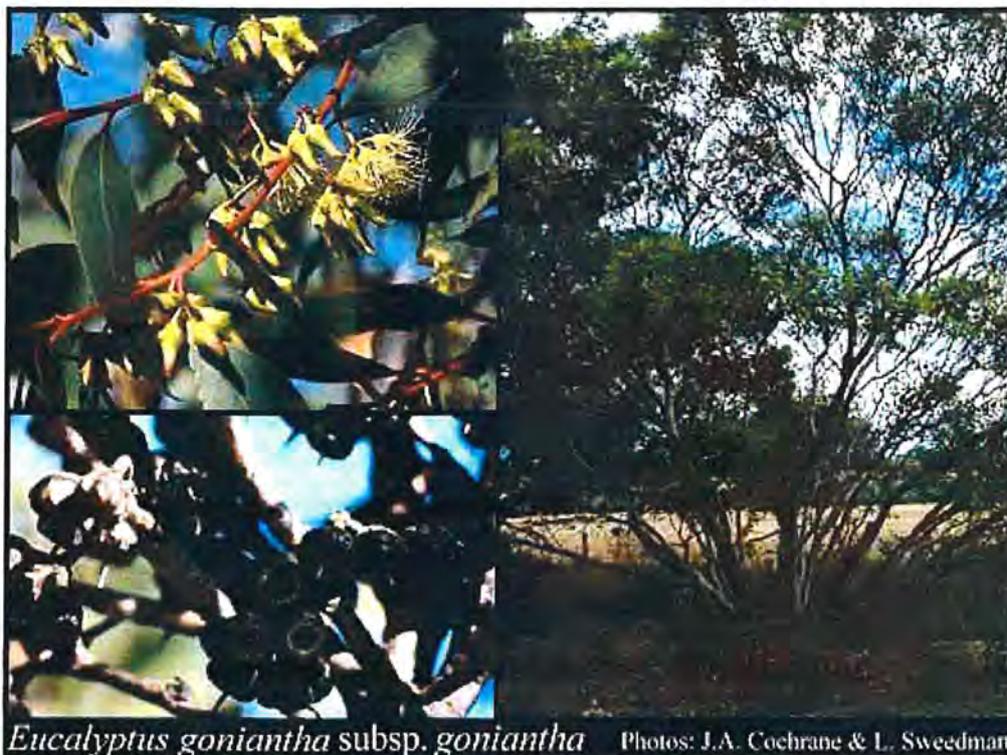
Conservation Code: [Priority Four](#)

Naturalised Status: [Native to Western Australia](#)

Mallee or tree (rarely), 1.5-10 m high, bark smooth, shedding. Fl. cream-white, Sep or Nov to Dec or Jan to Feb. Sand, sandy clay, often over weathered granite & laterite. Coastal areas.

Distribution

Local Government Areas (LGAs): Albany, Cranbrook, Esperance, Jerramungup, Plantagenet.



Grevillea tetragonoloba Conservation Code: [Priority Two](#)

Naturalised Status: Native to Western Australia

Local Government Areas (LGAs): Albany, Gnowangerup, Jerramungup, Lake Grace, Plantagenet, Ravensthorpe.

Habit and leaf form. Shrubs, 0.5–2.5 m high. Branchlets not glaucous. *Leaves* simple, 60–130 mm long overall. Leaf blade dissected, subpinnatisect, not further divided. Leaf lobes 30–75 mm long, 1–1.5 mm wide. Margins revolute, enclosing the lower surface of the leaf blade, forming two grooves with the midvein. Hairs straight.

Inflorescence and floral features. Inflorescence terminal; a raceme. *Flowers* brown, very irregular. Pedicel 1–2 mm long. Perianth 8–10 mm long, simple-hairy, 4-partite. Stamens 4. Pistil 20–25 mm long, sessile. Ovary hairy. Styles glabrous, orange or red. *Pollen presenter* oblique. **Flowering Time.** Flowers throughout the year. **Habitat.** Amongst medium trees, or low trees; in rocky or stony soil, or gravelly soil, or loam, or clay; occupying heathlands.

Distribution. Western Australia. Western Australian Botanical Province(s): South-west; IBRA Bioregions SW: MAL and ESP. Western Australian native; endemic to Western Australia.

