

**GEMCO/SOUTH32 SOUTHERN LEASE SMALL MAMMAL
RESEARCH PROJECT**

Report

For:

GEMCO/South32

June 2019

Final



**PO Box 2474
Carlingford Court 2118**

Report No. Q17005RP3

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

Version	Date Issued	Amended by	Details
1	7 June 2019		Final issued to client.

Approved by: Katrina Wolf

Position: Principal

Signed: 

Date: 7 June, 2019

Table of Contents

1	INTRODUCTION	
1.1	Project Background and Study Objectives	1.2
1.2	Overview of Target Threatened Species	1.4
1.2.1	Northern Hopping-mouse	1.4
1.2.2	Brush-tailed Rabbit-rat	1.6
1.3	Description of the Study Area	1.8
2	METHODOLOGY	
2.1	Site Selection	2.1
2.1.1	Introduction	2.1
2.1.2	Determination of Study Area	2.1
2.1.3	Determination of Sampling Area	2.1
2.1.4	Classification of Stratification Units	2.3
2.1.5	Selection of Sampling Sites	2.5
2.2	Field Surveys	2.6
2.2.1	Permit	2.6
2.2.2	Timing	2.6
2.2.3	Sampling Site Establishment	2.7
2.2.4	Motion-Sensor Camera Trapping	2.9
2.2.5	Habitat Assessment	2.9
2.2.6	Northern Hopping-mouse Burrow Survey	2.10
2.2.7	Additional Surveys in Proximity to the Cave Paintings	2.10
2.2.8	Weather Conditions	2.11
2.3	Data Analysis	2.12
2.3.1	Data Entry	2.12
2.3.2	Image Identification	2.12
2.3.3	Analysis	2.13
2.4	DENR Consultation	2.13
2.5	Personnel	2.14
2.6	Limitations	2.14

Table of Contents *(Cont'd)*

3	RESULTS	
3.1	Overview	3.1
	3.1.1 Habitat Data	3.1
	3.1.2 Images	3.1
	3.1.3 Fauna Species	3.1
3.2	Threatened Small Mammals	3.7
	3.2.1 Northern Hopping-mouse	3.7
	3.2.2 Brush-tailed Rabbit-rat	3.9
3.3	Review of the Small Mammal Project against Study Objectives	3.10

4 CONCLUSION

REFERENCES

FIGURES

List of Appendices

- A. COORDINATES OF SAMPLING SITES**
 - B. SAMPLING SITE DESCRIPTIONS**
 - C. DETAILED SURVEY PROCEDURE**
 - D. PERSONNEL**
 - E. FAUNA SPECIES RECORDED WITHIN EACH SAMPLING SITE**
-

List of Tables

2.1	Stratification units within the Study Area	2.4
3.1	Summary of fauna species recorded from cameras within the Sampling Area	3.2
3.2	Summary of Northern Hopping-mouse detections near the Cave Paintings	3.7
A.1	Coordinates of each sampling site	A.1
C.1	Vegetation categories used during the point intersect survey	C.14
D.1	Cumberland Ecology personnel	D.1
D.2	Other research project personnel	D.2
E.1	Fauna species recorded within sampling sites S001-S038	E.1
E.2	Fauna species recorded within sampling sites S039-S076	E.3
E.3	Fauna species recorded within sampling sites S077-S114	E.5
E.4	Fauna species recorded within sampling sites S115-S152	E.7

List of Figures

1	Location Plan
2	Local Setting
3	Location of the Study Area
4	Location of the Sampling Area
5	Habitat Types within the Study Area
6	Time Since Fire within the Study Area
7	Additional Exclusion Areas within the Study Area
8	Stratification Units within the Study Area
9	Location of Sampling Sites within the Sampling Area
10	Location of Sampling Sites near the Cave Paintings
A1	Location of Sampling Sites within the Sampling Area

List of Photographs

1.1	Northern Hopping-mouse (Source: Diets, 2016)	1.5
1.2	Brush-tailed Rabbit-rat (Source: K. Brennan in Woinarski and Hill, 2012)	1.7
3.1	Northern Brown Bandicoot	3.5
3.2	Delicate Mouse	3.5
3.3	Northern Quoll	3.6
3.4	Agile Wallaby	3.6
3.5	Northern Hopping-mouse recorded at CP2 on 13/04/2018	3.8
3.6	Northern Hopping-mouse recorded at CP2 on 12/04/2018	3.9

List of Graphs

Graph 2.1	Comparison of the historic mean and 2017 data for rainfall and temperature	2.11
Graph 2.2	Comparison of the historic mean and 2018 data for rainfall and temperature	2.12

List of Plates

Plate 2.1	Standard layout of sampling sites	2.8
Plate C.1	Standard layout of sampling sites	C.6
Plate C.2	Example unfenced camera setup	C.7
Plate C.3	Example fenced camera site layout	C.10

Acknowledgements

The Anindilyakwa People are the Traditional Owners of Groote Eylandt. The research project was undertaken on the lands of the Amagula, Maminyamanja, Wurramara and Wurrawilya people. The authors of this report and GEMCO/South32 gratefully acknowledge the assistance that the Traditional Owners and the Anindilyakwa Land Council (ALC) provided in relation to the research project. This included providing access to the Study Area for the purpose of undertaking field surveys and the participation of the Traditional Owners in field surveys.

Cumberland Ecology and GEMCO/South32 also acknowledge the assistance provided by the Northern Territory Department of the Environment and Natural Resources (NT DENR). This included developing the initial study design and ongoing consultation to facilitate development of the research project.

Cumberland Ecology acknowledges GEMCO's assistance with project managing this study, government agency consultation, the provision of field assistants and report reviewing. Cumberland Ecology also acknowledges Hansen Bailey's assistance with project managing this study, assisting with government agency consultation and with report reviewing, editing, and the preparation of report figures.

Glossary of Terms

ALC	Anindilyakwa Land Council
ALRA	Commonwealth <i>Aboriginal Land Rights (Northern Territory) Act 1976</i>
DENR	Northern Territory Department of Environment and Natural Resources
Densitometer stick	A constructed piece of survey equipment comprised of a pole, densitometer (i.e. device used for measuring canopy cover) and laser, used to determine vegetative cover
DotEE	Commonwealth Department of the Environment and Energy
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GEMCO	Groote Eylandt Mining Company
GPS	Global Positioning System
InfoNet	NRM InfoNet Database
NAFI	Northern Australia Fire Information
NT	Northern Territory
Research project	The Southern Lease small mammal research project
Sampling Area	Area subject to field surveys, as shown in Figure 3
Sampling site	Point location of surveys undertaken within the Sampling Area
Southern Lease	Exploration Licence application EL2455, as shown in Figure 1
Stratification unit	An area of land within the Sampling Area comprising the same habitat type and time since fire class, as shown in Figure 3
Study Area	Area subject to the research project, including the Southern Lease and adjacent areas to the west and south, as shown in Figure 2
TPWC Act	<i>Territory Parks and Wildlife Conservation Act</i>

Introduction

Cumberland Ecology was commissioned by the Groote Eylandt Mining Company Pty Ltd (GEMCO), to undertake a small mammal research project (the 'research project') within GEMCO's Exploration Licence (EL2455) (known as the Southern Lease) on Groote Eylandt.

The Southern Lease is located in the south-western part of Groote Eylandt (**Figure 1**). It is adjacent and to the south of GEMCO's existing mine and is also located adjacent to the southern boundary of the Eastern Leases, an area approved for future mining. The township of Angurugu is located approximately 10 km from the northern boundary of the Southern Lease and is the closest permanent residential community (**Figure 1**). The Southern Lease covers an area of approximately 26,000 ha. The area is remote, containing only a few 4WD access tracks and one outstation. The Southern Lease is accessed from the existing mine via the Emerald River Road, an unsealed public road (**Figure 2**). The Southern Lease, and all of Groote Eylandt, is Aboriginal land under the Commonwealth *Aboriginal Land Rights (Northern Territory) Act 1976* (ALRA) and the Anindilyakwa Land Council (ALC) is the Land Council responsible for this land.

As part of its long term strategy, GEMCO is assessing potential future manganese resources. In May 2016, GEMCO and the ALC signed an Exploration Agreement, under ALRA, for the Southern Lease. The Exploration Agreement describes the conditions under which exploration and associated activities may be undertaken within the Southern Lease. In October 2016 GEMCO was granted EL2455 under the Northern Territory (NT) *Mineral Titles Act*. In late 2016 GEMCO undertook an exploration drilling program in the Southern Lease.

Based on information obtained from the 2016 exploration program, GEMCO sought to undertake further exploration in the Southern Lease, commencing in 2017. In March 2017 GEMCO met with NT government agencies to obtain advice on the environmental approval process for the proposed 2017 exploration program. The meeting was attended by representatives from the NT Environmental Protection Authority, the Department of Primary Industry and Resources and the Department of Environment and Natural Resources (DENR). In this meeting GEMCO was advised that as part of the approval application for the exploration activities, there was a need to provide information on potential impacts on the Northern Hopping-mouse (*Notomys aquilo*) and Brush-tailed Rabbit-rat (*Conilurus penicillatus*). It was noted that these two threatened species were potentially present within the Southern Lease but there was a scarcity of information about their distribution and habitat preferences, and the potential for exploration to impact them.

DENR indicated that the information gaps on the Northern Hopping-mouse and Brush-tailed Rabbit-rat should be addressed by undertaking a research project, utilising motion-sensor cameras and habitat assessments, to confirm the occurrence and habitat preferences of the Northern Hopping-mouse and Brush-tailed Rabbit-rat and identify areas in the Southern Lease that were of most importance for these species.

The information gathered by the research project could then be used to guide the design of future exploration programs in the Southern Lease, with the intent of designing exploration programs to minimise impacts on the Northern Hopping-mouse and Brush-tailed Rabbit-rat (e.g. avoid undertaking exploration in areas rated as being of importance for these species).

This report presents the results of the small mammal research project, which was undertaken to provide the information requested by DENR on the Northern Hopping-mouse and Brush-tailed Rabbit-rat. The research project was undertaken by Cumberland Ecology and included collection of seasonal survey data between 2017 and 2018.

1.1 Project Background and Study Objectives

DENR indicated in the meeting in March 2017 that the following key questions should be addressed by the research project:

- What are the distributions of the Northern Hopping-mouse and Brush-tailed Rabbit-rat within the Southern Lease and adjacent areas? In particular, which are the most important parts of the Southern Lease for the two species?
- What environmental factors (i.e. structural habitat, floristic, landscape, fire history etc.) have the greatest influence on the Northern Hopping-mouse and Brush-tailed Rabbit-rat within the Southern Lease and adjacent areas?

GEMCO requested DENR's assistance with designing a research project to address these key questions. In response to this request, DENR prepared the *GEMCO Southern Lease Exploration Area Threatened Mammal Risk Assessment Plan* (Gillespie and Heiniger, 2017) (the 'DENR Risk Assessment Plan'). The survey design utilised the method of occupancy modelling. The survey design included undertaking systematic sampling across environmental gradients (based on habitat types and fire history) to determine relationships between environmental gradients and patterns of species occupancy.

The DENR Risk Assessment Plan formed the basis of the survey design for the small mammal research project. The objectives of the small mammal research project are therefore based on the objectives proposed within the DENR Risk Assessment Plan and are as follows:

- Design a study to ascertain the geographic distribution and key environmental correlates of the Northern Hopping-mouse and Brush-tailed Rabbit-rat in the Southern Lease¹.
- Build predictive models to assess the distribution of important areas for these species (i.e. high probabilities of occurrence) in Southern Lease.
- Evaluate the power of these models to predict with precision the distributions of these species in the Southern Lease, and assess additional data requirements.

In developing and implementing the research project, a number of modifications were made to the original survey design, which were agreed with DENR. The agreed components of the research project were:

- **Site selection:** development of a stratified sampling site regime based on habitat types and fire history (a total of 152 sampling sites);
- **Field survey:** Targeted surveys at each of the 152 sampling sites, including:
 - Motion-sensor camera trapping to determine species occurrence and detection rates. This trapping includes the use of four cameras, two of which are established as unfenced sites and two of which are established as fenced sites;
 - Habitat assessment to collect environmental and management attributes. The habitat assessment includes collection of information on recent fire, trees and logs and vegetative cover. The attributes collected by the habitat assessment were intended to be used for investigating any correlation with species occurrence; and
 - Northern Hopping-mouse burrow surveys to collect environmental attributes of any observed burrows. Information on the presence of burrows was intended to be used for investigating correlation with species occurrence.
- **Data analysis:** review of camera images, collation of field survey data and desktop analysis of environmental and management attributes; and
- **Predictive models:** assuming sufficient detection of the species, development of predictive models for the Northern Hopping-mouse and Brush-tailed Rabbit-rat based on species occurrence data from camera trapping and environmental and management attributes.

¹ Note that the DENR Risk Assessment Plan was originally restricted to areas west of the Amagula River, but was ultimately extended to encompass the full extent of the Southern Lease. As detailed in **Section 1.3**, the Study Area ultimately encompassed a larger area than the Southern Lease.

Whilst the research project focussed on the Northern Hopping-mouse and Brush-tailed Rabbit-rat, it also provided an opportunity to gather incidental data about the occurrence of other small mammals.

Cumberland Ecology was engaged by GEMCO in May 2017 to undertake the small mammal research project.

1.2 Overview of Target Threatened Species

Groote Eylandt is known to support a number of threatened fauna species, including birds, mammals and reptiles, listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Territory Parks and Wildlife Conservation Act* (TPWC Act). DENR has identified two threatened small mammals, the Northern Hopping-mouse and Brush-tailed Rabbit-rat, as having insufficient information on occurrence and habitat preferences within the Southern Lease. The research project therefore focussed on these two species. A summary description of the Northern Hopping-mouse and Brush-tailed Rabbit-rat is provided below.

1.2.1 *Northern Hopping-mouse*

i. Conservation Status

EPBC Act Status: Vulnerable

TPWC Act Status: Vulnerable

ii. Description

The Northern Hopping-mouse is a small (35-44 g) rodent, with a head and body length of 91-112 mm and tail length of 15-173 mm (Woinarski and Flannery, 2008). It is characterised by an extremely long tail (around 140-150 per cent head-body length) tipped with a tuft of longer dark hairs, large ears and eyes, and very long (35-40 mm) narrow hind-feet (Woinarski and Ward, 2012). The fur colour of the Northern Hopping-mouse is sandy brown above and white below (Woinarski and Ward, 2012). A photograph of a Northern Hopping-mouse is shown in **Photograph 1.1**.



Photograph 1.1 Northern Hopping-mouse (Source: Diете, 2016)

iii. Species Profile

The Northern Hopping-mouse is most often found in areas with sandy substrates and seems to favour coastal sand dunes and sand sheets with a cover of tussock grass or heath (DotE, 2013). It is also found in shrubland, eucalypt open forest, and the margins of coastal rainforest thickets (DotE, 2013). It constructs elaborate communally-used burrow systems, whose vertical entrances may be obscured by a thin layer of sand (Woinarski and Ward, 2012; Diете *et al.*, 2014). Burrows are unmarked by entrances or tracks (Ward, 2014). The Northern Hopping-mouse is active at night and it forages entirely on the ground (Woinarski and Ward, 2012). It feeds mainly on a range of seeds from grasses, herbs and shrubs and it is also known to eat insects (DotE, 2013). The species has been recorded as having a home range between 0.39 ha (lactating female) and 23.95 ha (scrotal male) (Diете *et al.*, 2016). The Northern Hopping-mouse is restricted to the monsoonal tropics of northern Australia, including Groote Eylandt (DotE, 2013). Records on Groote Eylandt are sparsely scattered across woodland, coast heathland and shrubland habitats (Woinarski *et al.*, 2014). Since the early 2000s there have been numerous reports on Groote Eylandt of sand mounds and foot prints originally thought to be made by the Northern Hopping-mouse. However, the accuracy of many of these records is uncertain due to possible confusion with the Delicate Mouse (*Pseudomys delicatulus*) which is common on the island (DENR and ALC, 2019).

Key threats to the Northern Hopping-mouse include predation by feral cats, habitat modification by feral stock, broad-scale strip mining and changes in fire regimes (DotE, 2013). In addition, invasive transforming weeds (such as Gamba grass) have been identified as a key threat to the species within the Threatened Species Management Plan (TSMP) (DENR and the ALC, 2019). The TSMP aims to reduce threats to the Northern Hopping-

mouse within the Groote Archipelago, and has identified a set of key actions required. These include, but are not limited to, developing and implementing Fire and Weed Management Plans, reducing the impact of cats in communities and preventing feral herbivore incursions on the island.

iv. *EPBC Act Plans*

a. Conservation Advice

Approved Conservation Advice for the Northern Hopping-mouse has been prepared, which identifies threats and conservation actions for the species. Conservation actions include management actions, survey and monitoring priorities and information and research priorities. Threats to the Northern Hopping-mouse have been identified as vegetation change through altered fire regimes, predation by feral cats and strip-mining (TSSC, 2015).

b. Recovery Plan

There is no current Recovery Plan for the Northern Hopping-mouse; however, the Commonwealth Department of the Environment and Energy (DotEE) Species Profile and Threats Database acknowledges that a recovery plan is required. A National Multi-species Recovery Plan has previously been in place for several small mammal species, including the Northern Hopping-mouse (Woinarski, 2004); however DotEE has advised that this plan has ceased to be in effect from 1 October 2015 (DotEE, 2019).

c. Threat Abatement Plan

Threat Abatement Plans relevant to the Northern Hopping-mouse include the *Threat abatement plan for predation by feral cats* (DotE, 2015) and the *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses* (DSEWPaC, 2012).

d. Referral Guideline

There is no Referral Guideline for the Northern Hopping-mouse.

1.2.2 *Brush-tailed Rabbit-rat*

i. *Conservation Status*

EPBC Act Status: Vulnerable

TPWC Act Status: Endangered

ii. *Description*

The Brush-tailed Rabbit-rat is a moderately large (144-163 g) rodent, with a head and body length of 135-227 mm and tail length of 102-235 mm (Kemper and Firth, 2008). It is a partly arboreal rat, and is characterised by a long brush-tipped tail, with the distal third either black or white, and long ears (Woinarski and Hill, 2012). The fur colour of the Brush-tailed Rabbit-

rat is grey to golden brown on the back and white to cream on the belly (Kemper and Firth, 2008). A photograph of a Brush-tailed Rabbit-rat is shown in **Photograph 1.2**.



Photograph 1.2 Brush-tailed Rabbit-rat (Source: K. Brennan in Woinarski and Hill, 2012)

iii. *Species Profile*

The Brush-tailed Rabbit-rat appears to have quite specific habitat requirements and is largely restricted to mixed eucalypt open forest and woodland, or on dunes with *Casuarina* (TSSC, 2008). Most records of this species are from lowland eucalypt forests and woodlands, particularly those dominated by *Eucalyptus miniata* (Darwin Woollybutt) and/or *Eucalyptus tetradonta* (Darwin Stringybark) (TSSC, 2016). Preference appears to be given to habitats that are not burnt annually, that have an understorey of predominantly perennial grasses and a sparse-to-moderate middle storey (TSSC, 2008). It shelters in tree hollows, hollow logs and, less frequently, in the crowns of pandanus or sand-palms (Woinarski and Hill, 2012). Most foraging is on the ground, but it is also partly arboreal (Woinarski and Hill, 2012). Their mean home range size is approximately 1 ha and males typically have larger home ranges than females (Firth, 2007). The diet of the Brush-tailed Rabbit-rat consists primarily of seed, particularly from perennial grasses (Firth, 2007) with some fruits, invertebrates and leaves (Woinarski and Hill, 2012). Within the Northern Territory this species is known to persist only on the Cobourg Peninsula, Bathurst, Melville and Inglis Islands, and Groote Eylandt (Woinarski and Hill, 2012). Potential habitat for the species exists on Winchelsea Island; however surveys are required to ascertain whether or not it occurs there (DENR and ALC, 2019).

Threats to the Brush-tailed Rabbit-rat include high frequency of extensive and intense fires, habitat loss, predation by feral cats (*Felis catus*), competition with introduced rodents, particularly black rats (*Rattus rattus*), invasive weeds and grazing by introduced herbivores (TSSC, 2016). In addition, invasive transforming weeds (such as Gamba Grass) have been identified as a key threat to the species within the TSMP (DENR and ALC, 2019). Key actions identified within this plan to support recovery of the Brush-tailed Rabbit-rat on Groote Eylandt include, but are not limited to, developing and implementing Fire and Weed Management Plans, reducing the impact of cats in communities, and preventing feral herbivore incursions on the island.

iv. *EPBC Act Plans*

a. Conservation Advice

Approved Conservation Advice for the Brush-tailed Rabbit-rat has been prepared, which identifies research and action priorities to manage and monitor the species. Identified threats to the Brush-tailed Rabbit-rat include habitat alteration due to inappropriate fire regimes, habitat loss and fragmentation resulting from forestry and mining operations, predation by feral cats, competition with introduced rodents, invasive weeds, and grazing by introduced herbivores (TSSC, 2016).

b. Recovery Plan

There is no Recovery Plan for the Brush-tailed Rabbit-rat; however, the DotEE Species Profile and Threats Database acknowledges that a recovery plan is required.

c. Threat Abatement Plan

Threat Abatement Plans relevant to the Brush-tailed Rabbit-rat include the *Threat abatement plan for predation by feral cats* (DotE, 2015) and the *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses* (DSEWPaC, 2012).

d. Referral Guideline

There is no Referral Guideline for the Brush-tailed Rabbit-rat.

1.3 Description of the Study Area

The Study Area is located in the south-western portion of Groote Eylandt and is approximately 34,000 ha in size (see **Figure 3**). The Study Area includes the Southern Lease Exploration Licence (EL2455) and additional areas adjoining the lease (see **Section 2.1.2**).

The Study Area includes the catchments of the Emerald, Yanbakwa, Amagula, Innokumanja and Mayimokumanja Rivers, as well as Salt Creek and the Emerald River Tributary (see **Figure 3**). It is characterised by areas of flat to undulating sand plains surrounded by low hills of outcropping quartzitic rock to the east, and the coastline to the west and south.

The vegetation and habitats within the Study Area are relatively pristine and are strongly influenced by topography and drainage. Eucalypt open forests and woodlands dominate the well-drained areas of the Study Area with Melaleuca-dominated vegetation occurring in swampy and riparian areas, and coastal vegetation and tidal flats occurring at locations in proximity to the coastline. Fire also plays a very significant role in determining vegetation composition in the open forest and woodland habitats, with a large proportion of the Study Area regularly burnt by the Traditional Owners. Overall, the vegetation is characterised by a high species and structural diversity, although the structure of the understorey and the condition of the ground layer has been modified by a regime of frequent fires. The Study Area provides a range of habitats for fauna species and is contiguous with native vegetation in others areas of Groote Eylandt.

Within the Study Area there are some areas of disturbance, including areas where exploration was undertaken in 2016. These areas are in the northern portion of the Study Area and localised to the south of the Emerald River and to the west of the Amagula River. Other forms of anthropogenic disturbance include the Emerald River Road and the outstations of Wurrumenbumanja, Yanbakwa and Yedikba (see **Figure 2**). A small number of other 4WD access tracks occur within the Study Area.

Methodology

2.1 Site Selection

2.1.1 Introduction

The research project included assessment of 152 sampling sites. The site selection process was undertaken in collaboration with DENR. The following steps were undertaken during the site selection process:

- Determination of the Study Area;
- Determination of the Sampling Area;
- Classification of stratification units; and
- Selection of proposed sampling sites.

Details of each of these steps are provided below.

2.1.2 Determination of Study Area

The Study Area includes the Southern Lease Exploration Licence (EL2455) (approximately 26,054 ha) and additional areas (approximately 8,000 ha) adjoining the northern, western and southern boundaries of the lease. The Study Area included these additional areas to enable collection of data over a wider geographic area, and allow for collection of data from locations with different environmental and management attributes to those within the Southern Lease. Collecting data from this wider area was intended to provide a regional context to data collected from the Southern Lease, which would assist in determining the factors influencing the species' distributions and importance of the habitat both within and outside of the Southern Lease.

The location of the Study Area is shown on **Figure 3** and is 34,095 ha in size. The Study Area represents the area of land considered for sampling.

2.1.3 Determination of Sampling Area

Following determination of the Study Area, a further area was delineated to represent the area subject to sampling. This area is referred to as the Sampling Area. This area was determined by taking into account the following:

- Habitat types considered to be suitable for the Northern Hopping-mouse and Brush-tailed Rabbit-rat. Areas that were considered to be unsuitable were excluded from the Sampling Area;
- Areas for which data is available on the time since fire. This is a key management parameter utilised in the study and so areas in which this data was unavailable were excluded from the Sampling Area; and
- Additional areas requiring exclusion from sampling (e.g. due to cultural sensitivities or past disturbance).

These components are described further below. The location of the Sampling Area is shown on **Figure 4** and is 23,180 ha in size.

i. Habitat Types

DENR prepared a first draft of island-wide vegetation mapping of Groote Eylandt in 2017. DENR assigned each vegetation map unit to a habitat type and assessed its suitability for survey as part of the study. The following habitat types were considered to be suitable for survey within the Study Area and were included in the Sampling Area:

- 1: Callitris;
- 2: Eucalypt Open Woodland to Woodland (Lateritic);
- 3: Eucalypt Open Woodland to Woodland (Other);
- 4: Eucalypt Woodland and Open Forest (Lateritic);
- 5: Eucalypt Woodland and Open Forest (Other);
- 6: Melaleuca dominated vegetation;
- 7: Melaleuca Wetlands;
- 8: Mixed Woodland and Open Forest;
- 9: Monsoon Forests;
- 10: Monsoon Open Woodland / Tussock Grassland; and
- 11: Shrublands on Coastal Sands.

Non-suitable habitats (e.g. mangroves) and habitat types that were too small to sufficiently sample (e.g. active sand dunes) were excluded from the Sampling Area. There were also a few sections of rivers (comprising 9 ha) for which DENR had not provided vegetation mapping and these areas were excluded from the Sampling Area.

The extent of each habitat type as mapped by DENR within the Study Area is shown in **Figure 5**.

ii. Time Since Fire

Time since fire data was downloaded from the Northern Australia Fire Information (NAFI) website on 20 July 2017 (Darwin Centre for Bushfire Research, 2017). This data is available as 250 m grid squares. All time since fire data was categorised into the following classes:

- A: 0-2 years since fire;
- B: 3-5 years since fire; and
- C: 6+ years since fire.

Approximately 776 ha of the Study Area had no fire data (i.e. areas along the coast that do not fit into the 250 m grid squares) and were excluded from the Sampling Area. These areas are located along the western boundary of the Study Area and scattered locations along the southern boundary of the Study Area. The exclusion of these areas was not considered to be a limitation because the habitat types within these unmapped areas were either non-suitable habitat types, or suitable habitat types that were surveyed at other locations, including in coastal areas.

The extent of each time since fire class within the Study Area is shown in **Figure 6**.

iii. Additional Exclusion Areas

The following additional areas were excluded from the Sampling Area based on the requirements of the ALC:

- 1 km buffer surrounding the Wurrumenbumanja, Yanbakwa and Yedikba Outstations;
- 100 m buffer from sacred sites; and
- 100 m buffer from specific white rock areas located east of the Amagula River nominated by the ALC in 2016.

Areas previously subject to exploration drilling, including areas within GEMCO's existing mineral lease and an area in the Southern Lease, were also excluded from the Sampling Area.

The extents of the additional exclusion areas within the Study Area are shown in **Figure 7**. Note that the location of sacred sites is not shown on this figure, given that this information is not permitted to be published.

2.1.4 Classification of Stratification Units

Stratification units for sampling were based on habitat types and time since fire classes, and were developed to capture environmental gradients within the Sampling Area. **Table 2.1** lists the stratification units occurring within the Sampling Area. The location of stratification units within the Sampling Area is shown in **Figure 8**.

Table 2.1 Stratification units within the Study Area

Stratification Unit	Habitat Type	Fire Class
1A	Callitris	0-2 years since fire
1B	Callitris	3-5 years since fire
1C	Callitris	6+ years since fire
2A	Eucalypt Open Woodland to Woodland (Lateritic)	0-2 years since fire
2B	Eucalypt Open Woodland to Woodland (Lateritic)	3-5 years since fire
2C	Eucalypt Open Woodland to Woodland (Lateritic)	6+ years since fire
3A	Eucalypt Open Woodland to Woodland (Other)	0-2 years since fire
3B	Eucalypt Open Woodland to Woodland (Other)	3-5 years since fire
3C	Eucalypt Open Woodland to Woodland (Other)	6+ years since fire
4A	Eucalypt Woodland and Open Forest (Lateritic)	0-2 years since fire
4B	Eucalypt Woodland and Open Forest (Lateritic)	3-5 years since fire
4C	Eucalypt Woodland and Open Forest (Lateritic)	6+ years since fire
5A	Eucalypt Woodland and Open Forest (Other)	0-2 years since fire
5B	Eucalypt Woodland and Open Forest (Other)	3-5 years since fire
5C	Eucalypt Woodland and Open Forest (Other)	6+ years since fire
6A	Melaleuca dominated vegetation	0-2 years since fire
6B	Melaleuca dominated vegetation	3-5 years since fire
6C	Melaleuca dominated vegetation	6+ years since fire
7A	Melaleuca Wetlands	0-2 years since fire
7B	Melaleuca Wetlands	3-5 years since fire
7C	Melaleuca Wetlands	6+ years since fire
8A	Mixed Woodland and Open Forest	0-2 years since fire
8B	Mixed Woodland and Open Forest	3-5 years since fire
8C	Mixed Woodland and Open Forest	6+ years since fire
9A	Monsoon Forests	0-2 years since fire
9B	Monsoon Forests	3-5 years since fire
9C	Monsoon Forests	6+ years since fire
10A	Monsoon Open Woodland / Tussock Grassland	0-2 years since fire
10B	Monsoon Open Woodland / Tussock Grassland	3-5 years since fire
10C	Monsoon Open Woodland / Tussock Grassland	6+ years since fire
11A	Shrublands on Coastal Sands	0-2 years since fire
11B	Shrublands on Coastal Sands	3-5 years since fire

Table 2.1 Stratification units within the Study Area

Stratification Unit	Habitat Type	Fire Class
11C	Shrublands on Coastal Sands	6+ years since fire

2.1.5 Selection of Sampling Sites

i. Preliminary Allocation

Following consultation with DENR, it was determined that a total of 152 sampling sites would be suitable for the research project. A preliminary allocation of sampling sites was undertaken, with a minimum of 12 sampling sites selected within each habitat type, and additional sampling sites selected within habitat types occupying larger areas within the Sampling Area. The allocation of the sampling sites to each time since fire category was based on the proportion of the category area in relation to the total area of each habitat type (e.g. if a time since fire category formed 50% of the total area of a habitat type, then 50% of the sampling sites in that habitat type were allocated to this time since fire category).

