



# Native Vegetation Clearing Referral: Reserve 49343 Proposed Laydown Yard

## Site Inspection Report

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## Introduction

The Shire of Esperance (herein referred to as the SOE) has proposed to clear approximately 0.94 ha of vegetation within Reserve 49343 (Lot 501 PIn 56689, 0.97 ha) situated along Harbour Road (Coolgardie-Esperance Highway) between SLK 367.24 – 367.36 (Main Roads 2024), for the purpose of constructing a laydown yard. This laydown yard will be utilised by the SOE for bulk storage of construction and earth materials to be used for ongoing maintenance and SOE development projects, due to storage becoming insufficient at the current SOE depot yard. No clearing of vegetation within the Harbour Road reserve is required to be cleared. Refer to Figure 1 for a map of the proposed project area.

## Desktop Summary

The Shire of Esperance's Desktop Environmental Impacts Spatial Interrogation Program (DEISIP) was utilised to conduct a comprehensive desktop search for an area encompassing a 20 km radius of the proposed Reserve 49343 Laydown Yard site. This program consults numerous Local, State and Federal government spatial data sets to provide valuable environmental, heritage and other relevant information required in the assessment of the project against the ten clearing principles for native vegetation, regulated under Schedule 5 of the *Environmental Protection Act 1986* (EP Act 1986). The ten clearing principles for native in relation to the proposed Reserve 49343 Laydown Yard site are discussed in detail in the conclusion of this document on page 8. Desktop assessments on Threatened and Priority flora and fauna potentially occurring within 20 km of the site were conducted using DBCA databases (DBCA 2024a-e), the EPBC Act Protected Matters Search Tool (DCCEE 2024), and Atlas of Living Australia (ALA 2024) records.

### Pedology and Geology

Situated within the Esperance Sandplain Zone, a single soil mapping unit (SMU) occurs within Reserve 43943, the Tooregullup 5 Subsystem (Schoknecht, Tille, & Purdie 2004). This SMU consists of calcareous deep sands and minor calcareous shallow sands within a level plain with moderately-inclined dune ridges and associated swales with occasional swamps. The underlying geology is mostly calcareous and unconsolidated Quaternary coastal sands.

### Bioregional Context and Vegetation

The proposed project is situated within the mapped extent of the Recherche IBRA subregion (ESP02) of the Esperance Plains IBRA Bioregion. The Recherche subregion boasts high floristic species endemism and incredible variability in vegetation types; however, it has been extensively cleared over the past century, predominantly for livestock grazing on improved pastures. Additionally, significant extents of the ESP02 subregion have been converted for dryland agriculture (e.g. cereal cropping) and forestry plantations of exotic commercial species (May & McKenzie, 2002; Thackway & Cresswell 1995).

The site is mapped as forming a component of one Beard Vegetation Association (VA), namely Fanny Cove 42, which is described below in Table 1. This Beard VA is well-retained across WA, the Esperance Plains IBRA Bioregion and Esperance LGA, with over 94% of the pre-European extent remaining in each level (DBCA 2018). The Fanny Cove 42 Beard Vegetation System Association (VSA) is also well-represented in the IUCN CAR reserve system, with approximately 64.03% of the current extent protected within conservation-covenanted land (DBCA 2018). As this is above the 30% remaining threshold, this vegetation association does not qualify as being 'extensively cleared' within the LGA and Esperance Plains Bioregion, and therefore remnant vegetation is not considered to be significant. This is appropriate given the scale of Beard vegetation mapping.

**Table 1:** Beard Vegetation Associations mapped by Beard (1973) within the proposed Reserve 49343 and associated extent statistics.

<b>Vegetation Association</b>	<b>42</b>
System	Fanny Cove
Description	Shrublands; mallee and acacia scrub on south coastal dunes
Pre-European extent within ESP02 IBRA Bioregion	95.56%
Pre-European extent within LGA	94.87%
Current extent conserved in IUCN area	64.03%

### Threatened and Priority Flora

The desktop search (DBCA 2024a & b) revealed 47 Threatened and Priority (TP) flora with records occurring within a 20 km radius of the site; these are reflected in the list in Appendix 1. One of these species, the Priority 2 listed flora *Leucopogon corymbiformis*, was determined to be likely to occur within Reserve 49343 due to the close proximity of a known record only 360 m from the reserve in similar vegetation.

To improve identifiability in the field and ensure appropriate specimens were collected, scans of pressed herbarium specimens, photos and taxonomic keys were taken into the field. Limitations to the detectability of flora, such as recent fire disturbance, ephemeral life-history or survey timing outside the species' peak flowering period, were considered in the post-survey likelihood of occurrence assessment.

### Threatened and Priority Fauna

The desktop search revealed records of 17 Threatened and 8 Priority (TP) fauna within 20 km of the site (DBCA 2024c; DCCEE 2024); refer to the list in Appendix 2. Twenty Migratory fauna were also returned in the desktop survey to be potentially occurring. Of these, 25 species were removed from the desktop list due to being restricted to marine or coastal / shore habitats, and therefore not suited to the vegetation present at Reserve 49343. Of the remaining 20 TP fauna determined to potentially occur at the site, two TP fauna were considered to be likely to occur due to the presumed presence of suitable habitat and proximity to known records, and home range requirements. These two species were the Carnaby's black cockatoo (*Zanda latirostris*), which is listed as Endangered under both the EPBC Act and BC Act and has a known roosting site 1.65 km away (DBCA 2024e); and the quenda (*Isoodon obesulus fusciventer*), which is listed as Priority 4 under the BC Act and is known to have a record within 6.6 km of the site. During the site inspection, fauna was incidentally surveyed through direct observations, as well as through traces of fauna (such as shells, feathers, diggings, burrows, nests, evidence of foraging, scats, tracks) to determine presence or absence. The vegetation present was inspected for habitat suitability for listed species. As fauna are mobile and often utilise broad home ranges, it is understood that the lack of detection of an animal during the survey period cannot definitively infer the species' absence from the proposed project site. The likelihood of a species utilising the site was assessed post-inspection based on the suitability of habitat within the landscape context.

### Threatened and Priority Ecological Communities

Two Threatened (TEC) and Priority (PEC) Ecological Communities were identified in the desktop assessment to be recorded within a 20 km radius of the project site at Reserve 49343 (DBCA 2024d).

