

Rey Resources Duchess Paradise Study Area, West Kimberley:

Baseline Fauna Surveys Oct 2009, Apr 2010, Oct 2010 & Jun 2011



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Executive Summary

Introduction

Rey Resources Limited (Rey Resources) is assessing the feasibility of mining at the Duchess Paradise mine site. The Duchess Paradise study area is located approximately 135km southeast of Derby and 45km southeast of Camballin, in the West Kimberley Region of Western Australia (Figure 1). The study area is divided into three sub-areas: Area A (totalling 4,065 ha) which overlays a coal resource, Area B (totalling 4,931 ha) which overlays proposed infrastructure areas and an access road connecting to the Great Northern Highway, and Area C (totalling 8565 ha) which overlays further resource and infrastructure areas (Figure 3). The study area is based on an early interpretation of the likely mine and infrastructure layout, therefore it is much larger than the expected area of impact.

Rey Resources commissioned Western Wildlife to carry out a Level 2 vertebrate fauna survey of the Duchess Paradise study area. The aim of the baseline fauna survey and literature review was to:

- Identify the fauna habitats present in the study area.
- List the vertebrate fauna that were recorded in the study area and/or have the potential to occur in the study area.
- Identify species of conservation significance, or habitats of particular importance for fauna, that may occur in the study area.

This document presents the combined results of the Level 2 fauna surveys to date for Area A, B and C of the Duchess Paradise study area.

Methods

The Level 2 fauna survey was undertaken in accordance with Environmental Protection Authority (EPA) Position Statement No.3 (EPA 2002), EPA Guidance Statement 56 (EPA 2004) and relevant Commonwealth Government guidelines such as that for surveying threatened mammals (DSWEPaC 2011).

Area A was surveyed in the dry season from 19 - 27 October 2009, and in the post wet season from 20 - 27 April 2010. Area B was surveyed in the dry season from 10 - 19 October 2010 and 8 - 18 June 2011. Area C was surveyed in the dry season from 8 - 18 June 2011. The methods used to sample the fauna of the area included:

- Trapping for reptiles, amphibians and small mammals
- Spotlighting and head-torching
- Bat surveys
- Bird surveys
- Keeping opportunistic records
- Targeted searches for conservation significant fauna including the Greater Bilby, Northern Quoll and Gouldian Finch

Trapping took place at 26 sites across Areas A and B with each site consisting of ten pitfall traps, eight funnel traps, ten Elliott traps and two cage traps. The traps were open for between four and nine nights in each survey period, to give a total of 8,610 trap-nights. Targeted Northern Quoll trapping took place at Snake Creek, Mt Wynne Creek and in woodland for a total of seven nights to give 574 trap-nights.

Species of conservation significance were classified as Conservation Significance 1 (listed under State or Commonwealth legislation), Conservation Significance 2 (listed as a Priority

species by the Department of Environment and Conservation), or Conservation Significance 3 (a locally significant species).

Results and Discussion

The Duchess Paradise study area has five main habitats; plains, sand ridges, a low stony ridge, dry swamps and creeks, seasonal swamps and floodplains. The plains habitat is further divided into four sub-habitats (woodland, shrubland, Spinifex plains and tussock grass plains), to give a total of eight habitats in the study area. These habitats are widely represented in the surrounding area.

Overall, the Duchess Paradise study area has the potential to support a wide range of vertebrate species including up to 23 amphibian, 91 reptile, 163 bird, 55 mammal and 25 freshwater fish species. A total of eleven frogs, 55 reptile, 129 bird and 26 mammal species were recorded from the study area during the 2009 – 2011 fauna surveys. There are 35 species of conservation significant fauna that may occur, of which 13 species are dependent on creeks, billabongs and seasonally inundated floodplains in the study area, and outside the study area on the Fitzroy River and/or Camballin Floodplain.

Species of Conservation Significance 1 that may occur are the Freshwater Crocodile (*Crocodylus johnstonei*), Great Egret (*Ardea alba*), Cattle Egret (*Ardea ibis*), Glossy Ibis (*Plegadis falcinellus*), White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Peregrine Falcon (*Falco peregrinus*), Common Sandpiper (*Tringa hypoleucos*), Common Greenshank (*Tringa nebularia*), Australian Painted Snipe (*Rostratula benghalensis australis*), Oriental Plover (*Charadrius veredus*), Oriental Pratincole (*Glareola maldivarum*), Fork-tailed Swift (*Apus pacificus*), Rainbow Bee-eater (*Merops ornatus*), Gouldian Finch (*Erythura gouldiae*), Northern Quoll (*Dasyurus hallucatus*), Greater Bilby (*Macrotis lagotis*), West Kimberley Rock Wallaby (*Petrogale lateralis* sp.), Orange Leaf-nosed Bat (*Rhinonicteris aurantius*) and Freshwater Sawfish (*Pristis microdon*). Of these, the Freshwater Crocodile, Great Egret, Glossy Ibis, Common Sandpiper, Common Greenshank, Oriental Plover, Fork-tailed Swift and Rainbow Bee-eater were recorded in the study area, and the White-bellied Sea-Eagle and Freshwater Sawfish were recorded nearby at the Camballin Barrage.

Species of Conservation Significance 2 that may occur are the skink (*Ctenotus uber johnstonei*), Grey Falcon (*Falco hypoleucos*), Australian Bustard (*Ardeotis australis*), Bush Stone-Curlew (*Burhinus grallarius*), Flock Bronzewing (*Phaps histrionica*) Star Finch (*Neochmia ruficauda subclarescens*), Pictorella Mannikin (*Heteromunia pectoralis*), Spectacled Hare-Wallaby (*Lagorchestes conspicillatus leichardti*), Ghost Bat (*Macroderma gigas*), Yellow-lipped Cave Bat (*Vespadelus douglasorum*), Rakali or Water-Rat (*Hydromys chrysogaster*), Lakeland Downs Mouse (*Leggadina lakedownensis*), Prince Regent Hardyhead (*Craterocephalus lentiginosus*) and Greenway's Grunter (*Hannia greenwayi*). Of these, *Ctenotus uber johnstonei*, Australian Bustard, Bush Stone-Curlew, Flock Bronzewing, Star Finch, Pictorella Mannikin and Lakeland Downs Mouse were recorded in the study area.

Species of Conservation Significance 3 that may occur are the skink (*Lerista simillima*) and the Wide-banded Northern Bandy-bandy (*Vermicella intermedia*). Neither species were recorded during the fauna survey.

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1. Introduction

Rey Resources Limited (Rey Resources) is assessing the feasibility of mining at the Duchess Paradise mine site. Rey Resources commissioned Western Wildlife to carry out a Level 2 vertebrate fauna survey of the Duchess Paradise study area. The fauna survey involved a field study to inventory, so far as possible, the fauna and habitats present in the study area. To supplement the information gathered during the survey, a review of relevant fauna literature for the area was also carried out.

The aim of the baseline vertebrate fauna survey and literature review was to:

- Identify the fauna habitats present in the study area.
- List the vertebrate fauna that were recorded in the study area and/or have the potential to occur in the study area.
- Identify species of conservation significance, or habitats of particular importance for fauna, that may occur in the study area.

This report details the findings of the fauna surveys conducted in October 2009, April 2010, October 2010 and June 2011. The fauna baseline surveys, along with other baseline assessments, are to inform project design, planning and a future environmental impact assessment.

2. The Study Area – Context and Description

The Duchess and Paradise study area is located about 130km south-east of Derby, in the Kimberley region of Western Australia (Figure 1). The study area totals 17,561 ha, but is based on an early interpretation of the likely mine and infrastructure layout, therefore it is much larger than the expected area of impact. The study area is on Liveringa Station, which was settled by the Kimberley Pastoral Company in 1881, so has a long history of pastoral activities. Currently, cattle are grazed throughout the study area, and there are cattle troughs and turkey's nest dams at bores and a larger dam (Duchess Dam) within the study area (Figure 2). Vegetation close to cattle troughs and dams is typically highly degraded.

The study is divided into three sub-areas: Area A (totalling 4,065 ha) which overlays a coal resource, Area B (totalling 4,931 ha) which overlays proposed infrastructure areas and an access road connecting to the Great Northern Highway, and Area C (totalling 8565 ha) which overlays further resource and infrastructure areas (Figure 3). It should be noted that as these areas B and C were added, fauna surveys targeted the new areas but still also included some survey of significant parts of Area A.

The study area falls within the Interim Biogeographic Regionalisation of Australia ('IBRA') Bioregion Dampierland 1 - Fitzroy Trough Subregion (DEWHA 2004, Graham 2001). The Dampierland Bioregion is characterised by a semi-arid to tropical monsoonal climate, with the wet season from November to April. The primary land-uses are grazing on native pastures, unallocated Crown land and Crown reserves, and conservation (Graham 2001).

An Environmentally Sensitive Area (ESA), the Camballin Floodplain, abuts the western edge of the study area (Figure 2). The Camballin Floodplain is also listed under *the Environment Protection and Biodiversity Conservation Act 1999* as a place on the Register of National Estate (RNE). The Camballin Floodplain includes Snake (Uralla) Creek, Le Lievre Swamp, 17 Mile Dam and Moulamen Swamp, and is contiguous with the Fitzroy River Floodplain. Its main value is to wetland birds as a breeding area, a post-breeding refuge or a stop-over point for migratory species (Morton *et al.* 1995). There are no other ESAs, Schedule 1 areas, conservation reserves or National Parks within or near the Duchess Paradise study area.

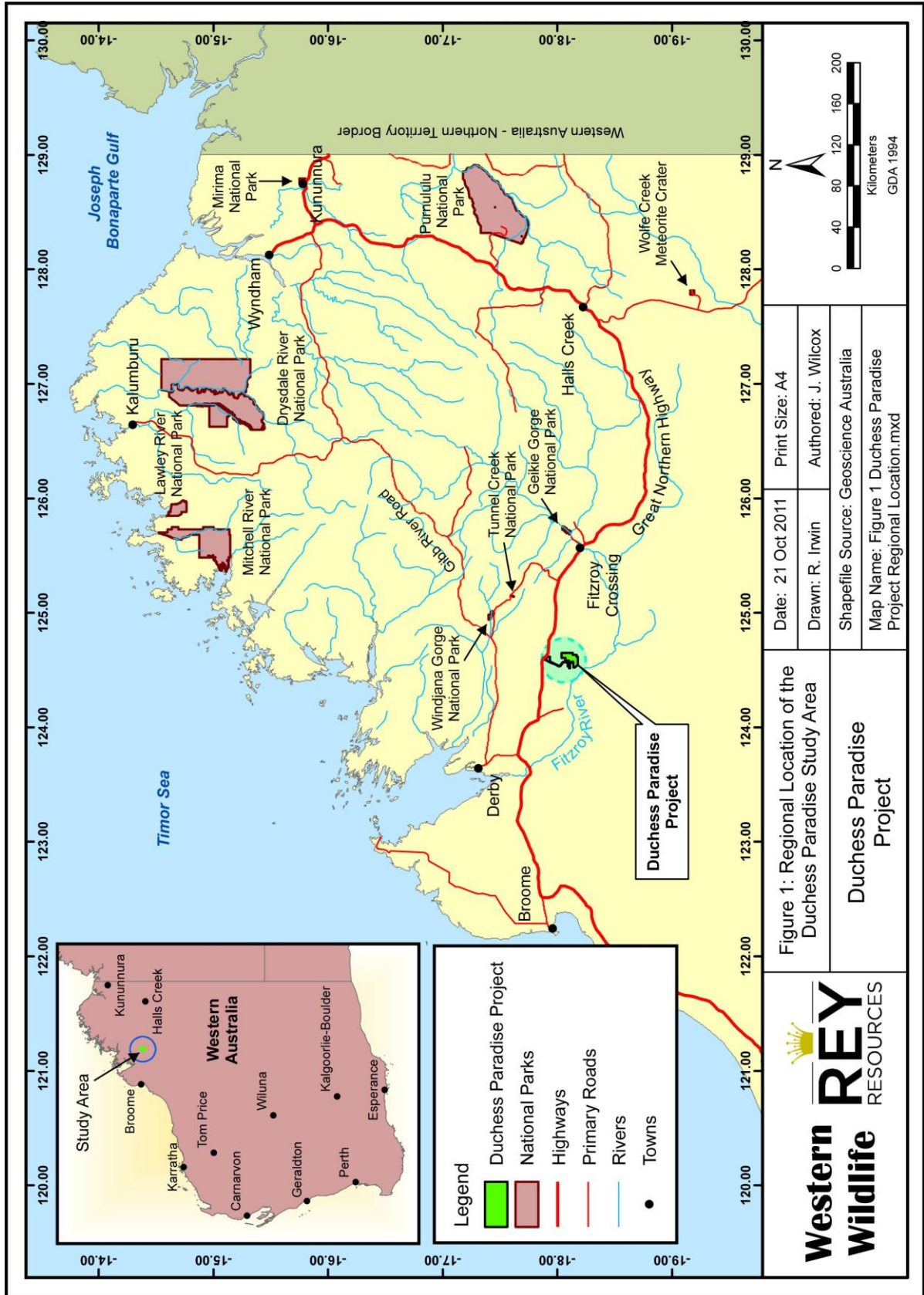


Figure 1. Regional Location of the Duchess Paradise study area.

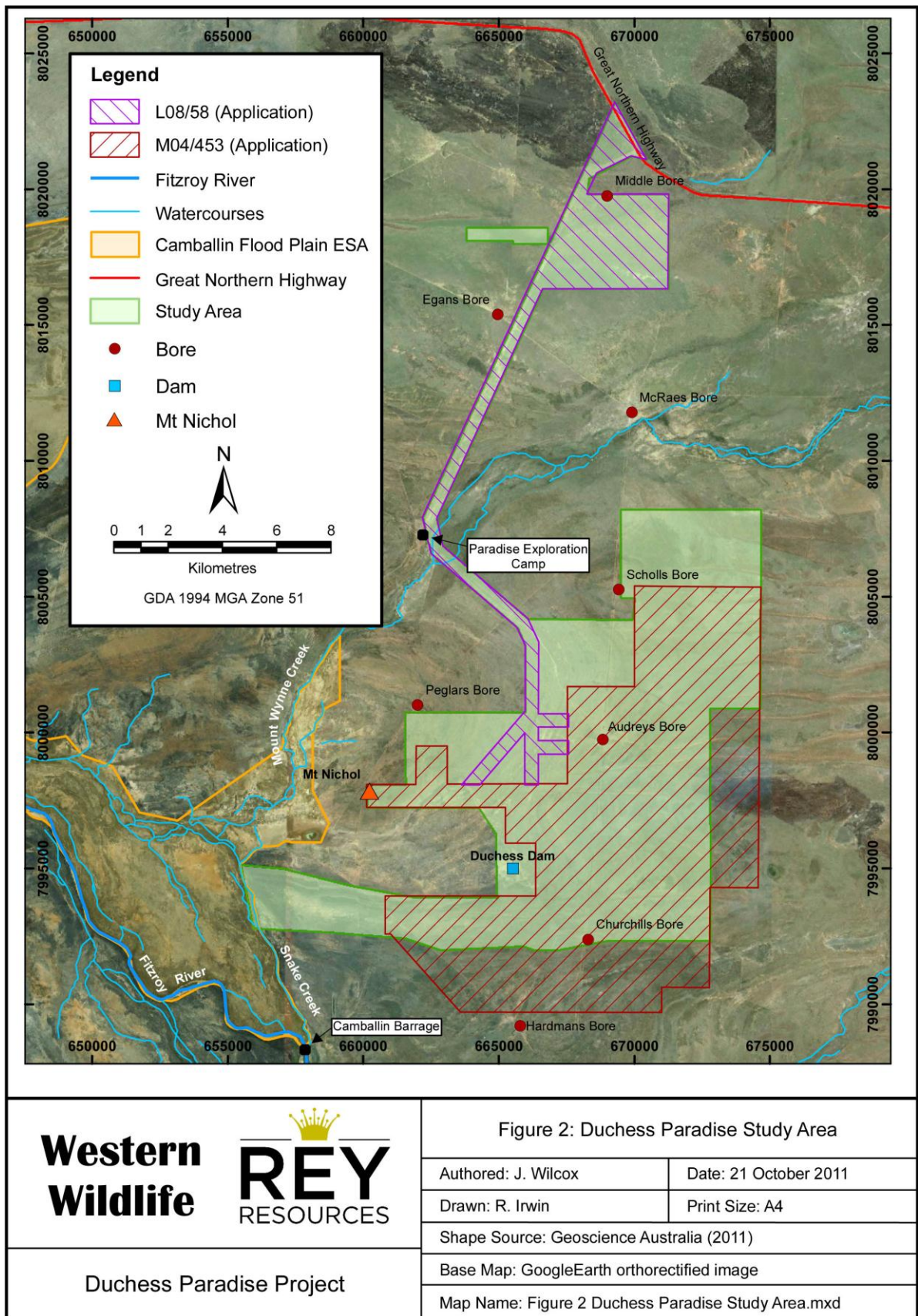


Figure 2. Duchess Paradise Study Area.