Provisional sampling sites were determined using a random point selector within ArcGIS®. Parameters used during this process included stratification units (see **Section 2.4.1**) and minimum spacing of 500 m between sites. These provisional sampling sites were then manually refined or added to ensure:

- Sampling sites were located at least 100 m from access tracks and roads;
- A 250 m buffer surrounding each site comprised at least 50% of the same stratification unit;
- The centre of the sampling site was located within the required stratification unit (of relevance where the 250 m buffer outline above comprised less than 100% of the same stratification unit);
- Sites were not located greater than 3-4 km from existing tracks, based on safety/access restrictions;
- Spatial and temporal distribution across the Sampling Area; and
- Sufficient number of sites within stratification units.

Where the minimum number of sampling sites could not be located within a stratification unit because the above criteria could not be met, alternative sites were selected based on the following process:

- Step 1: Alternative sites were selected from a related habitat type within the same fire class; or

- Step 2: Where step 1 was not possible, alternative sites were selected within the same habitat type with a different fire class.

Each sampling site was designated manually to one of four field survey rounds, taking into account spatial and temporal distribution.

ii. Amended Allocations

Given that the habitat types were based on broad scale vegetation mapping, it was necessary to confirm the habitat types in the field. Following the collection of field data, each sampling site was assessed for conformity to the allocated habitat type. Sampling sites that were not considered to conform were reassigned to the correct habitat type and revisions made to the subsequent proposed sampling sites to account for these amendments. These revisions sought to meet the initial number of sampling sites proposed for each stratification unit. However, some stratification units were 'oversampled' as changes to habitat type allocations resulted in additional sampling sites within some stratification units. As a result, some stratification units have fewer sampling sites than initially proposed. Despite these amendments, the sampling site allocations achieved both the required spatial and temporal spread across the Sampling Area.

The locations of sampling sites within the Sampling Area are shown on **Figure 9**. A table with the coordinates of all sampling sites and figures showing the location of individual sites is provided in **Appendix A**, and a summary description of each sampling site is provided in **Appendix B**.

2.2 Field Surveys

2.2.1 Permit

Surveys within the Study Area were undertaken by Cumberland Ecology under a *Permit to Interfere with Protected Wildlife* (Permit #: 58569) issued by the Northern Territory Parks and Wildlife Commission under the TPWC Act.

2.2.2 Timing

Field surveys were undertaken over the following periods:

- 23 August – 3 September 2017 (~ 12 days):
 - Survey of 38 sampling sites (termed deployment 1);
- 4 – 13 October 2017 (~10 days):
 - Collection of deployment 1 equipment (time cameras left in the field: ~ 41 to 43 days);
 - Survey of 38 sampling sites (termed deployment 2);

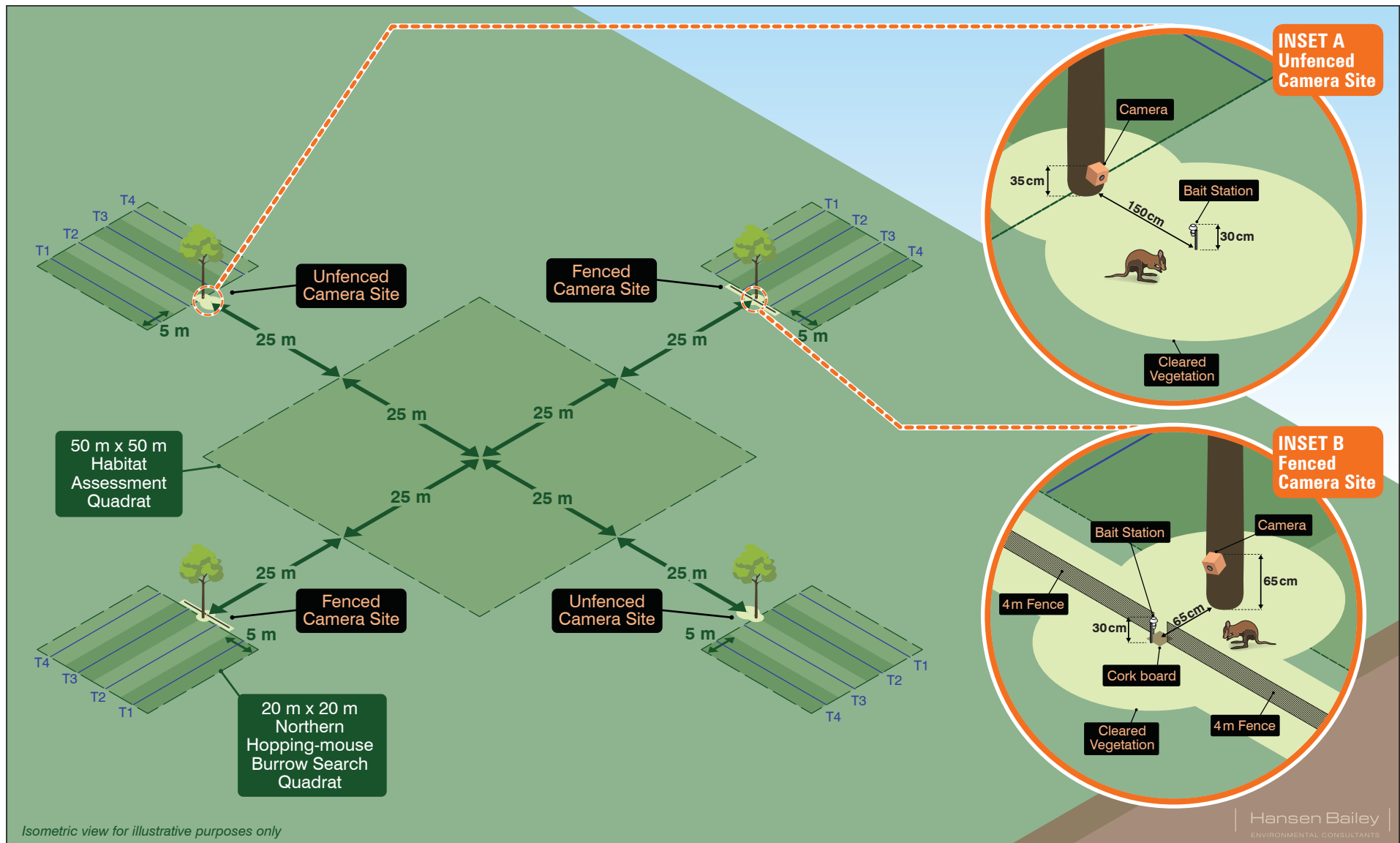
- 29 November – 5 December 2017 (~7 days):
 - Collection of deployment 2 survey equipment (time cameras left in the field: ~ 54 to 57 days);
- 16 – 25 May 2018 (~10 days):
 - Survey of 38 sampling sites (termed deployment 3);
- 27 June – 6 July 2018 (~10 days):
 - Collection of deployment 3 equipment (time cameras left in the field: ~ 43 days);
 - Survey of 38 sampling sites (termed deployment 4);
- 15 – 18 August 2018 (~4 days):
 - Collection of deployment 4 equipment (time cameras left in the field: ~43 to 50 days).

2.2.3 Sampling Site Establishment

A total of 152 sampling sites were surveyed across the Sampling Area. The locations of these sampling sites are shown in **Figure 9**. All sites included establishment of the following:

- Four motion-sensor cameras and bait stations in a diamond arrangement, with cameras in opposite corners located 100 m apart, including:
 - Two unfenced cameras in opposing corners of the diamond; and
 - Two fenced cameras in opposing corners of the diamond;
- A 50 x 50 m habitat assessment quadrat centred at the sampling site, with the quadrat positioned perpendicular to the diamond arrangement of cameras; and
- Four 20 x 20 m Northern Hopping-mouse burrow search quadrats located adjacent to each camera, with the quadrat position in the opposite direction of the camera, and the camera located on the midpoint of the quadrat.

The standard layout of the sampling sites is shown in **Plate 2.1** and detailed further in **Appendix C**. A Global Positioning System (GPS) unit was used to measure distances between the cameras.



2.2.4 Motion-Sensor Camera Trapping

Motion-sensor camera surveys were undertaken in accordance with the procedures described in the DENR Risk Assessment Plan, which included:

- Use of modified Reconyx PC850 cameras (see **Appendix C** for camera configuration details);
- At each survey site:
 - Establishment of two unfenced cameras and bait stations, which were left to record for a minimum of four weeks (28 days); and
 - Establishment of two fenced cameras and bait stations, which were left to record for a minimum of four weeks (28 days).

Fenced sites included the use of a barrier (a drift fence) which assists in directing fauna towards the bait station and into the field of view of the motion-sensor camera. The DENR Risk Assessment Plan indicated that the number and combination of camera trap setups is required at each sampling site to achieve the desired minimum detection probabilities for the target species whilst balancing time and logistic constraints.

The detailed field survey method for the motion-sensor camera trapping is provided in **Appendix C**.

2.2.5 Habitat Assessment

Habitat assessment surveys were undertaken at each sampling site. Surveys were undertaken in accordance with the procedures described in the NT DENR Risk Assessment Plan, which included:

- Recording evidence of fire prior to site establishment within the 50 x 50 m habitat assessment quadrat;
- Recording circumferences of trees within four 50 m transects, which ran parallel with the edges of the 50 x 50 m habitat assessment quadrat, with each transect being 5 m in width;
- Recording length and circumferences of logs that intersected the edges of the 50 x 50 m habitat assessment quadrat; and
- Point intersect method to record ground cover, grass layer, shrub/woody vegetation and mid-storey vegetation every 1 m along the edges of the 50 x 50 m habitat assessment quadrat (total of 200 points).

Following consultation with DENR, it was determined that the habitat assessment would also include collection of basic soil information at each camera location.

The detailed field survey method for the habitat assessment is provided in **Appendix C**.

2.2.6 Northern Hopping-mouse Burrow Survey

Northern Hopping-mouse burrow searches were undertaken within a 20 x 20 m search area adjacent to each camera. The burrow search was included as an additional variable for data analysis for occupancy modelling. The search area of 20 x 20 m was selected based on the size of an area that could be adequately searched by survey personnel within time limitations. The burrow search method included:

- Traverses within the 20 x 20 m search area to record the presence of spoil heaps, and recording of maximum spoil heap width and a photograph if detected; and
- Searches for pop holes within 5 m around spoil heaps that had a maximum width greater than 50 cm, and recording of pop hole size and photographs.

The detailed field survey method for the Northern Hopping-mouse burrow survey is provided in **Appendix C**.

2.2.7 Additional Surveys in Proximity to the Cave Paintings

Separate to the field surveys for the research project, two sampling sites were established and surveyed within proximity to previous records of the Northern Hopping-mouse at the Cave Paintings, an area located to the east of the existing GEMCO mine (**Figure 10**). Recent studies by Diete (2016) and Heiniger and Gillespie (2017) have detected the Northern Hopping-mouse at the Cave Paintings.

The additional sites located in the vicinity of the Cave Paintings were surveyed to provide evidence that the camera survey method is able to record the Northern Hopping-mouse. Heiniger and Gillespie (2017) had recently utilised a similar survey method and detected the Northern Hopping-mouse and Brush-tailed Rabbit-rat. However, once the results from Deployment 1 and 2 of the research project became available and did not include any records of the target species, camera surveys were conducted in the vicinity of the Cave Paintings to provide confirmation that the camera survey method was able to detect the target species. Collecting data in the vicinity of the Cave Paintings also provided an opportunity to confirm the persistence of the known population, with the last records collected by Heiniger and Gillespie (2017) in 2016.

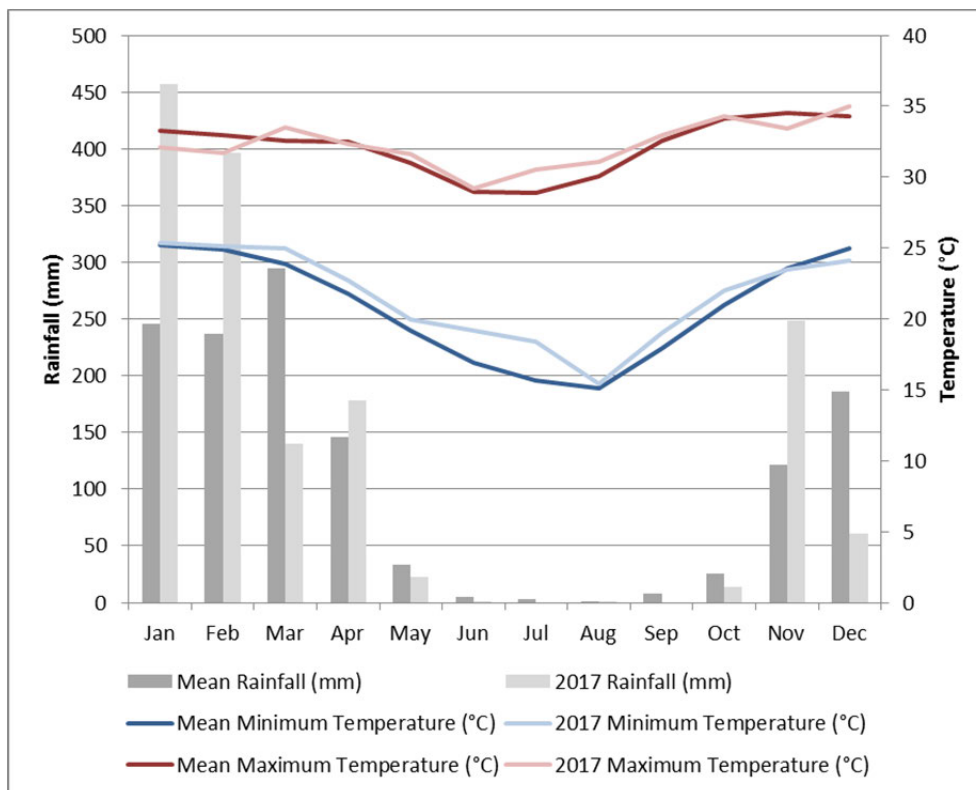
As collection of data at the Cave Paintings would bias the results of the research project, the surveys were undertaken independently of the research project. However, sampling methods followed those of the research project for consistency. The area surrounding the Cave Paintings was stratified in accordance with the methods detailed within **Section 2.1.4**. Two sites (CP1 and CP2) were selected for survey, both of which occurred within a stratification unit within which the Northern Hopping-mouse had previously been recorded. Field surveys were undertaken between 11 April and 17 May 2018 and followed the methods detailed within **Section 2.2**. The location of sampling sites near the Cave Paintings is shown in **Figure 10**.

2.2.8 Weather Conditions

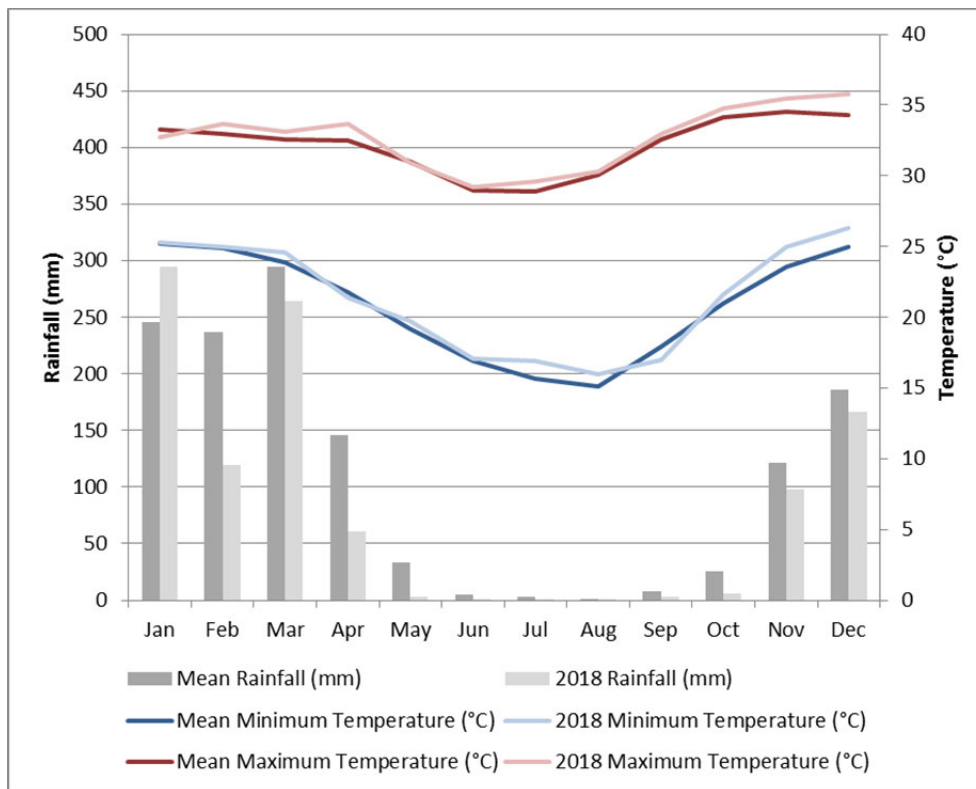
Average monthly rainfall and temperature data from 2017 and 2018 recorded at the Bureau of Meteorology (BoM) weather station at Groote Eylandt Airport (approximately 12 km from the Sampling Area) is presented within **Graph 2.1** and **Graph 2.2**, respectively. The data from this weather station is considered to be broadly representative of the conditions in the Sampling Area.

As can be seen from **Graph 2.1**, minimum and maximum temperatures during the 2017 field survey dates (August to December) were similar to the historic averages. The three months preceding the commencement of surveys in 2017 comprised the dry season, with little to no rainfall in the lead up to and during the first deployment. Higher than average rainfall fell in November 2017 (248.2 mm) compared against a mean rainfall (121.3 mm).

Graph 2.2 shows that minimum and maximum temperatures during the 2018 field survey dates (May to August) were slightly higher than average. Rainfall in the months leading up to the commencement of 2018 surveys varied from the average, with significantly higher rainfall in January, and lower than average rainfall in February, March and April.



Graph 2.1 Comparison of the historic mean and 2017 data for rainfall and temperature



Graph 2.2 Comparison of the historic mean and 2018 data for rainfall and temperature

2.3 Data Analysis

2.3.1 Data Entry

Following completion of field surveys, the collected data was collated and entered into a tabular format. This included the data from the site establishment, motion-sensor cameras, habitat assessment and Northern Hopping-mouse burrow searches.

2.3.2 Image Identification

Images were downloaded from the cameras following completion of each round of field survey and imported into a CPW Photo Warehouse (Newkirk, 2016) database. Due to the quantum of images and the need to conduct a two-stage identification process, the data was split into eight databases. Each database represented a single deployment (either deployment 1, 2, 3 or 4) as well as a single stage of the identification process. The database requires data to be labelled using a study area name and a location name. The databases were therefore set up to have the sampling sites (e.g. S001, S002) each representing a 'study area' within the database and the individual cameras (e.g. S001C1, S001C2, S001C3, S001C4) each representing a location within the 'study area'.

Images were identified using the following two-stage process:

1. Initial identification of images containing fauna species: All images were imported into a CPW Photo Warehouse database and files were renamed to include the location name (e.g. S001C1, S001C2, S001C3, S001C4), date and time of image capture and sequential image number. An initial filter of the data was undertaken by an ecologist to identify sequences of images that contained fauna species. As part of quality control, a re-check of the data was undertaken by the initial ecologist or second ecologist at a later point in time to ensure all fauna images were identified. All images identified as containing a fauna species were subsequently exported for further identification.
2. Identification of individual species within the fauna images: All fauna images identified in stage 1 of the process were imported into a new CPW Photo Warehouse database. The images were subsequently reviewed by an ecologist (either Jaime Heiniger or Dr Hugh Davies – see **Appendix D** for experience and qualifications) to identify the fauna species within the images. A subset of these images was reviewed by a second ecologist (Katrina Wolf – see **Appendix D**) to verify the identification, where possible. Images found to not include fauna (i.e. part of a sequence, however fauna not present in all images) were identified as having no fauna present. Images of fauna with insufficient identifying features were identified as being unknown.

2.3.3 Analysis

Following completion of the first three camera deployments, an analysis of the habitat types at each sampling site was undertaken. This included reviewing the general vegetation description and habitat quadrat photographs against the mapped habitat types, and revising habitat types as necessary. The revised habitat types were considered in the planning of subsequent rounds of field survey.

Based on results of the field surveys and advice received following consultation with DENR, occupancy modelling was not required to be undertaken as no individuals of the Northern Hopping-mouse and Brush-tailed Rabbit-rat were detected on cameras. The analysis presented within this report is therefore limited to species presence at each sampling site and an overview description of the vegetation at each sampling site. This data was extracted through the 'Species by Study Area' query within CPW Photo Warehouse database.

2.4 DENR Consultation

Regular consultation was undertaken with DENR (either Dr Graeme Gillespie, Dr Alaric Fisher or Nicholas Cuff) throughout the research project. This included initial consultation to review the amended study design developed by Cumberland Ecology, which included amendments to site selection and field survey methods for the Northern Hopping-mouse burrow search. DENR was also consulted following the completion of the first three rounds of camera deployment to discuss the habitat type allocations based on field data.

Preliminary findings of the image analysis were also discussed with DENR after the first two deployments. The final findings of image analysis from all four deployments were subsequently discussed with DENR.

2.5 Personnel

The research project was led by a team of ecologists from Cumberland Ecology, with support during field surveys provided by Traditional Owners and GEMCO/South32 staff. A full list of personnel involved in the research project is provided in **Appendix D**.

2.6 Limitations

The following specific limitations are relevant to the research project:

- Habitat type allocations to determine stratification units were based on the vegetation mapping provided by DENR in 2017, which represented the best available data at the time of site selection. DENR's mapping has subsequently been revised to incorporate the results of field surveys undertaken for this research project and field surveys undertaken by DENR, and the subsequent revisions will result in different habitat allocations to those utilised within this assessment.
- Fire class allocations were based on the time since fire data obtained from the NAFI website database downloaded in July 2017, which represented the best available data at the time of site selection (data included time since fire up to and including 2016). Subsequent revisions to this data, such as 2017 data, may result in different habitat allocations to those utilised within this assessment.
- Not all stratification units were sampled in accordance with the initially proposed sampling intensity as a result of modification to habitat type allocations following collection of field data. Notwithstanding this, the stratification of the Sampling Area as detailed within **Section 2.1.4** has enabled extensive sampling within a range of habitat types and fire history classes.
- Prior to the commencement of the first deployment, the bottom piece of the bait stations was deemed potentially susceptible to fauna interference. This was because the wire mesh of the bottom piece (which served to allow the scent of the bait to escape) was susceptible to damage by fauna seeking to obtain the bait. Following consultation with DENR, it was agreed that to reduce the potential fauna interference, the bait stations would be flipped to have the wire mesh at the top. The overhanging PVC rain cover became redundant for the purpose of rain cover because it was then positioned at the bottom of the bait station; however, it still functioned to allow the scent of the bait to escape. The requirement for a rain cover to protect the bait from being diluted by rain was not considered a necessity during the deployment 1 survey.

- Camera malfunction, which included continuous triggering from commencement, cessation of image capture, or partial cessation of image capture, resulted in a small number of cameras providing limited or no data.
- Filling of SD cards resulting from camera malfunction or false triggers resulted in a small number of cameras not capturing images for the entire duration of the deployment.
- Fire destroyed one camera, resulting in no data being captured from one camera location at a single sampling site.
- Fire damage to camera sites resulting in burnt bait stations, burnt drift fences and camera position movement resulted in a small number of cameras not capturing images for the entire duration of the deployment.
- Fauna disturbance resulted in the alteration of camera positions at a small number of sites. This meant that some cameras were not able to capture images that were centred on the bait station (unfenced sites) or cork board (fenced sites) for the entire duration of the deployment.

None of the above limitations are considered to be significant. The field surveys were successful in detecting a wide range of vertebrate fauna, particularly small mammals, with over 27,000 trap nights of data collected. The sampling sites were situated at locations that provided both spatial and temporal distribution across a range of habitat types and time since fire classes.

Results

3.1 Overview

3.1.1 *Habitat Data*

A suite of habitat assessment data was collected at each sampling site, including vegetation cover, soil information, fire history and burrow search data. Although no detailed analysis of this data was undertaken for this report for the purpose of occupancy modelling (see **Section 2.3.3**), the data collected has been supplied to DENR and may be utilised in future analyses.

A summary of the vegetation and soils occurring at each sampling site is provided in **Appendix B**. A representative photo of each of the sampling sites is also provided.

3.1.2 *Images*

Over 1.58 million images were captured on cameras during the research project. The total number of images captured per deployment is as follows:

- Deployment 1: ~503,900 total of which ~33,900 (equivalent to 7% of images) assigned to fauna triggers;
- Deployment 2: ~530,500 of which ~29,500 (equivalent to 6% of images) assigned to fauna triggers;
- Deployment 3: ~216,200 of which ~68,300 (equivalent to 32% of images) assigned to fauna triggers; and
- Deployment 4: ~330,100 of which ~50,900 (equivalent to 15% of images) assigned to fauna triggers.

The initial identification of images containing fauna species assigned approximately 12% of the total images collected to be fauna triggers.

3.1.3 *Fauna Species*

Seventy fauna species were identified to species level on images captured on cameras during the research project, including 42 birds, 15 mammals and 13 reptiles. A number of

other species were unable to be identified to species level. **Table 3.1** lists the species recorded across the Sampling Area.

The most commonly recorded species included:

- Northern Brown Bandicoot (*Isodon macrourus*) (see **Photograph 3.1**) – 139 sampling sites;
- Delicate Mouse (*Pseudomys delicatulus*) (see **Photograph 3.2**) – 129 sampling sites;
- Northern Quoll (*Dasyurus hallucatus*) (see **Photograph 3.3**) – 128 sampling sites; and
- Agile Wallaby (*Macropus agilis*) (see **Photograph 3.4**) – 105 sampling sites.

A breakdown of species recorded at each sampling site is provided in **Appendix E**.

Table 3.1 Summary of fauna species recorded from cameras within the Sampling Area

Scientific Name	Common Name	Sampling Sites Recorded
Birds		
<i>Rhipidura dryas</i>	Arafura Fantail	1
<i>Cracticus tibicen</i>	Australian Magpie	8
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar	39
<i>Anthus novaeseelandiae</i>	Australasian Pipit	1
<i>Geopelia humeralis</i>	Bar-shouldered Dove	29
<i>Dacelo leachii</i>	Blue-winged Kookaburra	13
<i>Falco berigora</i>	Brown Falcon	1
<i>Accipiter fasciatus</i>	Brown Goshawk	1
<i>Lichmera indistincta</i>	Brown Honeyeater	1
<i>Coturnix ypsilophora</i>	Brown Quail	11
<i>Gallirallus philippensis</i>	Buff-banded Rail	2
<i>Burhinus grallarius</i>	Bush Stone-curlew	6
<i>Turnix castanotus</i>	Chestnut-backed Button-quail	8
<i>Todiramphus chloris</i>	Collared Kingfisher	1
<i>Phaps chalcoptera</i>	Common Bronzewing	9
<i>Taeniopygia bichenovii</i>	Double-barred Finch	2
<i>Chalcophaps indica</i>	Emerald Dove	19
<i>Ptilonorhynchus nuchalis</i>	Great Bowerbird	3

Table 3.1 Summary of fauna species recorded from cameras within the Sampling Area

Scientific Name	Common Name	Sampling Sites Recorded
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	3
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	1
<i>Philemon sp.</i>	Friarbird sp.	1
<i>Caprimulgus macrurus</i>	Large-tailed Nightjar	2
<i>Microeca flavigaster</i>	Lemon-bellied Flycatcher	2
<i>Grallina cyanoleuca</i>	Magpie-lark	2
<i>Tyto novaehollandiae kimberli</i>	Masked Owl (northern)	1
<i>Rhipidura rufiventris</i>	Northern Fantail	2
<i>Megapodius reinwardt</i>	Orange-footed Scrubfowl	12
<i>Geopelia striata</i>	Peaceful Dove	26
<i>Centropus phasianinus</i>	Pheasant Coucal	17
<i>Cracticus nigrogularis</i>	Pied Butcherbird	6
<i>Merops ornatus</i>	Rainbow Bee-eater	1
<i>Pitta iris</i>	Rainbow Pitta	11
<i>Malurus melanocephalus</i>	Red-backed Fairy-wren	4
<i>Pachycephala rufiventris</i>	Rufous Whistler	1
<i>Todiramphus sanctus</i>	Sacred Kingfisher	1
<i>Myiagra alecto</i>	Shining Flycatcher	2
<i>Philemon argenteiceps</i>	Silver-crowned Friarbird	3
<i>Eurostopodus argus</i>	Spotted Nightjar	3
<i>Pardalotus striatus</i>	Striated Pardalote	1
<i>Podargus strigoides</i>	Tawny Frogmouth	3
<i>Corvus orru</i>	Torresian Crow	64
<i>Haliastur sphenurus</i>	Whistling Kite	1
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	1
Mammals		
<i>Macropus agilis</i>	Agile Wallaby	105
<i>Felis catus</i>	Cat*	9
<i>Planigale maculata</i>	Common Planigale	31
<i>Zyromys argurus</i>	Common Rock-rat	7
<i>Pseudomys delicatulus</i>	Delicate Mouse	129

Table 3.1 Summary of fauna species recorded from cameras within the Sampling Area

Scientific Name	Common Name	Sampling Sites Recorded
<i>Canis lupus</i>	Dingo	36
<i>Canis familiaris</i>	Dog*	1
<i>Tachyglossus aculeatus</i>	Echidna	72
<i>Melomys burtoni</i>	Grassland Melomys	80
<i>Isodon macrourus</i>	Northern Brown Bandicoot	139
<i>Dasyurus hallucatus</i>	Northern Quoll	128
<i>Petropseudes dahli</i>	Rock Ringtail	8
<i>Petrogale brachyotis</i>	Short-eared Rock-wallaby	11
<i>Petaurus breviceps</i>	Sugar Glider	5
<i>Hydromys chrysogaster</i>	Water Rat	1
Reptiles		
<i>Agamidae sp.</i>	Agamidae sp.	14
<i>Varanus tristis</i>	Black-headed Monitor	43
<i>Varanus glebopalma</i>	Black-palmed Monitor	4
<i>Tiliqua scincoides</i>	Blue-tongued Lizard	31
<i>Elapidae sp.</i>	Elapidae sp.	2
<i>Chlamydosaurus kingii</i>	Frilled Lizard	53
<i>Gekkonidae sp.</i>	Gekkonidae sp.	5
<i>Lophognathus gilberti</i>	Gilbert's Dragon	95
<i>Liasis olivaceus</i>	Olive Python	1
<i>Demansia olivacea</i>	Olive Whip Snake	2
<i>Pseudechis weigeli</i>	Pygmy Mulga Snake	9
<i>Varanus acanthurus</i>	Ridge-tailed Monitor	1
<i>Varanus gouldii</i>	Sand Goanna	89
<i>Scincidae sp.</i>	Scincidae	55
<i>Varanus scalaris</i>	Spotted Tree Monitor	33
<i>Diporiphora bilineata</i>	Two-lined Dragon	34
<i>Varanus sp.</i>	Varanus	8
<i>Pseudonaja nuchalis</i>	Western Brown Snake	3

* Denotes introduced species



Photograph 3.1 Northern Brown Bandicoot



Photograph 3.2 Delicate Mouse



Photograph 3.3 Northern Quoll



Photograph 3.4 Agile Wallaby

3.2 Threatened Small Mammals

3.2.1 Northern Hopping-mouse

No images of the Northern Hopping-mouse were captured by the cameras within the Sampling Area. Given that the species was not recorded in the Sampling Area, habitat occupancy modelling was not undertaken.