These are the 'Proteaceae Dominated Kwongkan Shrublands of the South East Coastal Floristic Province of Western Australia (Kwongkan)' TEC / PEC, which is listed as Endangered under the EPBC Act and Priority 3 under the BC Act, and the 'Subtropical and Temperate Coastal Saltmarsh (Coastal Saltmarsh)' TEC / PEC, which is listed as 'Vulnerable' under the EPBC Act and Priority 3 under the BC Act.

#### Aboriginal and Heritage Values

The proposed Reserve 49343 Laydown Yard site is situated within Wudjari Boodja within the broader Noongar nation, stretching westwards from Israelite Bay in the south-east across the interior of the WA Wheatbelt to Jurien Bay (AIATSIS 2024).

The desktop search indicated there are 29 Registered Aboriginal Heritage Sites located within 20 km of the site. Of these, four are located within 2 km of the site. No registered sites were within the project area.



**Figure 1.** Location and vegetation to be cleared at the proposed Reserve 49343 Laydown Yard site (a point within the site is 396,873.51m E, 6,254,311.73m N, GDA94, Zone 51).

## Site Inspection

A site inspection was conducted by Kahree Garnaut (SOE Environmental Officer) on the 29<sup>th</sup> of May 2024. The site was characterised by an undulating coastal dune system of calcareous sands forming moderately-steep ridges and mesic sedgeland-dominated swales.

### Vegetation Types and Condition

Approximately 0.94 ha of native vegetation was present within the project site, which was classified during the site inspection into one distinct vegetation type, namely:

A: Acacia, Melaleuca and Spyridium Shrubland over Sedgeland on Coastal Dune System.

**NVIS L5 Description:** U <sup>^^</sup> *Acacia cyclops*, *Melaleuca pentagona*/<sup>^</sup>low trees, tall shrubs/4/i; M<sup>^</sup> *Spyridium globulosum*, *Acacia cochlearis*, *Leucopogon obovatus*/<sup>^</sup> medium shrubs/3/d; G<sup>^^</sup> *Tetragonia implexicoma*, *Lepidosperma gladiatum*, *Billardiera fusiformis*/<sup>^</sup>low shrubs, sedges, vines/1/d.

Vegetation condition ranged between Completely Degraded and Very Good (Keighery 1994), with the majority of the native vegetation (0.74 ha) existing in a Good or Very Good condition. Primary causes of degradation observed to be afflicting the site was the ubiquitous invasion of the WoNS / Declared Pest, Bridal Creeper (*Asparagus asparagoides*), which maintained an average foliar cover of approximately 45% across the reserve. Additionally, Rose Pelargonium (*Pelargonium capitatum*) was dominant in the understorey of the sparser vegetation on the dune ridges, and rabbit and rat diggings were removing native vegetation on the dune slopes, reducing slope stability and encouraging proliferation of agricultural grasses. Areas of highest-quality vegetation (Good to Very Good) tended to occur within the heavily vegetated dune swales, and the relatively undisturbed slopes in the core of the reserve. Refer to Table 2 below for quantification of vegetation condition. Refer to Figure 2 for the map of vegetation types and condition within the proposed project area.

There was scattered litter throughout the reserve, primarily in the form of plastic wrappers and glass bottles. A substantial environmental health hazard was posed by the discovery of a 1000 L container of FarmPro® 700 Surfactant near the firebreak on the south-western boundary of the reserve (at coordinates 171.884911, -33.84649, UTM Zone 51), which was still 80% full and the container had been severely damaged. This will be removed and disposed of via an approved ChemClear pick up when next in Esperance.

The entirety of the vegetation within Reserve 49343 (0.94 ha) is proposed to be cleared for the construction of the laydown yard.

**Table 2:** Quantitative distribution of vegetation condition by vegetation type within the proposed Reserve 49343 Laydown Yard site.

Vegetation Type	Completely Degraded	Degraded	Good	Very Good	Excellent	Total
A	0.01	0.19	0.39	0.35	0	<b>0.94 ha</b>

### Threatened and Priority Ecological Communities

The desktop survey mapped the EPBC Act-listed Kwongkan TEC / PEC and the Coastal Saltmarsh TEC / PEC to be potentially occurring within the project area. Observed vegetation types lacked sufficient Proteaceae species richness and cover to be considered for Kwongkan TEC assessment, and the pedology was not conducive to sandplain heath, being too calcareous and alkaline in nature. No other Threatened Ecological Communities or Priority Ecological Communities were recognised as being

resembled by any of the distinguished vegetation types, with particular reference to the Coastal Saltmarsh TEC / PEC being absent.



**Figure 2.** Vegetation type and condition present within the proposed Reserve 49343 Laydown Yard site.



## Flora

A total of 46 flora species were identified during the field survey, of which 24 were native flora and 22 were introduced weed species that had intruded into the reserve. A full species list is presented in Appendix 3. No TP flora identified in the desktop assessment were detected, and a post-survey likelihood of occurrence assessment indicated that only one species may possibly occur within the reserve, namely the P4 orchid, *Corysanthes limpida* (Crystal Helmet Orchid), which is known to grow under shrublands on sand dunes, and as a species only evident and / or identifiable during its spring flowering season, it was significantly limited in its detectability during the field survey. There is a record of this orchid within 3.58 km of the proposed project area.

Of the 20 introduced flora, 15 are considered environmental weeds, of which two are listed as WoNS under the EPBC Act and / or Declared Pests under the BAM Act and require eradication or management. These species were African Boxthorn (*Lycium ferocissimum*) and Bridal Creeper (*Asparagus asparagoides*). Another problematic environmental weed observed within the proposed Reserve 49343 Laydown Yard area was Victorian Tea Tree (*Gaudium laevigatum*). Bridal Creeper was distributed across the reserve at a foliar coverage of approximately 45%, forming the most problematic weed species present. Rose Pelargonium was most abundant (~ 20% ground cover) on the dune ridges and disturbed margins of the native vegetation. A large 4 m African Boxthorn was sighted approximately 20 m north of the rear boundary of the reserve, growing along the south of the fenceline of the neighbouring property. This was likely several plants growing close together, and there are likely young plants establishing nearby.