Etymology. *tetragonoloba* (Gk): *tetra* four, *gonia* an angle + (L): *lobus* a lobe (refers to the cross-

sectional shape of the leaf lobes. **Fruit features.** Fruit ovoid, simple hairy, brown, 10–15 mm long.



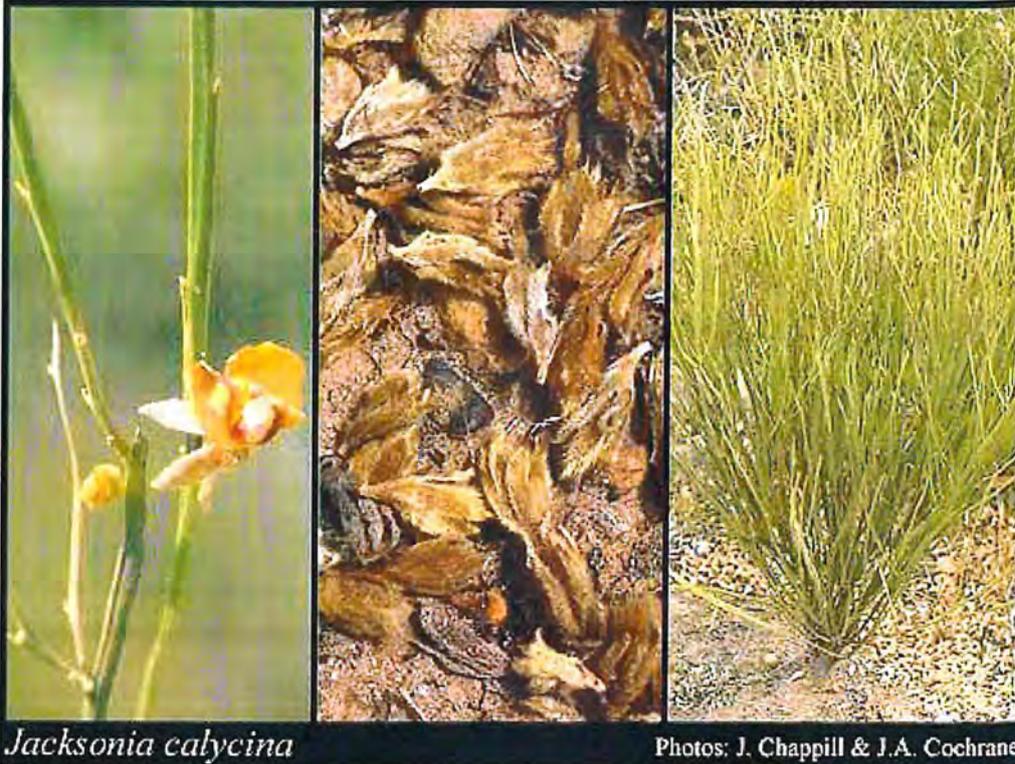
Hakea lasiocarpa - Conservation Code: **Priority Three**

Naturalised Status: **Native to Western Australia** **Erect shrub, to 6 m high. Fl. white, May to Jul. Sandy loam soils, organic litter over sand, clay or gravel. Hill tops, valleys.** Local Government Areas (LGAs): **Albany, Jerramungup, Plantagenet.** Common Name(s). **Long styled Hakea.** Habit and leaf form. **Shrubs, 1–6 m high. Leaves alternate, leaves 30–45 mm long overall. Leaf blade 30–45 mm long, 1–2 mm wide, dissected; indumentum absent.** Inflorescence and floral features. **Inflorescence axillary, racemose. Flowers pedicellate, white. Pedicel 3–5 mm long. Perianth (perigone) 8–9 mm long. Pistil 20–24 mm long. Pollen presenter conical. Fruit and seed features. Fruit 20–23 mm long, 10 mm wide; corky tetrahedral projections absent; red-brown and pale wood zones absent. Seed 10–11 mm long; wing discontinuous, marginal, extending down one lateral side only.** Distribution. **Western Australia. IBRA Bioregions SW: AW, or JF, or WAR, or ESP.** Habitat. **Amongst low (sclerophyll) shrubland; in sand, or clay.** Flowering Time. **May to July.** Etymology. **Lasiocarpa (Gk): lasio – woolly; carpha – dried up, withered, straw- or chaff-like; referring to the dry, woolly branchlets of this species.** Conservation Status. **P1: Priority One - Poorly Known Taxa.**



Jacksonia calycina - Conservation Code: [Priority Four](#) Naturalised Status: [Native to Western Australia](#) Erect or straggling shrub, (0.2-)0.4-1.4 m high. Fl. orange/yellow & red, Sep to Nov. Gravelly sandy or clayey soils. Sandplains, low rises, hillslopes.