The Northern Hopping-mouse was recorded at one of the sampling sites located in proximity to the Cave Paintings outside the Sampling Area. The detections of this species are summarised in **Table 3.2**. **Photograph 3.5** shows an individual recorded at a fenced camera at CP2 and **Photograph 3.6** shows an individual recorded at an unfenced camera at CP2.

Table 3.2 Summary of Northern Hopping-mouse detections near the Cave Paintings

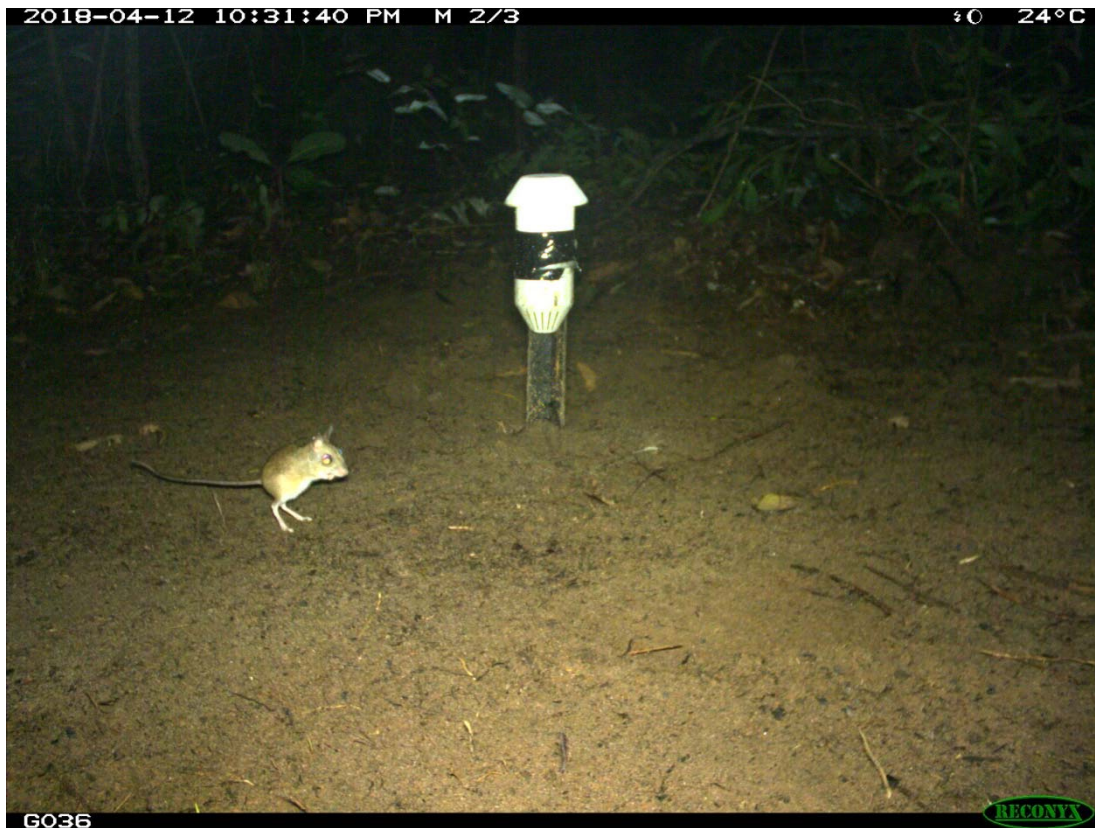
Sampling Site	Camera Setup	Date
CP2	Fenced	13/04/2018 (am), 14/04/2018 (pm), 29/04/2018 (am)
CP2	Unfenced	12/04/2018 (pm), 13/04/2018 (am), 14/04/2018 (pm)

A survey at the Cave Paintings was undertaken for the purpose of providing evidence that the camera trapping method could detect the Northern Hopping-mouse in areas where populations are known to be present. The records obtained at the Cave Paintings have provided evidence that the species can be detected using the methods used for the research project. In addition, the Northern Hopping-mouse was recorded in a previous study using a very similar survey methodology (Heiniger and Gillespie, 2017).

The lack of records from the Sampling Area suggests that the species is not present in the areas sampled. Given high survey intensity and sampling sites across a broad range of suitable habitats and fire types, it is concluded that there is a low probability of occurrence for the species in the Sampling Area. Although the potential for occurrence has been rated as low, it is noted that there is still some potential for it to be present in low numbers in parts of the Sampling Area that were not specifically sampled. In relation to the original objective of the research, the study has not identified any important areas for the Northern Hopping-mouse within the Sampling Area.



Photograph 3.5 Northern Hopping-mouse recorded at CP2 on 13/04/2018



Photograph 3.6 Northern Hopping-mouse recorded at CP2 on 12/04/2018

3.2.2 *Brush-tailed Rabbit-rat*

No images of the Brush-tailed Rabbit-rat were captured by the cameras within the Sampling Area. None were recorded within the two additional sampling sites located in proximity to the Cave Paintings. Given that the species was not recorded in the Sampling Area, habitat occupancy modelling was not undertaken.

The Brush-tailed Rabbit-rat was recorded extensively north of the Sampling Area using a very similar survey methodology by Heiniger and Gillespie (2017), giving rise to a high detection probability. Therefore, there is a high degree of confidence that if the species was present at the sample sites, it would have been recorded. As such, the absence of records within the Sampling Area is likely related to the absence of the species in the Sampling Area. However, it is noted that there is still some potential for it to be present in low numbers in parts of the Sampling Area that were not specifically sampled. In relation to the original objective of the research, the study has not identified any important areas for the Brush-tailed Rabbit-rat within the Sampling Area.

3.3 Review of the Small Mammal Project against Study Objectives

The original objectives of the small mammal research project were to:

- Design a study to ascertain the geographic distribution and key environmental correlates of the Northern Hopping-mouse and Brush-tailed Rabbit-rat in the Southern Lease.
- Build predictive models to assess the distribution of important areas for these species (i.e. high probabilities of occurrence) in Southern Lease.
- Evaluate the power of these models to predict with precision the distributions of these species in the Southern Lease, and assess additional data requirements.

The first objective was met and a research project was designed to ascertain the distribution of the Northern Hopping-mouse and Brush-tailed Rabbit-rat in the Southern Lease and the correlation of this distribution with key environmental parameters/gradients. The research project was implemented and it included field surveys across a wide range of environmental gradients in the Southern Lease and surrounding areas. No records of the Northern Hopping-mouse and Brush-tailed Rabbit-rat were obtained. A very similar survey methodology has been successfully used in the past for detecting these species, and supplementary work undertaken at the Cave Paintings provided further evidence that the method could detect the Northern Hopping-mouse. The lack of records therefore suggests that the two target species are absent from the areas surveyed.

Given the lack of records, no work was undertaken in relation to the second and third objectives. The research project has not identified any important areas for these species, given that neither species was recorded.

Conclusion

The research project aimed to provide an understanding of the distribution and habitat preferences of the Northern Hopping-mouse and Brush-tailed Rabbit-rat within the Study Area. It was important to understand the distribution and habitat preferences of these target species, and identify areas in the Southern Lease that were important for them, so that GEMCO's future exploration activities could be planned in a manner that minimised impacts on them.

The research project comprised detailed surveys at 152 locations within the Sampling Area between August 2017 and August 2018, and included spatial and temporal distribution within the environmental gradients of habitat type and time since fire. The research project represents a rigorous assessment that is supported by a robust data set.

The research project detected 70 fauna species including several small mammals such as the Delicate Mouse and Grassland Melomys. However, no individuals of the Northern Hopping-mouse or Brush-tailed Rabbit-rat were recorded within the Sampling Area. Although no records of the target species were obtained from the Sampling Area, records of the Northern Hopping-mouse were obtained at the Cave Paintings, an area outside of the Study Area known to support a population of the species. These records from the Cave Paintings provide some evidence that the camera trapping method is able to record the Northern Hopping-mouse if a population is present. A very similar camera trapping methodology has also been used successfully in the past by DENR for recording the Brush-tailed Rabbit-rat (Heiniger and Gillespie, 2017). The lack of records therefore suggests that the two target species are absent from the areas surveyed. However, it is noted that there is still some potential for the species to be present in low numbers in parts of the Sampling Area that were not specifically sampled.

The research project has not identified any important areas for these species, and has not identified any areas of the Southern Lease that should be excluded from future exploration in order to protect these species.

References

- Darwin Centre for Bushfire Research (2017). "North Australia and Rangelands Fire Information." from <http://www.firenorth.org.au/nafi3/>.
- DENR and ALC (2019). *Groote Archipelago Threatened Species Management Plan 2019-2028*. Department of the Environment and Natural Resources, Darwin.
- Diete, R. (2016). *Ecology and conservation of the northern hopping-mouse and sympatric vertebrates of Groote Eylandt, A thesis submitted for the degree of Doctor of Philosophy at The University of Queensland in 2016*. University of Queensland.
- Diete, R. L., Meek, P. D., Dickman, C. R. and Leung, L. K.-P. (2014). "Burrowing behaviour of the northern hopping-mouse (*Notomys aquilo*): field observations." *Australian Mammalogy* **36**: 242-246.
- Diete, R. L., Meek, P. D., Dickman, C. R. and Leung, L. K.-P. (2016). "Ecological and conservation of the northern hopping-mouse (*Notomys aquilo*)." *Australian Journal of Zoology* **64**(1): 21-31.
- DotE (2013). *Notomys aquilo in Species Profile and Threats Database* Department of the Environment, Canberra.
- DotE (2015). *Threat abatement plan for predation by feral cats*. Department of the Environment, Canberra.
- DotEE (2019). *Notomys aquilo in Species Profile and Threats Database*. Department of the Environment and Energy, Canberra.
- DSEWPaC (2012). *Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses*. Department of Sustainability, Environment, Water, Population and Communities, Canberra.
- Firth, R. S. C. (2007). *Ecology and conservation status of the brush-tailed rabbit-rat *Conilurus penicillatus**, PhD thesis. Charles Darwin University, Darwin.
- Gillespie, G. and Heiniger, J. (2017). *GEMCO Southern Lease Exploration Area Threatened Mammal Risk Assessment Plan. Unpublished report*. Flora and Fauna Division, Department of Environment and Natural Resources, Berrimah.
- Gillespie, G. R., Brennan, K., Gentles, T., Hill, B., Low Choy, J., Mahney, T., Stevens, A. and Stokeld, D. (2015). *A guide for the use of remote cameras for wildlife survey in northern Australia*. Charles Darwin University, Darwin.
- Heiniger, J. and Gillespie, G. (2017). *Survey of Threatened Mammal and Feral Cat Surveys on Groote Eylandt. Unpublished Report to the Anindilyakwa Land Council*. Flora and Fauna Division, Department of Environment and Natural Resources, Darwin.
- Kemper, C. M. and Firth, R. S. C. (2008). "Brush-tailed Rabbit-rat *Conilurus penicillatus*". In *The Mammals of Australia. Third edition*. (Eds. S. Van Dyck and R. Strahan). Reed New Holland, Sydney: 579-580.
- Newkirk, E. S. (2016). *CPW Photo Warehouse*. Colorado Parks and Wildlife, Fort Collins, Colorado, USA.
- Reonyx (2017). *Hyperfire™ Instruction Manual*. Reonyx, Inc., Helmen.
- TSSC (2008). *Approved Conservation Advice for *Conilurus penicillatus* (Brush-tailed Rabbit-rat)*. Department of the Environment, Water, Heritage and the Arts, Canberra.
- TSSC (2015). *Approved Conservation Advice for *Notomys aquilo* (northern hopping-mouse)*. Department of the Environment, Canberra.
- TSSC (2016). *Conservation Advice *Conilurus penicillatus* brush-tailed rabbit-rat*. Department of the Environment, Canberra.
- Ward, S. (2007). *Northern Hopping Mouse *Notomys aquilo* - ALC Ranger Report September 2007*.
- Ward, S. J. (2014). "Structure of a burrow of the northern hopping-mouse, *Notomys aquilo*, and its surface signs on Groote Eylandt." *Australian Mammalogy* **36**: 55-59.

- Welbourne, D. J. (2013). "A method for surveying diurnal terrestrial reptiles with passive infrared automatically triggered cameras." *Herpetological Review* **44**(2): 247-250.
- Woinarski, J., Burbidge, A. and Harrison, P. (2014). *The Action Plan for Australian Mammals 2012*. CSIRO Publishing, Collingwood.
- Woinarski, J. and Hill, B. (2012). *Threatened Species of the Northern Territory BRUSH-TAILED RABBIT-RAT *Conilurus penicillatus** Department of Land Resource Management, Darwin.
- Woinarski, J. and Ward, S. (2012). *Threatened Species of the Northern Territory NORTHERN HOPPING-MOUSE *Notomys aquilo**. Department of Land Resource Management, Darwin.
- Woinarski, J. C. Z. (2004). *National Multi-species Recovery Plan for the Carpentarian Antechinus *Pseudantechinus mimulus*, Butler's Dunnart *Sminthopsis butleri* and Northern Hopping-mouse *Notomys aquilo*, 2004 - 2009*. Northern Territory Department of Infrastructure Planning and Environment, Darwin.
- Woinarski, J. C. Z. and Flannery, T. F. (2008). "Northern Hopping-mouse *Notomys aquilo*". In *The Mammals of Australia. Third edition*. (Eds. S. Van Dyck and R. Strahan). Reed New Holland, Sydney: 599-600.

Figures

- Figure 1** **Location Plan**
- Figure 2** **Local Setting**
- Figure 3** **Location of the Study Area**
- Figure 4** **Location of the Sampling Area**
- Figure 5** **Habitat Types within the Study Area**
- Figure 6** **Time Since Fire within the Study Area**
- Figure 7** **Additional Exclusion Areas within the Study Area**
- Figure 8** **Stratification Units within the Study Area**
- Figure 9** **Location of Sampling Sites within the Sampling Area**
- Figure 10** **Location of Sampling Sites near the Cave Paintings**



SMALL MAMMAL RESEARCH PROJECT

Location Plan

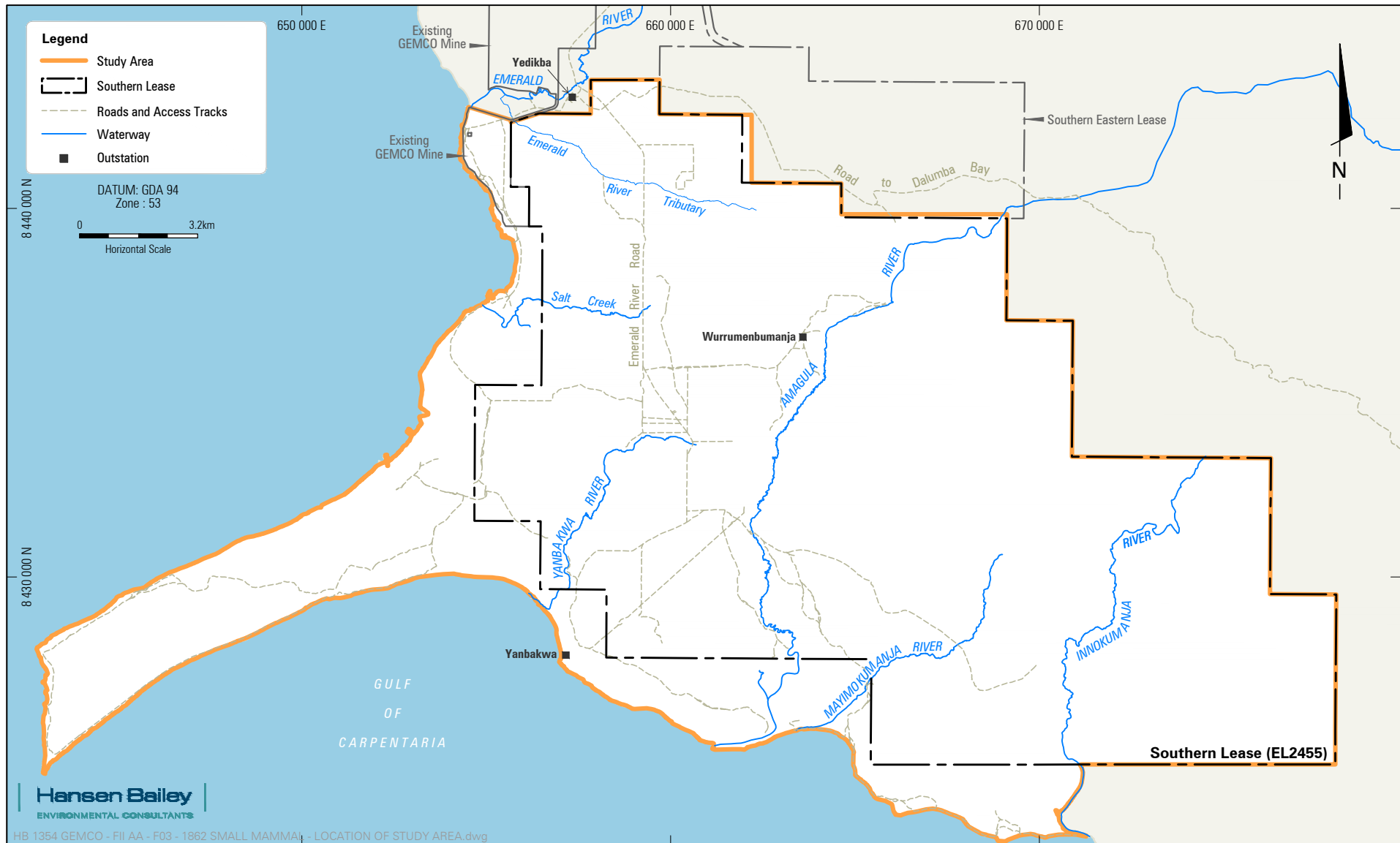
FIGURE 1



SMALL MAMMAL RESEARCH PROJECT

Local Setting

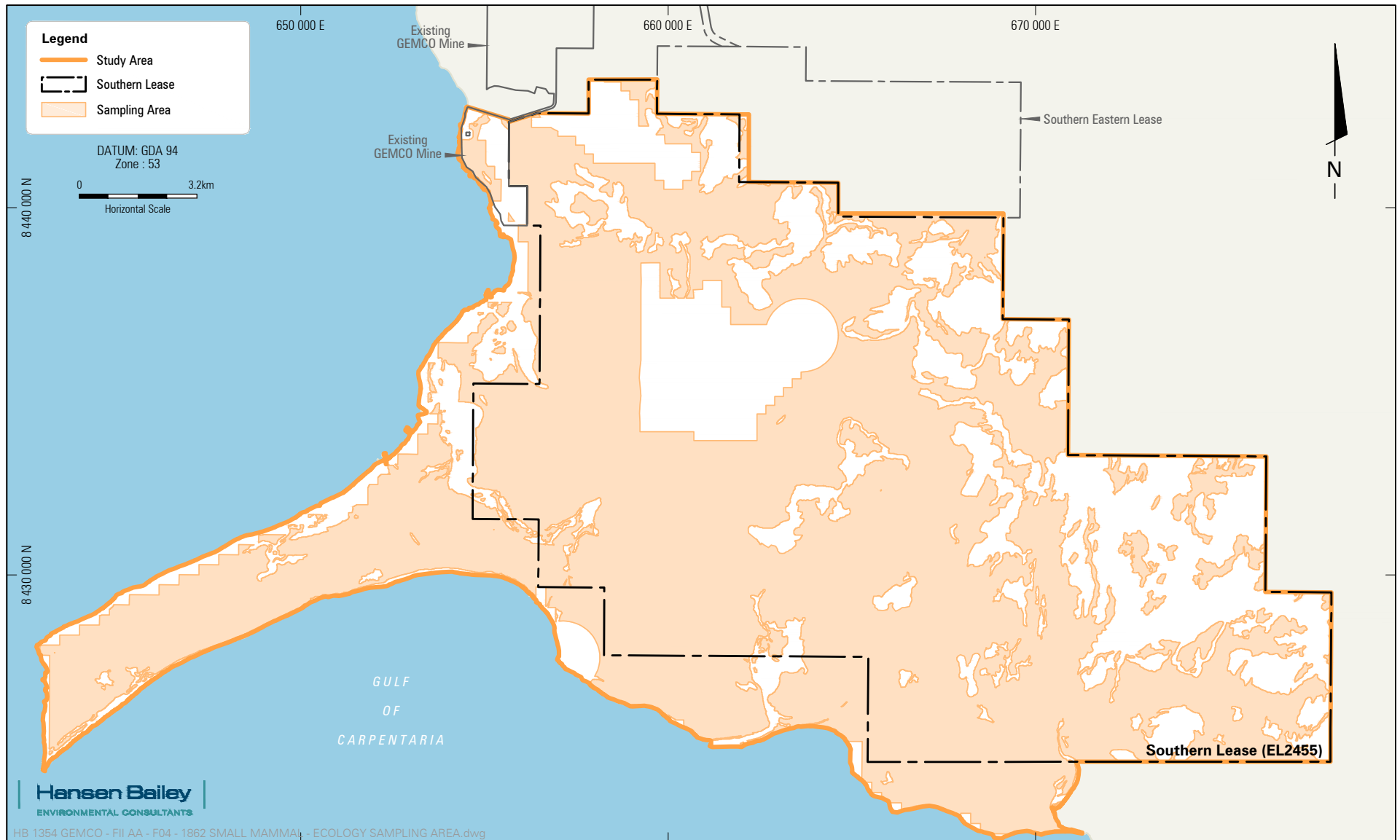
FIGURE 2



SMALL MAMMAL RESEARCH PROJECT

Location of the Study Area

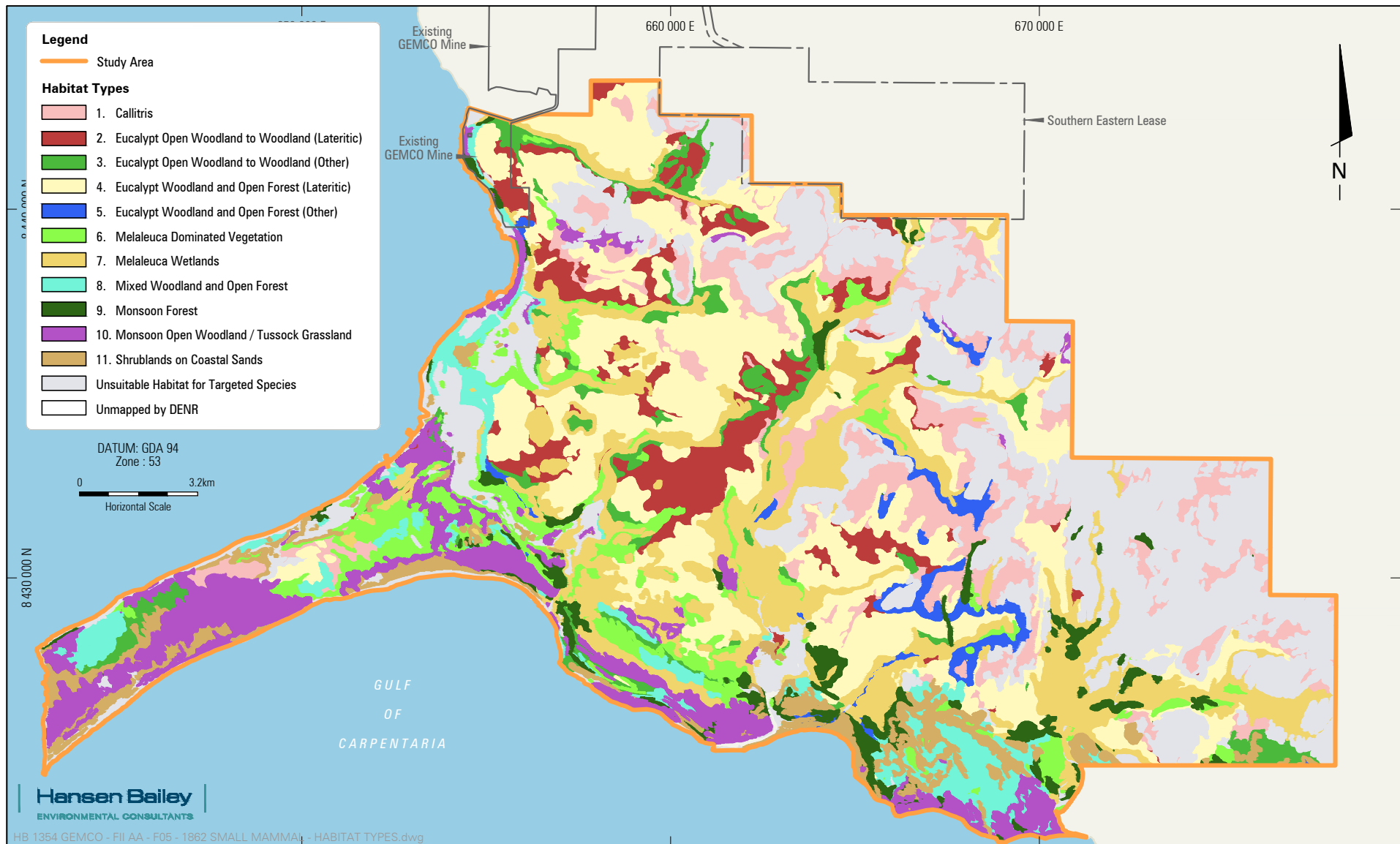
FIGURE 3



SMALL MAMMAL RESEARCH PROJECT

Location of the Sampling Area

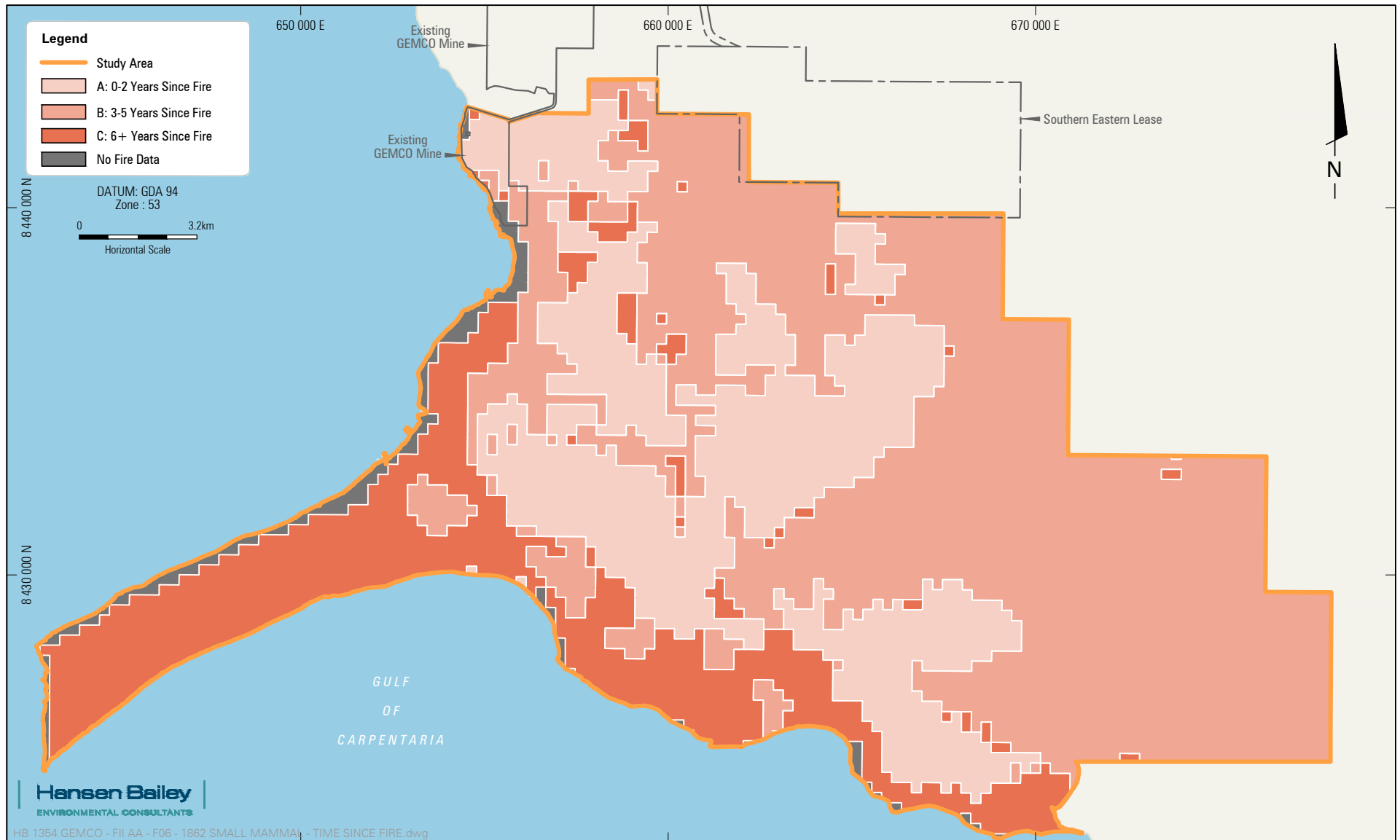
FIGURE 4



SMALL MAMMAL RESEARCH PROJECT

Habitat Types within the Study Area
(as mapped by DENR, 2017)