## Fauna

The incidental fauna survey recorded 21 faunal taxa, of which 15 were native species; refer to the comprehensive species list presented in Appendix 4. The remaining six species were introduced, of which two species, the European rabbit (*Oryctolagus cuniculus*) and European red fox (*Vulpes vulpes*), are listed as Declared Pests – C3 Management under the BAM Act. These species pose major ecological and environmental threats, contributing to the demise and extinction of numerous Australian mammals, birds and reptiles. Numerous kangaroo trails meandered through the vegetation and were dotted with kangaroo scats.

One conservation-significant fauna was detected within the reserve, namely the quenda (*Isoodon obesulus fusciventer*), which is listed as Priority 4 under the BC Act. Diagnostic conical diggings amongst dense sedgelands and moss-covered soils in the dune swales were indicative of this species in the reserve. High-quality habitat for this species was observed across the reserve, particularly within dense sedgelands and shrublands where the abundance of rotting timber and runnels through the sedges provided ample food resources and cover for the mycophagous marsupial. The persistence of this critical weight-range mammal in the reserve despite the presence of foxes suggests the quenda is able to seek refuge in dense *Lepidosperma* sedgelands that would be difficult for the fox to traverse. As this species is listed under the BC Act, and not the EPBC Act, they are unlikely to trigger any of the ten clearing principles under the EPA 1986. However, as endemic fauna to the south-west, cumulative impacts to these species from small-scale projects is advised to be considered.

Marginal or low-quality foraging habitat is present in the reserve for the Recherche Cape Barren goose (*Cereopsis novaehollandiae grisea*) in the form of extensive mats of *Carpobrotus virescens*, a favoured foraging herb, along these exposed ridges and slopes of the sand dunes. This is supplemented by the presence of other small herbs, invasive grasses, and adjoining cleared land to the north containing an abundance of grasses and herbs. If the goose were to use this habitat, they would do so in the summer months when they foraging on the mainland during the non-breeding season.

The EPBC Act-listed white-bellied sea eagle (*Haliaeetus leucogaster*) may have been responsible for dropping small fish heads into the reserve, with the head detachment too coarse to have been done by

a fisher. The white-bellied sea eagle is known to patrol the Esperance foreshore, and likely dropped the fish heads as it was flying over. The species is unlikely to use the vegetation due to being a primarily coastal piscivorous hunter.

Marginal hunting habitat for the EPBC Act-listed peregrine falcon (*Falco peregrinus*) was identified within the vegetation, as the resident large flock of introduced rock doves (which feed on spilt grain along Harbour Road) would provide ample prey for the falcon. Given the cosmopolitan occurrence of the peregrine falcon and abundance of marginal habitat elsewhere, this area of marginal habitat is not considered significant.

No suitable foraging habitat for the EPBC Act-listed Carnaby's black cockatoo was identified within the reserve, with the vegetation instead likely offering only opportunistic forage on the present *Acacia cyclops*. The absence of suitable Myrtaceous and Proteaceous foraging species and the lack of observation of traces of the cockatoo suggests this habitat is not frequently used, and the habitat offered is of very low quality. Therefore, it has not been mapped as Carnaby's black cockatoo habitat.

The site did not provide suitable habitat for any other threatened or priority fauna listed as likely or possible to occur on the desktop assessment.

## Summary of Clearing Impacts

According to the Shire of Esperance (LGA)'s desktop study and field survey, four of the 10 Clearing Principles (DWER 2014) are likely to be, or may be, at variance:

- Principles (b) and (g) are considered to be likely to be at variance due to the proposed activities impacting habitat of Threatened and Priority-listed fauna determined to be present at the site and the risk of considerable land degradation as a result of vegetation clearing.
- Principles (f), and (i) are considered as 'may be at variance' due to potential localised impacts to associated wetlands and damplands, and anticipated impacts to the quality and nature of surface water flow and groundwater.

All other principles are not at variance.

**Table 3:** Assessment of Clearing at the proposed Reserve 49343 Laydown Yard against the 10 Principles for clearing native vegetation under the *EP Act 1986*.

Clearing Principles for native vegetation under Schedule 5 of the EP Act	Comments
Principle (a) Native vegetation should not be cleared if it comprises a high level of biological diversity	<b>Not at variance</b> Diversity was low with only 26 native species recorded from the 0.97 ha site.
Principle (b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	<b>Likely to be at variance</b> High-quality habitat for the quenda ( <i>Isoodon obesulus fusciventer</i> ), a Priority 4 fauna listed under the BC Act, was present across the reserve. This species was detected to be present via the observation of traces (diggings). Marginal habitat for the Recherche Cape Barren goose ( <i>Cereopsis novaehollandiae grisea</i> ) was also present in the form

Clearing Principles for native vegetation under Schedule 5 of the EP Act	Comments
	of <i>Carpobrotus virescens</i> mats on-site, and adjoining herbaceous grassland.
Principle (c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	<b>Not at variance</b> No TF or PF present at the site; however, there is a very small chance that suitable habitat for the orchid, <i>Corysanthes limpida</i> (Crystal Helmet Orchid) occurring.
Principle (d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.	<b>Not at variance</b> No TECs or PECs were present at the site.
Principle (e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	<b>Not at variance</b> Beard Vegetation Association Fanny Cove 42 is well-retained across WA, within the Recherche IBRA subregion, and within the Shire of Esperance, with > 90% remaining. It is also well-represented in the CAR reserve system, with approximately 64% of the current extent protected in conservation tenure.  Within 5 km of the project area, 37% of the original vegetation extent remains, which is only 7% above the <30% extensively cleared threshold.
Principle (f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	<b>May be at variance</b> Within the site are two main dune swales forming dense sedgeland that appear to be seasonally-inundated.
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	<b>Likely to be at variance</b> Surrounding landscape is broadly developed and removal of vegetation will undoubtedly increase rates of degradation in adjacent remnant vegetation, as well as impact water quality in drains. If vegetation is cleared without levelling of the topographic relief, the dune sands are prone to erosion, and weed invasion is probable.
Principle (h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any	<b>Not at variance</b> Unlikely; it is not directly connected with any conservation reserves, and the closest reserve (Lake Warden Nature Reserve) is 2 km to the north-east. The reserve is separated from surrounding conservation tenure by highly-trafficked sealed

Clearing Principles for native vegetation under Schedule 5 of the EP Act	Comments
adjacent or nearby conservation area.	roads, light industrial infrastructure, and urban development with low tree cover.
Principle (i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	<p><b>May be at variance</b></p> <p>Dune swales in reserve and adjoining tenure likely assist with the filtration of rainwater as it permeates through overlying sediments into the unconfined aquifer. Removal of vegetation will reduce this benefit and may contribute to deterioration of underground or surface water quality by increasing volume, velocity and turbidity of surface run-off, eroding soils, and encouraging establishment of disturbance-opportunist weeds.</p>
Principle (j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	<p><b>Not at variance</b></p> <p>Clearing of native vegetation across the dune system will impact water drainage and the formation of seasonally-inundated wetlands in the swales; major earthworks will be required to level the landform.</p>

## Photos

All photos were taken by Kahree Garnaut on the 29<sup>th</sup> of May 2024.