Local Government Areas (LGAs): Albany, Cranbrook, Gnowangerup, Plantagenet.



Leucopogon elegans* subsp. *psorophyllus

Conservation Code: [Priority Three](#)

Naturalised Status: Native to Western Australia Name Status: [Current](#)

Local Government Areas (LGAs): Albany, Jerramungup.

Unfortunately No Photo Available - was found in deep sand in Banksia shrubland

Melaleuca micromera - Conservation Code: Priority Three

Naturalised Status: **Native to Western Australia** Shrub, 1-4 m high. Fl. yellow, Sep to Oct.
Gravelly sandy loam or clay. Local Government Areas (LGAs): Albany, Boyup Brook,
Broomehill-Tambellup, Cranbrook, Gnowangerup, Plantagenet.



Prostanthera verticillaris - Conservation Code: Priority One

Naturalised Status: **Native to Western Australia**

Openly branched, spreading shrub, 0.5-2 m high, 0.6-3 m wide. Fl. blue-purple/white, Sep to Oct. Granitic loam. Granite outcrops.

Local Government Areas (LGAs): Albany.



Stenanthemum sublineare Conservation Code: [Priority Two](#)

Naturalised Status: Native to Western Australia

Local Government Areas (LGAs): Albany, Gosnells, Swan, Wanneroo.

Unfortunately No Photo Available

Stylidium daphne - Conservation Code: [Priority Two](#)

Naturalised Status: Native to Western Australia

Rosetted perennial, herb, 0.15-0.45 m high, Leaves tufted, linear to narrowly oblanceolate, 1-4.5 cm long, 0.5-2 (-3) mm wide, apex subacute, margin entire, hoary. Scape mostly glabrous, inflorescence axis sparingly glandular. Inflorescence racemose. Fl. yellow, Dec. Grey to white sand or brown sandy clay loam over laterite. Gentle slopes or winter wet depressions. Mallee or Melaleuca shrubland. Local Government Areas (LGAs): Albany.

Unfortunately No Photo Available

Appendix 2 – Bird Species Sighting List Compiled in 2008 by Birds Australia

Species list for Mullocullopp Nature Reserve (based on taxonomy Christides & Boles 2008)

ANSERIFORMES

Anatidae

- Biziura lobata* Musk Duck
- Cygnus atratus* Black Swan
- Tadorna tadornoides* Australian Shelduck
- Chenonetta jubata* Australian Wood Duck
- Anas rhynchotis* Australasian Shoveler
- Anas gracilis* Grey Teal
- Anas superciliosa* Pacific Black Duck
- Aythya australis* Hardhead
- Oxyura australis* Blue-billed Duck

PODICIPEDIFORMES

Podicipedidae

- Tachybaptus novaehollandiae* Australasian Grebe
- Poliocephalus poliocephalus* Hoary-headed Grebe

COLUMBIFORMES

Columbidae

- Phaps chalcoptera* Common Bronzewing
- Phaps elegans* Brush Bronzewing
- Ocyphaps lophotes* Crested Pigeon

PHALACROCORACIFORMES

Phalacrocoracidae

- Microcarbo melanoleucos* Little Pied Cormorant
- Phalacrocorax sulcirostris* Little Black Cormorant

CICONIIFORMES

Ardeidae

- Egretta novaehollandiae* White-faced Heron

Threskiornithidae

- Threskiornis molucca* Australian White Ibis
- Platalea flavipes* Yellow-billed Spoonbill

ACCIPITRIFORMES

Accipitridae

- Elanus axillaris* Black-shouldered Kite
- Lophoictinia isura* Square-tailed Kite
- Haliastur sphenurus* Whistling Kite
- Accipiter cirrhocephalus* Collared Sparrowhawk
- Circus approximans* Swamp Harrier
- Aquila audax* Wedge-tailed Eagle
- Hieraaetus morphnoides* Little Eagle