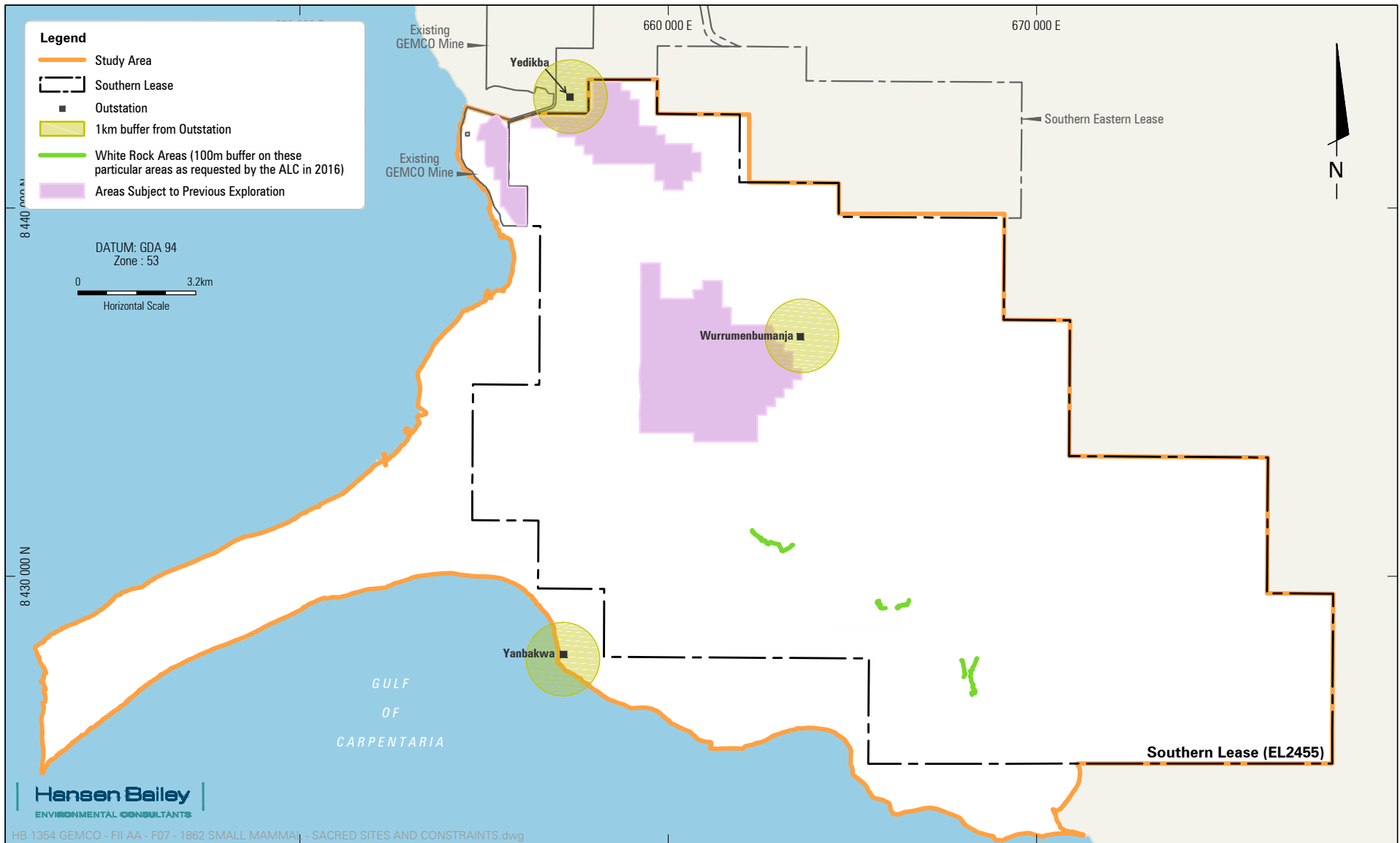
FIGURE 5



SMALL MAMMAL RESEARCH PROJECT

Time Since Fire within the Study Area
(Data downloaded July, 2017)

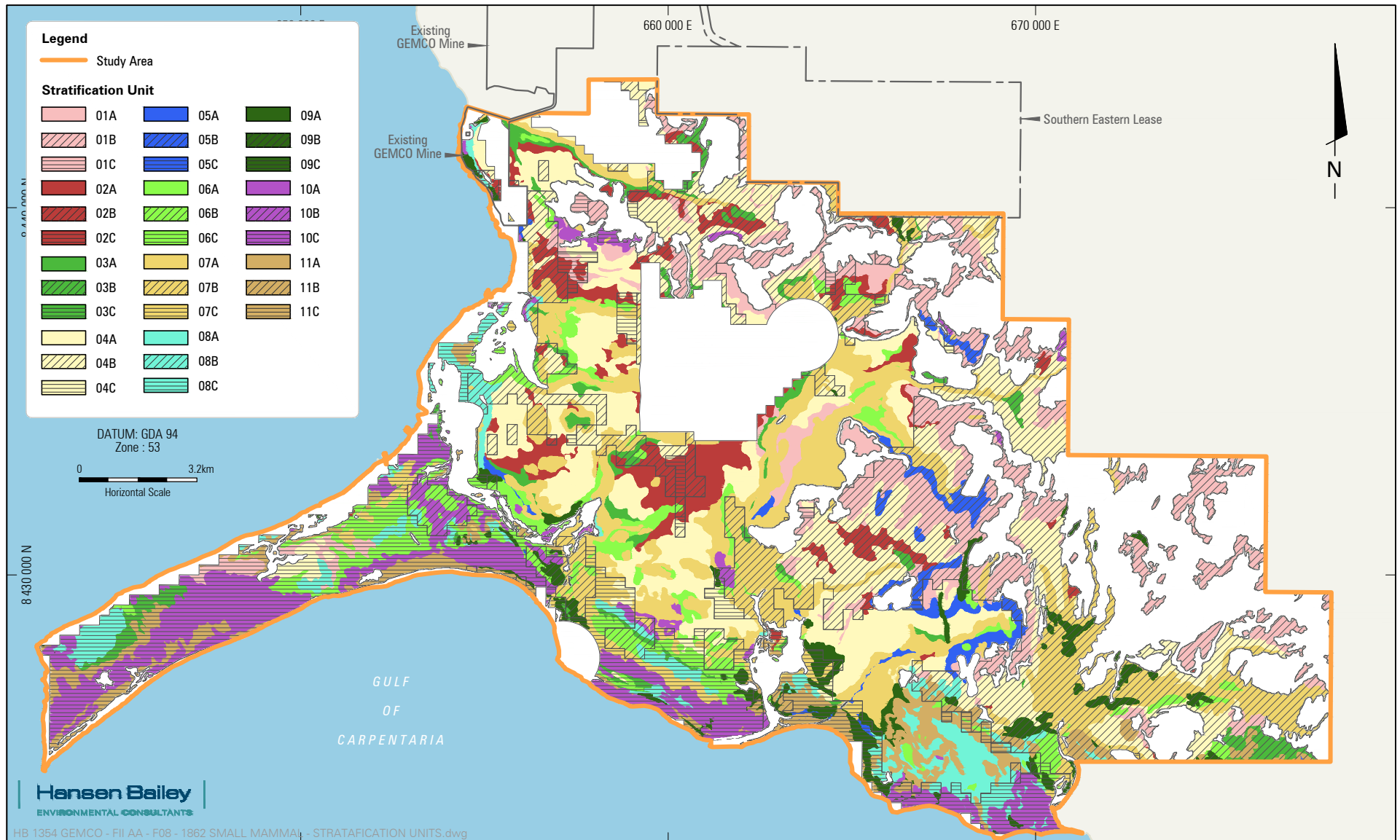
FIGURE 6



SMALL MAMMAL RESEARCH PROJECT

Additional Exclusion Areas within the Study Area

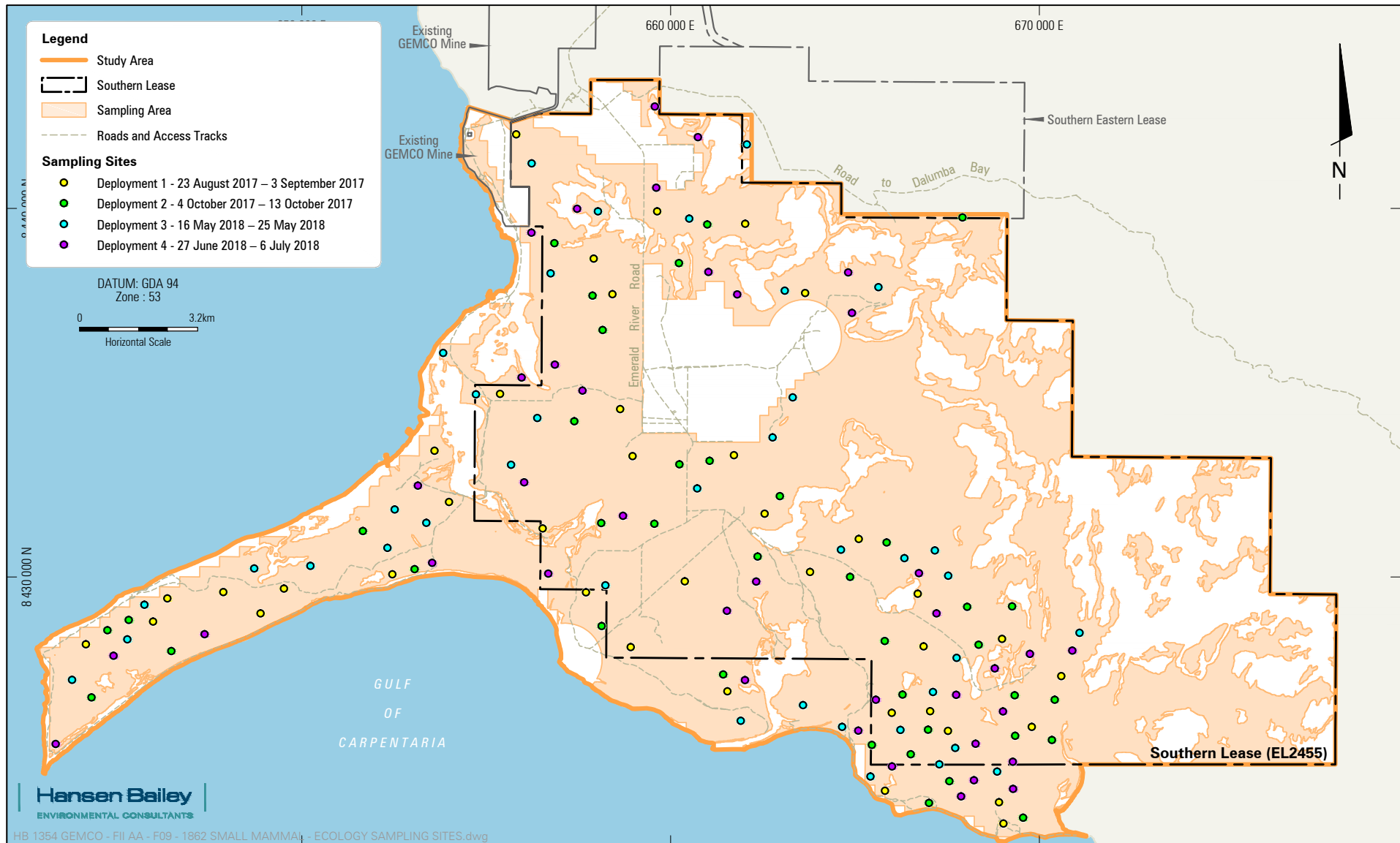
FIGURE 7



SMALL MAMMAL RESEARCH PROJECT

Stratification Units within the Sampling Area

FIGURE 8



SMALL MAMMAL RESEARCH PROJECT

Location of the Sampling Sites within the Sampling Area

FIGURE 9



SMALL MAMMAL RESEARCH PROJECT
Location of Sampling Sites near the “Cave Paintings”

FIGURE 10

Appendix A

Coordinates of Sampling Sites

Table A.1 **Coordinates of each sampling site**

Site Name	Deployment	Easting	Northing	Figure
S001	Deployment 3	665638	8437859	A1 Inset A
S002	Deployment 2	658163	8436700	A1 Inset A
S003	Deployment 1	657918	8438634	A1 Inset A
S004	Deployment 1	661722	8433301	A1 Inset A
S005	Deployment 1	658425	8437670	A1 Inset A
S006	Deployment 1	665102	8431030	A1 Inset C
S007	Deployment 1	662024	8439578	A1 Inset A
S008	Deployment 1	655820	8442009	A1 Inset A
S009	Deployment 1	658970	8433274	A1 Inset A / A1 Inset B
S010	Deployment 3	645274	8428304	A1 Inset B
S011	Deployment 1	660387	8429876	A1 Inset B / A1 Inset C
S012	Deployment 1	658633	8434554	A1 Inset A
S013	Deployment 4	669017	8426348	A1 Inset C
S014	Deployment 1	655380	8434963	A1 Inset A
S015	Deployment 1	668993	8428317	A1 Inset C
S016	Deployment 1	666702	8429544	A1 Inset C
S017	Deployment 1	656538	8431312	A1 Inset B
S018	Deployment 1	653995	8432032	A1 Inset B
S019	Deployment 1	661543	8426895	A1 Inset C
S020	Deployment 1	649521	8429682	A1 Inset B
S021	Deployment 2	645313	8428830	A1 Inset B
S022	Deployment 1	670600	8427307	A1 Inset C
S023	Deployment 1	657708	8429579	A1 Inset B
S024	Deployment 1	667526	8425825	A1 Inset C
S025	Deployment 1	668911	8423887	A1 Inset C
S026	Deployment 1	644149	8428170	A1 Inset B
S027	Deployment 1	665998	8426313	A1 Inset C
S028	Deployment 3	658031	8439920	A1 Inset A
S029	Deployment 1	669799	8425931	A1 Inset C
S030	Deployment 1	665816	8424199	A1 Inset C
S031	Deployment 2	668359	8428158	A1 Inset C
S032	Deployment 3	662069	8441733	A1 Inset A
S033	Deployment 1	667039	8426353	A1 Inset C

Table A.1 **Coordinates of each sampling site**

Site Name	Deployment	Easting	Northing	Figure
S034	Deployment 1	652460	8430068	A1 Inset B
S035	Deployment 1	645973	8428790	A1 Inset B
S036	Deployment 1	653600	8433422	A1 Inset A / A1 Inset B
S037	Deployment 3	667533	8430033	A1 Inset C
S038	Deployment 1	648887	8429012	A1 Inset B
S039	Deployment 2	667916	8439755	A1 Inset A
S040	Deployment 2	656853	8439052	A1 Inset A
S041	Deployment 2	660226	8438511	A1 Inset A
S042	Deployment 2	657888	8437628	A1 Inset A
S043	Deployment 2	661060	8433149	A1 Inset A / A1 Inset B
S044	Deployment 2	665860	8430933	A1 Inset C
S045	Deployment 2	660999	8439560	A1 Inset A
S046	Deployment 2	660243	8433055	A1 Inset A / A1 Inset B
S047	Deployment 2	657393	8434220	A1 Inset A
S048	Deployment 1	646360	8429416	A1 Inset B
S049	Deployment 2	665807	8428261	A1 Inset C
S050	Deployment 2	669331	8426786	A1 Inset C
S051	Deployment 1	659638	8439920	A1 Inset A
S052	Deployment 4	659578	8442763	A1 Inset A
S053	Deployment 2	668046	8429185	A1 Inset C
S054	Deployment 1	662554	8431715	A1 Inset C
S055	Deployment 2	669263	8429197	A1 Inset C
S056	Deployment 2	666514	8425187	A1 Inset C
S057	Deployment 2	661428	8427353	A1 Inset C
S058	Deployment 2	658132	8428663	A1 Inset B
S059	Deployment 2	658123	8431460	A1 Inset B
S060	Deployment 1	663653	8437704	A1 Inset A
S061	Deployment 2	670419	8426666	A1 Inset C
S062	Deployment 2	667560	8424458	A1 Inset C
S063	Deployment 4	668792	8427515	A1 Inset C
S064	Deployment 2	644731	8428553	A1 Inset B
S065	Deployment 2	666292	8426807	A1 Inset C
S066	Deployment 2	669347	8425690	A1 Inset C

Table A.1 **Coordinates of each sampling site**

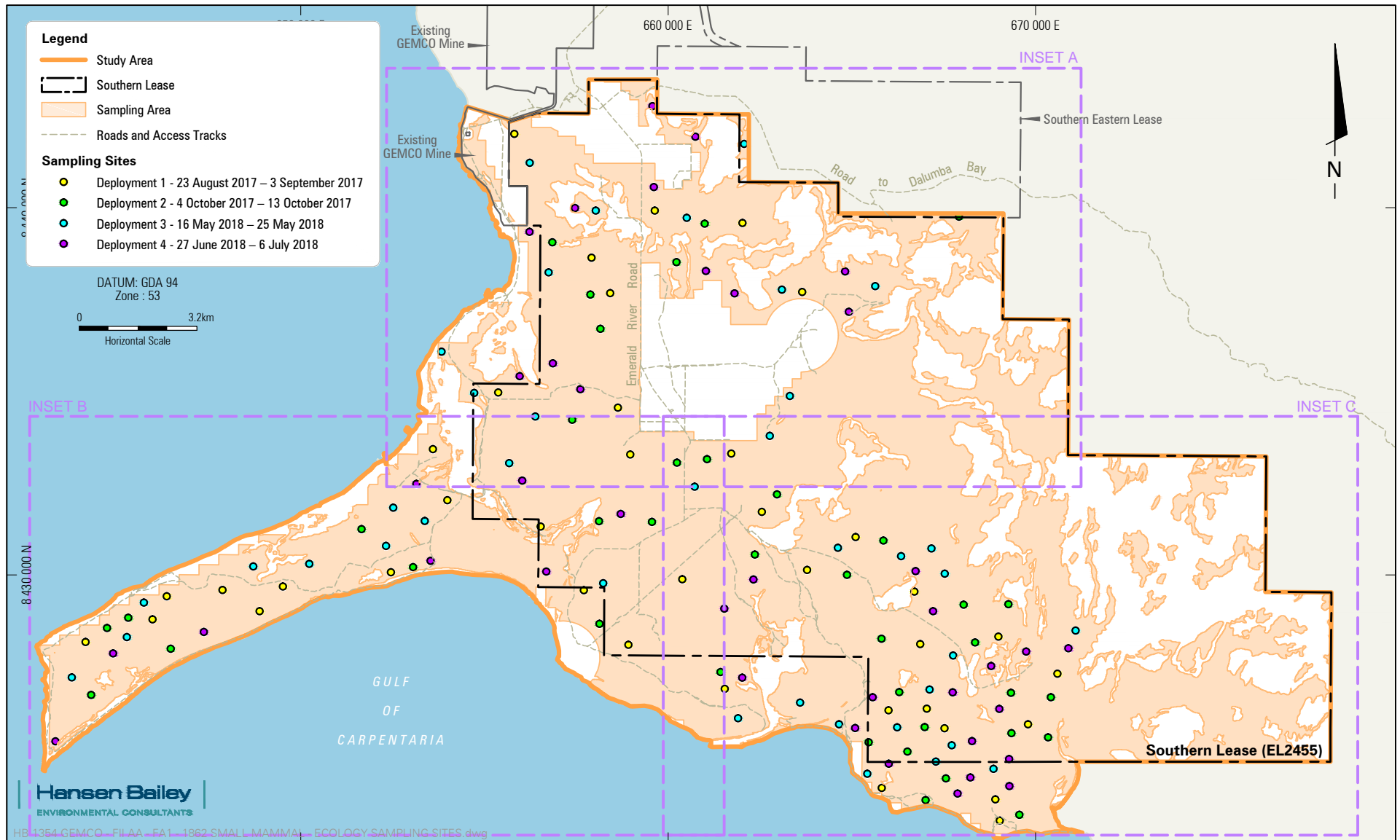
Site Name	Deployment	Easting	Northing	Figure
S067	Deployment 2	665458	8425439	A1 Inset C
S068	Deployment 4	664818	8438259	A1 Inset A
S069	Deployment 2	644300	8426727	A1 Inset B
S070	Deployment 2	669559	8423464	A1 Inset C
S071	Deployment 2	666982	8425851	A1 Inset C
S072	Deployment 2	653060	8430210	A1 Inset B
S073	Deployment 2	646464	8427987	A1 Inset B
S074	Deployment 4	657467	8439990	A1 Inset A
S075	Deployment 2	659564	8431441	A1 Inset A
S076	Deployment 1	647878	8429589	A1 Inset B
S077	Deployment 2	662967	8432193	A1 Inset C
S078	Deployment 3	660509	8439718	A1 Inset A
S079	Deployment 3	648710	8430228	A1 Inset B
S080	Deployment 4	661810	8437666	A1 Inset A
S081	Deployment 3	660723	8432399	A1 Inset A / A1 Inset B
S082	Deployment 3	656752	8438238	A1 Inset A
S083	Deployment 4	657614	8435056	A1 Inset A
S084	Deployment 3	663315	8434871	A1 Inset A
S085	Deployment 3	645738	8429241	A1 Inset B
S086	Deployment 3	656234	8441217	A1 Inset A
S087	Deployment 3	664624	8430736	A1 Inset C
S088	Deployment 3	667171	8430720	A1 Inset C
S089	Deployment 2	664870	8429998	A1 Inset C
S090	Deployment 3	650240	8430301	A1 Inset B
S091	Deployment 3	667760	8427801	A1 Inset C
S092	Deployment 4	656030	8432567	A1 Inset A / A1 Inset B
S093	Deployment 3	666344	8430511	A1 Inset C
S094	Deployment 2	670344	8425575	A1 Inset C
S095	Deployment 3	652325	8430789	A1 Inset B
S096	Deployment 1	666862	8428116	A1 Inset C
S097	Deployment 3	662770	8433786	A1 Inset A / A1 Inset C
S098	Deployment 3	656387	8434309	A1 Inset A
S099	Deployment 3	658237	8429772	A1 Inset B

Table A.1 Coordinates of each sampling site

Site Name	Deployment	Easting	Northing	Figure
S100	Deployment 3	667290	8424917	A1 Inset C
S101	Deployment 2	662364	8430552	A1 Inset C
S102	Deployment 4	664920	8437161	A1 Inset A
S103	Deployment 3	666234	8425846	A1 Inset C
S104	Deployment 3	671090	8428480	A1 Inset C
S105	Deployment 3	665422	8424581	A1 Inset C
S106	Deployment 4	661031	8438273	A1 Inset A
S107	Deployment 2	667009	8423867	A1 Inset C
S108	Deployment 3	668857	8424718	A1 Inset C
S109	Deployment 3	667118	8426879	A1 Inset C
S110	Deployment 3	664653	8425932	A1 Inset C
S111	Deployment 3	643772	8427205	A1 Inset B
S112	Deployment 3	661907	8426096	A1 Inset C
S113	Deployment 4	659613	8440559	A1 Inset A
S114	Deployment 3	663097	8437763	A1 Inset A
S115	Deployment 4	655962	8435409	A1 Inset A
S116	Deployment 4	666736	8430099	A1 Inset C
S117	Deployment 3	653378	8431464	A1 Inset B
S118	Deployment 3	655676	8433042	A1 Inset A / A1 Inset B
S119	Deployment 3	652523	8431831	A1 Inset B
S120	Deployment 4	669744	8427909	A1 Inset C
S121	Deployment 4	658715	8431657	A1 Inset B
S122	Deployment 4	660746	8441932	A1 Inset A
S123	Deployment 4	644900	8427859	A1 Inset B
S124	Deployment 4	661532	8429079	A1 Inset C
S125	Deployment 1	663787	8430131	A1 Inset C
S126	Deployment 4	656867	8435757	A1 Inset A
S127	Deployment 4	656228	8439340	A1 Inset A
S128	Deployment 4	667215	8429009	A1 Inset C
S129	Deployment 4	662322	8429875	A1 Inset C
S130	Deployment 1	658922	8428095	A1 Inset B
S131	Deployment 2	651659	8431241	A1 Inset B
S132	Deployment 4	665570	8426665	A1 Inset C

Table A.1 **Coordinates of each sampling site**

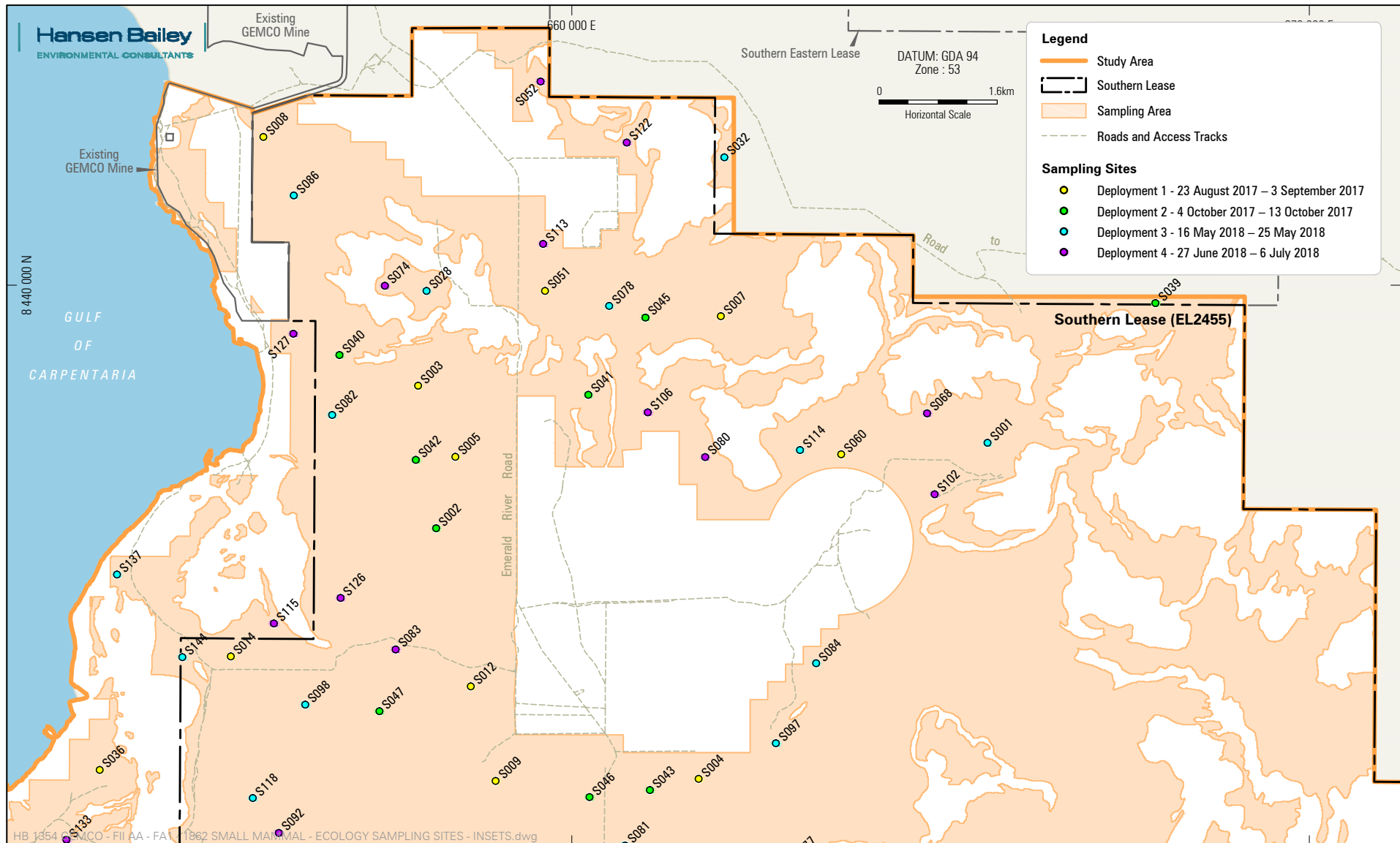
Site Name	Deployment	Easting	Northing	Figure
S133	Deployment 4	653152	8432475	A1 Inset A / A1 Inset B
S134	Deployment 4	668226	8424483	A1 Inset C
S135	Deployment 4	666009	8424858	A1 Inset C
S136	Deployment 4	667749	8426802	A1 Inset C
S137	Deployment 3	653837	8436073	A1 Inset A
S138	Deployment 4	667881	8424047	A1 Inset C
S139	Deployment 4	670898	8428000	A1 Inset C
S140	Deployment 4	656685	8430090	A1 Inset B
S141	Deployment 4	665090	8425828	A1 Inset C
S142	Deployment 4	662021	8427200	A1 Inset C
S143	Deployment 1	669026	8423306	A1 Inset C
S144	Deployment 3	654723	8434954	A1 Inset A
S145	Deployment 3	667720	8425358	A1 Inset C
S146	Deployment 4	669280	8424984	A1 Inset C
S147	Deployment 4	669292	8424250	A1 Inset C
S148	Deployment 4	653537	8430379	A1 Inset B
S149	Deployment 4	647366	8428443	A1 Inset B
S150	Deployment 4	668273	8425470	A1 Inset C
S151	Deployment 3	663595	8426522	A1 Inset C
S152	Deployment 4	643331	8425468	A1 Inset B