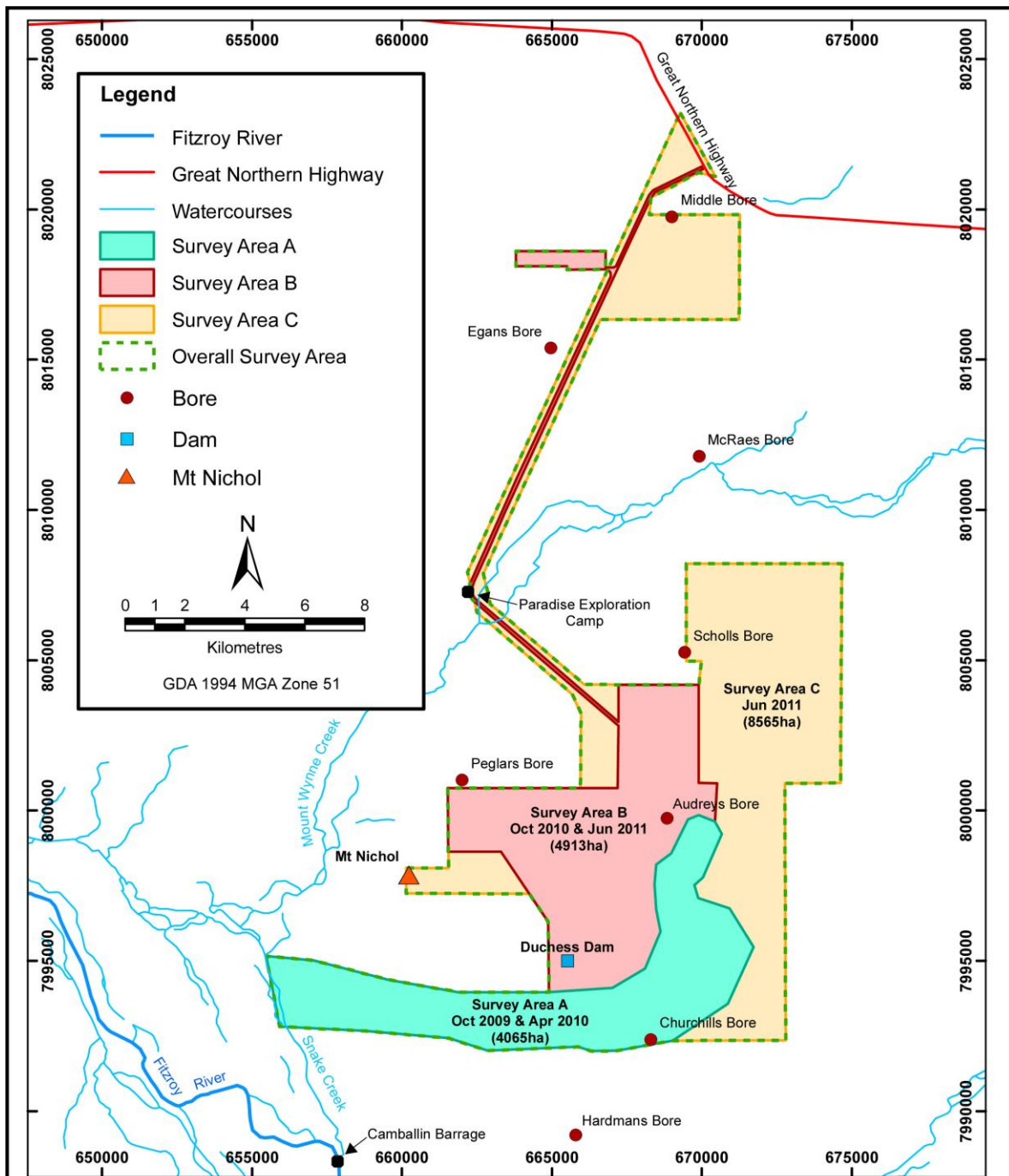


	Figure 3: Duchess Paradise Study Area Boundaries for each Survey Period	
	Authored: J. Wilcox	Date: 21 October 2011
Duchess Paradise Project	Drawn: R. Irwin	Print Size: A4
	Shape Source: Geoscience Australia (2011)	
	Map Name: Figure 3 Duchess Paradise Study Area Boundaries for each Survey Period.mxd	

Figure 3. Duchess Paradise Study Area Boundaries for Each Survey Period.

The western boundary of the study area is approximately 5km north of the Fitzroy River and the Camballin Barrage (Figure 2). The Camballin Barrage was built in the 1960s in order to divert water from the Fitzroy River up Snake Creek and into 17 Mile Dam. This was then to be used for irrigation for the Camballin Irrigation Scheme to grow rice and other crops. Although this scheme failed, the Camballin Barrage remains as an impediment to water flow on the Fitzroy River, and water continues to be diverted up Snake Creek when water levels are high (Morton *et al.* 1995). Water was observed flowing up Snake Creek during the fauna surveys.

3. Methods

The survey was conducted as a Level 2 fauna survey in accordance with the Environmental Protection Authority (EPA) Position Statement No.3 (EPA, 2002), Guidance Statement 56 (EPA, 2004) and relevant Commonwealth Government guidelines. The Level 2 fauna survey included a search of available literature and databases (a 'desktop' study), and a field survey of the study area in two seasons. The field survey served to put the desktop study into context, as well as allowing for the identification of fauna habitats and likely fauna assemblages of the study area.

3.1 Personnel

The personnel involved in the fauna survey, their qualifications and company affiliation, were as follows:

- **Supervising Zoologist:**
 - Ms Jenny Wilcox - *BSc.Biol./Env.Sci., Hons.Biol.* - Western Wildlife (all surveys)

- **Field Zoologists:**
 - Mr Richard King - *BSc.Env.Biol.* - Western Wildlife (October 2009, April 2010 & June 2011)
 - Mr Ian Harris - *BSc., Hons Zool.* - Western Wildlife (October 2010 only)
 - Mr Jeff Turpin - *BSc.Zool.* - Western Wildlife (October 2010 & June 2011)
 - Dr Dane Trembath - *PhD.* - Western Wildlife (October 2010)
 - Mr Glen Murray - *BSc.Appl.Sci.* - MBS Environmental (October 2009 & April 2010)
 - Mr Dave Algaba - *Cert IV CALM* - MBS Environmental (October 2010)
 - Mr Cameron Everard - *BSc. Env.Sci.* - Western Wildlife (June 2011)
 - Ms Jill Woodhouse - *BSc.Env.Sci.* - MBS Environmental (October 2009)
 - Ms Kirstin Wiseman - *BSc.Env.Sci.* - MBS Environmental (April 2010)

- **Additional Zoologists:**
 - Dr Kyle Armstrong - *BSc., PhD. Zool.* - Specialised Zoological
 - Mr Brad Maryan - Western Australian Museum

In addition, field labourers were provided briefly by Rey Resources in 2009, 2010 and 2011 to help establish trapping sites. Siobhan Pelliccia from MBS Environmental provided logistical support from Perth. Bat call analysis was carried out by Dr Kyle Armstrong (Specialised Zoological) from calls recorded by the field team. Mr Brad Maryan confirmed the identification of some reptile specimens collected in the field. This report was prepared by Jenny Wilcox.

3.2 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report follow the Western Australian Museum checklists. These were last updated in November 2010 and are accessed at URL: <http://www.museum.wa.gov.au/research/research-areas/#terrestrial-zoology/checklist-terrestrial-vertebrate-fauna-western-australia>. In the text, common names

are used where appropriate, and all scientific names are given in species lists. Where a species lacks a common name, they are referred to by their scientific name.

3.3 Habitat Mapping

Habitat mapping was undertaken using vegetation data provided by the flora and vegetation survey for the study area (Pilbara Flora 2011) and observations made by fauna personnel in the field. The maps were produced by Pilbara Flora from information provided by Western Wildlife.

3.4 Literature Review

Lists of fauna expected to occur in the study area were produced using information from a number of sources. These included publications that provide information on general patterns of distribution of frogs (Tyler *et al.* 2000), reptiles (Storr *et al.* 1983, 1990, 1999 and 2002), birds (Barrett *et al.* 2003; Johnstone and Storr 1998; Johnstone and Storr 2004), mammals (Churchill 1998, Menkhorst and Knight 2011; Van Dyck and Strahan 2008) and fish (Allen *et al.* 2002).

The databases listed in Table 1 were searched for fauna records in and around the study area. In all cases the extent of the database search was larger than the extent of the study area, in order to pick up records of species in the wider area that may also occur in the study area. Some species may occur on database results that are not likely to be present in the study area, usually due to a lack of suitable habitat or the study area being outside the known range of the species as presented in the literature. These species are not included in lists of expected fauna.

Records from a fauna survey at the Kimberley Diamond Mine (Ninox Wildlife Consulting 2008), about 50km north-east of the study area, have also been included.

These sources of information were used to create lists of species that potentially occur in the study area. As far as possible, expected species are those that are likely to utilise the study area. The lists exclude species that have been recorded in the general region as vagrants, or for which suitable habitat is absent within the study area.

Table 1. Databases used in the preparation of Tables 5 - 9.

Database	Type of records held on database	Area searched
NatureMap (DEC 2007-)	Includes records from specimens held in the WA Museum specimen database (includes historical data), the Fauna Survey Returns Database (DEC), Salinity Action Plan Fauna Survey Data (DEC) and Mammals on Islands (DEC).	40km radius from 18° 01' 04" S, 124° 31' 51" E
DEC's Threatened and Priority Fauna Database	Information and records on Threatened and Priority species in Western Australia	17.7445°S to 18.3742°S and 124.2192°E to 124.9205°E
Birds Australia Atlas Database	Records of bird observations in Australia, 1998-current.	17.7445°S to 18.3742°S and 124.2192°E to 124.9205°E
EPBC Act Protected Matters Search Tool	Records on matters protected under the EPBC Act, including threatened species and ecological communities, migratory species and marine species.	17.749°S to 18.242°S and 124.378°E to 124.748°E

3.5 Field Studies

The Duchess Paradise study area was divided into two sub-areas that were surveyed to the requirements of a Level 2 survey in accordance with the EPA (2004) and relevant Commonwealth Government guidelines. Area A (totalling 4,065 ha) was surveyed in the late dry season from 19 - 27 October 2009, and in the post wet season from 20 – 27 April 2010. Area B (totalling 4,931 ha) was surveyed in the late dry/early wet season from 10 – 19 October 2010 and the dry season in 8 – 19 June 2011. Area C (totalling 8,565 ha) was surveyed in the dry season in 8 – 19 June 2011.

The field study component of a Level 2 fauna survey aims to inventory, so far as possible, the vertebrate fauna present in the study area. This includes a variety of techniques to sample fauna as described in the following sub-sections.

3.5.1 Trapping for Reptiles, Amphibians and Small Mammals

Trapping took place at 26 sites across the study area (Figure 4). Each trapping site consisted of ten pitfall traps, eight funnel traps, ten standard Elliott traps and two cage traps. The pitfall traps were placed in two parallel lines with five pitfalls in each line. There were about 25m between each pitfall trap and about 50m between the lines. Each pitfall trap was a 40cm deep, white 20L bucket. Each trap had a flywire drift-fence approximately 25cm high, extending 3m to either side of the pitfall.

Funnel traps were about 15cm wide and 60cm long, with a funnel entrance of 5cm. Funnel traps were set up mid-way along a pitfall trap drift-fence, with the funnel entrances bisected by the fence (Plate 1). Funnel traps were covered with shade cloth and a clump of Spinifex or branches, in order to keep the temperature inside the funnel cool.



Plate 1. Layout of pitfall and funnel trap.

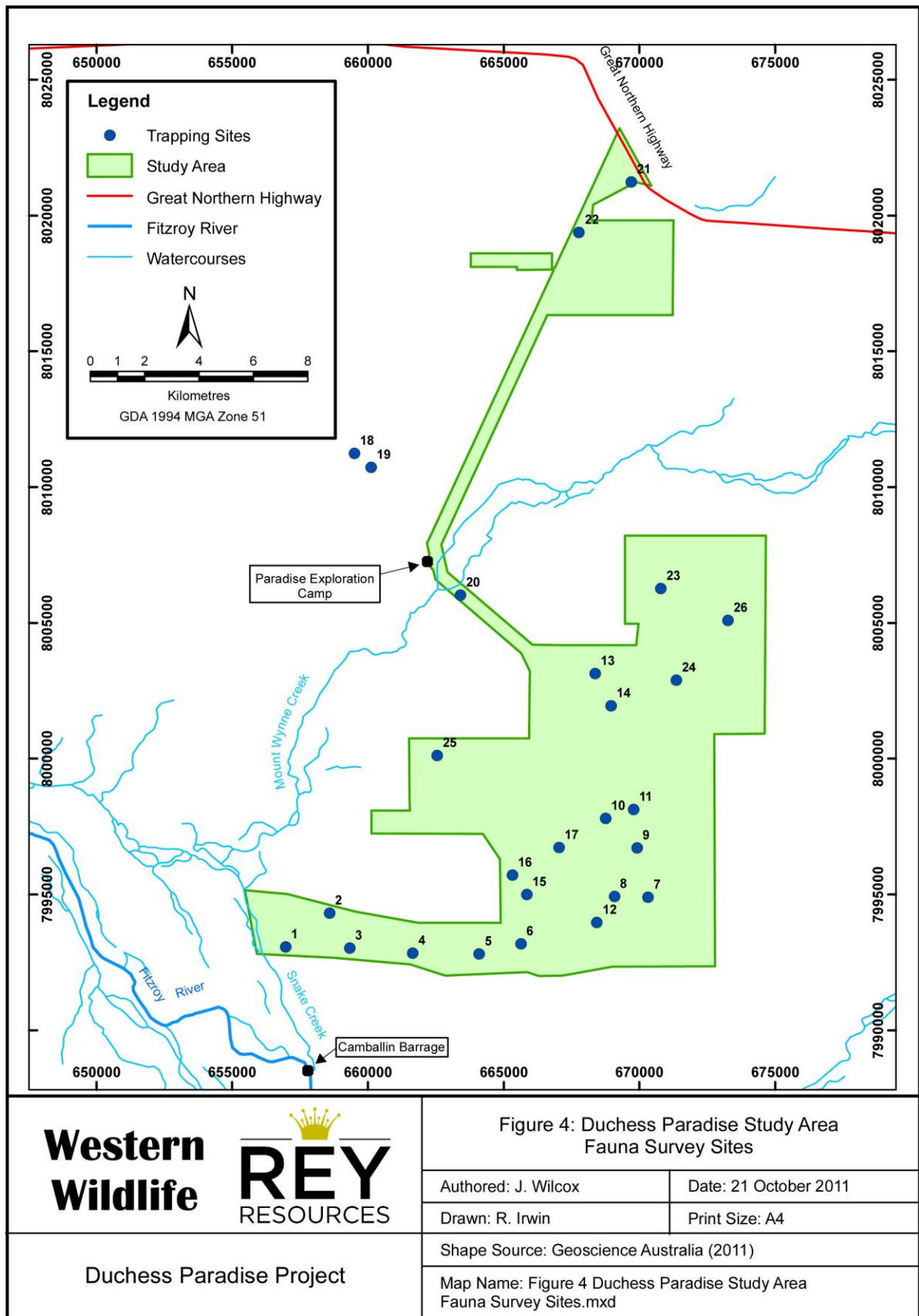


Figure 4. Duchess Paradise Study Area Fauna Survey Sites.