FALCONIFORMES

Falconidae

- Falco longipennis* Australian Hobby

GRUIFORMES

Rallidae

- Porphyrio porphyrio* Purple Swamphen
- Porzana tabuensis* Spotless Crake
- Fulica atra* Eurasian Coot

CHARADRIIFORMES

Charadriidae

- Charadrius ruficapillus* Red-capped Plover
- Elseyaornis melanops* Black-fronted Dotterel
- Thinornis rubricollis* Hooded Plover
- Vanellus tricolor* Banded Lapwing
- Calidris acuminata* Sharp-tailed Sandpiper

PSITTACIFORMES

Cacatuidae

- Calyptorhynchus latirostris* Carnaby's Black-Cockatoo
- Eolophus roseicapillus* Galah

Psittacidae

- Glossopsitta porphyrocephala* Purple-crowned Lorikeet
- Polytelis anthopeplus* Regent Parrot
- Platycercus icterotis* Western Rosella

Barnardius zonarius Australian Ringneck
Purpureicephalus spurius Red-capped Parrot
Neophema elegans Elegant Parrot
CUCULIFORMES
Cuculidae
Chalcites lucidus Shining Bronze-Cuckoo
Cacomantis flabelliformis Fan-tailed Cuckoo
STRIGIFORMES
Strigidae
Ninox novaeseelandiae Southern Boobook
CORACIIFORMES
Halcyonidae
Todiramphus sanctus Sacred Kingfisher
PASSERIFORMES
Maluridae
Malurus splendens Splendid Fairy-wren
Malurus elegans Red-winged Fairy-wren
Acanthizidae
Sericornis frontalis White-browed Scrubwren
Gerygone fusca Western Gerygone
Acanthiza apicalis Inland Thornbill
Acanthiza chrysorrhoa Yellow-rumped Thornbill
Pardalotidae
Pardalotus punctatus Spotted Pardalote
Meliphagidae
Acanthorhynchus superciliosus Western Spinebill
Anthochaera lunulata Western Wattlebird
Anthochaera carnunculata Red Wattlebird
Lichmera indistincta Brown Honeyeater
Phylidonyris novaehollandiae New Holland Honeyeater
Melithreptus lunatus White-naped Honeyeater
Neosittidae
Daphoenositta chrysoptera Varied Sittella
Campephagidae
Coracina novaehollandiae Black-faced Cuckoo-shrike
Pachycephalidae
Pachycephala pectoralis Golden Whistler
Colluricincla harmonica Grey Shrike-thrush
Artamidae
Artamus cyanopterus Dusky Woodswallow
Cracticus torquatus Grey Butcherbird
Cracticus tibicen Australian Magpie
Strepera versicolor Grey Currawong
Ripiduridae
Rhipidura albiscapa Grey Fantail
Rhipidura leucophrys Willie Wagtail
Corvidae
Corvus coronoides Australian Raven
Monarchidae
Myiagra inquieta Restless Flycatcher
Petroicidae
Petroica boodang Scarlet Robin
Eopsaltria georgiana White-breasted Robin
Timaliidae
Zosterops lateralis Silvereye
Hirundinidae
Hirundo neoxena Welcome Swallow
Petrochelidon nigricans Tree Martin
Estrildidae
Stagonopleura oculata Red-eared Firetail