SMALL MAMMAL RESEARCH PROJECT

Location of the Sampling Sites within the Sampling Area

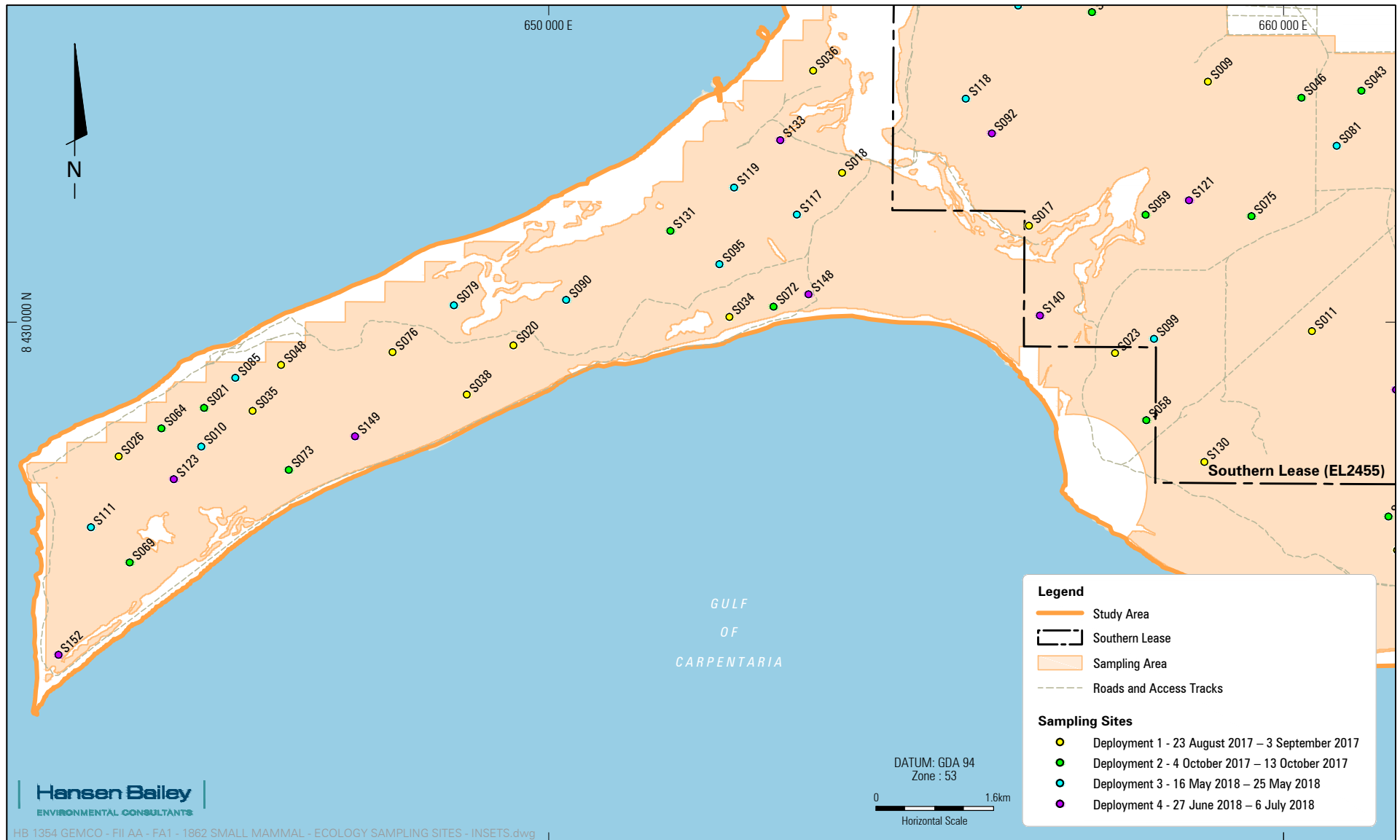
FIGURE A1



SMALL MAMMAL RESEARCH PROJECT

Sampling Sites
Inset A

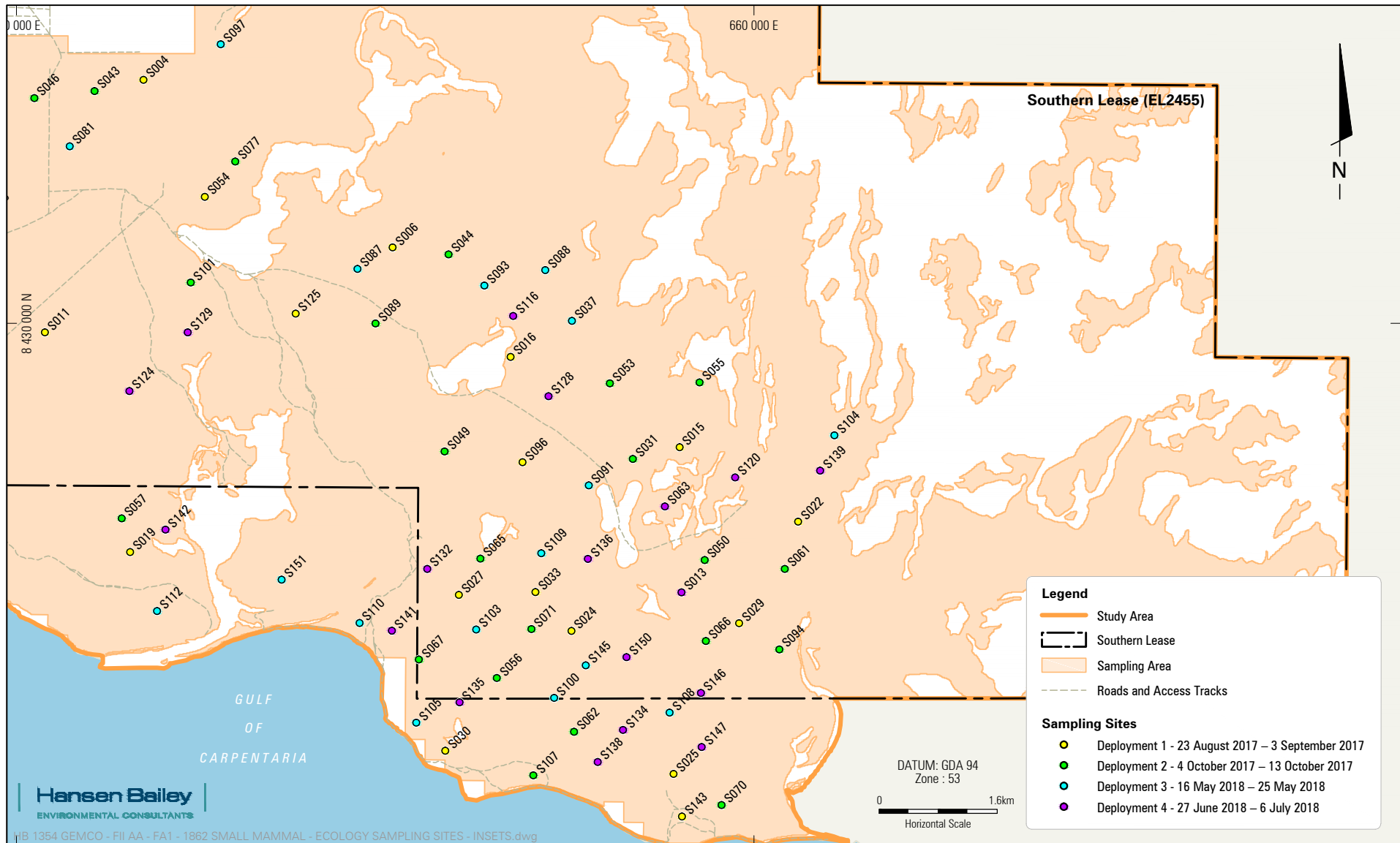
FIGURE A1



SMALL MAMMAL RESEARCH PROJECT

Sampling Sites
Inset B

FIGURE A1







SMALL MAMMAL RESEARCH PROJECT





Sampling Sites
Inset C





FIGURE A1





Appendix B





Sampling Site Descriptions





Site	Figure	Notes	Photograph
S001	A1 Inset A	<i>Eucalyptus tetradonta</i> , <i>Callitris intratropica</i> and <i>Corymbia kombolgiensis</i> open woodland. Sparse <i>Triodia</i> spp. in ground layer. <i>Cycas arnhemica</i> in mid layer/understorey. On sandstone. Soil type: Loamy sand.	
S002	A1 Inset A	<i>Eucalyptus tetradonta</i> +/- <i>Eucalyptus miniata</i> woodland/open forest. Open understorey due to recent fire. Perennial grass understorey. Other species with dbh >5cm included <i>Pandanus spiralis</i> , <i>Acacia difficilis</i> and <i>Grevillea heliosperma</i> . Soil type: Loamy sand.	
S003	A1 Inset A	<i>Eucalyptus tetradonta</i> and <i>Eucalyptus miniata</i> woodland on sandy soils. Other species with dbh >5cm included <i>Pandanus spiralis</i> , <i>Petalostigma pubescens</i> , <i>Owenia vernicosa</i> , <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> and <i>Persoonia falcata</i> . Soil type: Loamy sand.	
S004	A1 Inset A	<i>Eucalyptus tetradonta</i> (+/- <i>Eucalyptus miniata</i>) woodland on laterite. Other species with dbh >5cm included <i>Acacia difficilis</i> and <i>Pandanus spiralis</i> . Mid layer also included <i>Erythrophleum chlorostachys</i> and <i>Grevillea heliosperma</i> . Soil type: Loamy sand and sand loam.	





Site	Figure	Notes	Photograph
S005	A1 Inset A	<i>Eucalyptus tetradonta</i> (+/- <i>Eucalyptus miniata</i>) open woodland on laterite. Other species with dbh >5cm included <i>Acacia difficilis</i> and <i>Pandanus spiralis</i> . Soil type: Loamy sand and sand.	
S006	A1 Inset C	<i>Eucalyptus tetradonta</i> open forest on sandy soil. Other species with dbh >5cm included <i>Acacia difficilis</i> and <i>Grevillea pteridifolia</i> . Mid layer also included <i>Petalostigma pubescens</i> and <i>Exocarpos latifolius</i> . Soil type: Loamy sand and sand.	
S007	A1 Inset A	<i>Eucalyptus tetradonta</i> (+/- <i>Eucalyptus miniata</i>) woodland on sandy soil. Other species with dbh >5cm included <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> , <i>Pandanus spiralis</i> and <i>Petalostigma pubescens</i> . Soil type: Loamy sand.	
S008	A1 Inset A	<i>Eucalyptus tetradonta</i> woodland on laterite. Other species with dbh >5cm included <i>Cycas arnhemica</i> , <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> , <i>Terminalia carpentariae</i> , <i>Pandanus spiralis</i> and <i>Buchanania obovata</i> . Soil type: Loamy sand and sandy loam.	





Site	Figure	Notes	Photograph
S009	A1 Inset A / A1 Inset B	<i>Eucalyptus tetradonta</i> woodland on sandy soils containing lateritic gravel. Other species with dbh >5cm included <i>Erythrophleum chlorostachys</i> . Soil type: Loamy sand.	
S010	A1 Inset B	Emergent <i>Melaleuca</i> sp. (? <i>ferruginea</i>) above a shrubland of <i>Bossiaea bossiaeooides</i> , <i>Santalum lanceolatum</i> and <i>Brachychiton paradoxus</i> . Understorey of tussock grasses. Sandy soil. Soil type: Sand.	
S011	A1 Inset B / A1 Inset C	<i>Eucalyptus tetradonta</i> woodland/open forest on laterite. Other species with dbh >5cm included <i>Acacia difficilis</i> , <i>Pandanus spiralis</i> and <i>Erythrophleum chlorostachys</i> . Soil type: Loamy sand.	
S012	A1 Inset A	<i>Eucalyptus tetradonta</i> woodland/open forest on laterite. Other species with dbh >5cm included <i>Acacia difficilis</i> . Soil type: Sandy loam.	





Site	Figure	Notes	Photograph
S013	A1 Inset C	<i>Eucalyptus tetradonta</i> open forest. Mid layer of <i>Erythrophleum chlorostachys</i> and <i>Pandanus spiralis</i> . Shrub layer of regenerating <i>Eucalyptus tetradonta</i> , <i>Buchanania obovata</i> , <i>Pandanus spiralis</i> , <i>Petalostigma pubescens</i> , <i>Terminalia carpentariae</i> and <i>Brachychiton diversifolius</i> . Sparse ground layer. Abundant leaf litter. Soil type: Loamy sand.	
S014	A1 Inset A	<i>Eucalyptus tetradonta</i> woodland/open forest on laterite. Soil type: Loamy sand.	
S015	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland/open forest on sandy soil with lateritic gravel. Mid layer included <i>Buchanania obovata</i> and <i>Erythrophleum chlorostachys</i> . Soil type: Sandy loam and loamy sand.	
S016	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland on sandy soil. Occasional white rock. Other species with dbh >5cm included <i>Terminalia carpentariae</i> and <i>Pandanus spiralis</i> . Soil type: Loamy sand.	





Site	Figure	Notes	Photograph
S017	A1 Inset B	<i>Melaleuca viridiflora</i> forested wetland. Other species with dbh >5cm included <i>Pandanus spiralis</i> . <i>Imperata cylindrica</i> common in the ground layer. Humic soil. Soil type: Silty loam and loam.	
S018	A1 Inset B	Low open woodland with occasional <i>Melaleuca dealbata</i> with <i>Pandanus spiralis</i> and <i>Grevillea pteridifolia</i> . Soil type: Sand.	
S019	A1 Inset C	<i>Melaleuca dealbata</i> low woodland with leaf litter dominated understorey. Other species with dbh >5cm included <i>Acacia mimula</i> , <i>Acacia latescens</i> , <i>Sterculia quadrifida</i> , <i>Psyrax odorata</i> subsp. <i>arnhemica</i> , <i>Terminalia carpentariae</i> , <i>Canarium australianum</i> and <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> . Soil type: Sand.	
S020	A1 Inset B	Complex of shrubland and grassland (perennial grasses and hummock grass). Shrub species present included <i>Hakea arborescens</i> , <i>Pandanus spiralis</i> , <i>Terminalia carpentariae</i> and <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> . Soil type: Sand.	





Site	Figure	Notes	Photograph
S021	A1 Inset B	<i>Melaleuca dealbata</i> open woodland, with a diverse shrub layer, including <i>Bossiaea bossiaeooides</i> , <i>Brachychiton paradoxus</i> , <i>Sterculia quadrifida</i> , <i>Acacia difficilis</i> , <i>Diospyros humilis</i> , <i>Grevillea heliosperma</i> , <i>Drypetes deplanchei</i> and <i>Santalum lanceolatum</i> . Hummock grass in ground layer. Soil type: Sand.	
S022	A1 Inset C	<i>Melaleuca viridiflora</i> , <i>Corymbia bella</i> , <i>Corymbia polycarpa</i> , <i>Eucalyptus bigalerita</i> woodland. Mid layer comprised <i>Pandanus spiralis</i> , <i>Cycas arnhemica</i> , <i>Acacia difficilis</i> and <i>Erythrophleum chlorostachys</i> . Soil type: Loam and sandy loam.	
S023	A1 Inset B	<i>Melaleuca</i> forested wetland dominated by <i>Melaleuca viridiflora</i> . Other species with dbh >5cm included <i>Melaleuca cajuputi</i> and <i>Pandanus spiralis</i> . Soil type: Silty loam.	
S024	A1 Inset C	<i>Melaleuca dealbata</i> woodland on sand in dune swales. Mid layer also included <i>Acacia difficilis</i> and <i>Acacia latescens</i> . Soil type: Sand.	





Site	Figure	Notes	Photograph
S025	A1 Inset C	<i>Melaleuca dealbata</i> woodland with elements of vines and shrubs from Monsoon Forest. Other species with dbh >5cm included <i>Brachychiton paradoxus</i> , <i>Pandanus spiralis</i> , <i>Acacia difficilis</i> , <i>Pouteria sericea</i> , <i>Drypetes deplanchei</i> and <i>Acacia latescens</i> . Soil type: Sand.	
S026	A1 Inset B	<i>Acacia latescens</i> and <i>Jacksonia dilatata</i> shrubland with occasional <i>Melaleuca dealbata</i> . Soil type: Sand.	
S027	A1 Inset C	Monsoon forest dominated by <i>Pouteria sericea</i> . Other species with dbh >5cm included <i>Aglaiia brownii</i> , <i>Ixora timorensis</i> , <i>Drypetes deplanchei</i> , <i>Cupaniopsis anacardioides</i> , <i>Alyxia spicata</i> and <i>Myristica insipida</i> . Soil type: Sand.	
S028	A1 Inset A	<i>Eucalyptus tetradonta</i> and <i>Callitris intratropica</i> woodland on sandstone. <i>Triodia</i> sp. in ground layer and sparse shrub layer of <i>Calytrix brownii</i> , <i>Alyxia spicata</i> , <i>Lithomyrtus retusa</i> and <i>Exocarpos latifolius</i> . Soil type: Loamy sand.	





Site	Figure	Notes	Photograph
S029	A1 Inset C	<p>Monsoon forest dominated by <i>Aglaia brownii</i>, <i>Diospyros maritima</i>, <i>Micromelum minutum</i> and <i>Trophis scandens</i>. Other species with dbh >5cm included <i>Mallotus dispersus</i>, <i>Sterculia quadrifida</i> and <i>Terminalia carpentariae</i>.</p> <p>Soil type: Loamy sand.</p>	
S030	A1 Inset C	<p>Monsoon forest dominated by <i>Drypetes deplancei</i> and <i>Pouteria sericea</i>. Other species with dbh >5cm included <i>Strychnos lucida</i>, <i>Alyxia spicata</i>, <i>Asteromyrtus symphyocarpa</i>, <i>Cupaniopsis anacardioides</i>, <i>Buchanania arborescens</i>, <i>Aglaia brownii</i>, <i>Psydrax odorata</i> subsp. <i>arnhemica</i> and <i>Diospyros maritima</i>.</p> <p>Soil type: Sand.</p>	
S031	A1 Inset C	<p><i>Eucalyptus tetradonta</i> woodland/open forest on lateritic soils. Shrub layer of regenerating <i>Eucalyptus tetradonta</i>, <i>Buchanania obovata</i>, <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> and <i>Pandanus spiralis</i>.</p> <p>Soil type: Loamy sand.</p>	
S032	A1 Inset A	<p><i>Eucalyptus tetradonta</i> on high sandstone hill with hummock grass ground layer. Rare <i>Corymbia kombolgiensis</i> and <i>Callitris intratropica</i>. Mid layer of <i>Pandanus spiralis</i>, <i>Livistona inermis</i>, <i>Cycas arnhemica</i>, <i>Erythrophleum chlorostachys</i>, <i>Terminalia carpentariae</i>, <i>Petalostigma pubescens</i>, <i>Buchanania obovata</i> and <i>Acacia lamrocarpa</i>. <i>Ficus brachypoda</i> on larger rock outcrops.</p> <p>Soil type: Loamy sand.</p>	





Site	Figure	Notes	Photograph
S033	A1 Inset C	<i>Acacia torulosa</i> shrubland with scattered trees on sand dunes. Other species with dbh >5cm included <i>Owenia vernicosa</i> , <i>Verticordia verticillata</i> , <i>Corymbia kombolgiensis</i> and <i>Gardenia megasperma</i> . Soil type: Sand.	
S034	A1 Inset B	Complex of hummock grassland and coastal open shrubland, including <i>Santalum lanceolatum</i> , <i>Brachychiton paradoxus</i> and <i>Scaevola sericea</i> , with occasional <i>Casuarina equisetifolia</i> . Soil type: Sand.	
S035	A1 Inset B	Coastal open shrubland dominated by <i>Hakea arborescens</i> , <i>Santalum lanceolatum</i> and <i>Melaleuca</i> spp over perennial grasses. Soil type: Sand.	
S036	A1 Inset A / A1 Inset B	Grassland of perennial grasses and sedges on sandy soil located on occasionally inundated flats. Soil type: Sandy loam.	




Site	Figure	Notes	Photograph
S037	A1 Inset C	<i>Eucalyptus tetradonta</i> and <i>Callitris intratropica</i> woodland on sandstone. Shrub layer of <i>Acacia oncinocarpa</i> , <i>Cycas arnhemica</i> , <i>Exocarpos latifolius</i> , <i>Pandanus spiralis</i> and <i>Bossiaea bossiaeooides</i> . Soil type: Loamy sand and sandy loam.	
S038	A1 Inset B	Coastal sand dune with hummock grassland and occasional <i>Casuarina equisetifolia</i> . Soil type: Sand.	
S039	A1 Inset A	<i>Callitris intratropica</i> open forest with scattered <i>Eucalyptus tetradonta</i> and <i>Corymbia kombolgiensis</i> on the edge of sandstone. Other species with dbh >5cm included <i>Denhamia obscura</i> , <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> , <i>Petalostigma pubescens</i> , <i>Owenia vernicosa</i> , <i>Acacia difficilis</i> and <i>Terminalia carpentariae</i> . Soil type: Loamy sand, sandy loam and loam.	
S040	A1 Inset A	<i>Eucalyptus tetradonta</i> woodland. Rare occurrences of <i>Corymbia kombolgiensis</i> and <i>Corymbia polycarpa</i> . Shrub layer of regenerating <i>Eucalyptus tetradonta</i> and <i>Erythrophleum chlorostachys</i> . Perennial grass understorey. Other species with dbh >5cm included <i>Petalostigma pubescens</i> , <i>Persoonia falcata</i> and <i>Acacia difficilis</i> . Soil type: Loamy sand.	





Site	Figure	Notes	Photograph
S041	A1 Inset A	<p><i>Callitris intratropica</i> and <i>Corymbia polycarpa</i> woodland on edge of sandstone. Shrub layer of <i>Calytrix brownii</i>, <i>Jacksonia dilatata</i>, <i>Grevillea pteridifolia</i>, <i>Alyxia spicata</i>, <i>Melaleuca viridiflora</i>, <i>Bossiaea bossiaeoides</i>, <i>Acacia difficilis</i> and <i>Terminalia carpentariae</i>.</p> <p>Soil type: Loamy sand and sandy loam.</p>	
S042	A1 Inset A	<p><i>Eucalyptus tetradonta</i> +/- <i>Eucalyptus miniata</i> low open woodland on lateritic soils. Mid-dense shrub understorey of regenerating <i>Eucalyptus tetradonta</i>, <i>Buchanania obovata</i> and <i>Acacia difficilis</i>. Other species with dbh >5cm included <i>Pandanus spiralis</i>.</p> <p>Soil type: Loamy sand.</p>	
S043	A1 Inset A / A1 Inset B	<p><i>Eucalyptus tetradonta</i> woodland with occasional shrub cover of regenerating <i>Eucalyptus tetradonta</i>, <i>Acacia latescens</i>, <i>Petalostigma pubescens</i> and <i>Acacia difficilis</i>. <i>Eucalyptus miniata</i> rare. Perennial grass understorey. Other species with dbh >5cm included <i>Pandanus spiralis</i>.</p> <p>Soil type: Loamy sand.</p>	
S044	A1 Inset C	<p><i>Eucalyptus tetradonta</i> woodland on laterite. Mid layer of <i>Pandanus spiralis</i>, with shrubs of <i>Grevillea pteridifolia</i>, <i>Acacia torulosa</i>, <i>Acacia difficilis</i>, <i>Petalostigma pubescens</i> and <i>Grevillea heliosperma</i>. Predominantly bare ground layer due to recent fire, however perennial and hummock grasses present.</p> <p>Soil type: Loamy sand.</p>	





Site	Figure	Notes	Photograph
S045	A1 Inset A	<i>Eucalyptus tetradonta</i> woodland with <i>Corymbia polycarpa</i> and <i>Corymbia ferruginea</i> . Mid layer of <i>Petalostigma pubescens</i> , <i>Pandanus spiralis</i> , <i>Acacia difficilis</i> , <i>Erythrophleum chlorostachys</i> and <i>Buchanania obovata</i> . Other species with dbh >5cm included <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> . Soil type: Loamy sand.	
S046	A1 Inset A / A1 Inset B	<i>Eucalyptus tetradonta</i> +/- <i>Eucalyptus miniata</i> open forest on lateritic soils. Shrub layer of <i>Pandanus spiralis</i> and <i>Acacia difficilis</i> . Other species with dbh >5cm included <i>Grevillea heliosperma</i> . Soil type: Loamy sand and sandy loam.	
S047	A1 Inset A	<i>Melaleuca viridiflora</i> dominated woodland with <i>Melaleuca cajuputi</i> . Open grassy understorey. Other species with dbh >5cm included <i>Asteromyrtus symphyocarpa</i> . Soil type: Loam.	
S048	A1 Inset B	<i>Melaleuca dealbata</i> open woodland on dunes with perennial grass understorey. Other species with dbh >5cm included <i>Pandanus spiralis</i> and <i>Santalum lanceolatum</i> . Soil type: Sand.	





Site	Figure	Notes	Photograph
S049	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland with occasional <i>Corymbia polycarpa</i> . Understorey of low shrubs, including <i>Acacia difficilis</i> and <i>Erythrophleum chlorostachys</i> , with perennial grasses. Other species with dbh >5cm included <i>Buchanania obovata</i> . Soil type: Sandy loam.	
S050	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland with occasional <i>Eucalyptus miniata</i> . Shrub layer of regenerating <i>Eucalyptus tetradonta</i> , <i>Pandanus spiralis</i> and <i>Erythrophleum chlorostachys</i> . Other species with dbh >5cm included <i>Terminalia carpentariae</i> . Soil type: Loamy sand and sandy loam.	
S051	A1 Inset A	<i>Eucalyptus tetradonta</i> (+/- <i>Eucalyptus miniata</i>) woodland/open forest on sandy soil with lateritic gravel. Other species with dbh >5cm included <i>Pandanus spiralis</i> and <i>Acacia difficilis</i> . Soil type: Sandy loam.	
S052	A1 Inset A	<i>Eucalyptus tetradonta</i> and <i>Eucalyptus miniata</i> woodland, with rare <i>Coymbia polycarpa</i> and <i>Corymbia kombolgiensis</i> . Stands of <i>Callitris intratropica</i> on low sandstone plateaux. Loamy sand soil. Mid layer of <i>Grevillea pteridifolia</i> , <i>Pandanus spiralis</i> and <i>Buchanania obovata</i> . Ground layer of tussock grass, <i>Acacia yirrkallensis</i> and hummock grass. Some sandstone outcrops. Soil type: Loamy sand.	





Site	Figure	Notes	Photograph
S053	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland to open forest on lateritic soils. Low shrub layer of regenerating <i>Eucalyptus tetradonta</i> , <i>Acacia difficilis</i> and <i>Petalostigma pubescens</i> . Ground layer of perennial grasses and leaf litter. Other species with dbh >5cm included <i>Banksia dentata</i> and <i>Pandanus spiralis</i> . Soil type: Sand.	
S054	A1 Inset C	<i>Eucalyptus tetradonta</i> and <i>Eucalyptus miniata</i>) open forest on sandy soil. Other species with dbh >5cm included <i>Banksia dentata</i> , <i>Erythrophleum chlorostachys</i> , <i>Terminalia carpentariae</i> and <i>Pandanus spiralis</i> . Soil type: Sandy loam.	
S055	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland to open forest on sandy soils. Moderately dense shrub layer of regenerating <i>Eucalyptus tetradonta</i> , <i>Acacia difficilis</i> , <i>Petalostigma pubescens</i> , <i>Erythrophleum chlorostachys</i> and <i>Pandanus spiralis</i> . Soil type: Loam sand and sandy loam.	
S056	A1 Inset C	<i>Melaleuca viridiflora</i> and <i>Melaleuca cajuputi</i> low open woodland on depression in quaternary sand. Shrub layer of <i>Melaleuca cajuputi</i> , <i>Melaleuca viridiflora</i> and patches of dense <i>Acacia holosericea</i> . Tall sedge layer of <i>Dapsilanthus elatior</i> . Soil type: Sand.	





Site	Figure	Notes	Photograph
S057	A1 Inset C	Mixed woodland of <i>Eucalyptus tetrodonta</i> , <i>Corymbia polycarpa</i> and <i>Melaleuca viridiflora</i> . Mid layer of <i>Pandanus spiralis</i> , <i>Terminalia carpentariae</i> , <i>Acacia difficilis</i> , <i>Petalostigma pubescens</i> , <i>Asteromyrtus symphyocarpa</i> and <i>Hakea arborescens</i> . Other species with dbh >5cm included <i>Brachychiton diversifolius</i> subsp. <i>diversifolius</i> . Soil type: Sand.	
S058	A1 Inset B	<i>Corymbia polycarpa</i> and <i>Melaleuca dealbata</i> mixed woodland. Mid layer of <i>Erythrophleum chlorostachys</i> and <i>Pandanus spiralis</i> . Shrub layer of <i>Acacia torulosa</i> , <i>Asteromyrtus symphyocarpa</i> , <i>Terminalia carpentariae</i> , <i>Acacia latescens</i> and <i>Acacia difficilis</i> . Other species with dbh >5cm included <i>Grevillea heliosperma</i> , <i>Jacksonia dilatata</i> and <i>Grevillea pteridifolia</i> . Soil type: Sand.	
S059	A1 Inset B	<i>Melaleuca viridiflora</i> open woodland on edge of estuarine zone. Occasional <i>Corymbia bella</i> . Mid layer of <i>Pandanus spiralis</i> . Shrub layer of <i>Hakea arborescens</i> and <i>Acacia leptocarpa</i> . Soil type: Loam and silty clay loam.	
S060	A1 Inset A	<i>Eucalyptus tetrodonta</i> (+/- <i>Eucalyptus miniata</i>) woodland on sandy soil. Other species with dbh >5cm included <i>Banksia dentata</i> , <i>Grevillea pteridifolia</i> , <i>Erythrophleum chlorostachys</i> , <i>Pandanus spiralis</i> and <i>Acacia difficilis</i> . Soil type: Sandy loam.	





Site	Figure	Notes	Photograph
S061	A1 Inset C	<p><i>Melaleuca viridiflora</i> and <i>Melaleuca cajaputi</i> woodland, with occasional <i>Eucalyptus bigalerita</i>. Mid layer of <i>Pandanus spiralis</i>. Dense perennial grass in ground layer. Other species with dbh >5cm included <i>Timonius timon</i>.</p> <p>Soil type: Silty clay loam and clay loam.</p>	
S062	A1 Inset C	<p><i>Melaleuca dealbata</i> open woodland with dense shrub layer. Sandy soils with abundant leaf litter and occasional hummock grasses. Other species with dbh >5cm included <i>Pandanus spiralis</i> and <i>Terminalia carpentariae</i>.</p> <p>Soil type: Sand.</p>	
S063	A1 Inset C	<p>Low open woodland on sand/white rock. <i>Eucalyptus tetradonta</i> with <i>Callitris intratropica</i> at periphery. Sparse mid and shrub layer, including <i>Grevillea pteridifolia</i>, <i>Buchanania obovata</i>, <i>Petalostigma pubescens</i>, <i>Melaleuca viridiflora</i>, <i>Eucalyptus tetradonta</i> and <i>Eucalyptus kombolgiensis</i>. Ground layer of hummock grass and <i>Dapsilanthus</i> spp.</p> <p>Soil type: Sand.</p>	
S064	A1 Inset B	<p><i>Melaleuca dealbata</i> low open woodland to tall shrubland. Dense shrub layer of <i>Acacia latescens</i>, <i>Jacksonia dilatata</i>, <i>Acacia difficilis</i> and <i>Melaleuca cajaputi</i>. Dense sedge layer of <i>Dapsilanthus elatior</i>.</p> <p>Soil type: Sand.</p>	





Site	Figure	Notes	Photograph
S065	A1 Inset C	Tall monsoon vine forest behind coastal dune. Canopy dominated by <i>Diospyros maritima</i> , <i>Aglaia brownii</i> , <i>Celtis philippensis</i> , <i>Drypetes deplanchei</i> and <i>Pouteria sericea</i> . Emergent <i>Canarium australianum</i> and <i>Rhus taitensis</i> . Other species with dbh >5cm included <i>Micromelum minutum</i> , <i>Brucea javanica</i> and <i>Diospyros geminata</i> . Soil type: Sand.	
S066	A1 Inset C	Inland monsoon vine thicket with tall emergent <i>Alstonia actinophylla</i> , vines and <i>Arenga microcarpa</i> . Canopy of <i>Aglaia brownii</i> , <i>Celtis philippensis</i> , <i>Diospyros maritima</i> and <i>Pouteria sericea</i> . Other species with dbh >5cm included <i>Trophis scandens</i> and <i>Micromelum minutum</i> . Soil type: Loamy sand.	
S067	A1 Inset C	Monsoon vine forest on old sand dune. Canopy of <i>Drypetes deplanchei</i> , <i>Erythrophleum chlorostachys</i> , <i>Canarium australianum</i> , <i>Pouteria sericea</i> and <i>Denhamia obscura</i> . Emergent <i>Corymbia kombolgiensis</i> , <i>Ficus virens</i> and rare <i>Melaleuca dealbata</i> . Other species with dbh >5cm included <i>Psyrax odorata</i> subsp. <i>arnhemica</i> and <i>Flueggea virosa</i> . Soil type: Sand.	
S068	A1 Inset A	Rocky sandstone slope with <i>Eucalyptus tetradonta</i> , <i>Callitris intratropica</i> , <i>Coymbia kombolgiensis</i> and <i>Eucalyptus miniata</i> open forest. Hummock grass ground layer. Dense shrub layer of <i>Acacia oncinocarpa</i> , <i>Acacia difficilis</i> , <i>Cycas arnhemica</i> , <i>Acacia lamprocarpa</i> , <i>Petalostigma pubescens</i> and <i>Buchanania obovata</i> . Fern layer of <i>Drynaria quercifolia</i> on larger rocks. Soil type: Loamy sand.	