**Figure 4:** Vegetation Type A: Acacia, Melaleuca and Spyridium Shrubland over Sedgeland on Coastal Dune System within Reserve 49343.



**Figure 5.** Sparser vegetation on the dune uplands and ridges of the reserve, with increased intrusion by exotic grasses and Rose Pelargonium.



**Figure 6.** Bridal Creeper smothering *Lepidosperma gladiatum* sedgeland in south-east of reserve, with Couch Grass infestation in the foreground.



**Figure 8.** Large African Boxthorn (Declared Pest / WoNS) shrub on the rear perimeter of the reserve, likely comprised of 2-3 individual plants. These shrubs were profusely berried, and were frequented by western silvereyes.



**Figure 9.** Victorian Tea Tree establishing along the perimeter of the reserve fronting Harbour Road.



**Figure 7.** Broken chemical container of FarmPro® 700 Surfactant dumped in the reserve near the south-western boundary requiring specialist removal. This container is still 80% full with a Schedule 5 poison.



**Figure 10.** Quenda digging within *Lepidosperma gladiatum* sedgeland in dune swale.



**Figure 11.** Small fish heads (possibly sea mullet or herring) presumably dropped by a white-bellied sea eagle or osprey flying overhead.



## References

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## Appendix 1: Threatened and Priority flora species identified within 20 km

Data provided by Department of Biodiversity, Conservation and Attractions (DBCAs) and Western Australian Herbarium in May 2022 was used to assess threatened flora (TF), priority flora (PF), and threatened (TEC) and priority (PEC) ecological communities within 20 km radius of the site. Specifically, spatial data included;

- WAHerb extract (DBCA 2024a).
- Threatened and Priority Reporting (TPFL; DBCA 2024b).
- Esperance District Threatened Flora (DBCA 2022).

Species	Conservation Code		Record Distance (km)	Associated Habitat	Flowering Period	Post-survey LOO
	BC Act	EPBC Act				
<i>Leucopogon corymbiformis</i>	P2	Not listed	0.36	Sandplain heath and kwongan and sub-coastal dunes in <i>Banksia speciosa</i> woodland or heath. Commonly associated with <i>Banksia speciosa</i> , <i>Adenanthos cuneatus</i> , <i>Melaleuca striata</i> , <i>M. scabra</i> and <i>Taxandria baxteri</i> . particularly north of Esperance within a 30 km radius, and in Cape Arid NP.	Jul - Sep	Unlikely – unsuitable habitat.
<i>Grevillea baxteri</i>	P4	Not listed	1.42	Sandplains in heath and mallee in the Recherche and Eastern Mallee IBRA subregions.	Jul - Nov	Unlikely
<i>Banksia prolata</i> subsp. <i>calvicola</i>	P4	Not listed	1.59	White sand over limestone in coastal areas.	Jul - Sep	Unlikely
<i>Cyathostemon</i> sp. Esperance (A. Fairall 2431)	P1	Not listed	1.59	Poorly-known species. Has been found on saline white sand flats within a shrubland of <i>Melaleuca thyooides</i> and <i>Bossiaea cucullata</i> .		Unlikely
<i>Hopkinsia adscendens</i>	P3	Not listed	1.59	Sand in dry or seasonally-damp habitat along streams.	Oct	Possible; significant limitation posed by

Species	Conservation Code		Record Distance (km)	Associated Habitat	Flowering Period	Post-survey LOO
	BC Act	EPBC Act				
<i>Lepidium fasciculatum</i>	P3	Not listed	1.59	Inland plains.		survey timed outside of
<i>Eucalyptus x missilis</i>	P4	Not listed	2.34	Sand over limestone or granite along the south coast.	Jan - Apr	Unlikely - Not detected but suitable habitat present
<i>Pityrodia chrysocalyx</i>	P3	Not listed	2.55	Sandy soils on inland sandplains of mallee and shrublands north of Esperance.		Unlikely
<b><i>Corysanthes limpida</i></b>	<b>P4</b>	<b>Not listed</b>	<b>3.58</b>	<b>Coastal sites from Nornalup east to Esperance. Grows under dense shrubland on sand dunes.</b>	<b>Aug - Sep</b>	<b>Possible – suitable habitat present and significant limitation to detectability due to survey timing</b>
<i>Styphelia rotundifolia</i>	P3	Not listed	3.97	Restricted to Recherche and Eastern Mallee IBRA subregions, stretching north to Grass Patch and east to Israelite Bay, and south to Cape Le Grand and Cape Arid. Mallee shrublands and mallee over kwongkan. Known to occur in rehabilitated gravel pits.		Unlikely
<i>Hibbertia carinata</i>	P1	Not listed	5.29	Open mallee-heath on sandplains; also, low eucalypt forests and woodlands with mixed or myrtaceous shrublands on brown gravelly loams	Aug - Sep	Unlikely