Standard Elliott traps were placed near each pitfall, with the cages situated near the pitfalls at the beginning and end of each trapping line. All cage and Elliott traps were placed under vegetation to shade any captured animals and cage traps were covered with a hessian sack. All cage and Elliott traps were baited with a mixture of rolled oats, peanut butter, sardines and vanilla essence.

The placement of trapping sites in the study area aimed to sample the main fauna habitats present and give a geographic spread across the whole study area. Trapping sites were necessarily placed in the vicinity of drill tracks and station roads in order to facilitate efficient checking and clearing each morning. Location and brief descriptions of each trapping site are given in Table 2, and a photograph of each site is given in Plates 2 - 27. Sampling at each trapping site occurred over a period of four to nine nights between:

- 19 and 27 October 2009 (Sites 1 – 12)
- 20 and 27 April 2010 (Sites 1 – 12)
- 10 and 19 October 2010 (Sites 13 – 20)
- 9 and 18 June 2011 (Sites 13 – 17 and 20 – 26)

The overall number of trap-nights for the three surveys was 8,610 (Appendix 1). The open and close dates of each trapping grid and the number of trap-nights of each trap type are given in Appendix 1. All animals caught were identified and recorded, and generally released immediately at the site of capture. Some dead specimens and live blind snakes were collected for identification by the Western Australian Museum. All trapping and collection was carried out under a License to Take Fauna for Scientific Purposes (SF007085, SF007403, SF007638 and SF007979), covering all field personnel involved with the fauna survey.

3.5.2 Spotlighting and Head-torching

Spotlighting was carried out from a vehicle using a combination of the vehicle headlights and a hand-held spotlight. Head-torching was carried out on foot, and took place opportunistically at sites that were likely to support species difficult to trap, such as around termitaria and dams. Spotlighting took place on the nights of:

- 21 - 25 October 2009
- 23 and 25 - 27 April 2010
- 11 and 14 - 17 October 2010
- 14 May 2011
- 13 and 15 June 2011

All spotlighting and head-torching was carried out by two or four people concurrently.

3.5.3 Bat Surveys

In October 2009, bats were surveyed using two Anabat SD1 ultrasonic bat detectors at each of the trapping sites for one night, and at the Camballin Barrage for three nights. Calls were recorded between 18 and 27 October 2009 on evenings that were typically warm and humid with a light breeze. In April 2010, one Anabat SD2 ultrasonic bat detector was used on seven nights, 21 to 25 and 27 – 28 April 2010, on evenings that were typically warm with a light breeze. In October 2010, two Anabat SD1 ultrasonic bat detectors were used for a total of seven nights, with calls were recorded between the 15 – 20 October 2010. In June 2011 two Anabat SD1 ultrasonic bat detectors were used between the 11 and 19 of June and sampled each of the trapping grids for one night, Mt Nichol and Snake Creek (Figure 5).

Analysis of the recordings was undertaken by Dr Kyle Armstrong of Specialised Zoological. The reports on the bat call analyses are provided in Appendix 5.

Table 2. Location and habitat of trapping sites.

Site	Location (GDA 94 Zone 51)	Landform	Habitat Description (after Pilbara Flora 2011)
1	656967 E, 7993061 N	Near creek	Low open forest of <i>Eucalyptus microtheca</i> with sparse understorey.
2	658585 E, 7994304 N	Low rocky ridge	Open scrub of <i>Acacia monticola</i> over sparse Spinifex and grasses.
3	659328 E, 7993018 N	Plain	Closed high shrubland of <i>Acacia holosericea</i> over Spinifex. Some termitaria. Close to large Boab.
4	661652 E, 7992833 N	Plain	Open high shrubland of <i>Acacia holosericea</i> over tall Spinifex. Some termitaria.
5	664095 E, 7992799 N	Plain	Low woodland of <i>Corymbia greeniana</i> and <i>Bauhinia cunninghamii</i> over tall Spinifex. Some termitaria.
6	665636 E, 7993179 N	Sand ridge	Low open woodland of <i>Atalaya hemiglauca</i> and <i>Bauhinia cunninghamii</i> with a sparse understorey.
7	670324 E, 7994891 N	Plain	Low woodland of <i>Eucalyptus camaldulensis</i> and <i>Melaleuca nervosa</i> subsp <i>crosslandiana</i> with a sparse understorey.
8	669083 E, 7994917 N	Plain	Low woodland of <i>Corymbia greeniana</i> and <i>Bauhinia cunninghamii</i> over Spinifex. Some termitaria.
9	669915 E, 7996704 N	Plain	Low woodland of <i>Corymbia greeniana</i> and <i>Bauhinia cunninghamii</i> over Spinifex. Some termitaria. Close to large Boab.
10	668758 E, 7997792 N	Sand ridge	Low open woodland of <i>Atalaya hemiglauca</i> and <i>Bauhinia cunninghamii</i> with sparse understorey.
11	669786 E, 7998126 N	Swamp	Low woodland of <i>Eucalyptus microtheca</i> with sparse understorey. Many large termitaria.
12	668438 E, 7993970 N	Plain	Low woodland of <i>Corymbia greeniana</i> and <i>Bauhinia cunninghamii</i> over low Spinifex and grasses. Many large termitaria.
Camballin Barrage Camp (2009)	657920 E, 7988586 N	Near River	<i>Eucalyptus camaldulensis</i> and <i>Melaleuca</i> woodland along the Fitzroy River at the Camballin Barrage. Outside the study area (5km to the south).
13	668370 E, 8003130 N	Plain	Open woodland of <i>Bauhinia cunninghamii</i> over sparse <i>Acacia</i> shrubland over Spinifex plain. Many large termitaria.
14	668956 E, 8001946 N	Plain	Open woodland of <i>Bauhinia cunninghamii</i> , Boab (<i>Andersonia gregorii</i>) over Spinifex plain.
15	665855 E, 7994994 N	Plain	Low open woodland of <i>Bauhinia cunninghamii</i> , <i>Atalaya hemiglauca</i> , and <i>Grevillea striata</i> over a shrubland of <i>Acacia</i> spp. over tussock grassland.
16	665326 E, 7995714 N	Plain	High shrubland of <i>Acacia synchronicia</i> and <i>Acacia holosericea</i> over Spinifex.
17	667044 E, 7996723 N	Low rocky ridge	High shrubland of <i>Grevillea pyramidalis</i> with scattered <i>Corymbia</i> over Spinifex.
18	659503 E, 8011237 N	Plain	High <i>Acacia</i> shrubland over Spinifex plain.
19	660121 E, 8010731 N	Plain	Scattered <i>Acacia</i> shrubland over Spinifex plain.
20	663414 E, 8006022 N	Floodplain	Scattered Boab (<i>Andersonia gregorii</i>) over tussock grassland on floodplain.

Table 2. (cont.)

Site	Location (GDA 94 Zone 51)	Landform	Habitat Description (after Pilbara Flora 2011)
Paradise Camp (2010 – 2011)	662158 E 8007109 N	Plain	Disturbed area. Includes a turkeys nest dam, exploration camp and disused station outbuildings. Adjacent to Mt Wynne Creek.
21	669699 E, 8021242 N	Plain	Open <i>Corymbia</i> , <i>Hakea</i> and <i>Grevillea</i> woodland on tussock grass plain.
22	667780 E, 8019376 N	Plain	Spinifex plain on red loam soil.
23	670785 E, 8006260 N	Plain	Scattered <i>Corymbia</i> over <i>Acacia</i> shrubland over Spinifex on red loam soil. Many large termitaria.
24	671365 E, 8002884 N	Lower slopes of rocky ridge	Scattered <i>Corymbia cadophora</i> over tall <i>Acacia monticola</i> and <i>Grevillea pyramidalis</i> shrubland over Spinifex on red loam soil with some outcropping rock.
25	662551 E, 8000109 N	Plain	Scattered <i>Corymbia cadophora</i> over tall <i>Acacia monticola</i> shrubland over Spinifex on red loam soil.
26	673260 E, 8005093 N	Plain	Open woodland over grass and spinifex plain.

3.5.4 Bird Surveys

At least one bird survey was carried out at each of the trapping sites in the early morning while bird activity was high. Bird activity during the heat of the day was extremely low in October 2009 and April 2010, so bird surveys were limited to opportunistic observations. Afternoon bird surveys were targeted at habitats that were refuges for birds, such as along creeks, near dams or around livestock troughs. In June 2011, lower daily temperatures allowed seven surveys to be undertaken at each trapping site.

3.5.5 Opportunistic Surveys

At all times, observations of fauna were noted when they contributed to the accumulation of information on the fauna of the site. These included casual observations of reptiles, mammals and birds seen while travelling between sites as well as opportunistic hand-foraging for reptiles and opportunistic bird surveying. Hand-foraging involved looking for fauna under dead spinifex, leaf litter, rocks, bark and in hollows. Opportunistic records were made between:

- 19 and 27 October 2009
- 20 and 27 April 2010
- 10 and 19 October 2010
- 13 and 20 May 2011
- 9 and 18 June 2011

3.5.6 Targeted Searches for Conservation Significant Fauna

Conservation significant fauna may not necessarily be readily sampled by standard fauna survey techniques. In order to maximise the attempt to record some of these species, targeted searches were undertaken.

- **Bilby (*Macrotis lagotis*)**

In October 2010 and June 2011, searches targeting evidence of the Bilby were carried out. Habitats targeted included sand dunes and plains supporting *Spinifex* and *Acacia* shrubland. Transects along dunes were searched for evidence such as tracks, foraging diggings and burrows (Figure 5). Any evidence found was photographed and a GPS co-ordinate recorded.

- **Northern Quoll (*Dasyurus hallucatus*)**

In October 2010, targeted trapping for the Northern Quoll was planned, however, weather conditions and extensive flooding resulted in traps being unable to be deployed.

In May 2011, Northern Quoll trapping was carried out at three locations in the study area; along Snake Creek, Mt Wynne Creek and in an area of open Eucalypt woodland in study area A (Figure 5). The trapping methodology was consistent with that described in the survey guidelines for Australia's threatened mammals (DSEWPaC 2011). Along the creeks, each transect consisted of 25 large Elliott traps spaced 50 – 70m apart. The woodland transect consisted of 20 large Elliott traps. Each transect also had four cage traps deployed at Elliott numbers 5, 10, 15 and 20. The traps were shaded with a hessian bag and were baited with a mixture of rolled oats, peanut butter and sardines, renewed every second day. The traps were open for seven nights between 13 – 20 May 2011 to give a total of 574 trap-nights.

The targeted trapping mainly aimed to sample the creeks, as these habitats were not directly sampled with the standard trapping grids described in section 3.5.1 and were considered the most likely habitats to support quolls. However, the standard Elliott traps and cage traps used in the trapping grids also have the potential to capture the Northern Quoll. Between 2009 and 2011, a total of 2870 standard Elliott trap-nights and 574 cage trap-nights were achieved across 26 sites in the study area (Figure 4, Appendix 1).

Camera traps (Bushnell TrophyCam motion-sensitive cameras) were also deployed in locations along Snake Creek, on the plains and on a low rocky hill. These locations are shown in Figure 5. The camera traps were baited with the same mixture as the Elliott traps and are another method recommended by DSEWPaC (2011) for identifying the presence of the Northern Quoll.

- **Gouldian Finch (*Erythrura gouldiae*)**

In each survey period targeted searches for the Gouldian Finch were carried out in an opportunistic manner. The Gouldian Finch can occur as part of a mixed flock of finches, in which they can be relatively inconspicuous. Birds in immature plumage are particularly drab. All flocks of finches encountered in the study area (e.g. when travelling between trapping sites) were examined through binoculars to search for this species.

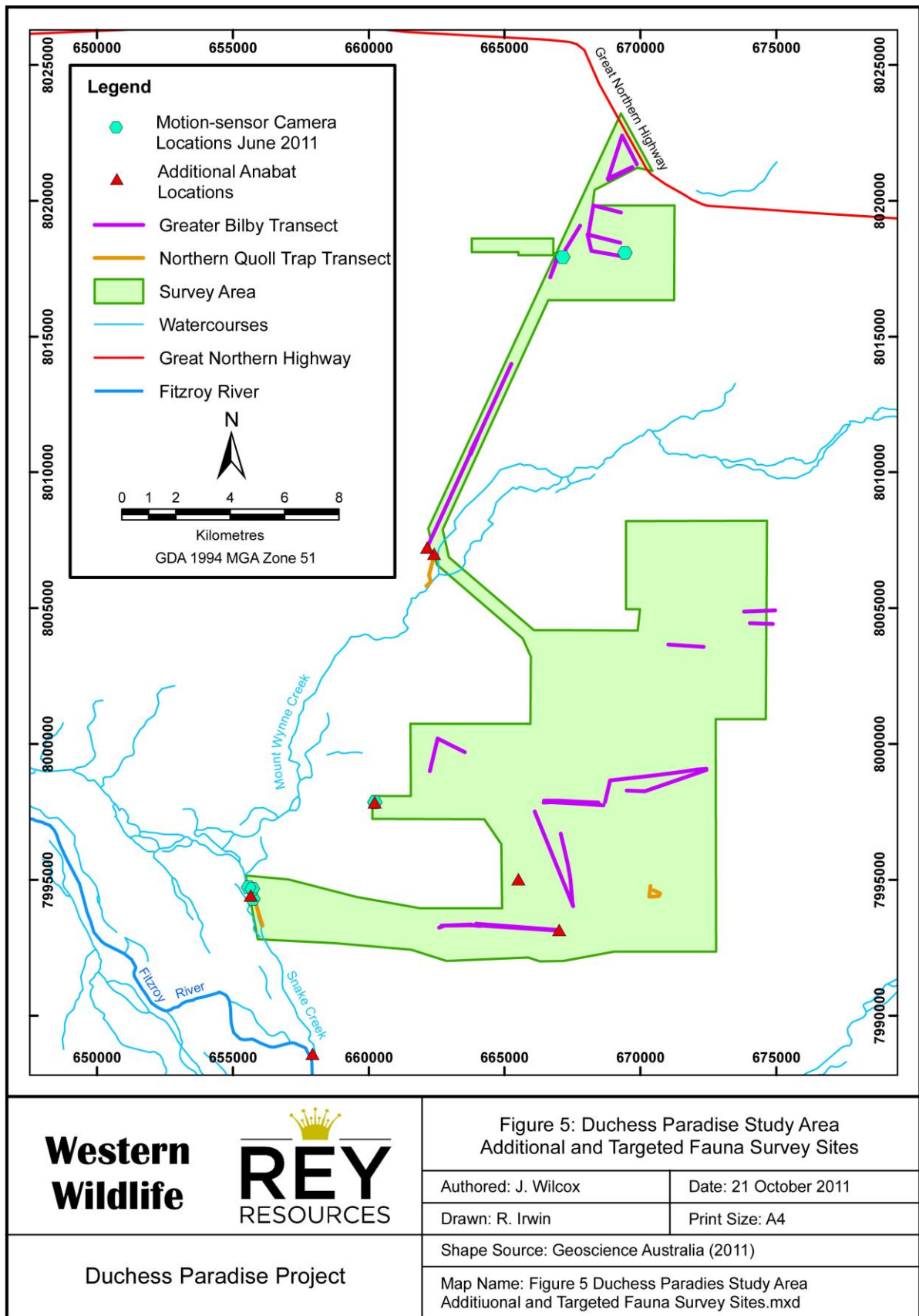


Figure 5. Duchess Paradise Study Area Additional and Targeted Fauna Survey Sites.