Site	Figure	Notes	Photograph
S069	A1 Inset B	Tussock grassland of perennial grasses with scattered <i>Pandanus spiralis</i> and patches of monsoon shrubs and <i>Brachychiton paradoxus</i> . Other species with dbh >5cm included <i>Hakea arborescens</i> . Soil type: Sand.	
S070	A1 Inset C	Coastal dune with hummock grass and scattered monsoon species of <i>Diospyros maritima</i> and <i>Drypetes deplanchei</i> , with occasional <i>Casuarina equisetifolia</i> . Soil type: Sand.	
S071	A1 Inset C	<i>Melaleuca viridiflora</i> and <i>Melaleuca cajuputi</i> low open woodland in depression. Shrub layer of <i>Asteromyrtus symphyocarpa</i> and <i>Jacksonia dilatata</i> . Soil type: Sand.	
S072	A1 Inset B	Mixed grassland of hummock and perennial grasses on cemented sand dunes. Scattered <i>Casuarina equisetifolia</i> . Sparsely scattered low shrubs of <i>Scaevola taccada</i> , <i>Santalum lanceolatum</i> , <i>Brachychiton paradoxus</i> and monsoon shrub species including <i>Drypetes deplanchei</i> . Soil type: Sand.	





Site	Figure	Notes	Photograph
S073	A1 Inset B	Hummock grassland on coastal sand dune. Dense grass layer with occasional patches of exposed sand and scattered monsoon shrub species. Soil type: Sand.	
S074	A1 Inset A	<i>Eucalyptus tetrodonta</i> and <i>Callitris intratropica</i> woodland on sand. Mid layer of <i>Callitris intratropica</i> , <i>Buchanania obovata</i> and <i>Pandanus spiralis</i> . Ground layer dominated by leaf litter. Hummock grasses present. Soil type: Sand.	
S075	A1 Inset A	<i>Melaleuca viridiflora</i> low woodland with scattered <i>Grevillea pteridifolia</i> and <i>Pandanus spiralis</i> . Other species with dbh >5cm included <i>Petalostigma pubescens</i> . Soil type: Loamy sand, sandy clay loam, silty clay loam, sandy loam.	
S076	A1 Inset B	Coastal sand dune with hummock grassland and shrubs, including <i>Diospyros humilis</i> , <i>Drypetes deplanchei</i> , <i>Diospyros maritima</i> and <i>Brachychiton paradoxus</i> . Soil type: Sand.	




Site	Figure	Notes	Photograph
S077	A1 Inset C	<i>Eucalyptus tetrodonta</i> open forest on sandy soils. Sparse <i>Eucalyptus miniata</i> in adjacent areas. Mid layer of <i>Pandanus spiralis</i> , <i>Grevillea pteridifolia</i> , <i>Banksia dentata</i> and <i>Owenia vernicosa</i> . Diverse low shrubs and perennial grass understorey. Other species with dbh >5cm included <i>Acacia difficilis</i> . Soil type: Loamy sand.	
S078	A1 Inset A	<i>Eucalyptus tetrodonta</i> and <i>Eucalyptus tectifera</i> woodland on laterite with some sandstone, located on plain near small drainage line. Mid layer of <i>Petalostigma pubescens</i> , <i>Hakea arborescens</i> , <i>Buchanania obovata</i> , <i>Acacia oncinocarpa</i> and <i>Grevillea heliosperma</i> . Soil type: Sandy loam.	
S079	A1 Inset B	<i>Melaleuca</i> sp. (? <i>ferruginea</i>) woodland with dense understorey of vines, including <i>Alyxia spicata</i> , <i>Flagellaria indica</i> and <i>Smilax australis</i> , and monsoon shrubs including, <i>Gardenia megasperma</i> , <i>Brachychiton paradoxus</i> , <i>Drypetes deplanchei</i> , <i>Diospyros humilis</i> , <i>Exocarpos latifolius</i> and <i>Pouteria sericea</i> , and other shrubs of <i>Acacia lamprocarpa</i> , <i>Terminalia carpentariae</i> , <i>Grevillea pteridifolia</i> , <i>Melaleuca acacioides</i> and <i>Pandanus spiralis</i> . Ground layer of <i>Triodia</i> sp. Soil type: Sand.	
S080	A1 Inset A	Woodland of <i>Callitris intratropica</i> , <i>Eucalyptus tetrodonta</i> , <i>Corymbia polycarpa</i> and <i>Corymbia kombolgiensis</i> on sandstone slope. Dense subcanopy of <i>Callitris intratropica</i> . Other mid layer and shrub species include <i>Lithomyrtus retusa</i> , <i>Calytrix brownii</i> , <i>Santalum lanceolatum</i> , <i>Alyxia spicata</i> , <i>Acacia difficilis</i> , <i>Jacksonia dilatata</i> , <i>Petalostigma pubescens</i> and <i>Grevillea pteridifolia</i> . <i>Triodia</i> spp. in ground layer	




Site	Figure	Notes	Photograph
		and sedges. Soil type: Loamy sand.	
S081	A1 Inset A / A1 Inset B	<i>Eucalyptus tetradonta</i> woodland with sparse <i>Eucalyptus miniata</i> . Open mid layer with occasional <i>Acacia difficilis</i> . Perennial grass ground layer. Sandy soils with lateritic gravel and scattered large lateritic rocks. Soil type: Loamy sand.	
S082	A1 Inset A	<i>Eucalyptus tetradonta</i> and <i>Eucalyptus miniata</i> open woodland. Mid layer of regenerating <i>Eucalyptus tetradonta</i> , <i>Pandanus spiralis</i> , <i>Buchanania obovata</i> and <i>Petalostigma pubescens</i> . Open grassy understorey with perennial and annual grasses. Sandy soils with some lateritic gravel. Soil type: Sand.	
S083	A1 Inset A	<i>Eucalyptus tetradonta</i> woodland on laterite. Mid layer of <i>Erythrophleum chlorostachys</i> , <i>Buchanania obovata</i> , <i>Corymbia ferruginea</i> , <i>Corymbia polycarpa</i> , <i>Cycas arnhemica</i> and <i>Pandanus spiralis</i> . Ground layer of perennial grasses. Soil type: Sandy loam.	
S084	A1 Inset A	<i>Eucalyptus tectifica</i> open woodland on alluvial plain. Mid layer of <i>Melaleuca viridiflora</i> , <i>Petalostigma pubescens</i> , <i>Terminalia carpentariae</i> , <i>Erythrophleum chlorostachys</i> and <i>Gardenia megasperma</i> . Silty clay loam with abundant gravel and laterite. Other species with dbh>5cm included <i>Buchanania obovata</i> , <i>Wrightia saligna</i> and <i>Corymbia confertiflora</i> . Soil type: Sandy loam and silty clay.	




Site	Figure	Notes	Photograph
S085	A1 Inset B	<i>Melaleuca</i> sp. (? <i>ferruginea</i>) scattered above a perennial and hummock grass understorey with patches of exposed sand. Scattered <i>Pouteria sericea</i> , <i>Brachychiton paradoxus</i> and regenerating <i>Melaleuca</i> sp. (? <i>ferruginea</i>). Sandy soil. Soil type: Sand.	
S086	A1 Inset A	<i>Eucalyptus tetradonta</i> woodland. Shrub layer of <i>Petalostigma pubescens</i> , <i>Acacia difficilis</i> , <i>Terminalia carpentariae</i> and <i>Pandanus spiralis</i> . Perennial grass understorey. Sandy soils with lateritic gravel. Soil type: Sand.	
S087	A1 Inset C	<i>Eucalyptus tetradonta</i> open forest / woodland on sandy soils with some laterite. Sparse mid layer of <i>Pandanus spiralis</i> , <i>Grevillea heliosperma</i> and <i>Acacia</i> sp. Ground layer of <i>Sorghum</i> sp and <i>Heteropogon triticeus</i> . Soil type: Sandy loam.	
S088	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland. Tall shrub layer of <i>Acacia latescens</i> , <i>Grevillea pteridifolia</i> , <i>Petalostigma pubescens</i> . Other shrubs included <i>Buchanania obovata</i> , <i>Hibbertia</i> sp. and <i>Pandanus spiralis</i> . Ground layer of perennial and hummock grasses and <i>Dapsilanthus elatior</i> . Sandy soils. Soil type: Sand.	





Site	Figure	Notes	Photograph
S089	A1 Inset C	<i>Eucalyptus tetrodonta</i> woodland to open forest on lateritic soils. Low open shrub layer of <i>Erythrophleum chlorostachys</i> , <i>Buchanania obovata</i> and <i>Acacia difficilis</i> . Perennial grass understorey. Soil type: Sandy loam.	
S090	A1 Inset B	Dense shrubland of <i>Acacia difficilis</i> , <i>Acacia latescens</i> , <i>Grevillea pteridifolia</i> , <i>Bossiaea bossiaeioides</i> , <i>Jacksonia dilatata</i> and scattered monsoon species, including <i>Syzygium suborbiculare</i> , <i>Gardenia megasperma</i> and <i>Pouteria sericea</i> on coastal sands. Scattered emergent of <i>Melaleuca</i> sp. (? <i>ferruginea</i>) and <i>Melaleuca viridiflora</i> . <i>Triodia</i> sp. in ground layer, dense litter and <i>Dapsilanthus elatior</i> . Other species with dbh>5cm included <i>Terminalia carpentariae</i> and <i>Pandanus spiralis</i> . Soil type: Sand.	
S091	A1 Inset C	<i>Eucalyptus tetrodonta</i> woodland on sandy soils. Shrubs include <i>Pandanus spiralis</i> and <i>Petalostigma pubescens</i> . Dense ground layer of perennial grasses. Sandy soils. Soil type: Loamy sand and sand.	
S092	A1 Inset A / A1 Inset B	<i>Eucalyptus tetrodonta</i> on lateritic soils. Recent fire, therefore mid/ground layer absent. Perennial grasses regenerating. Soil type: Loamy sand.	





Site	Figure	Notes	Photograph
S093	A1 Inset C	<i>Eucalyptus tetrodonta</i> low open forest/shrubland on quaternary sand plain. Hummock grass ground layer. Shrubs of <i>Banksia dentata</i> , <i>Acacia torulosa</i> , <i>Pandanus spiralis</i> , <i>Grevillea pteridifolia</i> , <i>Petalostigma pubescens</i> and <i>Bossiaea bossiaeoides</i> . Soil type: Loamy sand.	
S094	A1 Inset C	<i>Eucalyptus tetrodonta</i> low woodland. Dense shrub layer of regenerating <i>Eucalyptus tetrodonta</i> and sedge dominated ground layer. Other species with dbh >5cm included <i>Grevillea pteridifolia</i> and <i>Banksia dentata</i> . Soil type: Sand.	
S095	A1 Inset B	<i>Grevillea pteridifolia</i> tall open shrubland with <i>Hakea arborescens</i> , <i>Acacia difficilis</i> and <i>Grevillea heliosperma</i> . Low shrubs of monsoon species present including <i>Brachychiton paradoxus</i> , <i>Pouteria sericea</i> , <i>Ficus scobina</i> and <i>Syzygium suborbiculare</i> . Interspersed with grassland of hummock and tussock grasses, and <i>Gomphrena canescens</i> and <i>Tephrosia</i> sp. On coastal sands. Soil type: Sand.	
S096	A1 Inset C	Melaleuca forested wetland dominated by <i>Melaleuca viridiflora</i> . Other species with dbh >5cm included <i>Banksia dentata</i> , <i>Pandanus spiralis</i> and <i>Melaleuca cajuputi</i> . Humic soil. Soil type: Sandy clay loam and sandy loam.	



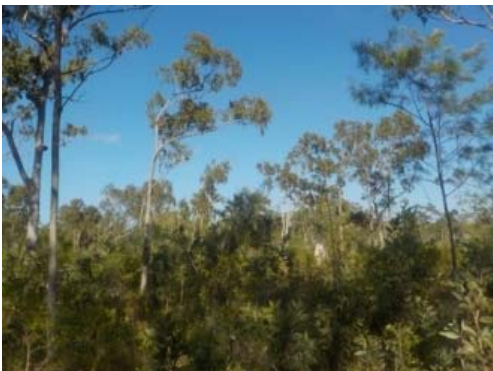

Site	Figure	Notes	Photograph
S097	A1 Inset A / A1 Inset C	<p><i>Eucalyptus bigalerita</i> woodland with scattered <i>Corymbia bella</i>. Subcanopy of <i>Melaleuca viridiflora</i>, <i>Pandanus spiralis</i>, <i>Acacia latescens</i>, <i>Acacia difficilis</i> and <i>Acacia B.25</i> isperses B.25. Shrub layer of <i>Asteromyrtus symphyocarpa</i>, <i>Cycas arnhemica</i> and <i>Canarium australianum</i>. Dense grass layer. Other species with dbh>5cm included <i>Vitex acuminata</i> and <i>Terminalia carpentariae</i>.</p> <p>Soil type: Silty loam and sandy loam.</p>	
S098	A1 Inset A	<p>Low open woodland of <i>Melaleuca viridiflora</i> and dense shrubland of <i>Acacia holosericea</i>, <i>Asteromyrtus symphyocarpa</i>, regenerating <i>Melaleuca viridiflora</i>, <i>Grevillea pteridifolia</i> and <i>Acacia multisiliqua</i>. Adjacent to standing fresh water.</p> <p>Soil type: Silty clay loam.</p>	
S099	A1 Inset B	<p><i>Eucalyptus tetradonta</i>, <i>Corymbia polycarpa</i> and <i>Erythrophleum chlorostachys</i> woodland/open woodland. Shrub layer of <i>Erythrophleum chlorostachys</i>, <i>Buchanania obovata</i>, <i>Grevillea pteridifolia</i>, <i>Petalostigma pubescens</i>, <i>Pandanus spiralis</i>, <i>Asteromyrtus symphyocarpa</i>, <i>Acacia leptocarpa</i> and <i>Acacia lamprocarpa</i>. Ground layer of <i>Sorghum</i> sp. and <i>Heteropogon triticeus</i>. Sandy soil with some lateritic gravel and lateritic outcropping on floodplain/alluvial plain.</p> <p>Soil type: Loamy sand.</p>	





Site	Figure	Notes	Photograph
S100	A1 Inset C	<i>Melaleuca</i> sp. (? <i>ferruginea</i>) in dune swale. Dense shrub layer of <i>Acacias</i> and <i>Jacksonia dilatata</i> . Soil type: Sand.	
S101	A1 Inset C	Mixed woodland of <i>Melaleuca viridiflora</i> , <i>Eucalyptus bigalerita</i> , <i>Melaleuca cajaputi</i> , <i>Lophostemon lactifluus</i> and <i>Corymbia bella</i> . Mid layer of <i>Pandanus spiralis</i> . Soil type: Silty loam.	
S102	A1 Inset A	Open woodland of <i>Eucalyptus tetrodonta</i> , <i>Corymbia bella</i> and <i>Corymbia polycarpa</i> on sandy alluvial deposits. <i>Erythrophleum chlorostachys</i> and <i>Eucalyptus bigalerita</i> also present. Diverse mid layer of <i>Terminalia carpentariae</i> , <i>Acacia lamprocarpa</i> , <i>Acacia difficilis</i> , <i>Persoonia falcata</i> , <i>Petalostigma pubescens</i> , <i>Cycas arnhemica</i> , <i>Pandanus spiralis</i> and <i>Owenia vernicosa</i> . Ground layer dominated by <i>Mnesithea rottboellioides</i> . Some monsoon species including <i>Wrightia saligna</i> , <i>Pouteria arnhemica</i> , <i>Canarium australianum</i> , <i>Drypetes deplanchei</i> , <i>Vitex acuminata</i> , <i>Timonius timon</i> and <i>Bridelia tomentosa</i> . Soil type: Loamy sand.	





Site	Figure	Notes	Photograph
S103	A1 Inset C	<p>Monsoon vine thicket with emergent <i>Corymbia polycarpa</i>. Canopy of <i>Erythrophleum chlorostachys</i>, <i>Pouteria sericea</i>, <i>Canarium australianum</i>, <i>Strychnos lucida</i>, <i>Drypetes deplanchei</i> and <i>Tabernaemontana orientalis</i> in dune swale. Other species included <i>Corymbia kombolgiensis</i> and <i>Alstonia actinophylla</i>.</p> <p>Soil type: Loamy sand.</p>	
S104	A1 Inset C	<p>Seepage monsoon vine forest. Swampy humic rich soil. Canopy of <i>Melaleuca leucadendra</i>, <i>Syzygium angophoroides</i> and <i>Calophyllum sil.</i> Dense ferns of <i>Stenochlaena palustris</i>, <i>Nephrolepis hirsutula</i> and <i>Lygodium microphyllum</i>. Palms of <i>Hydriastele wendlandiana</i> and <i>Arenga microcarpa</i>. Mid layer of <i>Schefflera actinophylla</i>, <i>Macaranga tanarius</i>, <i>Gmelina schlechteri</i> and <i>Syzygium nervosum</i>. Vines of <i>Flagellaria indica</i> and <i>Cissus reniformis</i>. Other species with dbh>5cm included <i>Alphitonia isper</i>, <i>Myristica insipida</i> and <i>Melicope elleryana</i>.</p> <p>Soil type: Wet peat.</p>	
S105	A1 Inset C	<p>Coastal monsoon vine thicket behind first dune. Canopy of <i>Aglaia brownii</i>, <i>Diospyros maritima</i>, <i>Hibiscus tiliaceus</i>, <i>Buchanania arborescens</i> and <i>Myristica insipida</i>. Emergent <i>Rhus taitensis</i>, <i>Alstonia actinophylla</i> and <i>Sterculia holtzei</i>. Other species with dbh>5cm included <i>Strychnos lucida</i>, <i>Micromelum minutum</i>, <i>Celtis philippensis</i> and <i>Mimusops elengi</i>.</p> <p>Soil type: Loamy sand.</p>	





Site	Figure	Notes	Photograph
S106	A1 Inset A	<p><i>Eucalyptus tetrodonta</i>, <i>Callitris intratropica</i> and <i>Corymbia polycarpa</i> woodland on sandstone slope. Sedges in ground layer and <i>Eriachne</i> spp. Diverse shrub layer of <i>Grevillea pteridifolia</i>, <i>Buchanania obovata</i>, <i>Calytrix brownii</i>, <i>Acacia oncinocarpa</i>, <i>Bossiaea bossiaeooides</i>, <i>Exocarpos latifolius</i>, <i>Pandanus spiralis</i>, <i>Jacksonia dilatata</i>, <i>Melaleuca viridiflora</i>, <i>Santalum lanceolatum</i>, <i>Acacia lamprocarpa</i> and <i>Terminalia carpentariae</i>.</p> <p>Soil type: Sand.</p>	
S107	A1 Inset C	<p>Coastal sand dune comprising hummock grassland with scattered <i>Casuarina equisetifolia</i>, and patches of monsoon shrub species in swales. Other species with dbh >5cm included <i>Scaevola taccada</i>, <i>Exocarpos latifolius</i>, <i>Drypetes deplanchei</i>, <i>Pavetta brownii</i>, <i>Mallotus isperses</i>, <i>Brachychiton paradoxus</i>, and <i>Pouteria sericea</i>.</p> <p>Soil type: Sand.</p>	
S108	A1 Inset C	<p>Low open woodland of <i>Melaleuca</i> sp. (?<i>ferruginea</i>) and <i>Melaleuca viridiflora</i>. Shrub layer of <i>Asteromyrtus symphyocarpa</i>, <i>Bossiaea bossiaeooides</i>, <i>Pandanus spiralis</i> and <i>Acacia difficilis</i>. Ground layer of <i>Dapsilanthus elatior</i> and tussock grasses. Located in dune swale with white sand.</p> <p>Soil type: Sand.</p>	
S109	A1 Inset C	<p>Predominantly tall shrubland of Acacias with emergent canopy trees of <i>Corymbia polycarpa</i> on sandy soils. Tall shrubs include <i>Acacia torulosa</i>, <i>Acacia latescens</i>, <i>Acacia oncinocarpa</i>, <i>Owenia vernicosa</i>, <i>Petalostigma pubescens</i> and <i>Terminalia carpentariae</i>. Other areas include depression containing <i>Melaleuca viridiflora</i>, <i>Pandanus spiralis</i>,</p>	





Site	Figure	Notes	Photograph
		<i>Asteromyrtus symphyocarpa</i> and <i>Dapsilanthus elatior</i> , adjacent to <i>Eucalyptus tetradonta</i> woodland. Soil type: Sand.	
S110	A1 Inset C	Coastal dunes with hummock and perennial grasses, scattered monsoon shrubs, including <i>Brachychiton paradoxus</i> , <i>Capparis quiniflora</i> , <i>Santalum lanceolatum</i> , <i>Diospyros humilis</i> and <i>Pouteria sericea</i> and <i>Hakea arborescens</i> with open areas of sand. Soil type: Sand.	
S111	A1 Inset B	Tussock grassland on stabilised sand dunes. Emergent <i>Pandanus spiralis</i> , <i>Hakea arborescens</i> , <i>Brachychiton paradoxus</i> , <i>Ficus scobina</i> and <i>Diospyros humilis</i> . Grass layer of <i>Chrysopogon</i> sp. Scattered forbs of <i>Gomphrena canescens</i> . Soil type: Sand.	
S112	A1 Inset C	Hummock grassland of <i>Triodia</i> sp on cemented sand dunes (some laterite). Patches of shrubland of <i>Drypetes deplanchei</i> , <i>Hakea arborescens</i> , <i>Santalum lanceolatum</i> , <i>Pandanus spiralis</i> and monsoon forest species. Scattered forbs of <i>Gomphrena canescens</i> . Sandy soil. Soil type: Sand.	
S113	A1 Inset A	<i>Eucalyptus tetradonta</i> +/- <i>Eucalyptus miniata</i> open forest. Mid/shrub layer of <i>Pandanus spiralis</i> , <i>Acacia difficilis</i> , <i>Erythrophleum chlorostachys</i> , <i>Petalostigma pubescens</i> , <i>Hakea arborescens</i> and <i>Buchanania obovata</i> . Perennial grass ground layer. Sandy soils with lateritic gravel. Soil type: Loamy sand and sand.	





Site	Figure	Notes	Photograph
S114	A1 Inset A	<i>Eucalyptus tetradonta</i> and <i>Eucalyptus miniata</i> woodland. Mid layer of <i>Petalostigma pubescens</i> , <i>Buchanania obovata</i> , <i>Acacias</i> , <i>Owenia vernicosa</i> and <i>Pandanus spiralis</i> . Sandy soils. Soil type: Loamy sand.	
S115	A1 Inset A	<i>Melaleuca viridiflora</i> and <i>Corymbia polycarpa</i> open woodland. Mid layer of <i>Pandanus spiralis</i> . Perennial grass ground layer. Soil type: Sandy loam and sandy clay loam.	
S116	A1 Inset C	<i>Eucalyptus tetradonta</i> and <i>Corymbia polycarpa</i> open woodland. Mid layer of <i>Grevillea pteridifolia</i> . Shrub layer of <i>Melaleuca viridiflora</i> , <i>Asteromyrtus symphyocarpa</i> , <i>Petalostigma pubescens</i> and <i>Acacia difficilis</i> . Sedges dominate ground layer. Sandy soil. Some <i>Persoonia falcata</i> and <i>Banksia dentata</i> . Soil type: Loamy sand.	
S117	A1 Inset B	Scattered <i>Melaleuca viridiflora</i> , <i>Pandanus spiralis</i> , <i>Grevillea pteridifolia</i> and <i>Terminalia carpentariae</i> above a perennial grass understorey with sedges and forbs. Sandy soils. Soil type: Sand.	




Site	Figure	Notes	Photograph
S118	A1 Inset A / A1 Inset B	<i>Eucalyptus tetradonta</i> woodland. Mid layer of regenerating <i>Eucalyptus tetradonta</i> , <i>Acacia difficilis</i> , <i>Grevillea heliosperma</i> and <i>Buchanania obovata</i> . Perennial grass understorey. Loamy sand with lateritic gravel. Soil type: Loamy sand.	
S119	A1 Inset B	<i>Melaleuca viridiflora</i> shrubland with emergent <i>Grevillea pteridifolia</i> . Understorey of <i>Dapsilanthus elatior</i> . Sandy soils. Other species with dbh>5cm included <i>Acacia difficilis</i> , <i>Terminalia carpentariae</i> and <i>Pandanus spiralis</i> . Soil type: Sand.	
S120	A1 Inset C	<i>Callitris intratropica</i> , <i>Eucalyptus tetradonta</i> , <i>Corymbia kombolgiensis</i> and <i>Corymbia polycarpa</i> woodland to open woodland. Dense low shrub layer of <i>Acacia yirrkallensis</i> , <i>Acacia oncinocarpa</i> , <i>Acacia difficilis</i> , <i>Jacksonia dilatata</i> , <i>Petalostigma pubescens</i> , <i>Bossiaea bossiaeooides</i> and <i>Calytrix brownii</i> . <i>Triodia</i> spp. in ground layer. On low sandstone hillside. Scattered <i>Cycas arnhemica</i> . Soil type: Loamy sand.	
S121	A1 Inset B	<i>Eucalyptus tetradonta</i> open forest on laterite. Mid layer of <i>Acacia difficilis</i> , <i>Pandanus spiralis</i> , <i>Erythrophleum chlorostachys</i> and <i>Buchanania obovata</i> . Perennial grass understorey. Soil type: Loamy sand.	





Site	Figure	Notes	Photograph
S122	A1 Inset A	Mixed woodland near base of white rock with sandy soil, near a gully and transitioning into laterite. Canopy species include <i>Eucalyptus tetradonta</i> , <i>Corymbia polycarpa</i> , <i>Corymbia ferruginea</i> , <i>Eucalyptus miniata</i> , <i>Callitris intratropica</i> (on edge of site) and <i>Eucalyptus tectifica</i> . Mid layer includes <i>Melaleuca viridiflora</i> and <i>Petalostigma pubescens</i> , <i>Buchanania obovata</i> and <i>Erythrophleum chlorostachys</i> . Perennial grass in ground layer and sedges near gully. Soil type: Sandy loam.	
S123	A1 Inset B	Dense shrubland of <i>Acacia difficilis</i> with <i>Triodia</i> spp. ground layer on coastal sand. Scattered trees of <i>Melaleuca ferruginea</i> . Also patches of monsoon vine forest species including <i>Brachychiton paradoxus</i> , <i>Sterculia quadrifida</i> , <i>Pouteria sericea</i> , <i>Diospyros humilis</i> and <i>Psychotria nesophila</i> . Soil type: Sand.	
S124	A1 Inset C	<i>Eucalyptus tetradonta</i> open forest on sandy soil. Mid layer moderately dense comprising regenerating <i>Eucalyptus tetradonta</i> , <i>Acacia difficilis</i> , <i>Brachychiton diversifolius</i> , <i>Terminalia carpentariae</i> , <i>Pandanus spiralis</i> , <i>Grevillea heliosperma</i> and <i>Grevillea pteridifolia</i> . Perennial grasses and leaf litter. Rare <i>Callitris intratropica</i> . Soil type: Loamy sand.	
S125	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland/open forest on laterite. Soil type: Sandy loam and loamy sand.	





Site	Figure	Notes	Photograph
S126	A1 Inset A	<i>Eucalyptus tetradonta</i> +/- <i>Eucalyptus miniata</i> open forest on laterite. Mid layer of <i>Petalostigma pubescens</i> , <i>Buchanania obovata</i> and <i>Acacia difficilis</i> . Perennial grass and leaf litter ground layer. Soil type: Loamy sand.	
S127	A1 Inset A	<i>Eucalyptus tetradonta</i> open forest on lateritic soil. Mid layer of <i>Buchanania obovata</i> , <i>Pandanus spiralis</i> , <i>Acacia difficilis</i> , <i>Terminalia carpentariae</i> , <i>Petalostigma pubescens</i> and <i>Erythrophleum chlorostachys</i> . Ground layer of perennial grasses. Soil type: Sandy loam.	
S128	A1 Inset C	<i>Eucalyptus tetradonta</i> woodland. Low shrub layer of <i>Acacia ocinocarpa</i> , <i>Grevillea pteridifolia</i> , <i>Erythrophleum chlorostachys</i> and <i>Hakea arborescens</i> . Ground layer of annual grass, tussock grass and <i>Triodia</i> spp. <i>Callitris intratropica</i> in general area, although not in site. Laterite outcrops in parts of site. Part of site is sandy with no lateritic gravel and gently sloping. Soil type: Loamy sand and sandy loam.	
S129	A1 Inset C	<i>Eucalyptus tetradonta</i> , <i>Eucalyptus bigalerita</i> and <i>Corymbia polycarpa</i> alluvial woodland. Shrub layer of <i>Pandanus spiralis</i> , <i>Cycas arnhemica</i> , <i>Erythrophleum chlorostachys</i> , <i>Petalostigma pubescens</i> , <i>Asteromyrtus symphyocarpa</i> and <i>Hakea arborescens</i> . Ground layer of <i>Mnesithea rottboellioides</i> . Soil type: Silty loam.	





Site	Figure	Notes	Photograph
S130	A1 Inset B	<i>Melaleuca dealbata</i> and <i>Corymbia polycarpa</i> woodland on sand. Other species with dbh >5cm included <i>Banksia dentata</i> , <i>Grevillea pteridifolia</i> , <i>Acacia oncinocarpa</i> , <i>Pandanus spiralis</i> , <i>Acacia difficilis</i> and <i>Terminalia carpentariae</i> . Soil type: Sand.	
S131	A1 Inset B	Low woodland / tall shrubland of <i>Melaleuca viridiflora</i> , <i>Grevillea pteridifolia</i> and <i>Terminalia carpentariae</i> on coastal sand. Perennial grass and sedge understorey. Soil type: Sand and loamy sand.	
S132	A1 Inset C	Open woodland of <i>Eucalyptus tetradonta</i> , with extensive canopy death and dense sapling regeneration after fire. Regeneration of <i>Eucalyptus tetradonta</i> , <i>Corymbia polycarpa</i> , <i>Erythrophleum chlorostachys</i> and <i>Acacias</i> (<i>Acacia lamrocarpa</i> , <i>Acacia multisiliqua</i> , <i>Acacia holosericea</i>). Lateritic gravel, outcrops. <i>Cycas arnhemica</i> in shrub layer. Soil type: Gravelly loam.	
S133	A1 Inset A / A1 Inset B	Open woodland/low open woodland. Scattered trees of <i>Melaleuca acacioides</i> and <i>Melaleuca viridiflora</i> . Sparse shrub layer of <i>Melaleuca acacioides</i> and vines. Also grassland of tussock grass and sedges. Adjacent to estuarine zone. Soil type: Sand.	