**Appendix 3 – Bird Species Sighting List Compiled in 2008 by Birds
Australia** Benmore Farm Fauna Survey

ITC Fauna Survey
2009 Report

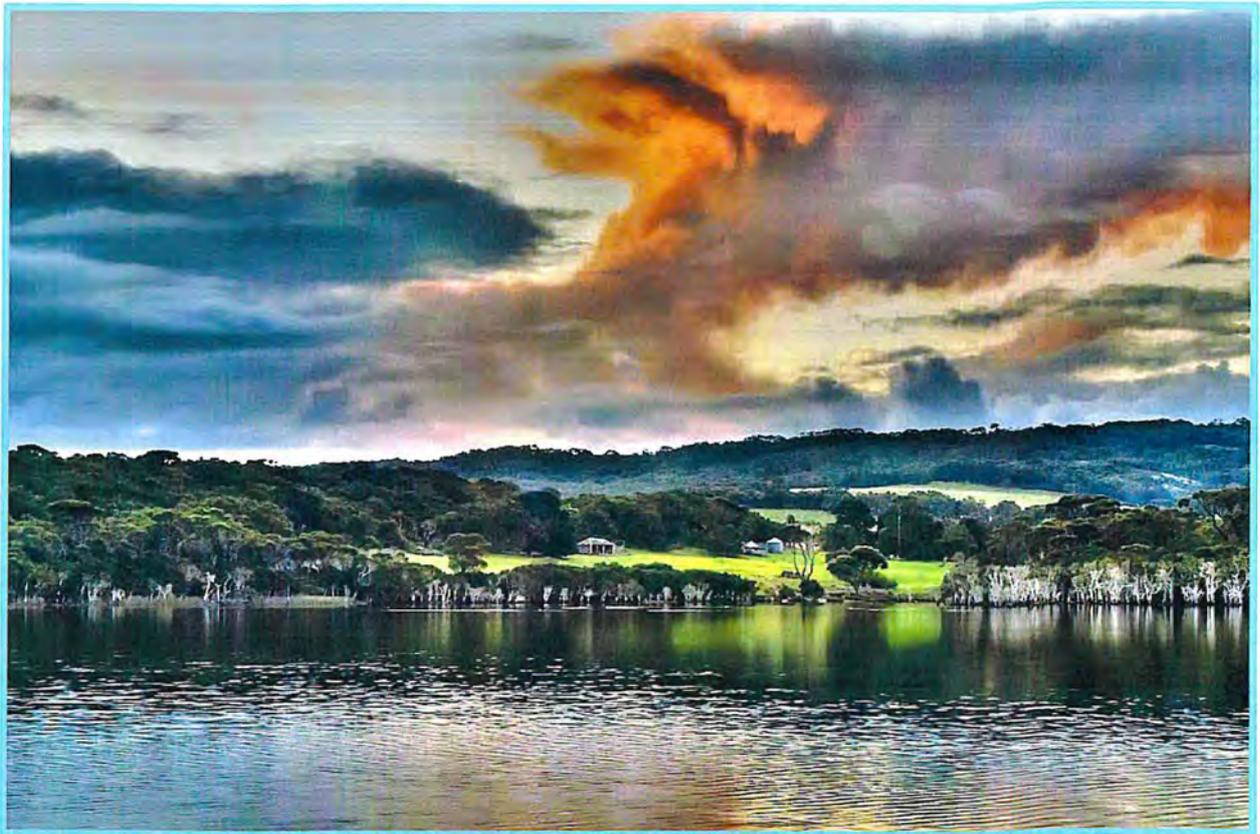
Prepared by Green Skills Inc.

Species Identified	Sunnyside	Benmore	Cheynes
<i>Birds</i>			
Emu	*	*	*
Brown Quail	*		*
Stubble Quail		*	
Musk Duck		*	
Australian Wood Duck		*	
Grey Teal		*	
Australian Shelduck		*	
Pacific Black Duck		*	*
Little Pied Cormorant		*	
Banded Lapwing	*		*
White-faced Heron		*	
White-necked Heron			*
Wedge-tailed Eagle	*	*	*
Square-tailed Kite		*	
Black-shouldered Kite	*	*	
Swamp Harrier		*	*
Nankeen Kestrel		*	
Collared Sparrowhawk		*	
Brown Goshawk		*	
Australian Hobby		*	
Brown Falcon	*	*	*
Eurasian Coot		*	
Purple Swamphen			*
Spotless Crake		*	
Crested Pigeon		*	
Common Bronzewing	*	*	*
Brush Bronzewing	*	*	*
Carnaby's Black Cockatoo		*	
Baudin's Black Cockatoo		*	*
Red-tailed Black Cockatoo	*		
Galah		*	
Purple-crowned Lorikeet	*	*	*
Regent Parrot	*	*	*
Western Rosella		*	
Red-capped Parrot	*	*	*
Australian Ringneck	*	*	*
Elegant Parrot		*	*
Fantail Cuckoo		*	
Horsefield's Bronze-Cuckoo	*	*	*
Shining Bronze-Cuckoo	*	*	*