Plate 2. Site 1.



Plate 3. Site 2.



Plate 4. Site 3.



Plate 5. Site 4.



Plate 6. Site 5.



Plate 7. Site 6.



Plate 8. Site 7.



Plate 9. Site 8.



Plate 10. Site 9.



Plate 11. Site 10.



Plate 12. Site 11.



Plate 13. Site 12.



Plate 14. Site 13.



Plate 15. Site 14.



Plate 16. Site 15.



Plate 17. Site 16.



Plate 18. Site 17.



Plate 19. Site 18.



Plate 20. Site 19.



Plate 21. Site 20.



Plate 22. Site 21.



Plate 23. Site 22.



Plate 24. Site 23.



Plate 25. Site 24.



Plate 26. Site 25.



Plate 27. Site 26.

3.6 Survey Limitations

Various factors can limit the effectiveness of a fauna survey. Pursuant to EPA Guidance Statement 56, these factors have been identified and their potential to impact on the effectiveness of the surveys has been assessed in Table 3. All fauna surveys have limitations, and not all fauna species present on the site are likely to be sampled during a survey. Fauna may not be recorded because they are rare, they are difficult to trap or observe, or because they are only present on the site for part of the year. Trapping in more than one season and a review of known information aims to mitigate this.

Table 3. Fauna survey limitations.

Potential Limitation	Extent of limitation for the Duchess Paradise fauna survey	
Experience of fauna personnel	Not limiting:	The supervising zoologist has 11 years experience in fauna consulting. Team members have 1 – 12 years experience.
Types of traps or other survey methods used	Not limiting:	Standard trapping techniques for vertebrate fauna were used. Targeted techniques were used for key conservation significant fauna.
Number of trapping sites	Not limiting:	The trapping effort was moderately high for the size of the study area and sampled all major landforms.
Ability to survey all habitats present	Not limiting:	All habitats present were surveyed during the fauna survey, either by trapping or visually.
Availability of fauna information for the area in literature and on databases	Not limiting:	Moderate amount of fauna information available, though specimen records (from the WA Museum) are sparse. There are fauna data from Kimberley Diamond Mine (Ninox Wildlife Consulting 2008), 50km to the north-east of the study area.
Effects of weather during the survey	Minor limitation on some surveys:	Weather during the field survey was hot and humid, reducing fauna activity (particularly birds) during the day. Dry conditions may have an impact on the number of captures. Wet weather in October 2010 allowed for recording more frog species than on the previous two surveys.
Seasonal effects	Not limiting:	Four main surveys were conducted, one in the dry season 2009, one post-wet season 2010, one in the breaking wet season 2010 and one in the early dry season 2011. Though the study area was relatively dry in the post-wet season survey, (due to low summer rainfall in 2009/2010), wet conditions in October 2010 resulted in increased activity of water dependent fauna.
Disturbance to site such as recent fires, cattle grazing	Not limiting:	Most of site is grazed by cattle, but the majority of vegetation is in relatively good condition when away from cattle troughs and tracks. Some trapping grids were disturbed by cattle during the survey periods.
Ease of access to site	Not limiting:	Site access is generally very good with numerous tracks to all habitat types.

3.7 Assessment of Conservation Significance

Three levels of conservation significance are used within this report to indicate the level of significance of fauna species. These are described in the following sub-sections.

3.7.1 Conservation Significance 1

Conservation Significance 1 (CS1) is the highest level of conservation significance, describing species that are protected under State or Commonwealth legislation. These species are considered to be of state and/or national conservation significance, and some species (e.g. some migratory species) may be considered of international significance.

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is the Commonwealth Government's primary piece of environmental legislation. Listed under Part 3 of the EPBC Act are 'matters of National Environmental Significance'. These include threatened species, threatened ecological communities and migratory species.

Fauna species are assessed against categories based on International Union for Conservation of Nature (IUCN) criteria, into:

- **Extinct:** Taxa not definitely located in the wild during the past 50 years.
- **Extinct in the wild:** Taxa known to survive only in captivity.
- **Critically Endangered:** Taxa facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered:** Taxa facing a very high risk of extinction in the wild in the near future.
- **Vulnerable:** Taxa facing a very high risk of extinction in the wild in the medium-term future.
- **Conservation Dependent:** Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classed as Vulnerable or more severely threatened.

Only fauna classified as 'extinct in the wild' 'critically endangered', 'endangered' or 'vulnerable' are listed as matters of National Environmental Significance.

The migratory species listed under the EPBC Act are those recognised under China-Australia Migratory Bird Agreement (CAMBA), the Japan-Australia Migratory Bird Agreement (JAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), or species listed under the Bonn Convention for which Australia is a range state. Species listed in JAMBA are also protected under Schedule 3 of the *Western Australian Wildlife Conservation Act 1950*.

Reports on the conservation status of most vertebrate fauna species have been produced by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) in the form of Action Plans. An Action Plan is a review of the conservation status of a taxonomic group against IUCN categories. Action Plans have been prepared for amphibians (Tyler 1998), reptiles (Cogger *et al.* 1993), birds (Garnett and Crowley 2000), monotremes and marsupials (Maxwell *et al.* 1996), rodents (Lee 1995) and bats (Duncan *et al.* 1999). These publications also use categories similar to those used by the EPBC Act. The information presented in some of the earlier Action Plans may be out of date due to changes since publication.

The *Western Australian Wildlife Conservation Act 1950* (WA Wildlife Conservation Act) is State legislation for fauna protection administered by the Department of Environment and Conservation (DEC). The WA Wildlife Conservation Act lists species under a set of Schedules

- **Schedule 1:** Fauna that are rare or likely to become extinct.
- **Schedule 2:** Fauna presumed to be extinct.
- **Schedule 3:** Migratory birds that are listed under JAMBA.
- **Schedule 4:** Other specially protected fauna.

Schedule 1 species are further categorised by DEC into the categories 'extinct', 'extinct in the wild', 'critically endangered', 'endangered', 'vulnerable' and 'conservation dependent' species.

3.7.2 Conservation Significance 2

Species of Conservation Significance 2 (CS2) are not listed under State or Commonwealth Acts, but are listed as Priority species by DEC. These species may be considered to be regionally significant.

In Western Australia, DEC maintains a list of Priority Fauna made up of species that are not considered Threatened under the WA Wildlife Conservation Act, but for which DEC feels there is cause for concern. There are five levels of Priority as defined by DEC.

- **Priority 1:** Taxa with few, poorly known populations on threatened lands.
- **Priority 2:** Taxa with few, poorly known populations on conservation lands.
- **Priority 3:** Taxa with several, poorly known populations, some on conservation lands.
- **Priority 4:** Taxa in need of monitoring.
- **Priority 5:** Taxa in need of monitoring (conservation dependent species).

3.7.3 Conservation Significance 3

Conservation Significance 3 (CS3) species are not listed under State or Commonwealth Acts or in publications on threatened fauna or as Priority species by DEC, but are considered by the author to be of local significance.

These are species considered to be of local significance in the study area because they are at the limit of their distribution in the area, they have a very restricted range or they occur in breeding colonies (e.g. some waterbirds). This level of significance has no legislative recognition and is based on interpretation of information on the species patterns of distribution. For example, the Government of Western Australia (2000) used this sort of interpretation to identify significant bird species in the Perth metropolitan area as part of Bush Forever. Recognition of such species is consistent with the aim of preserving regional biodiversity.

4. Habitats of the Study Area

The main fauna habitats in the study area were identified on the basis of the 34 vegetation types identified by Pilbara Flora (2011) and observations made in the field.

The five main fauna habitats are:

- Plains
- Sand ridges
- Low rocky ridges
- Dry swamps
- Creeks, swamps and seasonally inundated floodplains

The plains can be divided into a further four sub-habitats, into those that support savannah woodland, shrubland, Spinifex grassland or tussock grassland. This gives a total of eight fauna habitats.

There are some localised highly degraded areas in the study area, generally areas where livestock congregate around dams, tanks and bores. The degraded areas are characterised by a lack of understorey vegetation and a highly disturbed ground surface. As the entire study area is grazed by cattle, evidence such as cattle tracks and scats were common throughout the study area, except in denser vegetation and on the rocky ridge.

Each habitat is described below and presented in Figures 4 and 5.

4.1 Plains

The plains are the most widespread habitat in the study area. The plains can be subdivided into four habitats on the basis of the vegetation present.

- **Savannah woodland on plains**

A widespread habitat type in the study area, the plains support Spinifex (*Triodia spp.*) or tussock grassland with open woodland. The woodlands are dominated by *Corymbia greeniana*, *Corymbia cadophora* and/or *Bauhinia cunninghamii*, but also include Whitewood (*Atalaya hemiglauca*), *Eucalyptus camaldulensis*, Beefwood (*Grevillea striata*), *Acacia* and scattered Boab trees (*Adansonia gregorii*). Where this habitat is near tanks, troughs or dams it is heavily disturbed by cattle and in poor condition, the remainder is in variable condition dependent on the level of grazing pressure. As this habitat is quite variable, it is likely to support a large number of vertebrate fauna. Termitaria are common across much of this habitat, and some tree species contained hollows suitable for roosting or nesting fauna.

- **Shrublands on plains**

The shrublands are dominated by *Acacia holosericea*, *Acacia inaequilatera*, *Acacia synchronicia* and/or *Grevillea pyramidalis subsp pyramidalis* over an open to dense understorey of Spinifex (*Triodia spp.*) or tussock grassland. Where the Spinifex is dense it provides shelter for ground fauna such as reptiles and small mammals. Areas of dense shrubland provide nesting habitat for passerine birds and some tree species contained hollows suitable for roosting or nesting fauna. The majority of this habitat is in good condition.

- **Spinifex plains**

Plains with Spinifex grassland are represented by small areas on the Paradise access road and north-east of Audrey's Bore. Spinifex grassland is likely to support a range of fauna species, but will lack species that depend on trees and shrubs.

- **Tussock grass plains**

To the north of the Paradise Exploration Camp is an area of open tussock grass plains, dominated by White Grass (*Sehima nervosum*). These plains are likely to support relatively few fauna species compared to other habitats in the study area, but may still support, for example, conservation significant migratory birds that favour open habitats.

4.2 Sand Ridges

Several low ridges of red sand are present, running east-west. They were vegetated with a low, open woodland of *Atalaya hemiglauca* and *Bauhinia cunninghamii* with a shrubland of *Acacia platycarpa* over a sparse understorey of grasses. The only areas of true sand in the study area, some reptile species in the study area may be restricted to, or at least favour, this habitat.

4.3 Low Rocky Ridges

A low rocky ridge (Duchess Ridge) runs discontinuously through the southern and eastern part of the study area. On the highest parts it was vegetated with a low, open woodland of *Grevillea pyramidalis* subsp *leucadendron*, *Acacia holosericea* and *Acacia inaequilatera* over low Spinifex, or scattered tall *Acacia inaequilatera* over low spinifex. Around the lower slopes there was an open scrub of *Acacia monticola*. The dense vegetation and flowering shrubs on the ridge are likely to be habitat for foraging and nesting birds, and provide shelter for mammals.

4.4 Dry Swamps

In scattered dry swamp areas between dunes on the eastern part of the study area there were woodlands of *Eucalyptus microtheca*, *Eucalyptus camaldulensis*, and/or *Melaleuca nervosa* subsp *crosslandiana*. These swamp areas did not appear to hold water during the fauna survey periods, but the dense vegetation is likely to support a range of fauna species.

4.5 Creeks, Swamps and Seasonally Inundated Floodplains

Although the creeks, seasonally inundated swamps and seasonally inundated floodplains have been mapped separately (Figures 6 & 7), they are discussed together here, as much of the fauna that favour these habitats are the same.

Riparian vegetation along Snake (Uralla) Creek, on the western edge of the study area (Area A), consisted of *Eucalyptus microtheca* woodlands with *Eucalyptus camaldulensis* along the banks of the creek. Associated with Snake Creek were sparsely vegetated seasonal swamps that held some water in April 2010, October 2010 and May/June 2011. Mt Wynne Creek (Area B) had similar riparian vegetation. In October 2010, rain resulted in inundation of the floodplain surrounding Mt Wynne Creek (Figure 5). Seasonally inundated areas are likely to be used by a variety of species that would move into the area to take advantage of the temporary availability of water.

Other sources of water in the study area were from man-made sources (e.g. Duchess Dam, Paradise Camp Dam, Egans Bore and troughs at Audrey's Tank and Churchill's Tank). The woodland along Snake and Mt Wynne Creeks are likely to support hollow-nesting fauna, and areas of water are likely to be used by both wetland-dependent fauna (such as waterbirds) and other fauna coming into drink or bathe.