Species	Conservation Code		Record Distance (km)	Associated Habitat	Flowering Period	Post-survey LOO
	BC Act	EPBC Act				
<i>Myriophyllum muelleri</i>	P1		5.70	over ironstone or flats. Lake Magenta north-east to Salmon Gums.		Unlikely
<i>Daviesia pauciflora</i>	P3		7.02	Aquatic herb occupying lagoons and small lakes. White or grey sand over laterite or limestone on coastal sandplain and inland sandplain.	Oct - Dec	Unlikely
<i>Hibbertia turleyana</i>	P2		7.13	White sands on flats and seasonally-wet areas north of Esperance, particularly around Gibson and Scaddan.	Aug	Unlikely
<i>Austrobaekea uncinella</i>	P3		7.85	Inland sandplains and mallee in Munglinup, Cascades, Grass Patch, Gibson and Mt Ridley.		Unlikely
<i>Tecticornia indefessa</i>	P2		8.42	White or grey-brown sands fringing salt lakes north and north-east of Esperance.		Unlikely – no samphires present
<i>Eucalyptus semiglobosa</i>	P3		8.76	White sand over laterite, silty sand on end of granite shelf, or limestone. Hillslopes, gullies and cliffs.	May, Oct - Jan	Unlikely – no eucalypts present
<i>Dampiera sericantha</i>	P3		8.96	Sandplains (sometimes with gravel) north and west of Esperance to Fitzgerald NP and north to Scaddan.	May, Aug – Dec	Unlikely
<i>Adelphacme minima</i>	P3	Not listed	9.15	Annual post-seral herb.	Sep - Jan	Unlikely
<i>Comesperma calcicola</i>	P3	Not listed	9.46	Calcareous or semi-saline clay loams over limestone, sometimes around saline water.	Oct - Jan	Unlikely

Species	Conservation Code		Record Distance (km)	Associated Habitat	Flowering Period	Post-survey LOO
	BC Act	EPBC Act				
<i>Kennedia beckxiana</i>	P4	Not listed	11.26	Sand and sandy loams associated with granite hills and outcrops.	Sep - Dec	Unlikely
<i>Galium leptogonium</i>	P3	Not listed	11.49	Predominantly across the Nullarbor Plain.		Unlikely
<i>Austrostipa mundula</i>	P3	Not listed	11.64	Coastal areas.		Unlikely
<i>Eucalyptus foliosa</i>	P3	Not listed	13.86	Flats of grey-white sandy clays adjacent to salt lakes north and north-east of Esperance.		Unlikely
<i>Paracaleana parvula</i>	P2	Not listed	14.41	Deep white sands on sandplains.	Oct – Nov	Unlikely; insignificant limitation of survey occurring outside orchid's flowering period
<i>Comesperma griffinii</i>	P2	Not listed	15.22	Yellow or grey sand on plains.	Oct	Unlikely; insignificant limitation of survey occurring outside herb's flowering period
<i>Persoonia scabra</i>	P3	Not listed	15.24	White sands or sandy loams.	Nov – Jan	Unlikely; not detected
<i>Kunzea salina</i>	P3	Not listed	15.37	Sandplains and mallee plains north of Gibson to Grass Patch and Scaddan / Mt Ridley.		Unlikely

Species	Conservation Code		Record Distance (km)	Associated Habitat	Flowering Period	Post-survey LOO
	BC Act	EPBC Act				
<i>Schoenus</i> sp. Grey Rhizome (K.L. Wilson 2922)	P1	Not listed	15.40	Sandy clays and sand along south coastal sandplain from Albany to Cape Arid NP.		Unlikely
<i>Eucalyptus litorea</i> (prev. <i>E. famelica</i> )	P3 (de-listed)	Not listed	15.63	De-listed mallee growing on calcareous sands, sandy clay loams and stony soils leeward of primary dune systems and around salt lakes.		Unlikely – no eucalypts detected
<i>Dampiera triloba</i>	P3	Not listed	15.87	Known from Gibson area; low Myrtaceous and Fabaceous shrublands on hillside, as well as grey soils supporting kwongkan, banksia shrublands and <i>Nuytsia floribunda</i> .	Aug – Dec	Unlikely
<i>Astartea reticulata</i>	P3	Not listed	16.28	Damp habitats associated with winter-wet depressions, swamps, creek lines and bases of granitic outcrops. Soils tend to be rich in organic matter. Often with <i>Melaleuca cuticularis</i> .	Nov - Jan	Unlikely
<i>Goodenia exigua</i>	P2	Not listed	16.37	Poorly-known.		Unlikely
<i>Gonocarpus pycnostachyus</i>	P3	Not listed	16.39	Sand or clay soils associated with wet depressions and granite rocks.		Unlikely
<i>Leucopogon apiculatus</i>	P3	Not listed	17.14	Skeletal sands or stony soils over quartzite or granite, ridges and rocky slopes along coast east of Esperance up to Mt Ragged and Balladonia.	Jul - Nov	Unlikely

Species	Conservation Code		Record Distance (km)	Associated Habitat	Flowering Period	Post-survey LOO
	BC Act	EPBC Act				
<i>Goodenia quadrilocularis</i>	P2	Not listed	17.18	Sands associated with sand dunes, granite slopes and outcrops along south coast and Great Southern region from Kojonup east to Cape Arid.	Sep – Dec	Unlikely
<i>Dampiera decurrens</i>	P2	Not listed	17.32	Sandy soils associated with granitic rocks. Restricted to Cape Le Grand and Recherche Archipelago.	Sep - Jan	Unlikely
<i>Eucalyptus insularis</i> subsp. <i>insularis</i>	P4	Not listed	17.45	Only known from Twin Peak Island in Recherche Archipelago south of Alexander Bay, growing in loams on steep granite in association with <i>Eucalyptus angulosa</i> , <i>Anthocercis</i> spp. And <i>Acacia heteroclita</i> .		Unlikely
<i>Myosotis australis</i> subsp. <i>australis</i>	P4	Not listed	17.50	Sandy soils near granite on hillslopes in association with low shrublands of <i>Melaleuca elliptica</i> , <i>Pimelea ferruginea</i> and <i>Cheilanthes</i> sp.		Unlikely
<i>Eucalyptus preissiana</i> subsp. <i>lobata</i>	P4	Not listed	18.13	Sand on coastal limestone rises and sand dunes.	Nov	Unlikely – no eucalypts present
<i>Brachyloma mogin</i>	P3	Not listed	18.74	Grey clayey sand in swamp flats, often associated with <i>Melaleuca cuticularis</i> and <i>Gahnia trifida</i> .	May - Jun	Unlikely
<i>Pterostylis faceta</i>	P3	Not listed	19.11	Lateritic sand and clay-loams in scrub association of <i>Thryptomene</i> sp., <i>Spartochloa scirpoidea</i> and <i>Lepidosperma</i> sp.	Aug	Unlikely