Black-eared Cuckoo			*
Fork-tailed Swift	*	*	
Laughing Kookaburra	*	*	*
Red-winged Fairy-Wren	*	*	
Splendid Fairy-Wren		*	
Southern Emu-Wren	*	*	
Striated Pardalote		*	
White-browed Scrubwren	*	*	*
Western Gerygone		*	
Yellow-rumped Thornbill		*	*
Western Thornbill	*		
Inland Thornbill		*	*
Red Wattlebird	*	*	*
Little Wattlebird	*	*	*
Yellow-throated Miner		*	
Yellow-plumed Honeyeater		*	
Singing Honeyeater	*		
Brown Honeyeater	*	*	
Tawny-crowned Honeyeater	*	*	
New Holland Honeyeater	*	*	*
White-naped Honeyeater		*	
Western Spinebill	*	*	*
White-breasted Robin		*	*
Western Whipbird	*	*	
Black-capped Sittella		*	*
Golden Whistler		*	*
Rufous Whistler		*	
Grey Shrike-Thrush	*	*	*
Restless Flycatcher	*		
Grey Fantail	*	*	*
Willie Wagtail	*	*	*
Magpie-lark	*	*	
Black-faced Cuckoo-Shrike	*	*	*
White-winged Triller	*		
Dusky Woodswallow		*	
Grey Butcherbird	*	*	*
Australian Magpie	*	*	*
Grey Currawong	*		*
Australian Raven	*	*	*
Australian Pipit	*	*	
Red-eared Firetail	*	*	*
Welcome Swallow		*	
Tree Martin	*	*	
Silvereye	*	*	*

<i>Mammals</i>			
Short-beaked Echidna			*
Grey-bellied Dunnart	*		
Mardo			*
Southern Brown Bandicoot		*	
Honey Possum	*	*	*
Pygmy possum			*
Western Grey Kangaroo	*	*	*
House Mouse	*	*	*
Black Rat		*	
Bush Rat	*	*	*
Fox	*	*	*
Cat	*		
Rabbit	*	*	*
<i>Reptiles</i>			
<i>Geckos</i>			
Strophurus spinigerus (Spiny-tailed Gecko)		*	
<i>Worm lizards</i>			
Delma australis (Marbled-faced Delma)			*
<i>Skinks</i>			
Ctenotus catenifera (Chain-striped Heath Ctenotus)	*	*	
Ctenotus labillardieri (Red-legged Ctenotus)		*	
Egernia napoleonis (Southwestern Crevice Skink)		*	
Hemiergis initialis (Southern Five-toed Mulch Skink)		*	
Hemiergis peronii (Four-toed Mulch Skink)	*	*	
Menetia greyii (Common Dwarf Skink)	*	*	
Lerista distinguenda (Southwestern Four-toed Lerista)		*	
Lerista microtis (Variable-striped Robust Lerista)		*	
Morethia obscura (Shrubland Pale-flecked Morethia)	*	*	
Morethia lineocellata (West Coast Pale-flecked Morethia)		*	
Tiliqua rugosa (Bobtail)	*	*	*
<i>Monitors</i>			
Varanus rosenbergi (Southern Heath Monitor)	*		
<i>Legless Lizards</i>			
Delma australis (Marble-faced Delma)	*	*	
Pygopus lepidopodus (Southern Scalyfoot)	*		
<i>Snakes</i>			
Notechis scucatus (Tiger Snake)	*		*
Pseudonaja affinis (Dugite)		*	*
Elapognathus coronatus (Crowned Snake)	*	*	*
Echiopsis curta (Bardick)	*	*	
Rhamphatyphlops australis (Southwestern Blind Snake)		*	

<i>Amphibians</i>			
<i>Frogs</i>			
<i>Crinia pseudinsignifera</i> (Bleating Froglet)	*	*	
<i>Crinia georgiana</i> (Quacking Frog)	*	*	*
<i>Crinia glauerti</i> (Clicking Froglet)		*	*
<i>Litoria adelaidensis</i> (Slender tree Frog)	*	*	*
<i>Litoria cycloryncha</i> (Spotted-thighed Frog)	*	*	*
<i>Litoria moorei</i> (Motorbike Frog)	*	*	*
<i>Geocrinia leai</i> (Lea's Frog)		*	
<i>Lymnodastes dorsalis</i> (Banjo Frog)	*	*	*
<i>Psuedophryne guentheri</i> (Guenther's Toadlet)	*	*	*
<i>Helioporus eyrei</i> (Moaning Frog)		*	
<i>Helioporus psammophilus</i> (Sand Frog)	*	*	



A view across Swan Lake to the historical farm site

Photo courtesy of www.panaromio.com