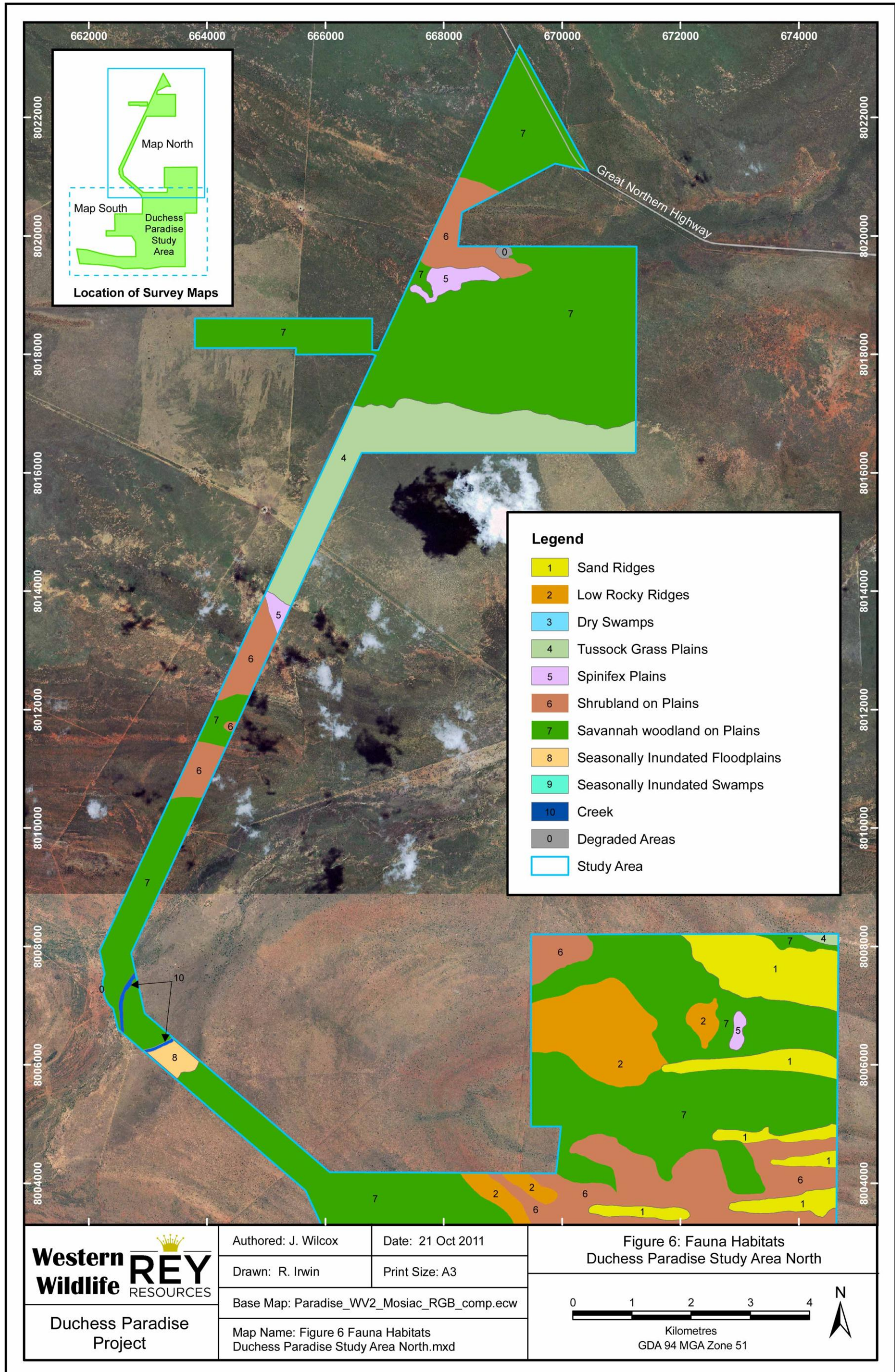


Figure 6. Fauna habitats – Duchess Paradise Study Area North.

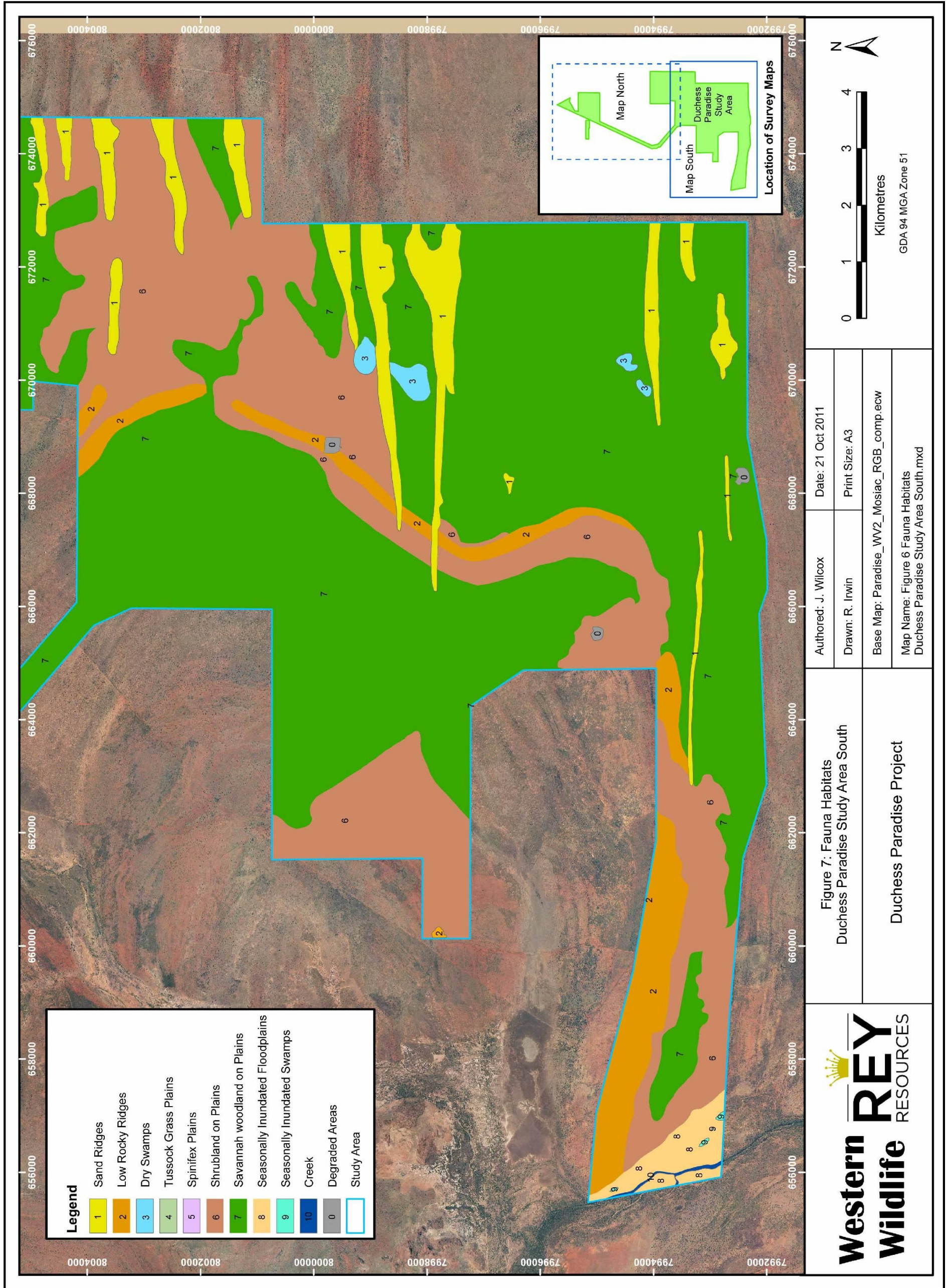


Figure 7. Fauna habitats - Duchess Paradise Study Area South.

5. Vertebrate Fauna of the Study Area

The numbers of vertebrate species potentially occurring in the study area are summarised below in Table 4. The amphibians, reptiles, birds, mammals and freshwater fish that have the potential to occur in the study area are listed in Tables 5 - 9. Indicated in each table are the species recorded:

- In the study area by Western Wildlife during each of the four fauna survey periods (October 2009, April 2010, October 2010 and June 2011)
- At the Camballin Barrage (on the Fitzroy River) by Western Wildlife during the 2009 fauna survey, about 5km south of the study area.
- At the Kimberley Diamond Mine (Ninox Wildlife Consulting 2008), about 50km from the study area.
- In the wider area on NatureMap (see Table 1).
- In the wider area on the Birds Australia Atlas Database (see Table 1).

Over a quarter of the vertebrate fauna species, notably amphibians, waterbirds and fish, are dependent on local creeks, swamps, billabongs, dams or seasonally inundated habitats for all or most of their needs (Table 4). These species are indicated in Tables 5 - 9. The only habitats in the study area these species are likely to be found in are creeks, seasonal swamps and areas of seasonally inundated floodplain.

Table 4. Summary of vertebrate fauna potentially occurring in the study area.

Taxon	Total species	Introduced species	Species dependent on creeklines, swamps and seasonally inundated habitats	Conservation significant species		
				CS1	CS2	CS3
Amphibians	23	0	23	-	-	-
Reptiles	91	0	6	1	1	2
Birds	163	0	35	13	6	-
Mammals	55	6	1	4	5	-
Freshwater Fish	25	0	25	1	2	-
Totals:	357	6	90	19	14	2

Results of the fauna survey are given in Tables 10 - 21. Fauna of conservation significance are discussed in the sections below and are summarised in Table 22. The results of the EPBC Act Protected Matters search and the DEC Threatened and Priority Fauna Database search are given in Appendices 2 and 3 respectively, and the opportunistic and spotlighting records made in the fields are listed in Appendix 4.

5.1 Amphibians

There are 23 species of frog that have the potential to occur in the study area, of which eleven species have been recorded during the fauna surveys (Table 5). No frogs were recorded in the study area during the October 2009 fauna survey as conditions were dry, but three species were recorded nearby on the Fitzroy River (Table 5, Appendix 4). In April 2010, two species were recorded in the study area, the Pale Frog (*Litoria pallida*) and Desert Spadefoot (*Notaden nichollsi*) (Table 5). In October 2010, eleven species were recorded in the study area, and most were recorded on the recently inundated floodplain around Mt Wynne Creek. Most of these species are likely to be widespread throughout floodplain areas, with *Cyclorana* species trapped at sites 14, 15, 16 and 20 (Table 12). Most of the listed species breed in temporary or seasonal waters on floodplains. During the dry season, these frogs are aestivating underground so are not easily sampled during dry season fauna surveys.

Some of the species not recorded in the study area inhabit caves, rock crevices and rocky creeks or pools, including Copland's Rock Frog (*Litoria coplandi*), Rockhole Frog (*Litoria meiriana*) and Magnificent Tree Frog (*Litoria splendida*) (Tyler *et al.* 2000). Although some of these species are common in the region, there is unlikely to be suitable habitat present in the study area.

Frogs are likely to occur throughout the study area, and potentially breed anywhere that holds water after rainfall. The tributary of the Fitzroy River (Snake Creek), the small seasonal swamps on the western edge of the study area (Area A) and areas of floodplain are likely to be suitable habitat for frog breeding, and some species are also likely to breed around man-made water sources such as the dams and tanks.

5.1.1 Amphibians of Conservation Significance

No frogs of conservation significance are likely to be present in the study area.

5.2 Reptiles

There are 91 species of reptile that have the potential to occur in the study area, of which 55 species have been recorded in the study area during the fauna surveys (Table 6). In addition, one species of freshwater turtle, the Northern Snake-necked Turtle (*Chelodina rugosa*) was recorded nearby in the Fitzroy River in 2009 (Appendix 4). Species that inhabit aquatic habitats, such as turtles and the Freshwater Crocodile (*Crocodylus johnstoni*), are only likely to be present in Snake Creek for most of the year, but may also range into Mt Wynne Creek, seasonal swamps and seasonally inundated floodplains.

The reptiles captured in each of the four fauna survey periods are summarised in Tables 10 - 13. In October 2009, between seven and 19 species were recorded from each site, with a total of 35 species captured across all twelve trapping sites (Table 10). In April 2010, between six and 18 species were recorded from each site, with a total of 42 species captured across trapping sites 1 - 12 (Table 11). In October 2010, 22 species were trapped across sites 13 - 20, with five to twelve species recorded at each individual site (Table 12). In June 2011, 26 species were trapped across sites 13 - 17 and 20 - 26, with three to ten species recorded at each individual site (Table 13).

Species that were commonly trapped across the study area included a suite of skinks such as *Ctenotus inornatus*, *Ctenotus saxatilis*, *Eremiascincus isolepis*, *Lerista bipes* and the Dwarf Skink (*Menetia greyii*). The Pilbara Dtella (*Gehyra pilbara*) was common at sites 11 and 12, both of which had large termite mounds for this species to shelter in. Termitaria are likely to shelter a range of reptile species, particularly geckoes.

Sites 6 and 10, which were situated on sand ridges, had very high numbers of *Lerista bipes* and *Eremiascincus isolepis*, and were the only sites where *Diporiphora pindan* and *Diporiphora magna* were captured (Tables 10 and 11). A common species along rivers and in woodlands, the Ta-Ta Lizard (*Amphibolurus gilberti*) was mainly captured at site 1 (near Snake Creek) and site 7 (low-lying woodland in a dry swamp). Although a common skink of northern Australia, *Ctenotus robustus* was captured only in the floodplain of Mt Wynne Creek, at Site 20 (Table 13).

5.2.1 Reptiles of Conservation Significance

There are four reptiles of conservation significance that may occur in the study area. Each species is listed and discussed below. Of these, the skink *Ctenotus uber johnstonei* and the Freshwater Crocodile were recorded in the study area during the fauna survey (Table 6).

Conservation Significance 1

Freshwater Crocodile

Crocodylus johnstoni

This species is listed under Schedule 4 (specially protected fauna) of the WA Wildlife Conservation Act, and is a listed marine species under the EPBC Act.

The Freshwater Crocodile was recorded nearby on the Fitzroy River in 2009 and in Snake Creek in 2010 and 2011 (Appendix 4). This species is common in freshwater rivers and billabongs across the Kimberley region. It is likely to be present in the study area when the tributary of the Fitzroy River (Snake Creek) in the western edge of the study area holds water. The Freshwater Crocodile is capable of moving over dry land, so may be present even in isolated pools such as the billabongs near Snake Creek. However, it is unlikely to be present in the majority of the study area.

The Saltwater Crocodile (*Crocodylus porosus*) has not been listed in Table 6, as it is unlikely to be present. The study area is relatively far inland from the estuarine and coastal waters that this species favours.

Conservation Significance 2

skink

Ctenotus uber johnstonei

This species is listed as Priority 2 by DEC.

The skink *Ctenotus uber johnstonei* is known from relatively few records across Western Australia. The nearest record outside the study area is from chenopod shrubland near Balgo Hill in the north-east interior of Western Australia (Storr *et al.*, 1999, Wilson and Swan 2003), about 400km to the south-east. The specimens caught in the study area were from a different habitat (scattered *Acacia* and *Corymbia* over Spinifex grassland), and were most commonly captured at Site 12 (Table 10), but were also captured at sites 5, 9, 15 and 24 (Tables 10 and 13). The captures may represent a different species or subspecies (B. Maryan, pers. comm. November 2009), and a specimen from the study area has been lodged with the WA Museum (specimen number R150812). The taxonomic status of this species is likely to remain in doubt until a genetic study is carried out. It appears likely that this species is widespread in the shrublands and woodlands in the study area.

Conservation Significance 3

skink

Wide-banded Northern Bandy-bandy

Lerista simillima
Vermicella intermedia

There are two species potentially occurring in the study area that could be of local conservation significance. The skink *Lerista simillima* is a small sand-swimming skink restricted to a small part of the southern Kimberley between Liveringa Station and Fitzroy Crossing (Storr *et al.* 1999). It is known to inhabit Acacia thickets and woodlands on red sandy loams (Wilson and Swan 2003), so it may be present on the sand ridges in the study area. However, it was not recorded during the fauna survey.

The Wide-banded Northern Bandy-bandy is known from very few records in Western Australia, including from Liveringa Station, and further north on the Mitchell Plateau (Storr *et al.*, 2002). The distribution and ecology of this species in Western Australia is not well understood. Because of the paucity of information on this species, it is difficult to ascertain its status in the study area, and it was not recorded during the fauna surveys.