Species	Conservation Code		Record Distance (km)	Associated Habitat	Flowering Period	Post-survey LOO
	BC Act	EPBC Act				
<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	EN	EN	NA	Short-lived post-seral disturbance opportunist preferring moist sandy soil in heath, and also shallow skeletal soils near granite outcrops or wet gravelly clays.	Jul – Dec	Unlikely
<i>Eucalyptus insularis</i>	EN	EN	NA	Known from North Twin Peak Island in the Recherche Archipelago growing amongst <i>Eucalyptus conferruminata</i> and <i>Acacia</i> above granite shelf.		Unlikely
<i>Eucalyptus merrickiae</i>	VU	VU	NA	White and grey sandy clay and grey sand fringing salt lakes north and north-east of Esperance.	Aug – Nov	Unlikely
<i>Lambertia echinata</i> subsp. <i>echinata</i>	EN	EN	NA	Gravelly sandy loam, brown sandy loam, white-grey sand over granite and laterite, often between and below rocky outcrops, slopes and hill crests.	Sep - Oct	Unlikely
<i>Ricinocarpos trichophorus</i>	EN	EN	NA	Sandy clay and loams on breakaways and amongst sandstone rocks.	May - Sep	Unlikely



### Appendix 2: Desktop Threatened & Priority Fauna within 20 km

Scientific Name	Common Name	Conservation Code		Record Distance (km)	Habitat Requirements	Post-survey LOO
		BC Act	EPBC Act			
<i>Isoodon obesulus fusciventer</i>	Quenda, southwestern brown bandicoot	Not listed	P4	6.62	Sandy soils with scrubby vegetation, open forest and woodland; crepuscular and during day sleeps on grassy nest in dense vegetation. Opportunistically utilises fresh growth in small, recently-burnt areas; prefers swamp habitats. Often habituated to urban environments where bushland present. Mycophagous, as well as eating small invertebrates and vegetative matter.	Present. High-quality foraging habitat.
<i>Haliaeetus leucogaster</i>	White-bellied sea eagle	MI	MI	Known to occur at Castletown Quays	Moderately common to common in the Recherche Archipelago, where hunts along coastlines and inshore areas for fish, sea snakes, and nesting seabirds, as well as occasionally wallabies, large lizards, and marine turtles. Breeds almost exclusively on islands, with 13 known breeding islands in the Recherche and mainland cliffs at Pt Culver (Nuytsland NR). Nests are a messy stack of sticks, up to 2.8 m wide and 2.7 m deep, with a shallow egg depression < 0.6 m lined with coastal plants. Nests usually on high rocky ground, a rigid shrub, old osprey nests, tall eucalypts, and powerline / telegraph towers.	Present, but unsuitable habitat; fly-over.

Scientific Name	Common Name	Conservation Code		Record Distance (km)	Habitat Requirements	Post-survey LOO
		BC Act	EPBC Act			
<i>Zanda latirostris</i>	Carnaby's cockatoo, Ngoolark	EN	EN	1.26	Feeds on proteaceous shrubs and heath and adjacent eucalypt woodland; eats seeds of <i>Banksia</i> , <i>Hakea</i> , <i>Grevillea</i> , <i>Allocasuarina</i> and introduced pines, as well as flowers of <i>Eucalyptus</i> , <i>Banksia</i> , <i>Hakea</i> , <i>Melaleuca</i> , <i>Calothamnus</i> , <i>Callistemon</i> , etc. Also known to roost in Swamp Yate ( <i>E. occidentalis</i> ). In non-breeding season most flocks migrate to coastal feeding territories along the South Coast, Midwest, and South West regions; this is the period when most Carnaby's are sighted in Esperance, with numerous roosts known in Tuart, Maritime Pine, and Swamp Yate trees in the region. Not known to breed east of Cocanarup Timber Reserve.	Possible. Opportunistic use of sporadic forage species present (e.g. <i>Acacia cyclops</i> ).
<i>Cereopsis novaehollandiae grisea</i>	Recherche Cape Barren goose	VU	VU	0.84	During winter breeds on the larger vegetated Islands of the Recherche Archipelago. Forages on herbfields (especially of <i>Carpobrotus virescens</i> ) and grasslands along the southern coastline between Munghup and Israelite Bay / Cape Arid. Prefers beaches, pasture, and rocky outcrops, with known visitation to Pink Lake and Red Islet. Has been observed in town, as well as Cape Arid, Stokes National Park, and Cape le Grand during the summer	Possible. Low-quality foraging habitat present as <i>Carpobrotus virescens</i> on dune ridge and invasive grasses.

Scientific Name	Common Name	Conservation Code		Record Distance (km)	Habitat Requirements	Post-survey LOO
		BC Act	EPBC Act			
<i>Falco peregrinus</i>	Peregrine falcon	OS	OS	5.59	feeding months, particularly on maintained lawns, golf courses, and ornamental lakes. Broad habitat range, from tropical and temperate rainforests to arid zone, and alpine areas. Requires abundant prey and secure nest sites, preferring cliffs (both inland and coastal) or open woodlands in close proximity to water. Pairs maintain a home range of approximately 20-30 sq km, laying eggs in cliff recesses, tree hollows or abandoned nests of other large birds.	Possible; marginal and insignificant hunting habitat present
<i>Ctenotus gemmula</i>	Jewelled sandplain Ctenotus	Not listed	P3	10.34	Coastal sandplains along south coast to Cape Arid supporting heaths in association with banksia or mallee woodlands.	Unlikely; unsuitable soil and vegetation type.
<i>Acanthophis antarcticus</i>	Southern death adder	Not listed	P3	2.16	Deep leaf litter where it can ambush unsuspecting prey such as frogs, lizards, and small mammals. Wide habitat range across southern and eastern part of the Shire of Esperance; grasslands, open woodland, scrub and heathland, preferring undisturbed habitat. Breeds in late summer where females give birth to live young.	Unlikely.
<i>Aphelocephala leucopsis</i>	Southern whiteface	VU	VU		Lightly-timbered scrublands in arid zone.	Unlikely