Site	Figure	Notes	Photograph
S134	A1 Inset C	<p><i>Melaleuca ferruginea</i> and <i>Melaleuca viridiflora</i> open woodland and <i>Acacia</i> shrubland on sand. Dense mid layer of <i>Acacia</i> spp., regenerating <i>Melaleucas</i>. Ground layer of leaf litter, open patches of sand and occasional <i>Dapsilanthus</i> spp. Other shrub species include <i>Pandanus spiralis</i>, <i>Grevillea pteridifolia</i>, <i>Grevillea heliosperma</i> and <i>Jacksonia dilatata</i>.</p> <p>Soil type: Sand.</p>	
S135	A1 Inset C	<p>Shrubland of <i>Acacia difficilis</i>, <i>Acacia latescens</i>, <i>Bossiaea bossiaeooides</i>, <i>Owenia vernicosa</i>, <i>Terminalia carpentariae</i>, <i>Jacksonia dilatata</i>, <i>Grevillea heliosperma</i> and <i>Buchanania obovata</i> on dune crest. Ground layer of <i>Triodia</i> spp. and <i>Platyzoma microphyllum</i>. Surrounded by woodland of <i>Melaleuca ferruginea</i>, <i>Corymbia polycarpa</i> and <i>Melaleuca viridiflora</i> in dune swale with sedge (<i>Dapsilanthus</i> spp.) in ground layer.</p> <p>Soil type: Sand.</p>	
S136	A1 Inset C	<p><i>Corymbia polycarpa</i> and <i>Corymbia kombolgiensis</i> low open woodland on sand with white rock. Midstorey of <i>Terminalia carpentariae</i>, <i>Bossiaea bossiaeooides</i>, <i>Buchanania obovata</i>, <i>Petalostigma pubescens</i> and regenerating canopy species. Ground layer of hummock grass and perennial grass. Abundant leaf litter.</p> <p>Soil type: Sand.</p>	
S137	A1 Inset A	<p>Open perennial grassland with scattered shrubs including <i>Pandanus spiralis</i>, <i>Terminalia carpentariae</i> and <i>Brachychiton paradoxus</i>. Other species with dbh>5cm included <i>Planchonella</i> sp., <i>Melaleuca viridiflora</i>, <i>Cycas arnhemica</i> and <i>Hakea arborescens</i>.</p> <p>Soil type: Sandy loam and sandy clay loam.</p>	

Site	Figure	Notes	Photograph
S138	A1 Inset C	Dense shrubland of <i>Acacia torulosa</i> , <i>Acacia difficilis</i> , <i>Grevillea pteridifolia</i> , <i>Melaleuca viridiflora</i> , <i>Bossiaea bossiaeoidea</i> , <i>Terminalia carpentariae</i> , <i>Acacia oncinocarpa</i> , <i>Pandanus spiralis</i> , <i>Banksia dentata</i> , <i>Acacia latescens</i> and <i>Buchanania obovata</i> . Scattered trees to open woodland of <i>Melaleuca ferruginea</i> . Ground layer of <i>Triodia</i> spp., <i>Platyzoma microphyllum</i> and <i>Dapsilanthus elatior</i> . On coastal dune. Soil type: Sand.	
S139	A1 Inset C	Spring monsoon vine forest dominated by <i>Melicope elleryana</i> and <i>Syzygium nervosum</i> . Vines of <i>Flagellaria indica</i> , <i>Cayratia acris</i> and <i>Cissus reniformis</i> . Dense ferns of <i>Nephrolepis hirsutula</i> and <i>Stenochlaena palustris</i> . Shrub layer of <i>Leea indica</i> and palms of <i>Hydriastele wendlandiana</i> . Other tree species include <i>Schefflera actinophylla</i> , <i>Horsfieldia australiana</i> , <i>Syzygium angophoroides</i> and <i>Gmelina schlechteri</i> . Soil type: Humus/loam and loam.	
S140	A1 Inset B	Open forest to low open forest of <i>Melaleuca cajuputi</i> . Mid layer of <i>Timonius timon</i> , <i>Pandanus spiralis</i> , <i>Grevillea pteridifolia</i> and <i>Melaleuca viridiflora</i> . Tussock grass ground layer. Wet peaty soil. Adjacent to low open forest/low woodland of same species and <i>Terminalia carpentariae</i> , <i>Acacia lamprocarpa</i> , <i>Cycas angulata</i> and <i>Hakea arborescens</i> . Soil type: Sandy loam.	

Site	Figure	Notes	Photograph
S141	A1 Inset C	Seepage monsoon vine forest in dune swale. Emergent large <i>Melaleuca leucadendra</i> and <i>Melaleuca cajuputi</i> . Vines of <i>Trophis scandens</i> , <i>Flagellaria indica</i> and <i>Mucuna gigantea</i> . Canopy of <i>Hibiscus tiliaceus</i> , <i>Buchanania obovata</i> , <i>Calophyllum sil</i> , <i>Dillenia alata</i> , <i>Gmelina schlechteri</i> , <i>Diospyros maritima</i> , <i>Myristica insipida</i> , <i>Aglaia brownii</i> , <i>Sterculia quadrifida</i> , <i>Alphitonia oblata</i> , <i>Celtis philippensis</i> , <i>Uvaria glabra</i> and <i>Nauclea orientalis</i> . Soil type: Sand.	
S142	A1 Inset C	Coastal closed monsoon vine forest. Dense canopy of <i>Diospyros maritima</i> , <i>Strychnos lucida</i> , <i>Pouteria sericea</i> , <i>Celtis philippensis</i> , <i>Micromelum minutum</i> , <i>Timonius timon</i> , <i>Ficus virens</i> , <i>Cupaniopsis anacardioides</i> , <i>Tabernaemontana orientalis</i> , <i>Psydrax odorata subsp. arnhemica</i> , <i>Psychotria nesophila</i> and <i>Drypetes deplanchei</i> . Emergent <i>Sterculia quadrifida</i> and <i>Canarium australianum</i> . Soil type: Sandy loam and loamy sand.	
S143	A1 Inset C	Hummock grassland with patches of monsoon forest species on sand dunes. Species with dbh >5cm included <i>Brachychiton paradoxus</i> , <i>Celtis philippensis</i> and <i>Diospyros maritima</i> . Soil type: Sand.	
S144	A1 Inset A	Perennial grassland with <i>Pandanus spiralis</i> , <i>Terminalia carpentariae</i> , <i>Cycas arnhemica</i> and <i>Hakea arborescens</i> . Soil type: Sandy loam.	

Site	Figure	Notes	Photograph
S145	A1 Inset C	Shrubland within dune swale, with <i>Acacia</i> sp. located in adjacent swales. Shrub layer of dead timber, <i>Acacia latescens</i> , <i>Acacia difficilis</i> , <i>Grevillia heliosperma</i> , <i>Owenia vernicosa</i> , <i>Bossiaea bossiaeooides</i> , <i>Jacksonia dilatata</i> , <i>Tephrosia</i> sp. and <i>Boronia lanuginosa</i> . Ground layer of hummock grass and <i>Platyzoma microphyllum</i> with patches of open sand. Soil type: Sand.	
S146	A1 Inset C	Shrubland on coastal sand dune (inland). Mid layer of <i>Acacia</i> spp., <i>Terminalia carpentariae</i> and <i>Grevillia heliosperma</i> . Soil type: Sand.	
S147	A1 Inset C	<i>Melaleuca viridiflora</i> and <i>Melaleuca ferruginea</i> open woodland on sand. Mid layer of <i>Acacia</i> spp., <i>Brachychiton paradoxus</i> , <i>Terminalia carpentariae</i> and monsoon species. Hummock grass and leaf litter ground layer. Behind dune system. Soil type: Sand.	
S148	A1 Inset B	Hummock grassland on sand dune. Scattered monsoon shrubs in adjacent areas. <i>Santalum lanceolatum</i> and <i>Brachychiton paradoxus</i> in shrub layer. <i>Gomphrena canescens</i> common in ground layer. Soil type: Sand.	

Site	Figure	Notes	Photograph
S149	A1 Inset B	Hummock grassland on sand dune with scattered <i>Santalum lanceolatum</i> . <i>Gomphrena canescens</i> common in ground layer. Soil type: Sand.	
S150	A1 Inset C	<i>Melaleuca ferruginea</i> open woodland in dune swale. Dense shrub layer of <i>Bossiaea bossiaeooides</i> and <i>Acacia</i> spp. Other shrubs include <i>Jacksonia dilatata</i> , <i>Pouteria sericea</i> and <i>Grevillia heliosperma</i> . Hummock grass understorey. Soil type: Sand.	
S151	A1 Inset C	Mixed shrubland, grassland and monsoon shrubs in coastal dune swale. Shrubs include <i>Hakea arborescens</i> , <i>Santalum lanceolatum</i> and <i>Brachychiton paradoxus</i> . Ground layer of hummock grasses and bare sand. Scattered sedges and forbs. Soil type: Sand.	
S152	A1 Inset B	Hummock grassland with scattered patches of monsoon species. Soil type: Sand.	

Appendix C

Detailed Survey Procedure

C.1 Motion-sensor Camera Trapping

Motion-sensor camera surveys were undertaken in accordance with the procedures described in the DENR Risk Assessment Plan, which included:

- Use of modified Reconyx PC850 cameras (see **Section C.1.1.iv** for camera configuration details);
- At each survey site:
 - Establishment of two unfenced cameras and bait stations, which were left to record for a minimum of four weeks (28 days); and
 - Establishment of two fenced cameras and bait stations, which were left to record for a minimum of four weeks (28 days).

As not all habitat types proposed to be sampled were guaranteed to contain suitable trees to attach the cameras, star pickets or wooden stakes were utilised as an alternative. Tape measures were utilised to provide accurate measurements between equipment components (e.g. camera and bait station) during camera setup.

The following camera information was recorded on datasheets at each site:

- Date set;
- Site number (e.g. S001, S002);
- Camera position number (e.g. C1, C2, C3, C4);
- Camera setup type (e.g. fenced, unfenced)
- Waypoint ID, comprising site number and camera position (e.g. S001C1, S001C2, S001C3, S001C4);
- Easting;
- Northing;
- Personnel responsible for camera setup;
- Unique camera identifier, comprising sequential numbering (e.g. G001, G002); and
- Unique SD card identifier, comprising sequential numbering (e.g. G001, E001).

C.1.1 Equipment Preparation

i. Bait Stations

Bait stations were comprised of an 80 mm PVC pipe, with a ventilated cap on each end to prevent fauna eating the bait ball whilst allowing the scent of a bait ball to escape. The ventilated cap on the top of the bait station had an overhanging cover to reduce dilution of the bait ball during rainfall. Bait balls were made using a standard small mammal bait mix (Gillespie *et al.*, 2015) comprising peanut butter, oats and honey to a wet and oily consistency. Bait balls were at least the size of a golf ball.

Each bait station was attached to a metal star picket using a cable tie and, if required cloth or duct tape. The metal star pickets utilised for the bait stations were either 45 cm or 60 cm in length. The taller fence posts were utilised at locations where additional stability was required (e.g. sand dunes), thereby ensuring the bait stations could not be readily knocked over by fauna and remained within the focal area of the motion-sensor cameras.

ii. Camera Mounts

The cameras at the fenced site were attached to a camera mount. The camera mounts were made of 23 x 12 cm marine ply board. Each mount had the following holes drilled:

- A hole in the centre to enable fastening of the camera using a ¼ inch x 15 mm mushroom head bolt;
- Two holes in the top corners to enable threading of the octopus strap; and
- One hole in the centre of the top edge to fit a M8 x 120 mm hex head bolt with a nut on each site of the board to enable adjustment of camera angle.

Cameras were attached to the camera mounts in a horizontal orientation.

iii. Cork Boards

A cork board was utilised at the fenced sites only. Cork boards were made of 30 x 30 cm cork board glued to a 30 x 30 cm piece of marine ply. Each cork board had a hole drilled in each corner to enable the board to be secured to the ground using metal tent pegs. Cork boards were positioned between the two drift fences at each fenced site, in front of the bait station.

Cork boards were used to create a more homogenous temperature zone to increase the chance of the motion-sensor cameras capturing images, as the camera relies on a temperature differential in conjunction with movement (see **Section C.1.1.iv**). The presence of a more homogenous temperature zone results in increased contrast with the thermal signature of small mammals (Welbourne, 2013). The cork boards were utilised at the fenced sites only due to the restricted field of view of the cameras at the fenced sites (i.e. higher downward angle directly between two fences). The restricted field of view at the fenced sites allows for greater detection of the temperature differential.

iv. *Camera Configuration*

The motion-sensor cameras utilised for the research project were Reconyx® PC850 Hyperfire Professional White Flash Camera units. These camera units were considered by NT DENR to be the only camera available on the market at that time that could operate satisfactorily in the Top End environment with adequate sensitivity and precision to consistently detect both the Northern Hopping-mouse and Brush-tailed Rabbit-rat (Gillespie and Heiniger, 2017).

The motion-sensor cameras will trigger (i.e. commence capturing images) when movement occurs across motion detection zones configured within the camera. For the camera to trigger two things need to happen (Reonyx, 2017):

1. An object with a temperature different from the background temperature must be present within the detection bands of the camera (i.e. something warmer or colder than the ambient temperature); and
2. That object (i.e. something warmer or colder than the ambient temperature) must either: enter, leave, or cross between any of the motion detection zones.

All cameras were modified by Reconyx to have high sensitivity and a focal length of 90 cm. The cameras were then configured with the following settings in the Advanced setup mode:

- Trigger:
 - Motion sensor: On;
 - Sensitivity: High;
 - Pictures per trigger: 3;
 - Picture interval: Rapidfire;
 - Quiet period: No delay;
- Timelapse:
 - AM period: Off;
 - PM period: Off;
- Resolution: 3.1 MP;
- Nightmode:
 - Nightmode: Fast shutter; and
 - Illuminator: On.

Each camera was given a unique identifier, which was programmed into the camera. This unique identifier is shown on the images captured by the camera.

Consistency in the use of the Reconyx PC850 cameras with the modifications and procedures described above was applied across all sampling sites. This ensured that the design and effectiveness of the study was not compromised.

A total of 12 rechargeable Ni-MH batteries were used in each camera. The camera settings were configured to reflect this battery type. An empty 16 GB SD card was installed within each camera prior to deployment. A fresh desiccant sachet was inserted into each camera case prior to camera deployment.

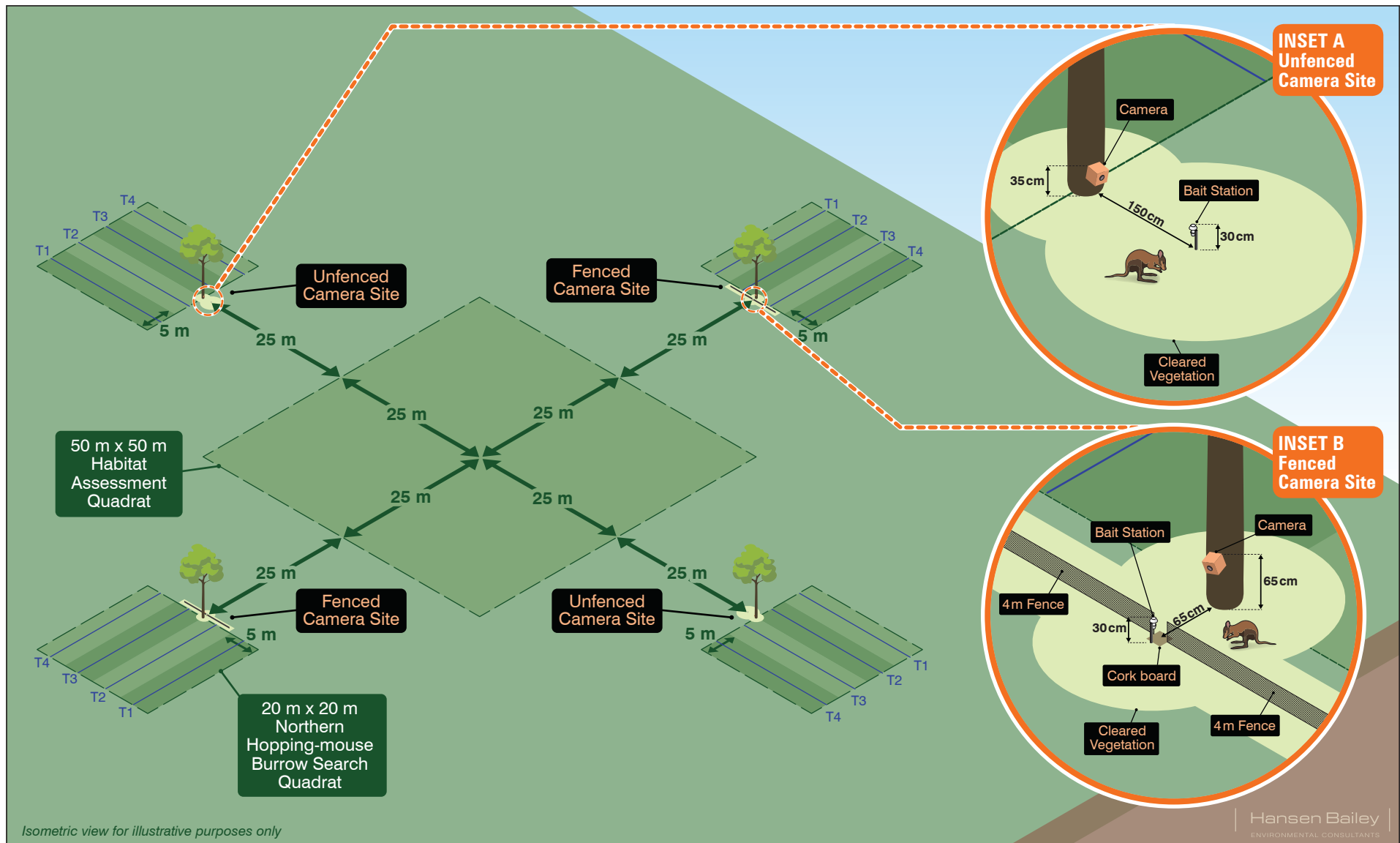
C.1.2 Unfenced Camera Setup

Unfenced camera setup was undertaken as follows:

- Site preparation:
 - Vegetation clearing at each site was undertaken using shovels, rakes, secateurs and saws. Clearing was undertaken to minimise false triggers of the cameras (i.e. triggered by vegetation and not fauna), to maximise detections within the motion detection zones of the camera, and to reduce the risk of fire damage to equipment. Clearing was undertaken in accordance with the following specifications, as shown in **Plate C.1**:
 - Clearing between the camera and the bait station (width of approximately 1.5 m cleared);
 - Clearing at least 1 m surrounding the camera; and
 - Clearing at least 1 m behind the bait station;
 - Vegetation that could cause false triggers, such as overhanging vegetation, was removed;
 - Perennial grasses and shrub bases were dug out;
 - Additional clearing was undertaken if camera position checks determined field of view was obstructed;
 - Cleared vegetation was not piled next to the cleared area as it could blow into the field of view resulting in false triggers or impede animal movement;
- Bait station installation:
 - Bait stations were positioned 150 cm from the base of the camera;
 - Bait stations were hammered into the ground until the top of the bait station was positioned 30 cm above the ground;

- Once the remaining components of the camera setup were completed, ant granules were sprinkled around the base of each bait station;
- Camera installation:
 - To prevent glare and sun damage to the cameras, east or west facing cameras were avoided;
 - Cameras were attached to either a tree or wooden stake/metal star picket using an octopus strap, with the top of the camera casing positioned at 35 cm above the ground;
 - Cameras were angled slightly downwards, using short sticks or bark, to ensure the image captured by the camera was centred directly on the base of the bait station;
 - The camera angle was tested to ensure the image was centred on the base of the bait station. This was done by inserting an SD card into the motion-sensor camera, then triggering image capture by moving across the motion detection zones. The SD card was then inserted into a digital camera which had its viewing screen marked with a circular label showing the centre of the image;
 - The camera was repositioned and tested until the image was centred on the base of the bait station and then all test images were deleted from the camera;
 - The camera was armed following completion of site setup. To facilitate the recording of the commencement date and time, a sign was placed in front of the bait station and the camera triggered. The sign was removed following the camera being triggered.

An example of an unfenced camera setup is shown in **Plate C.2**.



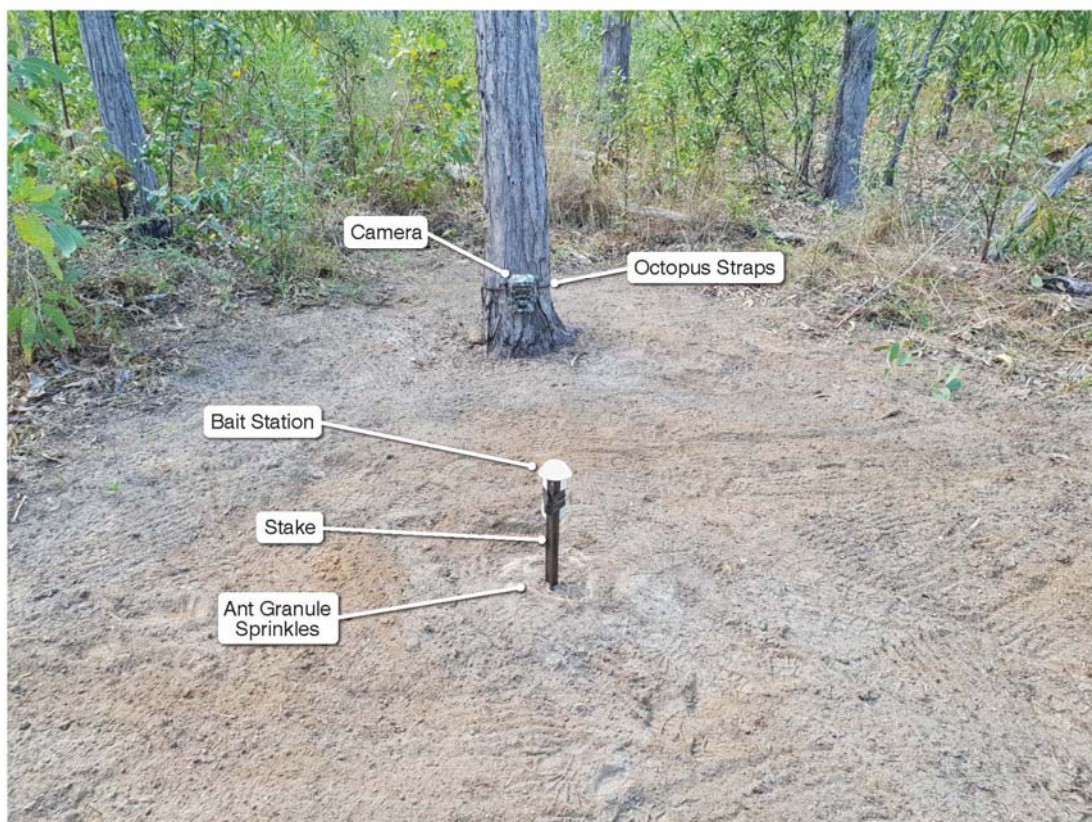
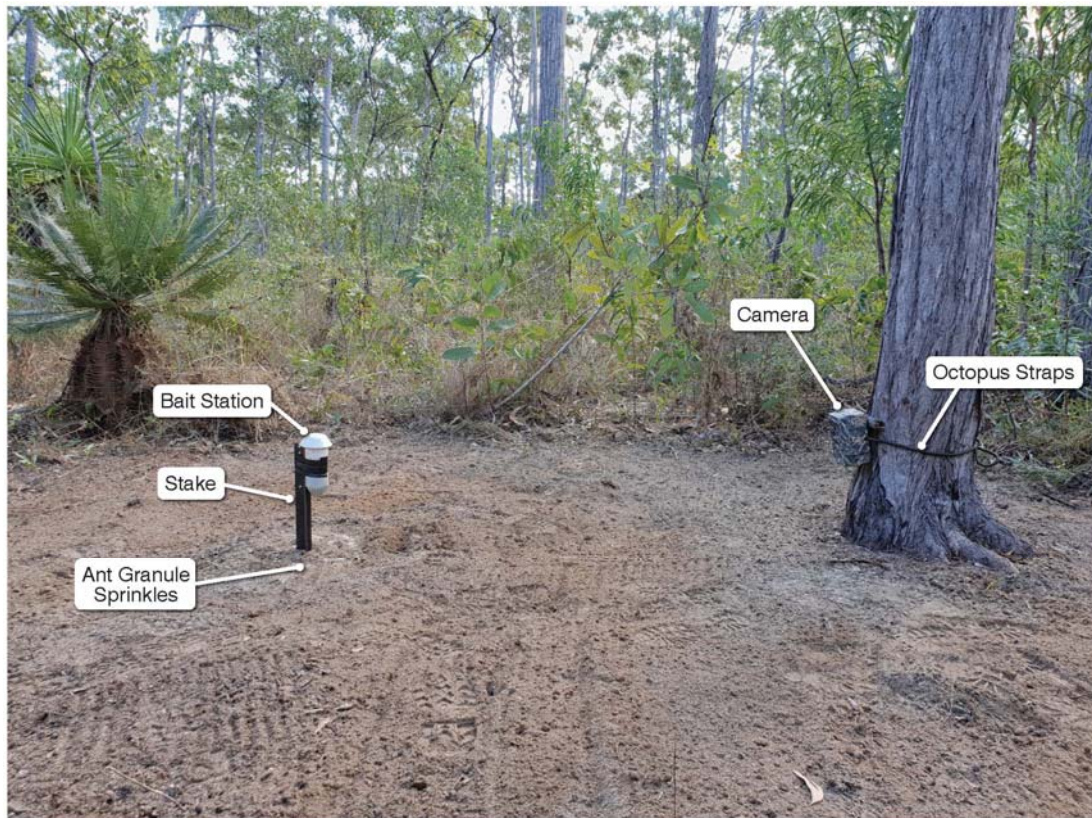


Plate C.2 Example unfenced camera setup

C.1.3 Fenced Camera Setup

Fenced camera setup was undertaken as follows:

- Site preparation:
 - Vegetation clearing at each site was undertaken using shovels, rakes, secateurs and saws. Clearing was undertaken to minimise false triggers of the cameras (i.e. triggered by vegetation and not fauna), to maximum detections within the motion detection zones of the camera, and to reduce the risk of fire damage to equipment. Clearing was undertaken in accordance with the following specifications, as shown in **Plate C.1**;
 - Clearing between the camera and the bait station (width of approximately 1.5 m cleared);
 - Clearing at least 1 m surrounding the camera;
 - Clearing at least 1 m behind the bait station; and
 - Clearing at least 0.5 m either side of the drift fence;
 - Vegetation that could cause false triggers, such as overhanging vegetation, was removed;
 - Perennial grasses and shrub bases were dug out;
 - Additional clearing was undertaken if camera position checks determined field of view was obstructed;
 - Cleared vegetation was not piled next to the cleared area as it could blow into the field of view resulting in false triggers or impede animal movement;
- Cork board installation:
 - The middle of the cork board was positioned 65 cm from the base of the camera;
 - The cork board was secured with four tent pegs;
- Bait station installation:
 - Bait stations were positioned immediately behind the cork board at the mid-point;
 - Bait stations were hammered into the ground until the top of the bait station was positioned 30 cm above the ground;
 - Once the remaining components of the camera setup were completed, ant granules were sprinkled around the base of each bait station;

- Drift fence installation:
 - The drift fences at each of the two fenced camera sites were deployed at orientations perpendicular to each other;
 - Two 4 m drift fences were installed either side of the cork board and secured using a shallow trench to bury the base of the fence, and drift fence rods/stakes to keep the fence erect. Drift fence rods/stakes were placed at three locations along each drift fence;
 - Excess soil was pushed along the base of the drift fence to allow the fence to be held in place and to fill gaps, which directs fauna along the length of the drift fence towards the bait station;

- Camera installation:
 - Cameras were attached to either a tree or wooden stake/metal star picket using an octopus strap, with the top of the camera casing positioned at 65 cm above the ground;
 - Cameras were angled downwards (45°), using the bolt/nuts attached to the camera mount and short sticks or bark, to ensure the image captured by the camera was centred on the centre of the cork board;
 - The camera angle was tested to ensure the image was centred on the centre of the cork board. This was done by inserting an SD card into the motion-sensor camera, then triggering image capture by moving across the motion detection zones. The SD card was then inserted into a digital camera, which had its viewing screen marked with a circular label showing the centre of the image;
 - The camera was repositioned and tested until the image was centred on the centre of the cork board and then all test images were deleted from the camera;
 - The camera was armed following completion of site setup and triggered to indicate commencement of the survey. To facilitate the recording of the commencement date and time, a sign was placed in front of the bait station and the camera triggered. The sign was removed following the camera being triggered.

An example of a fenced camera setup is shown in **Plate C.3**.