5.3 Birds

There are 163 species of bird that have the potential to occur in the study area, of which 129 have been recorded thus far (Table 7). Most bird activity was confined to the early morning, with between six and 26 species recorded at trapping sites in October 2009 (Table 18), between 7 and 39 species recorded in April 2010 (Table 19), between 19 and 35 species recorded in October 2010 (Table 20) and between 25 and 40 species recorded in June 2011 (Table 21).

Sources of water in the study area include Snake Creek, Mt Wynne Creek, dams (at Paradise Camp, Duchess Dam and Egans Bore), troughs (at Churchill's and Audrey's Tanks), seasonal swamps near Snake Creek and areas of floodplain. When wet, these areas attracted birds for drinking and bathing, and the dams attract waterbirds such as the Darter (*Anhinga melanogaster*) recorded at Duchess Dam in 2009, and over 400 Plumed Whistling Ducks (*Dendrocygna eytoni*) in 2010 (Appendix 4). Small numbers of waterbirds are likely to be present along Snake Creek year-round, and the swamps near Snake Creek are likely to support a suite of seasonal species, as observed in April 2010. When inundated, the floodplain areas around Mt Wynne Creek are likely to support a range of waterbirds including herons and ducks. The study area is not likely to support significant numbers of migratory shorebirds, although significant congregations are known to occur on the Camballin Floodplain to the west of the study area.

At the time of the October 2009 survey, the Boab trees were flowering, attracting a range of species, particularly honeyeaters such as the Rufous-throated Honeyeater (*Conopophila rufogularis*), Brown Honeyeater (*Lichmera indistincta*) and Little Friarbird (*Philemon citreogularis*). In October 2010 and June 2011 the *Bauhinia cunninghamii* trees were flowering, likewise attracting flocks of honeyeaters, and also White-winged Trillers (*Lalage tricolor*). Patches of a tall *Acacia sp.* shrub were seeding at the time of the 2009 survey, and this attracted large flocks of the Varied Lorikeet (*Trichoglossus versicolor*), Red-winged Parrot (*Aprosmictus erythropterus*) and Red-tailed Black-Cockatoo (*Calyptorhynchus banksii*), with smaller numbers of other species.

Hollows in Boab, *Eucalyptus* and *Corymbia* trees are likely to be used for nesting by a range of species, including the Australian Owlet-Nightjar (*Aegotheles cristatus*), Southern Boobook (*Ninox novaeseelandiae*), cockatoos, parrots, and the Tree Martin (*Hirundo nigricans*). In 2011, a pair of Barn Owls (*Tyto novaehollandiae*) were recorded roosting in a large hollow Boab tree (Appendix 4). Birds of prey may favour the tall Boab trees for nesting, with old nests observed in the study area, with an active Brown Falcon (*Falco berigora*) nest observed at Duchess Dam in 2009/2011 and an active Whistling Kite nest observed on the Paradise Access Rd in 2011 (Appendix 4).

5.3.1 Birds of Conservation Significance

There are 19 birds of conservation significance that have either been recorded or may potentially occur in the study area. Each species is listed in the boxes below, and discussed. During the 2009 - 2011 fauna surveys the conservation significant species recorded in the study area were the Great Egret, Glossy Ibis, Common Sandpiper, Common Greenshank, Oriental Plover, Fork-tailed Swift, Rainbow Bee-eater, Australian Bustard, Bush Stone-curlew, Flock Bronzewing, Star Finch and Pictorella Mannikin, with the White-bellied Sea-eagle recorded nearby at the Camballin Barrage (Table 7).

<u>Conservation Significance 1</u>	
<p>Great Egret This species is listed as migratory under the EPBC Act.</p>	<i>Ardea alba</i>
<p>Cattle Egret This species is listed as migratory under the EPBC Act.</p>	<i>Ardea ibis</i>
<p>Glossy Ibis This species is listed as migratory under the EPBC Act.</p>	<i>Plegadis falcinellus</i>
<p>White-bellied Sea-Eagle This species is listed as migratory under the EPBC Act.</p>	<i>Haliaeetus leucogaster</i>
<p>Peregrine Falcon This falcon is listed under Schedule 4 (other specially protected fauna) of the WA Wildlife Conservation Act.</p>	<i>Falco peregrinus</i>
<p>Common Sandpiper This species is listed as migratory under the EPBC Act.</p>	<i>Tringa hypoleucos</i>
<p>Common Greenshank This species is listed as migratory under the EPBC Act.</p>	<i>Tringa nebularia</i>
<p>Australian Painted Snipe This species is listed under Schedule 1 (Vulnerable) of the WA Wildlife Conservation Act, as Vulnerable and Migratory under the EPBC Act, and as Vulnerable in the Action Plan for Australian Birds (Garnett and Crowley 2000).</p>	<i>Rostratula benghalensis australis</i>
<p>Oriental Plover This species is listed as migratory under the EPBC Act and is listed under Schedule 3 of the WA Wildlife Conservation Act.</p>	<i>Charadrius veredus</i>
<p>Oriental Pratincole This species is listed as migratory under the EPBC Act.</p>	<i>Glareola maldivarum</i>
<p>Fork-tailed Swift This species is listed as migratory under the EPBC Act and is listed under Schedule 3 of the WA Wildlife Conservation Act.</p>	<i>Apus pacificus</i>
<p>Rainbow Bee-eater This species is listed as migratory under the EPBC Act.</p>	<i>Merops ornatus</i>
<p>Gouldian Finch This species is listed under Schedule 1 (Endangered) of the WA Wildlife Conservation Act, as Endangered under the EPBC Act, and as Endangered in the Action Plan for Australian Birds (Garnett and Crowley 2000).</p>	<i>Erythrura gouldiae</i>

The **Great Egret** was recorded at the Camballin Barrage during the 2009 fauna survey and in the study area in October 2010 and June 2011 (Table 7). The Great Egret is a common bird of shallow freshwaters in the Kimberley (Johnstone and Storr 1998), and is likely to commonly occur as individual birds or small flocks in the general area. In the study area it is likely to use the seasonal swamps, inundated floodplains and pools on Mt Wynne Creek and Snake Creek. Although a listed migratory species, the status of the Great Egret is secure.

The **Cattle Egret** was not recorded during the fauna survey. The Cattle Egret is generally uncommon, occurring in wetlands and short-grass pastures, often in association with cattle (Johnstone and Storr 1998). This species could potentially occur in the study area, though it is only likely to be an occasional visitor.

The **Glossy Ibis** is locally common in the Kimberley, both during and after the wet season (Johnstone and Storr 1998) and may occur in small flocks or occasionally large flocks. It was recorded in a seasonal swamp near Snake Creek April 2010 (Table 7, Appendix 4). In the study area the Glossy Ibis is likely to use the swamps, inundated floodplains and pools on Mt Wynne Creek and Snake Creek. Although a listed migratory species, the status of the Glossy Ibis is secure.

A **White-bellied Sea-Eagle** was recorded on the Fitzroy River during the October 2009 fauna survey, within 5km of the study area (Table 7, Appendix 4). This species may overfly the study area on occasion, although foraging or breeding habitat for the White-bellied Sea-Eagle is generally absent. This species generally inhabits coastal areas, islands and larger river systems (Johnstone and Storr 1998).

The **Peregrine Falcon** is a widespread bird of prey. This falcon nests mainly on ledges on cliffs, rocky outcrops and quarries, and it may also use tall trees (Johnstone and Storr 1998). This species often takes advantage of man-made structures such as abandoned open pits. The Peregrine Falcon may be present in the study area, though it has not been recorded thus far on fauna surveys. If present, it may potentially nest in large Boab trees in the study area, and forage over the open plains.

The **Common Sandpiper** may be present all year, but is most common from September to March (Johnstone and Storr 1998). This species occurs in a range of salt and freshwater habitats, including coasts, river pools, drying swamps and floodwaters (Johnstone and Storr 1998). A single bird was recorded near the study area at the lake to the west of Paradise Camp in October 2010 (Appendix 4). A site may be deemed important for this species if it supports more than 1% of the flyway population for the species, or 250 birds (Bamford *et al.* 2008). Although this species is likely to be a regular visitor to seasonal swamps, creeks and floodplains in the study area, it is only likely to be present in low numbers.

The **Common Greenshank** breeds in the northern hemisphere, and is a visitor to Australia generally between September and March (Johnstone and Storr 1998). The Common Greenshank inhabits a range of fresh and salt waters including swamps and river pools (Johnstone and Storr 1998). This species was recorded in a seasonal swamp near Site 1 in April 2010 (Table 17) and is likely to commonly occur there and in other nearby billabongs in small numbers. The Common Greenshank does not use terrestrial habitats such as open woodlands, sand-ridges the stony ridge that comprise the majority of the study area. A site may be deemed important for this species if it supports more than 1% of the flyway population for the species, or 600 birds (Bamford *et al.* 2008), and more than one bird is yet to be recorded in the study area.

The **Painted Snipe** is an extremely cryptic and scarce species and generally occurs in the north and east of Australia, with a few records from the south-west of Western Australia (Johnstone and Storr 1998). This species generally inhabits ephemeral, seasonal or temporary wetlands and feeds on the waters edge (Garnett and Crowley 2000). There are no nearby records of this species on databases and it has not been recorded from the study area (Table 7). This species may possibly occur in the study area in the small billabongs, or on the edges of floodplains, though it seems unlikely given that the vegetation is very sparse and degraded by cattle.

The **Oriental Plover** inhabits sparsely vegetated plains, as well as beaches and tidal flats (Johnstone and Storr 1998). This migratory species breeds in Mongolia and northern China, and is present in northern Australia from late August to early April. Five birds were observed near Audrey's Tank in October 2010 (Appendix 4). This species is likely to be a regular visitor to the region, but given the vegetated habitats present, much of the study area is unlikely to be important for the Oriental Plover. A site may be deemed important for this species if it supports more than 1% of the flyway population for the species, or 700 birds (Bamford *et al.* 2008). It appears unlikely that such large numbers of birds would visit the study area, but this species may be present on open plains, including degraded open areas around water such as tanks or dams.

The **Oriental Pratincole** is a migratory species that winters in northern Australia from late October to May (Johnstone and Storr 1998), inhabiting bare ground beside water. Although a single bird was observed in the Camballin Irrigation Area in 2009 (Appendix 4), the Oriental Pratincole was not observed in the study area. A site may be deemed important for this species if it supports more than 1% of the flyway population for the species, or 20,000 birds (Bamford *et al.* 2008). The Oriental Pratincole may occur in the study area on occasion, but the area is unlikely to support such large numbers as to constitute 1% of the flyway population. This species is likely to favour open habitats such as floodplains, but is not likely to occur in more densely vegetated habitats.

The **Fork-tailed Swift** is a non-breeding visitor to Australia between September and April (Boehm 1962). Five birds were recorded in the study area at site 14 in October 2010 (Table 19). While it can be scarce in south-west Australia this species is generally more common in the north (Johnstone and Storr 1998). The bird is primarily observed foraging for insects in proximity to cyclonic weather (Boehm 1962). Although a migratory species, the Fork-tailed Swift has a large range and a large population that appears to be stable (IUCN 2010). The Fork-tailed Swift is largely an aerial species and is unlikely to be affected by changes to the study area.

The **Rainbow Bee-eater** is a common species that migrates southwards in summer to breed. It was recorded in the study area during all surveys, at sites 6 and 12 in 2009 (Table 18), at sites 1-3, 5, 6 and 10-12 in April 2010 (Table 19), opportunistically in October 2010 (Appendix 4) and at sites 13, 14, and 17 – 26 in June 2011 (Table 21). This species may forage anywhere over the study area, but is only likely to breed where there are sandy soils in which to burrow, such as along the sand ridges.

The **Gouldian Finch** is distributed across northern Australia, and inhabits open forests and woodlands with a grassy understorey (Johnstone and Storr 2004). These finches are often found near fresh water, particularly in the dry season. Breeding occurs in winter (April to July), generally in hilly or rocky areas with Snappy Gum (*Eucalyptus brevifolia*), with the birds building nests in the *E. brevifolia* hollows (Johnstone and Storr 2004). Grazing by cattle and altered fire regimes are thought to be the most likely causes of declines in this species (Garnett and Crowley 2000). The Gouldian Finch was not recorded in the study area during the fauna survey. Although this species could potentially occur and forage in the study area, there is unlikely to be breeding habitat present as *E. brevifolia* are not present.

Conservation Significance 2**Grey Falcon***Falco hypoleucos*

This falcon is listed as Priority 4 by DEC and as Near Threatened in the Action Plan for Australian Birds (Garnett and Crowley 2000).

Australian Bustard*Ardeotis australis*

This species is listed as Priority 4 by DEC and as Near Threatened in the Action Plan for Australian Birds (Garnett and Crowley 2000).

Bush Stone-Curlew*Burhinus grallarius*

This species is listed as Priority 4 by DEC and as Near Threatened in the Action Plan for Australian Birds (Garnett and Crowley 2000).

Flock Bronzewing*Phaps histrionica*

This pigeon is listed as Priority 4 by DEC and as Near Threatened in the Action Plan for Australian Birds (Garnett and Crowley 2000).

Pictorella Mannikin*Heteromunia pectoralis*

This species is listed as Priority 4 by DEC and as Near Threatened in the Action Plan for Australian Birds (Garnett and Crowley 2000).

Star Finch (western)*Neochmia ruficauda*

This species is listed as Priority 4 by DEC and as Near Threatened in the Action Plan for Australian Birds (Garnett and Crowley 2000).

The **Grey Falcon** is a very uncommon bird that inhabits lightly wooded areas in the northern part of Western Australia (Johnstone and Storr 1998). This species nests in eucalypts along rivers, so the woodland area along Snake Creek and Mt Wynne Creek may potentially be breeding habitat. However, this species has not been recorded in the study area during fauna surveys, and has not been recorded on databases (Table 7).

The **Australian Bustard** inhabits grasslands and savannah grasslands, moving nomadically in response to the presence of food (Johnstone and Storr 1998). This species was recorded in the study area near sites 1-4, 8, 10, 15, 17 and 18 (Appendix 4, Tables 19 – 21) and is likely to be present throughout the plains of the study area. This species is slow to take flight, so is vulnerable to road mortalities, and may also be subject to hunting pressure (Garnett and Crowley 2000).

The **Bush Stone-Curlew** inhabits lightly wooded plains, sheltering during the day in thickets of grass or under shrubs (Johnstone and Storr 1998). This species roosts and nests on the ground and is vulnerable to feral predators such as the fox. The Bush Stone-Curlew was recorded in the study area during all fauna surveys (Table 7, Appendix 4). As a ground-dwelling species, the Bush Stone-Curlew may be vulnerable to road mortalities at night. The Bush Stone-Curlew is likely to forage throughout most of the study area.

The **Flock Bronzewing** is distributed across a large part of inland northern Australia, however, within that area the species only occurs patchily and periodically. The Flock Bronzewing mainly inhabits Mitchell Grass grasslands on blacksoil plains, but also uses other habitats including Spinifex grasslands and grassy woodlands (Garnett and Crowley 2000). The Flock Bronzewing was recorded in the study area in 2011, with about 170 birds foraging on the open plain near Egans Bore on the Paradise Access Rd (Appendix 4). The Flock Bronzewing is likely to be a periodic visitor to the plains of the study area.