Scientific Name	Common Name	Conservation Code		Record Distance (km)	Habitat Requirements	Post-survey LOO
		BC Act	EPBC Act			
<i>Apus pacificus</i>	Fork-tailed swift	MI	MI		Almost exclusively aerial.	Unlikely
<i>Atelomastix dendritica</i>	Recherche atelomastix millipede	VU	VU	14.56	Only known from Cape Le Grand NP.	Unlikely
<i>Botaurus poiciloptilus</i>	Australasian bittern	EN	EN		Densely-vegetated freshwater and slightly brackish wetlands and lakes across the south coast east to Cape Arid. Beds of tall bulrush ( <i>Typha</i> sp.), <i>Baumea</i> , and sedges in freshwater swamps. Nests in rough platform of bulrush and sticks placed in tea trees or other shrubs just above the waterline. Eggs laid between September to December. Threatened by swamp drainage and development, declining water quality.	Unlikely
<i>Dasyurus geoffroii</i>	Chuditch, western quoll	VU	VU	NA	Currently restricted to south-western WA, with population strongholds in dry sclerophyll forest and dry woodland and mallee-heath, namely in Lake Magenta NR, Southern Forests, Julimar State Forest, and Fitzgerald River NP. Require hollow logs, earth burrows, and occasionally hollowed-out termite mounds for daytime shelter / nesting. Hollow tree bases occasionally used. Diet is broad and consists largely of small mammals, amphibians, small	Unlikely; presumed locally-extinct.

Scientific Name	Common Name	Conservation Code		Record Distance (km)	Habitat Requirements	Post-survey LOO
		BC Act	EPBC Act			
					reptiles, invertebrates, freshwater crustaceans, small birds. Occupies even high-quality habitats at low densities due to territorial behaviour - female habitats extend over core areas of 55-120 ha and don't overlap, whilst male territories extend over 400 ha or more and overlap. Although meso-predator, chuditch threatened by raptor and feral fox predation, drowning in dam nets, injury in traps set-up for foxes or rabbits, and previously deliberate shooting by landholders. Recently re-introduced to AWC Mt Gibson Sanctuary (2022).	
<i>Elanus scriptus</i>	Letter-winged kite	Not listed	P4	11.21	Arid and semi-arid areas, reported as far south as Esperance and Gnowangerup. Usually in lightly wooded open country.	Unlikely
<i>Falco hypoleucos</i>	Grey falcon	VU	VU	NA	The distribution of this species is restricted largely to areas of the highest annual average temperatures where there is an average annual rainfall of less than 500 mm. It favours lightly timbered and untimbered lowland plains that are crossed by tree-lined watercourses. It uses the abandoned nests of other bird species, particularly corvids.	Unlikely
<i>Hydroprogne caspia</i>	Caspian tern	MI	MI	1.01	Known to breed in the Recherche Archipelago and north to Dirk Hartog and Faure Islands in	Unlikely

Scientific Name	Common Name	Conservation Code		Record Distance (km)	Habitat Requirements	Post-survey LOO
		BC Act	EPBC Act			
<i>Leipoa ocellata</i>	Malleefowl	VU	VU	4.35	<p>Shark Bay. Nests in open, sparsely vegetated areas with some shelter (i.e. near bushes, large sticks, driftwood, clumps of beach wrack) and consists of a shallow scape in the ground, often lined with grass, seaweed, feathers, small stones and shells. Coastal and offshore island habitats; sheltered seas, estuaries, tidal creeks, near-coastal salt lakes and brackish pools, open wetlands. Very unlikely to use fresh waters. Feeds predominantly on fish, bird eggs, carrion, aquatic invertebrates, flying insects and earthworms.</p> <p>Semi-arid to arid, long-unburnt mallee-dominated areas with sandy (can be sandy gravel) substrate and abundant leaf-litter for nest mound building. Occasionally low <i>E. wandoo</i> or <i>E. astringens</i> woodlands and mulga shrublands dominated by <i>Eucalyptus</i>, <i>Callitris</i>, and <i>Acacia</i> sp. Diet consists of <i>Acacia</i> seeds, flower blossoms, buds, fruit and lerps, and soil invertebrates. Construct distinctive nest mounds that can exceed 4 m across and 1 m high. Threatened by habitat fragmentation, degradation of habitat by feral ungulates and rabbits, altered fire regimes, vehicle strike, and feral predators.</p>	Unlikely

Scientific Name	Common Name	Conservation Code		Record Distance (km)	Habitat Requirements	Post-survey LOO
		BC Act	EPBC Act			
<i>Notamacropus imma</i>	Kwoora, western brush wallaby	Not listed	P4	1.63	Open forest or woodland, favouring open seasonally-wet flats with low grasses and open scrubby thickets. Mallee and heathland.	Unlikely
<i>Oxyura australis</i>	Blue-billed duck	Not listed	P4	4.33	Deeper freshwater swamps and lakes; occasionally salt lakes and estuaries recently freshened by flood or rain waters. Recently sighted at Lake Mortjinup. Coastal areas of Esperance Shire, stretching east to Merivale. Breeds on well-vegetated freshwater lakes, nests usually made of bulrushes ( <i>Typha</i> sp.) trampled over leaning fork of dense tea tree or melaleuca. Often lined with down and paperbark and screened from above with growing bulrushes.	Unlikely
<i>Pandion haliaetus</i>	Osprey	MI	MI	17.73	Coasts, islands and lower courses of rivers and estuaries.	Unlikely
<i>Parantechinus apicalis</i>	Dibbler	EN	EN	18.53	Crepuscular carnivore feeding primarily on ground-dwelling insects, small lizards, birds and mammals. Prefers long-unburnt habitat. Requires dense leaf litter under dense low shrubland dominated by genera such as Banksia, where it also drinks nectar and berries. Diurnal, resting in raised dray of twigs and grasses. Population in Fitzgerald River NP possibly expanding into Munglinup area.	Unlikely; regionally-extinct.