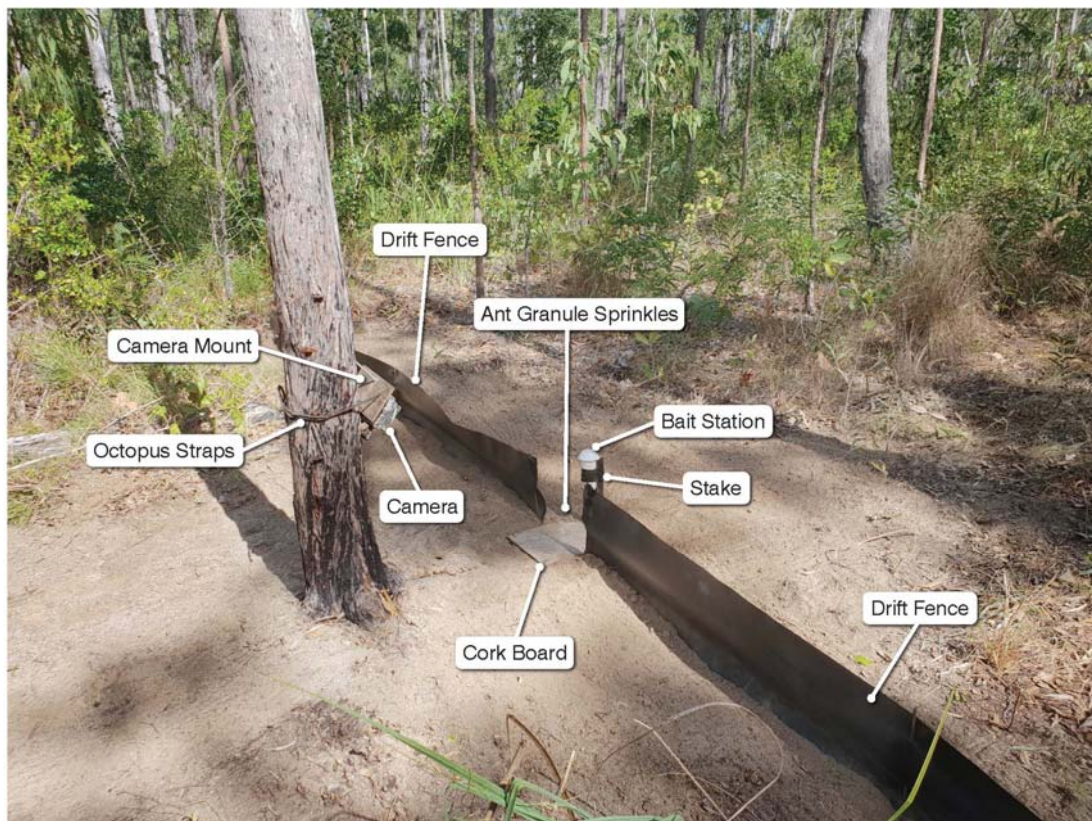
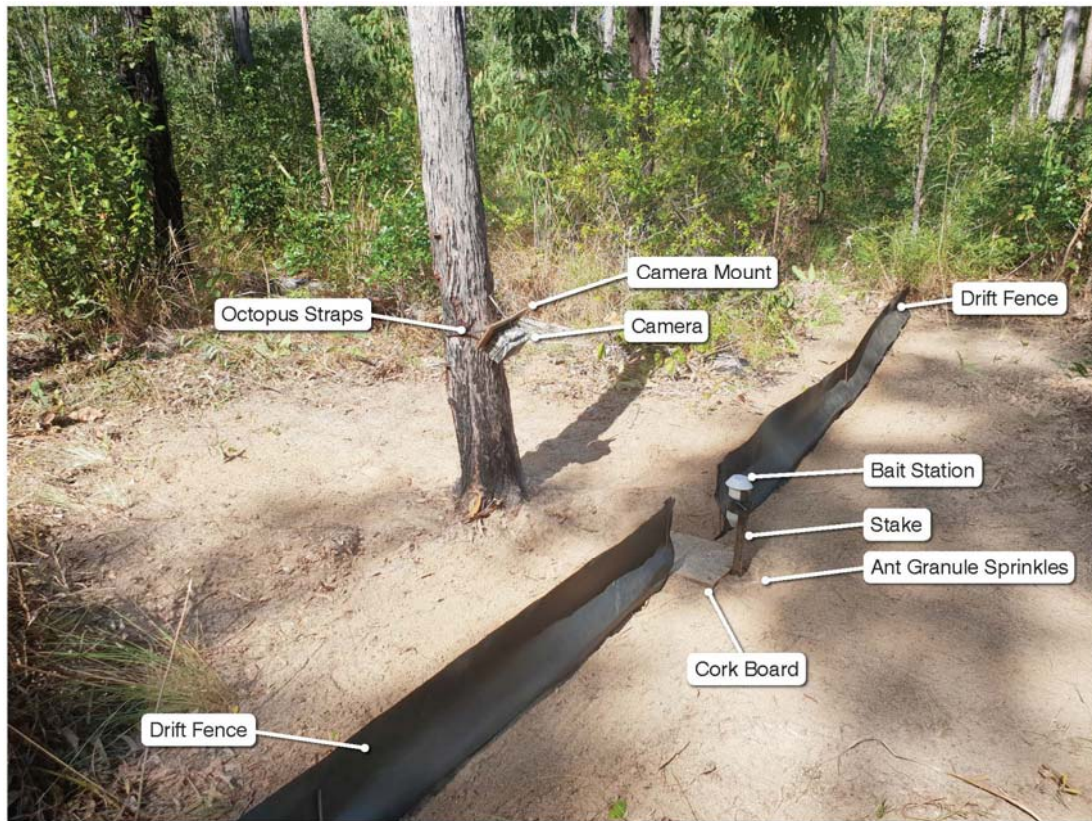


Plate C.3 Example fenced camera site layout

C.1.4 Equipment Retrieval

Equipment retrieval was undertaken as follows:

- The camera was triggered to indicate the completion of the survey. To facilitate the recording of the completion date and time, a sign was placed in front of the bait station prior to the camera being triggered.
- The camera screen was checked to ensure the last trigger was showing and if not, the camera was triggered again;
- The OK button was pressed to view capture data;
- The camera was switched off;
- The camera, bait station, cork board and drift fence were removed.

The following details were recorded during equipment retrieval:

- Date of retrieval;
- Number of images;
- Percentage of SD card filled;
- Percentage of battery remaining;
- Unique camera identifier (e.g. G001, G002);
- Unique SD card identifier (e.g. G001, E001); and
- Proportion of 50 x 50 m habitat assessment quadrat burnt on retrieval.

C.2 Habitat Assessment

Habitat assessment surveys were undertaken at each sampling site. Surveys were undertaken in accordance with the procedures described in the DENR Risk Assessment Plan, which included:

- Recording evidence of fire prior to site establishment;
- Recording circumferences of trees;
- Recording length and circumferences of logs; and
- Point intersect method to record ground cover, grass layer, shrub/woody vegetation and mid-storey vegetation.

Following consultation with DENR, it was determined that the habitat assessment would also include collection of basic soil information at each camera location.

The habitat assessment surveys were undertaken using a 50 x 50 m habitat assessment quadrat, which was marked out using a 50 m measuring tape and GPS. A detailed description of the method used for the habitat assessment is provided in the following sections.

In addition to the habitat assessment, the following data was also collected:

- Site number (e.g. S001, S002);
- Date of habitat assessment;
- Personnel undertaking the habitat assessment;
- Three photographs of the site (facing into the habitat assessment quadrat); and
- General description of the vegetation.

C.2.1 Evidence of Fire

Evidence of recent fire was recorded as present or absent within each 50 x 50 m habitat assessment quadrat. Where evidence of fire was present, additional notes were recorded, such as the height of charring and estimated time since fire.

Evidence of fire within the 50 x 50 m habitat assessment quadrat was also recorded as part of equipment retrieval.

C.2.2 Tree Circumference

Tree circumference data collection was undertaken within four 50 m transects, which ran parallel with the edges of the 50 x 50 m habitat assessment quadrat, with each transect being 5 m in width (see **Plate C.1**). Data collection was undertaken as follows:

- Tree data was collected for trees with a diameter at breast height of >5 cm within the four transects, ceasing when total number of trees reached 50;
- The species of each tree assessed was recorded, or if dead, was noted as such;
- The circumference of each tree assessed was measured at 1.3 m above the ground and recorded;
- If an assessed tree was multi-stemmed, all stems with a diameter at breast height of >5 cm were measured and recorded, with each stem circumference recorded separately (i.e. not totalled); and
- If the number of trees assessed reached 50, the total length of the transects traversed was recorded (maximum of 200 m).

C.2.3 Log Length and Circumference

Log length and circumference data collection was undertaken as follows:

- Log data was collected for logs with a diameter >5 cm that intersected the edges of the 50 x 50 m habitat assessment (see **Plate C.1**);
- The length of each log assessed was recorded;
- The circumference of each log assessed was recorded at the midpoint, either by measuring around the entirety of the log or if this was not possible, measuring half the circumference and doubling the measurement; and
- Where a log had more than one stem that crossed the tape of the 50 m transect, all stems had the circumference measured and recorded separately, with no overlaps to the total length measurement.

C.2.4 Point Intersect Data

A point intersect survey was undertaken to record ground cover, grass layer, shrub/woody vegetation and mid-storey vegetation at 200 points along the edges of the 50 x 50 m habitat assessment. The survey was undertaken using a densitometer stick as detailed within the DENR Risk Assessment Plan, which is a constructed piece of survey equipment comprising a pole with a densitometer and laser positioned at 1.5 m on opposite sides of the pole, and height markings at 20 cm, 50 cm and 150 cm. Data was recorded every metre along the 50 m transect, commencing at 1 m, resulting in a total of 200 data points for each 50 x 50 m habitat assessment quadrat.

Point intersect data collection was undertaken as follows:

- Ground cover, grass layer, shrub/woody vegetation (below 1.5 m):
 - The densitometer stick was placed at each 1 m mark in a vertical position using the level in the densitometer;
 - The laser was turned on;
 - The first category (see **Table C.1**) of vegetation that the laser beam touched was recorded as present;
 - The recorded category of vegetation was then moved to the side and the presence of the subsequent category of vegetation was recorded (e.g. if the first category recorded was a small shrub, this was moved to the side to enable recording of the grass category). This process was repeated until a ground category was recorded;
 - A ground cover category was always recorded as present even if no other categories of vegetation were recorded;

- Midstorey vegetation (between 1.5 m and 6 m):
 - The densitometer stick was placed at each 1 m mark in a vertical position using the level in the densitometer; and
 - The view-finder of the densitometer was inspected to determine the presence or absence of vegetation (foliage, branch or twig) occurring between 1.5 m and 6 m. Presence or absence was determined by vegetation intersecting the cross-hairs visible in the view-finder.

Table C.1 Vegetation categories used during the point intersect survey

Layer	Category
Ground (moved to nearest measurable location if point intersects a trunk)	Bare ground
	Litter
	Rock: 2-20 cm
	Rock: >20 cm
	Bedrock
Grass (no height restriction)	Perennial: More firmly rooted in the ground and mostly form distinct tussocks
	Perennial burnt: The base is visible but no attached senescent or green leaves due to a very recent fire
	Annual: Can easily be pulled out and have very short root systems
	Hummock grass: <i>Triodia</i> spp. (spinifex grass)
	Sedge: Like a grass but generally have a leathery smooth texture with brown at the base
	Forb/herb: Non-woody plants with broader leaves and distinct flowers (when present)
Shrub/Woody Vegetation (all living vegetation with a woody component)	Small: 0-20 cm
	Medium: 20-50 cm
	Tall: 50-150 cm

C.2.5 Soil Observations

Soil observations were recorded at each camera location. This included collection of the following data:

- Camera position number (e.g. C1, C2, C3, C4);
- Photograph;
- Basic soil classification (e.g. sand, loamy sand, clay); and
- Additional observations, such as presence of organic matter, gravel size.

The classification was intended to provide an indication on the sandiness of the soils, which could be used as an additional variable for data analysis for occupancy modelling. The basic soil classification did not involve the collection of samples.

C.3 Northern Hopping-mouse Burrow Searches

Northern Hopping-mouse burrow searches were undertaken within a 20 x 20 m search area adjacent to each camera. The Northern Hopping-mouse burrow search method included:

- Four traverses within the 20 x 20 m search area, each 5 m in width (see **Plate C.1**) to record occurrences of spoil heaps;
- Where spoil heaps were recorded, a measurement of maximum spoil heap width was recorded, a GPS reading taken, and the spoil heap photographed;
- Where spoil heaps had a maximum width greater than 50 cm, searches were undertaken within 5 m of the spoil heap for the presence of pop holes; and
- Where pop holes were detected, a measurement of the width of the hole was recorded, a GPS reading taken, and the hole photographed.

The name of the field surveyor undertaking each search was also recorded. Each individual Northern Hopping-mouse burrow search was undertaken by one field surveyor.

Appendix D

Personnel

D.1 Cumberland Ecology

Table D.1 Cumberland Ecology personnel

Name	Tasks	Qualifications
Katrina Wolf	Project management, site selection, field surveys, data analysis, DENR consultation, report preparation	Bachelor of Science (Environmental). The University of Sydney, 2007
Dr David Robertson	Project management, data analysis, DENR consultation, report preparation	Doctor of Philosophy. Ecology, University of Melbourne, 1986 Bachelor of Science (Honours) in Ecology, University of Melbourne, 1980
Dr Trevor Meers	Field surveys, data analysis, DENR consultation	Doctor of Philosophy, Restoration Ecology. University of Melbourne, 2007 Bachelor of Applied Science (Honours) in Natural Resource Management. Deakin University, 2002
Matthew Freeman	Field surveys	Bachelor of Natural Science (Nature Conservation). University of Western Sydney, 2012
Jaime Heiniger	Field surveys, data analysis	Bachelor of Science (Honours) in Biology. University of Queensland, 2011 <i>In progress: Doctor of Philosophy, Ecology. University of Queensland (2012-Present)</i>
Dr Hugh Davies	Field surveys, data analysis	Doctor of Philosophy. Ecology, University of Melbourne, 2018 Bachelor of Environmental Science (Honours) in Zoology. Monash University, 2012
Eleanor Saxon	Data analysis	Bachelor of Science (Honours). The University of New South Wales, 2017 Bachelor of Environmental Management. The University of New South Wales, 2016

D.2 Other Personnel

Table D.2 Other research project personnel

Company/ Personnel	Tasks
GEMCO/South32	
Mike Chapman	Project management, document review, DENR consultation, field assistance
Jacques Cramatte	Field assistance
Edward Fletcher	Field assistance
Brendan Kenny	Field assistance
Melinda Simmons	Field assistance
Reece Weight	Field assistance
Kerehi Wilson	Field assistance
Pat Gorbunovs	Field assistance
Sam Samarua	Field assistance
Tony Rivero	Field assistance
Scott Jeffery	Field assistance
Nicolas Johnston	Field assistance
Angus Phelps	Field assistance
Traditional Owners	
Ronald Wurrawilya	Field assistance
Torrance Wurrawilya	Field assistance
Daniel Amagula	Field assistance
Leonard Amagula	Field assistance
Rodson Amagula	Field assistance
Hansen Bailey	
Laura Knowles	Project management, document review, DENR consultation
Jesse Campbell	Document review

Appendix E

**Fauna Species Recorded within each
Sampling Site**

Table E.1 Fauna species recorded within sampling sites S001-S038

Fauna Species	S001	S002	S003	S004	S005	S006	S007	S008	S009	S010	S011	S012	S013	S014	S015	S016	S017	S018	S019	S020	S021	S022	S023	S024	S025	S026	S027	S028	S029	S030	S031	S032	S033	S034	S035	S036	S037	S038		
Birds																																								
Arafura Fantail																																								
Australasian Pipit																																					X			
Australian Magpie							X					X																												
Australian Owlet-nightjar	X			X	X			X				X	X		X							X		X					X									X		
Bar-shouldered Dove										X			X				X	X	X			X				X				X							X			
Blue-winged Kookaburra						X															X	X				X					X									
Brown Falcon																																								
Brown Goshawk																																								
Brown Honeyeater																																								
Brown Quail										X											X	X		X																
Buff-banded Rail																																								
Bush stone-curlew																																								
Chestnut-backed Button-quail									X				X																											
Collared Kingfisher																																								
Common Bronzewing																																							X	
Double-barred Finch																																								
Emerald Dove																						X						X			X									
Friarbird sp.		X																																						
Great Bowerbird		X																																						
Grey Shrike-thrush		X			X																																			
Grey-crowned Babbler																																								
Large-tailed nightjar																																								
Lemon-bellied Flycatcher																																								
Magpie-lark																																							X	
Masked Owl (northern)																																							X	
Northern Fantail																																								
Orange-footed Scrubfowl																																								
Peaceful Dove										X			X	X	X			X	X			X					X													
Pheasant Coucal																X				X				X															X	
Pied Butcherbird			X																																					
Rainbow Bee-eater																																								
Rainbow Pitta																																								
Red-backed Fairy-wren																																								
Rufous Whistler																																								
Sacred Kingfisher																																								
Shining Flycatcher																																								
Silver-crowned Friarbird		X																																						
Spotted Nightjar																												X										X		
Striated Pardalote																																								
Tawny Frogmouth								X																																
Torresian Crow		X					X			X		X		X		X		X	X			X	X			X			X				X					X		
Whistling Kite																																								
White-bellied Sea-eagle																																								

Table E.1 Fauna species recorded within sampling sites S001-S038

Fauna Species	S001	S002	S003	S004	S005	S006	S007	S008	S009	S010	S011	S012	S013	S014	S015	S016	S017	S018	S019	S020	S021	S022	S023	S024	S025	S026	S027	S028	S029	S030	S031	S032	S033	S034	S035	S036	S037	S038		
Mammals																																								
Agile Wallaby		X	X	X	X	X	X	X			X		X	X	X	X	X		X	X	X	X	X			X	X	X	X	X	X	X						X		
Cat																X					X	X																		
Common Planigale		X																X		X	X														X	X				
Common Rock-rat	X																														X									
Delicate Mouse			X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X					X	X		X			X	X	X	X	X	X	X	X	
Dingo															X	X	X							X			X											X		
Dog									X																														X	
Echidna		X	X	X		X				X	X			X			X							X	X	X	X	X	X	X	X		X	X		X			X	
Grassland Melomys										X			X		X		X			X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		X		
Northern Brown Bandicoot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Northern Quoll	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X			X	X	X		X		X	X	X	X	X	X	X	X	X	
Rock Ringtail	X																												X											
Short-eared Rock-wallaby	X		X																										X										X	
Sugar Glider																																								
Water Rat																																								
Reptiles																																								
Agamidae			X				X																																	
Black-palmed Monitor																													X											
Black-tailed Monitor										X	X		X		X						X	X	X			X				X	X	X							X	
Common Blue-tongued Lizard			X					X	X											X	X	X			X	X	X			X	X				X	X				
Elapidae										X																														
Frilled Lizard		X	X	X			X					X		X	X	X	X		X		X			X	X	X	X				X									
Gekkonidae																																							X	
Gilbert's Dragon				X			X					X	X		X		X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	X	X	X		X	
Olive Python																																								
Olive Whip Snake																	X																							
Pygmy Mulga Snake								X																														X		
Ridge-tailed Monitor																																								
Sand Goanna		X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X		X	X	X		X	X	X			X	
Scincidae				X							X	X				X	X				X			X				X		X		X						X		
Spotted Tree Monitor		X					X	X						X	X																X	X								
Two-lined Dragon		X		X		X										X						X	X									X				X	X			
Varanus																																								
Western Brown Snake																		X																						
TOTAL	6	14	10	11	7	8	9	11	7	12	8	10	11	10	13	11	13	10	11	13	19	8	13	4	15	13	13	9	9	13	17	7	8	9	13	6	10	8		

Table E.2 Fauna species recorded within sampling sites S038-S076

Fauna Species	S039	S040	S041	S042	S043	S044	S045	S046	S047	S048	S049	S050	S051	S052	S053	S054	S055	S056	S057	S058	S059	S060	S061	S062	S063	S064	S065	S066	S067	S068	S069	S070	S071	S072	S073	S074	S075	S076	
Birds																																							
Arafura Fantail																																							
Australasian Pipit																																							
Australian Magpie													X																										
Australian Owlet-nightjar				X							X	X																											
Bar-shouldered Dove																		X	X	X				X															
Blue-winged Kookaburra					X				X													X			X														
Brown Falcon																																							
Brown Goshawk																																							
Brown Honeyeater																																							
Brown Quail										X											X				X						X								
Buff-banded Rail																																							
Bush stone-curlew													X																				X		X			X	
Chestnut-backed Button-quail				X																		X																	
Collared Kingfisher																																							
Common Bronzewing		X												X																								X	
Double-barred Finch																																							
Emerald Dove																X			X	X						X	X	X											
Friarbird sp.																																							
Great Bowerbird			X																																				
Grey Shrike-thrush																																							
Grey-crowned Babbler	X																																						
Large-tailed nightjar																																							
Lemon-bellied Flycatcher	X	X																																					
Magpie-lark		X																																					
Masked Owl (northern)																																							
Northern Fantail																																							
Orange-footed Scrubfowl																																							
Peaceful Dove									X										X		X			X			X		X										
Pheasant Coucal							X			X					X			X						X															
Pied Butcherbird				X				X																		X													
Rainbow Bee-eater																																							
Rainbow Pitta																				X								X	X	X									
Red-backed Fairy-wren																																							
Rufous Whistler																																							
Sacred Kingfisher										X																													
Shining Flycatcher																													X										
Silver-crowned Friarbird								X																															
Spotted Nightjar																																							
Striated Pardalote															X																								
Tawny Frogmouth																																							
Torresian Crow	X		X	X	X		X		X			X	X	X							X	X		X												X	X		
Whistling Kite																																							
White-bellied Sea-eagle								X																															

Table E.2 Fauna species recorded within sampling sites S038-S076

Fauna Species	S039	S040	S041	S042	S043	S044	S045	S046	S047	S048	S049	S050	S051	S052	S053	S054	S055	S056	S057	S058	S059	S060	S061	S062	S063	S064	S065	S066	S067	S068	S069	S070	S071	S072	S073	S074	S075	S076	
Mammals																																							
Agile Wallaby	X	X	X				X		X	X	X			X	X	X	X	X	X	X	X	X	X	X			X	X	X	X					X	X			
Cat																		X					X		X														
Common Planigale		X			X			X		X	X								X		X									X	X		X	X				X	
Common Rock-rat	X																																						
Delicate Mouse		X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X		X	X	X	X			X	X	X	X	X	X	X	X	X	X
Dingo	X		X	X		X	X	X			X					X			X	X	X																		
Dog																																							
Echidna	X			X				X		X	X		X						X	X	X	X		X	X	X	X	X		X	X		X			X	X	X	
Grassland Melomys		X			X				X	X								X		X	X		X	X		X	X	X	X		X	X		X	X		X	X	
Northern Brown Bandicoot		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Northern Quoll	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X			X	X	X	X	X	X	X	X	X	X	X
Rock Ringtail																			X										X	X									
Short-eared Rock-wallaby	X																	X									X												
Sugar Glider																						X																	
Water Rat																																							
Reptiles																																							
Agamidae		X		X																																			
Black-palmed Monitor																																							
Black-tailed Monitor	X	X	X	X						X					X				X	X			X	X					X							X			
Common Blue-tongued Lizard	X	X					X		X	X							X		X	X	X						X									X		X	
Elapidae																																							
Frilled Lizard	X		X	X	X		X	X			X	X	X		X				X	X				X	X		X						X					X	
Gekkonidae																																							
Gilbert's Dragon	X	X		X			X		X	X		X		X	X	X	X	X	X	X	X			X		X	X	X				X	X	X	X	X	X	X	
Olive Python																																							
Olive Whip Snake																																							
Pygmy Mulga Snake																																							
Ridge-tailed Monitor	X																																						
Sand Goanna	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Scincidae		X			X	X	X					X	X			X					X							X						X	X		X	X	
Spotted Tree Monitor				X			X	X			X	X			X				X		X													X				X	
Two-lined Dragon				X	X	X	X		X		X		X		X	X	X															X	X		X	X		X	
Varanus	X		X			X												X																				X	
Western Brown Snake																																							
TOTAL	16	15	11	16	11	8	12	13	11	14	13	7	11	7	11	10	11	11	19	16	14	9	7	12	9	9	14	10	11	10	12	9	8	12	11	10	14	9	

Table E.3 Fauna species recorded within sampling sites S077-S114

Fauna Species	S077	S078	S079	S080	S081	S082	S083	S084	S085	S086	S087	S088	S089	S090	S091	S092	S093	S094	S095	S096	S097	S098	S099	S100	S101	S102	S103	S104	S105	S106	S107	S108	S109	S110	S111	S112	S113	S114	
Birds																																							
Arafura Fantail																											X												
Australasian Pipit																																							
Australian Magpie					X			X															X																
Australian Owlet-nightjar	X	X			X	X					X	X			X	X	X	X				X	X					X			X						X		
Bar-shouldered Dove								X													X		X			X	X							X					
Blue-winged Kookaburra	X												X																										
Brown Falcon																																							
Brown Goshawk																																							
Brown Honeyeater																																							
Brown Quail																																		X					
Buff-banded Rail																				X		X																	
Bush stone-curlew																										X													
Chestnut-backed Button-quail		X					X	X														X																	
Collared Kingfisher																																							
Common Bronzewing																													X								X		
Double-barred Finch																				X																			
Emerald Dove																					X					X	X	X	X				X						
Friarbird sp.																																							
Great Bowerbird		X																																					
Grey Shrike-thrush																										X													
Grey-crowned Babbler																																							
Large-tailed nightjar																		X																					
Lemon-bellied Flycatcher																																							
Magpie-lark																																							
Masked Owl (northern)																																							
Northern Fantail								X																														X	
Orange-footed Scrubfowl																											X	X	X										
Peaceful Dove							X													X															X				
Pheasant Coucal																X	X			X		X																	
Pied Butcherbird					X																																		
Rainbow Bee-eater																							X																
Rainbow Pitta																											X		X										
Red-backed Fairy-wren																																							
Rufous Whistler																																							
Sacred Kingfisher																																							
Shining Flycatcher																											X												
Silver-crowned Friarbird																																							
Spotted Nightjar																																							
Striated Pardalote																																							
Tawny Frogmouth																																							
Torresian Crow		X	X		X	X	X	X	X												X		X											X	X	X	X	X	
Whistling Kite																																							X
White-bellied Sea-eagle																																							

Table E.3 Fauna species recorded within sampling sites S077-S114

Fauna Species	S077	S078	S079	S080	S081	S082	S083	S084	S085	S086	S087	S088	S089	S090	S091	S092	S093	S094	S095	S096	S097	S098	S099	S100	S101	S102	S103	S104	S105	S106	S107	S108	S109	S110	S111	S112	S113	S114	
Mammals																																							
Agile Wallaby	X	X	X	X	X	X	X	X			X		X		X	X	X	X		X	X	X	X		X	X	X	X								X	X		
Cat				X																				X						X									
Common Planigale							X			X			X	X		X				X			X							X									
Common Rock-rat				X																																			
Delicate Mouse	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Dingo							X									X						X	X		X	X												X	
Dog																																							
Echidna		X	X	X								X		X	X		X	X									X			X			X		X		X		
Grassland Melomys			X					X	X			X		X	X		X	X	X	X	X	X		X	X	X	X	X	X	X		X			X	X	X		
Northern Brown Bandicoot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	
Northern Quoll	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	
Rock Ringtail																											X	X											
Short-eared Rock-wallaby				X																										X									
Sugar Glider								X																															
Water Rat																											X												
Reptiles																																							
Agamidae																																						X	
Black-palmed Monitor																																							
Black-tailed Monitor	X			X							X		X				X									X	X			X		X							
Common Blue-tongued Lizard																	X								X														
Elapidae																																							
Frilled Lizard	X	X			X	X							X			X		X	X						X	X			X									X	
Gekkonidae																			X																				
Gilbert's Dragon	X		X		X	X	X	X	X					X	X	X		X	X	X	X	X	X		X	X				X	X	X	X	X		X		X	
Olive Python																							X																
Olive Whip Snake																																							
Pygmy Mulga Snake																										X						X	X						
Ridge-tailed Monitor																																							
Sand Goanna	X				X	X								X		X		X	X			X	X		X					X	X				X	X			
Scincidae	X	X			X		X	X					X		X		X					X					X												
Spotted Tree Monitor						X						X	X									X				X													
Two-lined Dragon	X					X											X					X																	
Varanus				X																						X													
Western Brown Snake																																							
TOTAL	12	11	8	9	10	9	14	13	6	5	6	7	10	7	9	10	10	13	7	12	8	15	14	5	14	15	12	9	9	8	13	4	13	5	11	4	10	10	

Table E.4 Fauna species recorded within sampling sites S115-S152

Fauna Species	S115	S116	S117	S118	S119	S120	S121	S122	S123	S124	S125	S126	S127	S128	S129	S130	S131	S132	S133	S134	S135	S136	S137	S138	S139	S140	S141	S142	S143	S144	S145	S146	S147	S148	S149	S150	S151	S152																			
Birds																																																									
Arafura Fantail																																																									
Australasian Pipit																																																									
Australian Magpie							X				X																																														
Australian Owlet-nightjar	X	X		X		X	X			X		X						X								X																															
Bar-shouldered Dove									X	X						X	X		X					X																X																	
Blue-winged Kookaburra									X		X																																														
Brown Falcon														X																																											
Brown Goshawk																		X																																							
Brown Honeyeater																																																									
Brown Quail																X																								X																	
Buff-banded Rail																																																									
Bush stone-curlew							X																																																		
Chestnut-backed Button-quail																																																									
Collared Kingfisher																																																									
Common Bronzewing																						X																																			
Double-barred Finch																																																									
Emerald Dove																X									X	X		X	X																												
Friarbird sp.																									X	X		X	X																												
Great Bowerbird																																																									
Grey Shrike-thrush																																																									
Grey-crowned Babbler																																																									
Large-tailed nightjar																																																									
Lemon-bellied Flycatcher																																																									
Magpie-lark																																																									
Masked Owl (northern)																																																									
Northern Fantail																																																									
Orange-footed Scrubfowl																										X		X	X																												
Peaceful Dove	X		X			X	X					X	X				X							X															X																		
Pheasant Coucal		X																X			X						X																														
Pied Butcherbird		X																																																							
Rainbow Bee-eater																																																									
Rainbow Pitta																												X	X																												
Red-backed Fairy-wren																																																									
Rufous Whistler																																																									
Sacred Kingfisher																																																									
Shining Flycatcher																																																									
Silver-crowned Friarbird		X																																																							
Spotted Nightjar																												X																													
Striated Pardalote																																																									
Tawny Frogmouth									X													X																																			
Torresian Crow	X		X	X	X		X	X		X		X	X	X		X					X						X													X																	
Whistling Kite																																																									
White-bellied Sea-eagle																																																									

Table E.4 Fauna species recorded within sampling sites S115-S152

Fauna Species	S115	S116	S117	S118	S119	S120	S121	S122	S123	S124	S125	S126	S127	S128	S129	S130	S131	S132	S133	S134	S135	S136	S137	S138	S139	S140	S141	S142	S143	S144	S145	S146	S147	S148	S149	S150	S151	S152	
Mammals																																							
Agile Wallaby		X		X	X		X	X	X	X		X	X	X	X		X	X	X	X	X	X		X	X	X	X	X		X		X	X					X	
Cat						X								X																					X	X			X
Common Planigale							X						X																										X
Common Rock-rat						X																	X																
Delicate Mouse	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dingo		X		X	X		X					X		X			X	X																					
Dog													X																										
Echidna	X						X	X	X	X		X	X		X	X		X		X	X	X		X				X	X						X				X
Grassland Melomys		X	X		X				X	X					X			X		X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Northern Brown Bandicoot	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Northern Quoll	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rock Ringtail																													X										
Short-eared Rock-wallaby																																							
Sugar Glider			X					X											X																				
Water Rat																																							
Reptiles																																							
Agamidae		X					X												X						X														
Black-palmed Monitor						X																X																	
Black-tailed Monitor			X											X				X		X		X				X		X		X		X		X					
Common Blue-tongued Lizard						X										X		X																					
Elapidae																																							
Frilled Lizard		X					X				X						X				X																		
Gekkonidae																								X															X
Gilbert's Dragon	X		X	X	X		X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Olive Python																																							
Olive Whip Snake	X																																						
Pygmy Mulga Snake	X								X				X										X																
Ridge-tailed Monitor																																							
Sand Goanna			X	X	X											X	X		X	X	X	X					X										X	X	
Scincidae	X			X				X		X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X								X	X	
Spotted Tree Monitor	X										X							X				X							X										
Two-lined Dragon		X															X																						
Varanus																																							
Western Brown Snake		X																																					
TOTAL	12	14	9	10	9	9	15	9	11	10	10	10	10	9	8	12	12	14	8	10	13	14	7	13	6	13	11	10	4	9	4	7	13	4	7	7	7	10	