The **Pictorella Mannikin** is a finch that is distributed across northern Australia. This species inhabits lightly wooded grasslands, usually near water, where it feeds on fallen seeds and small insects (Johnstone and Storr 2004, Garnett and Crowley 2000). The Pictorella Mannikin is highly mobile (Garnett and Crowley 2000), so may not be present in the study area every year, and this makes its status difficult to assess. The Pictorella Mannikin was recorded in the study area during the May 2011 Northern Quoll survey, with records of a small number of birds (two to ten individuals) at Mt Wynne Creek and Snake Creek (Appendix 4).

The **Star Finch** inhabits the dense vegetation around swamps, rivers and permanent waterholes on larger watercourses in the north-west of Western Australia (Johnstone and Storr 2004). This species was recorded in the study area at Snake Creek in May and June 2011 (Appendix 4). The Star Finch is likely to occur nearby on the Fitzroy River and is likely to be an occasional visitor to the study area in the vicinity of Snake Creek and Mt Wynne Creek, but is unlikely to occur away from riparian vegetation.

5.4 Mammals

There are 55 species of mammal that have the potential to occur in the study area, of which 49 are native and six introduced (Table 8). Twenty-six mammal species were recorded from the study area during the 2009 – 2011 fauna surveys, 21 native species and five introduced (Table 8).

Two dasyurid marsupials were recorded during the fauna surveys, the Long-tailed Planigale (*Planigale ingrami*) and the Stripe-faced Dunnart (*Sminthopsis macroura*), though only the Stripe-faced Dunnart was recorded in 2010 and 2011 (Tables 14 - 17). The Stripe-faced Dunnart is a very widespread species that occurs in a variety of habitats (Van Dyck and Strahan 2008) and is likely to be common in the study area. A second dunnart species, the Lesser Hairy-footed Dunnart (*Sminthopsis youngsoni*) is known from red sandy desert areas (Van Dyck and Strahan 2008), and may also be present. The Long-tailed Planigale favours blacksoil plains (Van Dyck and Strahan 2008) so may be more common outside the study area, on the Camballin Floodplain. The Common Planigale (*Planigale maculata*) was not recorded in the fauna survey, but is a habitat generalist and likely to be present.

Kangaroo and wallaby species were uncommon in the study area in October 2009, but four species were recorded (Table 7). The Northern Nailtail Wallaby (*Onychogalea unguifera*) was more common in the April and October 2010 surveys, with records throughout the study area (Appendix 4). The Euro (*Macropus robustus*) was not recorded, but is likely to be present.

Five native rodents were trapped during the fauna survey, the Lakeland Downs Mouse (*Leggadina lakedownensis*), Delicate Mouse (*Pseudomys delicatulus*), Desert Mouse (*Pseudomys desertor*), Sandy Inland Mouse (*Pseudomys hermannsbergensis*) and Western Chestnut Mouse (*Pseudomys nanus*) (Tables 14 - 17). These species are likely to be common in the study area, with the Delicate Mouse and Sandy Inland Mouse possibly favouring the sand ridge habitats. The Common Rock-Rat (*Zygomys argurus*) was not recorded, but may be present on the low rocky ridges.

The Little Red Flying Fox (*Pteropus scapulatus*) was common in the study area in 2009 (Table 7). At night, this species was observed foraging on nectar from flowering Boab trees in the study area and *Melaleuca* sp. along the Fitzroy River. In 2010, the Black Flying Fox (*Pteropus alecto*) was recorded roosting at Snake Creek (Appendix 4).

Six insectivorous bat species were positively identified from calls recorded at each of the trapping sites in October 2009 and April 2010 (Table 7, Appendix 5). Several other species could not be positively identified from call analysis, but could potentially be present (Appendix 5), however, these species are not indicated in Table 7, as their presence has not been confirmed by trapping. Bats are likely to forage over the entire study area, and some species are likely to roost in tree hollows, such as the Northern Freetail Bat (*Chaerophon jobensis*) and Gould's Wattled Bat (*Chalinolobus gouldii*).

5.4.1 Mammals of Conservation Significance

There are nine mammals of conservation significance that may occur in the study area. Each species is listed and discussed below. During the 2009 - 2010 fauna surveys the only conservation significant mammal species recorded was the Lakeland Downs Mouse.

<u>Conservation Significance 1</u>	
Northern Quoll This species is listed under Schedule 1 (Endangered) of the WA Wildlife Conservation Act and as Endangered under the EPBC Act.	<i>Dasyurus hallucatus</i>
Greater Bilby This species is listed under Schedule 1 (Vulnerable) of the WA Wildlife Conservation Act and as Vulnerable under the EPBC Act.	<i>Macrotis lagotis</i>
West Kimberley Rock Wallaby This rock wallaby is listed under Schedule 1 (Vulnerable) of the WA Wildlife Conservation Act and as Vulnerable under the EPBC Act.	<i>Petrogale lateralis</i> sp.
Orange Leaf-nosed Bat This bat is listed under Schedule 1 (Vulnerable) of the WA Wildlife Conservation Act.	<i>Rhinonicteris aurantius</i>

The **Northern Quoll** is a medium-sized carnivore that was listed under the EPBC Act in 2005 partly due to concern about the impact of the Cane Toad (*Bufo marinus*) on the species. The Northern Quoll has apparently disappeared from its range in the south-east and south-west Kimberley, remaining in rocky areas of the Mitchell Plateau (Braithwaite and Griffiths 1994). The range contraction is possibly due to the effects of changed fire regimes and cattle grazing (Van Dyck and Strahan 2008). The study area lacks the rocky habitats that are considered to be the core habitat for the Northern Quoll. In the study area, the creeks are the most likely Northern Quoll habitat, and if present in the creeks they could potentially range into the surrounding woodlands to forage. Mt Wynne Creek and Snake Creek were subject to a targeted trapping programme (Figure 5), and standard trapping has been carried out throughout the study area (Figure 4), but no quolls were trapped. Therefore, although within the historical range of this species, Northern Quoll is considered unlikely to be present in the study area.

Once widespread across much of inland Australia, the range of the **Greater Bilby** has contracted substantially, and it is now patchily distributed across northern inland Australia (Van Dyck and Strahan 2008). This species inhabits a range of habitats, including red earths with *Acacia* shrubland and *Spinifex* grasslands on dunes and alluvial plains (Van Dyck and Strahan, 2008). Although not recorded in the study area, this species could potentially inhabit spinifex plains in the study area. Targeted searches on sand ridges and *Spinifex* plains in October 2010 and June 2011 (Figure 5) did not uncover any signs of the Greater Bilby. Conversations with Aboriginal people that traditionally hunt on the lands encompassed by Liveringa Station indicate that the Greater Bilby is not currently found in the area, although it does occur outside the study area in the deserts to the east. It appears likely that this species is locally extinct in the study area.

The **West Kimberley Rock Wallaby** is currently known only from a few ranges in the West Kimberley region, such as the Grant and Edgar and Erskine Ranges (Pearson and Kinnear 1997). Closer to the study area, there are historical records from Mt Wynne in 1901, and an undated specimen from Mt Anderson (Pearson and Kinnear 1997). The West Kimberley Rock Wallaby inhabits low flat-topped hills with scree slopes (Van Dyck and Strahan 2008). There are records of this species from the Erskine Range, about 40km to the north of the study area, on DEC's Threatened and Priority Fauna Database. The West Kimberley Rock Wallaby is also known from Uralla (about 20km west) and Mt Anderson (about 90km west). Despite the nearby records, the study area is unlikely to support this species as there are no suitable ranges present.

The **Orange Leaf-nosed Bat** requires warm and humid roost sites and feeds in adjacent woodland (Duncan *et al.* 1999). No suitable caves are present in the study area. However, it is thought that during the wet season Orange Leaf-nosed Bats may roost in trees (Van Dyck and Strahan 2008). This species may be present in the study area, where it could potentially forage in all habitats and roost in trees in the wet season. The calls of this species were not recorded during the fauna survey (Appendix 5).

Conservation Significance 2	
Spectacled Hare-Wallaby This wallaby is listed as Priority 3 by DEC.	<i>Lagorchestes conspicillatus leichardti</i>
Ghost Bat This bat is listed as Priority 4 by DEC.	<i>Macroderma gigas</i>
Yellow-lipped Cave Bat This bat is listed as Priority 2 by DEC.	<i>Vespadelus douglasorum</i>
Water-Rat (Rakali) This species is listed as Priority 4 by DEC.	<i>Hydromys chrysogaster</i>
Lakeland Downs Mouse This mouse is listed as Priority 4 by DEC.	<i>Leggadina lakedownensis</i>

The mainland population of the **Spectacled Hare-Wallaby** is very uncommon. This species inhabits areas of tall, long-unburnt Spinifex, where it uses the large Spinifex clumps for shelter (Van Dyck and Strahan 2008). There is a possibility that the Spectacled Hare-Wallaby may be present in the study area, however, much of the Spinifex is small. The Spectacled Hare-Wallaby was not recorded in the study area during the fauna survey. There are no nearby records of this species on DEC's Threatened and Priority Fauna Database, but it has been recorded in the general vicinity on the Western Australian Museum Specimen Database (Table 8, Appendix 3).

The **Ghost Bat** may utilise the study area for foraging, but it is unlikely that any roost sites occur within the area given the lack of suitable geological formations (deep caves) or old mine shafts. The Ghost Bat may forage in the study area, but its calls were not recorded during the fauna survey (Appendix 5).

The **Yellow-lipped Cave Bat** is endemic to the western Kimberley, where it forages in open woodlands and along rivers. Roosts of this species have been found in limestone and sandstone caves (Van Dyck and Strahan 2008), neither of which are present in the study area. This species may forage in parts of the study area, but its calls were not recorded during the fauna surveys (Appendix 5).

Although the study area is within the range of the **Water-Rat**, this species is patchily distributed. There are no nearby records of this species on the Western Australian Museum Specimen Database or on the DEC Threatened and Priority Fauna Database (Table 8, Appendix 3). The Water-Rat is usually found near permanent water where it forages mainly for aquatic prey such as large insects, crustaceans and fish (Van Dyck and Strahan 2008). This species may occur along Snake Creek on the western edge of the study area, or may occur to the south on the Fitzroy River. During the wet season, the Water-Rat may also range along Mt Wynne Creek. The remainder of the study area is unlikely to be important habitat for the Water-Rat.

The **Lakeland Downs Mouse** appears to favour seasonally inundated sandy-clay soils, but also occurs in a range of other habitats, including Spinifex grasslands and stony ranges (Van Dyck and Strahan 2008). The Lakeland Downs Mouse was recorded on the stony ridge (site 2) during the October 2009 survey (Table 14), on the Spinifex plain (site 4) during the April 2010 survey (Table 16) and at sites 24, 25 and 26 in the June 2011 survey (Table 17). Populations of this species can fluctuate dramatically (Van Dyck and Strahan 2008), so it may be common in one year and virtually absent in another. The Lakeland Downs Mouse is likely to be widespread in the study area and potentially occurring on plains and the low rocky ridge.

5.5 Freshwater Fish

There are 25 species of freshwater fish that have the potential to occur in the Fitzroy River, Snake Creek and associated billabongs (Table 9). These are all species known to occur in the Fitzroy River, and most of them were recorded at the Camballin Barrage in a 2003 - 2004 study (Morgan *et al.* 2005). The main habitat for fish in the study area is in Snake (Uralla) Creek. A tributary of the Fitzroy River, water is diverted up Snake Creek from the Camballin Barrage. During the wet season, fish may also range into Mt Wynne Creek and other seasonally inundated areas.

5.5.1 Freshwater Fish of Conservation Significance

There are three fish of conservation significance known from the Fitzroy River (Table 9). Each species is listed and discussed below.

Conservation Significance 1

Freshwater Sawfish

This fish is listed as Vulnerable under the EPBC Act, and as Priority 3 by DEC.

Pristis microdon

The **Freshwater Sawfish** occurs in coastal areas, estuaries and large rivers across northern Australia (Allen *et al.* 2002). This species was recorded from the Camballin Barrage on the Fitzroy River in 2009, and there are nearby records on the DEC's Threatened and Priority Fauna Database, including from Camballin in 2001 and from Geegully Creek in 2003 (Appendix 3). This large fish takes several years to gain maturity, and is vulnerable to gillnet fishing (Allen *et al.* 2002).

Conservation Significance 2

Prince Regent Hardyhead

This fish is listed as Priority 2 by DEC.

Craterocephalus lentiginosus

Greenway's Grunter

This fish is listed as Priority 1 by DEC.

Hannia greenwayi

The **Prince Regent Hardyhead** is known only from a few rivers and streams in the Kimberley region, of which the Fitzroy River is one (Allen *et al.* 2002). There is a 2001 record of the Prince Regent Hardyhead from Camballin on DEC's Threatened and Priority Fauna Database (Appendix 3), and it has been recorded from the Camballin Barrage (Morgan *et al.* 2005), so is present within 5km of the study area.

Greenway's Grunter is known only from a small area in the Kimberley, where it inhabits flowing clear or turbid water in streams with mixed sandy and rocky bottoms (Allen *et al.* 2002). It has been recorded from the Fitzroy River at the Camballin Barrage (Morgan *et al.* 2005) so is present within 5km of the study area. Although it has a limited range, this species can be locally common (Allen *et al.* 2002).

7. Summary and Conclusions

The Duchess Paradise study area has five main habitats: plains, sand ridges, a low stony ridge, dry swamps and creeks, swamps and floodplains. The plains habitat can be divided into four sub-habitats to give a total of eight habitats in the study area. These habitats are generally widely represented in the surrounding area.

Overall, the Duchess Paradise study area has the potential to support a wide range of vertebrate species including up to 23 frog, 91 reptile, 163 bird, 55 mammal and 25 freshwater fish species. A total of eleven frogs, 54 reptile, 129 bird and 26 mammal species were recorded from the study area during the 2009 – 2011 fauna surveys.

The 35 fauna of conservation significance that have the potential to occur in the study area are summarised in Table 22. Of the 35 species of conservation significant fauna, 13 species are wetland dependent, so are only likely to occur in the creeks, seasonal swamps and seasonally inundated floodplains in the study area, and outside the study area on the Fitzroy River and/or Camballin Floodplain.

There are no frogs of conservation significance likely to occur, but there are four reptiles, 19 birds, nine mammals and three freshwater fish of conservation significance that may occur. The Freshwater Crocodile, Great Egret, Glossy Ibis, Oriental Plover, Common Sandpiper, Common Greenshank, Rainbow Bee-eater, Fork-tailed Swift, *Ctenotus uber johnstonei*, Australian Bustard, Bush Stone-Curlew, Flock Bronzewing, Star Finch, Pictorella Mannikin and Lakeland Downs Mouse were recorded in the study area, and the White-bellied Sea-Eagle and Freshwater Sawfish were recorded nearby at the Camballin Barrage on the Fitzroy River.

Table 5. Amphibians that potentially occur in the study area.

+ = species recorded in the study area during the baseline fauna surveys.

Barrage = species recorded in 2009 from the Fitzroy River at the Camballin Barrage (see Appendix 4).

KDM = species recorded on Kimberley Diamond Mine (Ninox Wildlife Consulting 2008).

WAM = species recorded in the area on the Western Australian Museum Specimen Database (see Table 1).

W sp. = species likely only to occur in habitats such as the Fitzroy River, inundated swamps, creeks, billabongs, dams and inundated floodplains.