Scientific Name	Common Name	Conservation Code		Record Distance (km)	Habitat Requirements	Post-survey LOO
		BC Act	EPBC Act			
<i>Plegadis falcinellus</i>	Glossy ibis	MI	MI	4.67	Swamps and lakes throughout Australian mainland but most abundant in northern Australia. Non-breeding (summer) visitor to SW Australia. Shallow water, mudflats, well-vegetated wetlands, floodplains, mangroves, and rice fields.	Unlikely



### Appendix 3: Incidental Flora List

Family	Scientific Name	Common Name	Conservation Code		Introduced
			BC Act	EPBC Act	
Aizoaceae	<i>Carpobrotus virescens</i>	Coastal Pigface			
	<i>Tecticornia implexicoma</i>	Bower Spinach			
Apiaceae	<i>Foeniculum vulgare</i>	Fennel			*
Asparagaceae	<i>Asparagus asparagoides</i>	Bridal Creeper			* WoNS / DP
Asphodelaceae	<i>Asphodelus fistulosus</i>	Onion Weed			*
Asteraceae	<i>Arctotheca calendula</i>	Cape Weed			*
	<i>Cirsium vulgare</i>	Spear Thistle			*
	<i>Gazania linearis</i>	Treasure Flower			*
	<i>Hyperchaeris radicata</i>	Hairy Cat's Ear			*
	<i>Olearia axillaris</i>	Coastal Daisy			
Boraginaceae	<i>Heliotropium europaeum</i>	Common Heliotrope			*
Brassicaceae	<i>Lepidium africanum</i>	Rubble Peppergrass			*
Chenopodiaceae	<i>Rhagodia baccata</i>	Berry Saltbush			
Cupressaceae	<i>Callitris drummondii</i>	Southern Cypress Pine			
Cyperaceae	<i>Ammothryon grandiflorum</i>	Large-flowered Bog-rush			
	<i>Ficinia nodosa</i>	Knotted Club-rush			
	<i>Lepidosperma gladiatum</i>	Coast Sword-sedge			
	<i>Lepidosperma</i> sp.				
Ericaceae	<i>Leucopogon obovatus</i>	Coast Beard-heath			
Euphorbiaceae	<i>Euphorbia terracina</i>	Geraldton Carnation Weed			*
Fabaceae	<i>Acacia cochlearis</i>	Rigid Wattle			
	<i>Acacia cyclops</i>	Red-eyed Wattle			
	<i>Acacia saligna</i>	Orange Wattle			
	<i>Templetonia retusa</i>	Cockie's Tongue			
Geraniaceae	<i>Pelargonium capitatum</i>	Rose Pelargonium			*
Hemerocallidaceae	<i>Dianella revoluta</i>	Blueberry Lily			
Lauraceae	<i>Cassytha racemosa</i>	Dodder Laurel			
Myrtaceae	<i>Agonis flexuosa</i>	Peppermint			*

Family	Scientific Name	Common Name	Conservation Code		Introduced
			BC Act	EPBC Act	
Myrtaceae	<i>Gaudium laevigatum</i>	Victorian Tea Tree			*
	<i>Melaleuca pentagona</i> subsp. <i>latifolia</i>	Little Penta			
	<i>Melaleuca pentagona</i> subsp. <i>pentagona</i>	Oval-leaf Honey-myrtle			
Onagraceae	<i>Oenothera drummondii</i>	Beach Evening Primrose			*
Papaveraceae	<i>Fumaria capreolata</i>	Whiteflower Fumitory			*
Phyllanthaceae	<i>Phyllanthus calycinus</i>	False Boronia			
Pittosporaceae	<i>Billardiera fusiformis</i>	Australian Bluebell			
Poaceae	<i>Avena barbata</i>	Bearded Oat			*
	<i>Cenchrus cladestinus</i>	Kikuyu			*
	<i>Cynodon dactylon</i>	Couch Grass			*
	<i>Eragrostis curvula</i>	African Lovegrass			*
	<i>Lagurus ovatus</i>	Hare's Tail Grass			*
	<i>Neurachne alopecuroides</i>	Foxtail Mulga Grass			
	<i>Clematis linearifolia</i>	Old Man's Beard			
	<i>Spyridium globulosum</i>	Basketbush			
	<i>Myoporum insulare</i>	Common Boobialla			
	<i>Lycium ferocissimum</i>	African Boxthorn			* WoNS / DP
Solanaceae	<i>Solanum nigrum</i>	Blackberry Nightshade			*

## Appendix 4: Incidental Fauna List

Class	Family	Scientific Name	Common Name	Noongar Name	Introduced	Conservation Code		Notes	
						BC Act	EPBC Act		
Aves	Acanthizidae	<i>Acanthiza chrysothroa</i>	Yellow-rumped thornbill	Miyamit				Heard calling	
		<i>Sericornis frontalis</i>	White-browed scrubwren	Koorkal					
	Artamidae	<i>Gymnorhina tibicen</i>	Australian magpie						
		<i>Columba livia</i>	Rock pigeon		*				Flying overhead
	Corvidae	<i>Corvus coronoides</i>	Australian raven		Wardang				
		<i>Stagonopleura oculata</i>	Red-eared firetail						Heard calling
	Meliphagidae	<i>Anthorchaera lunulata</i>	Western wattlebird						
		<i>Phylidonyris novaehollandiae</i>	New Holland honeyeater		Bandiny				Abundant
		<i>Grallina cyanoleuca</i>	Magpie-lark						
	Phasianidae	<i>Coturnix ypsilophora</i>	Brown quail						Heard calling
		<i>Rhipidura leucophrys</i>	Willie-wagtail		Djiti-djiti				
	Threskiornithidae	<i>Threskiornis spinicollis</i>	Straw-necked ibis						
		<i>Zosterops lateralis</i>	Western silvereeye		Doolor				Abundant
	Gastropoda	Bulimulidae	<i>Bothriembryon esperantia</i>	Esperance mallee land snail					Live snail
			<i>Cornu aspersum</i>	Garden snail					Shells
		<i>Theba pisana</i>	White Italian snail						Shells
	Mammalia	Canidae	<i>Vulpes vulpes</i>	European red fox		*DP			Fresh scat
<i>Oryctolagus cuniculus</i>			European rabbit		*DP			Diggings	
Macropodidae		<i>Macropus fuliginosus</i>	Western grey kangaroo or yonga		Yonga				Trails, scats
		<i>Rattus rattus</i>	Black rat			*			Deep diggings
Peramelidae		<i>Isoodon obesulus fusciventer</i>	Southwestern brown bandicoot or quenda		Kwenda		P4	Not listed	Diggings and runnels