Species	Conservation Status	Records							W sp.
		Oct '09	Apr '10	Oct '10	Jun '11	Barrage	KDM	WAM	
Hylidae (tree frogs and water-holding frogs)									
Giant Frog	<i>Cyclorana australis</i>			+			x	x	✓
Hidden-ear Frog	<i>Cyclorana cryptotis</i>			+				x	✓
Long-footed Frog	<i>Cyclorana longipes</i>			+					✓
Wailing Frog	<i>Cyclorana vagitus</i>			+		x		x	✓
Green Tree Frog	<i>Litoria caerulea</i>			+			x	x	✓
Copland's Rock Frog	<i>Litoria coplandi</i>						x		✓
Peter's Frog	<i>Litoria inermis</i>			+				x	✓
Rockhole Frog	<i>Litoria meiriana</i>						x		✓
Rocket Frog	<i>Litoria nasuta</i>								✓
Pale Frog	<i>Litoria pallida</i>		+	+			x	x	✓
Roth's Tree Frog	<i>Litoria rothii</i>			+	+	x	x	x	✓
Desert Tree Frog	<i>Litoria rubella</i>			+		x	x	x	✓
Black-shinned Rocket Frog	<i>Litoria tornieri</i>								✓
Magnificent Tree Frog	<i>Litoria splendida</i>								✓
Wotjulum Frog	<i>Litoria wotjulumensis</i>								✓
Limnodynastidae (ground frogs)									
Marbled Frog	<i>Limnodynastes convexiusculus</i>						x		✓
Northern Burrowing Frog	<i>Neobatrachus aquilonius</i>							x	✓
Desert Spadefoot	<i>Notoden nichollsi</i>		+	+			x	x	✓
Ornate Burrowing Frog	<i>Platyplectrum ornatum</i>						x		✓
Myobatrachidae (ground frogs)									
Bilingual Froglet	<i>Crinia bilingua</i>								✓
Derby Toadlet	<i>Uperoleia aspera</i>								✓
Mjoberg's Toadlet	<i>Uperoleia mjobergii</i>			+			x		✓
Mole Toadlet	<i>Uperoleia talpa</i>						x		✓
# frog species expected in the study area:		23							
# frog species recorded in the study area 2009 - 2011:		11							

Table 6. Reptiles that potentially occur in the study area.

+ = species recorded in the study area during the baseline fauna surveys.

Barrage = species recorded in 2009 from the Fitzroy River at the Camballin Barrage (see Appendix 4).

KDM = species recorded on Kimberley Diamond Mine (Ninox Wildlife Consulting 2008).

WAM = species recorded in the area on the Western Australian Museum Specimen Database (see Table 1).

W sp. = species likely only to occur in habitats such as the Fitzroy River, inundated swamps, creeks, billabongs, dams and inundated floodplains.

Species	Conservation Status	Records							W sp.
		Oct '09	Apr '10	Oct '10	Jun '11	Barrage	KDM	WAM	
Crocodylidae (crocodiles)									
Freshwater Crocodile <i>Crocodylus johnstonei</i>	CS1		+	+	+	x			✓
Cheluidae									
Northern Snake-necked Turtle <i>Chelodina rugosa</i>						x			✓
Northern Snapping Turtle <i>Eseya dentata</i>									✓
North-west Red-faced Turtle <i>Emydura australis</i>									✓
Northern Yellow-faced Turtle <i>Emydura tanybaraga</i>									✓
Agamidae (dragon lizards)									
Ta-Ta Lizard <i>Amphibolurus gilberti</i>		+	+	+		x	x		
Frill-neck Lizard <i>Chlamydosaurus kingii</i>							x		
Ring-tailed Dragon <i>Ctenophorus caudicinctus</i>							x		
Military Dragon <i>Ctenophorus isolepis</i>		+	+	+	+		x	x	
Central Netted Dragon <i>Ctenophorus nuchalis</i>		+	+	+				x	
<i>Diporiphora arnhemica</i>							x		
<i>Diporiphora bennettii</i>		+							
<i>Diporiphora lalliae</i>		+	+	+	+		x		
<i>Diporiphora magna</i>		+	+						
<i>Diporiphora pindan</i>		+					x		
Blue-lined Dragon <i>Diporiphora winneckei</i>									
Bearded Dragon <i>Pogona minor mitchelli</i>		+	+	+	+		x		
<i>Tympanocryptis lineata</i>							x		
Diplodactylidae (geckoes)									
Fat-tailed Gecko <i>Diplodactylus conspicillatus</i>									
Sand-plain Gecko <i>Lucasium stenodactylum</i>		+	+	+	+		x		
Zig-zag Velvet Gecko <i>Oedura rhombifera</i>									
Beaked Gecko <i>Rhynchoedura ornata</i>									
Spiny-tailed Gecko <i>Strophurus ciliaris</i>		+	+	+	+		x	x	
<i>Strophurus taeniatus</i>							x		
Carphodactylidae (Knob-tailed Geckoes)									
Northern Knob-tailed Gecko <i>Nephrurus sheai</i>							x	x	

Table 6. (cont.)

Species	Conservation Status	Records						W sp.	
		Oct '09	Apr '10	Oct '10	Jun '11	Barrage	KDM		WAM
Gekkonidae (geckoes)									
Northern Dtella	<i>Gehyra australis</i>			+			x		
	<i>Gehyra nana</i>			+	+		x	x	
	<i>Gehyra occidentalis</i>						x	x	
Pilbara Dtella	<i>Gehyra pilbara</i>	+	+	+			x	x	
Spotted Dtella	<i>Gehyra punctata</i>	+	+						
	<i>Gehyra variegata</i>		+						
Bynoe's Gecko	<i>Heteronotia binoei</i>	+	+	+	+		x		
	<i>Heteronotia planiceps</i>								
Pygopodidae (legless lizards)									
	<i>Delma borea</i>	+	+		+		x		
	<i>Delma nasuta</i>						x		
	<i>Delma tincta</i>	+		+			x		
Burton's Legless Lizard	<i>Lialis burtonis</i>			+	+		x		
	<i>Pygopus steelscottii</i>						x		
Scincidae (skink lizards)									
	<i>Carlia munda</i>	+	+			x			
	<i>Carlia triacantha</i>						x		
	<i>Cryptoblepharus ruber</i>								
	<i>Cryptoblepharus tythos</i>	+	+				x		
	<i>Ctenotus inornatus</i>	+	+	+	+		x		
	<i>Ctenotus militaris</i>						x		
	<i>Ctenotus pantherinus</i>	+	+	+	+		x		
	<i>Ctenotus piankai</i>		+	+	+		x		
	<i>Ctenotus robustus</i>				+		x		
	<i>Ctenotus saxatilis</i>	+	+				x		
	<i>Ctenotus serventyi</i>	+	+				x		
	<i>Ctenotus uber johnstonei</i>	+	+		+				
Spinifex Slender Blue-tongue	<i>Cyclodomorphus melanops</i>		+						
	<i>Eremiascincus (Glaphyromorphus) isolepis</i>	+	+	+			x		
Broad-banded Sand Swimmer	<i>Eremiascincus richardsonii</i>								
	<i>Lerista bipes</i>	+	+		+		x		
	<i>Lerista borealis</i>								
	<i>Lerista greeri</i>								
	<i>Lerista griffini</i>								
	<i>Lerista simillima</i>							x	
Dwarf Skink	<i>Menetia greyii</i>	+	+	+	+		x		
	<i>Menetia maini</i>								
	<i>Morethia ruficauda</i>	+	+	+	+		x		
	<i>Notoscincus ornatus</i>	+	+	+			x		
	<i>Proablepharus reginae</i>						x		
	<i>Proablepharus tenuis</i>	+	+	+	+		x		

Table 6. (cont.)

Species		Conservation Status	Records						W sp.	
			Oct '09	Apr '10	Oct '10	Jun '11	Barrage	KDM		WAM
Central Blue-tongue	<i>Tiliqua multifasciata</i>				+	+		x	x	
Eastern Blue-tongue	<i>Tiliqua scincoides</i>			+	+			x		
Varanidae (goanna or monitor lizards)										
Ridge-tailed Monitor	<i>Varanus acanthurus</i>		+	+	+	+		x		
Short-tailed Pygmy Monitor	<i>Varanus brevicauda</i>		+	+				x		
Pygmy Desert Monitor	<i>Varanus eremius</i>		+	+				x		
Gould's Goanna	<i>Varanus gouldii</i>			+	+	+		x		
	<i>Varanus panoptes</i>			+	+	+		x		
	<i>Varanus scalaris</i>			+		+		x		
	<i>Varanus storri</i>							x		
Black-tailed Monitor	<i>Varanus tristis</i>		+	+	+			x		
Typhlopidae (blind snakes)										
	<i>Ramphotyphlops diversus</i>		+	+	+			x		
Beaked Blind Snake	<i>Ramphotyphlops grypus</i>		+	+		+				
	<i>Ramphotyphlops unguirostris</i>							x		
Boidae (pythons)										
Children's Python	<i>Antaresia childreni</i>							x	x	
Stimpson's Python	<i>Antaresia stimpsoni</i>				+	+			x	
Black-headed Python	<i>Aspidites melanocephalus</i>		+		+	+		x		
Olive Python	<i>Liasis olivaceus</i>									✓
Elapidae (front-fanged snakes)										
Desert Death Adder	<i>Acanthophis pyrrhus</i>								x	
Northern Shovel-nosed Snake	<i>Brachyurophis roperi</i>		+	+				x		
Narrow-headed Whipsnake	<i>Demansia angusticeps</i>		+	+		+		x		
Moon Snake	<i>Furina ornata</i>		+	+	+	+		x		
Mulga Snake	<i>Pseudechis australis</i>			+		+		x	x	
Ringed Brown Snake	<i>Pseudonaja modesta</i>									
Gwardar	<i>Pseudonaja nuchalis</i>		+	+		+		x	x	
Desert Banded Snake	<i>Simoselaps anomalus</i>							x		
Spotted Snake	<i>Suta punctata</i>			+	+	+				
Wide-banded Northern Bandy-bandy	<i>Vermicella intermedia</i>	CS3								
# reptile species expected in the study area:			91						6	
# reptile species recorded in the study area in 2009 - 2011:			55						1	

Table 7. Birds that potentially occur in the study area.

+ = species recorded in the study area during the baseline fauna surveys.

Barrage = species recorded in 2009 from the Fitzroy River at the Camballin Barrage (see Appendix 4).

KDM = species recorded on Kimberley Diamond Mine (Ninox Wildlife Consulting 2008).

WAM = species recorded in the area on the Western Australian Museum Specimen Database (see Table 1).

BA = species recorded in the area by Birds Australia (see Table 1).

Int = introduced species.

W sp. = species likely only to occur in habitats such as the Fitzroy River, inundated swamps, creeks, billabongs, dams and inundated floodplains.

Species	Conservation Status	Records								W sp.		
		Oct '09	Apr '10	Oct '10	May '11	Jun '11	Barrage	KDM	BA		WAM	
Casuariidae (emu)												
Emu <i>Dromaius novaehollandiae</i>		+	+			+		x	x			
Phasianidae (quails)												
Brown Quail <i>Coturnix ypsilophora</i>		+		+	+	+		x	x			
Anatidae (ducks and swans)												
Plumed Whistling-Duck <i>Dendrocygna eytoni</i>			+		+	+		x	x			✓
Wandering Whistling-Duck <i>Dendrocygna arcuata</i>				+		+		x				✓
Grey Teal <i>Anas gracilis</i>								x	x			✓
Pacific Black Duck <i>Anas superciliosa</i>		+	+	+				x	x			✓
Hardhead <i>Aythya australis</i>								x	x			✓
Pink-eared Duck <i>Malacorhynchus membranaceus</i>								x				✓
Podicipedidae (grebes)												
Australasian Grebe <i>Tachybaptus novaehollandiae</i>				+		+			x			✓
Anhingidae (darter)												
Darter <i>Anhinga melanogaster</i>			+	+		+			x			✓
Phalacrocoracidae (cormorants)												
Pied Cormorant <i>Phalacrocorax varius</i>				+						x		✓
Little Pied Cormorant <i>Phalacrocorax melanoleucos</i>		+					x	x	x			✓
Little Black Cormorant <i>Phalacrocorax sulcirostris</i>		+					x	x	x			✓
Ardeidae (herons, egrets and bitterns)												
White-necked Heron <i>Ardea pacifica</i>			+		+	+	x	x	x			✓
White-faced Heron <i>Ardea novaehollandiae</i>			+	+	+	+	x	x	x			✓
Great Egret <i>Ardea alba</i>	CS1			+	+	+		x	x			✓
Intermediate Egret <i>Ardea intermedia</i>			+		+	+		x	x			✓
Little Egret <i>Ardea garzetta</i>					+	+	x		x			✓
Cattle Egret <i>Ardea ibis</i>	CS1								x			✓
Nankeen Night-Heron <i>Nycticorax caledonicus</i>			+		+	+	x		x			✓
Black Bittern <i>Ixobrychus flavicollis</i>								x				✓
Threskionithidae (ibis and spoonbills)												
Glossy Ibis <i>Plegadis falcinellus</i>	CS1		+			+	x		x			✓
Australian White Ibis <i>Threskiornis molucca</i>			+		+	+	x		x			✓
Straw-necked Ibis <i>Threskiornis spinicollis</i>				+	+	+	x	x	x			✓
Royal Spoonbill <i>Platalea regia</i>			+	+	+	+			x			✓
Ciconiidae (storks)												
Black-necked Stork <i>Ephippiorhynchus asiaticus</i>			+	+		+			x			✓

Table 7. (cont.)

Species	Conservation Status	Records								W sp.
		Oct '09	Apr '10	Oct '10	May '11	Jun '11	Barrage	KDM	BA	
Accipitridae (osprey, hawks, eagles and harriers)										
Black-shouldered Kite	<i>Elanus caeruleus</i>	+	+					x	x	
Square-tailed Kite	<i>Hamirostra isura</i>				+	+		x		
Black-breasted Buzzard	<i>Hamirostra melanosternon</i>		+		+	+	x	x		
Black Kite	<i>Milvus migrans</i>	+	+	+		+	x	x	x	
Whistling Kite	<i>Haliastur sphenurus</i>	+	+	+		+	x	x	x	
Brown Goshawk	<i>Accipiter fasciatus</i>	+	+	+		+	x	x	x	
Collared Sparrowhawk	<i>Accipiter cirrocephalus</i>		+		+	+		x	x	
Grey Goshawk	<i>Accipiter novaehollandiae</i>									
Little Eagle	<i>Aquila morphnoides</i>				+			x	x	
Wedge-tailed Eagle	<i>Aquila audax</i>			+		+		x	x	
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	CS1					x		x	✓
Spotted Harrier	<i>Circus assimilis</i>				+	+		x	x	
Swamp Harrier	<i>Circus approximans</i>								x	✓
Falconidae (falcons)										
Brown Falcon	<i>Falco berigora</i>	+	+	+	+	+		x	x	
Nankeen Kestrel	<i>Falco cenchroides</i>	+	+	+	+	+		x	x	
Australian Hobby	<i>Falco longipennis</i>							x		
Grey Falcon	<i>Falco hypoleucos</i>	CS2								
Peregrine Falcon	<i>Falco peregrinus</i>	CS1						x		
Black Falcon	<i>Falco subniger</i>								x	
Gruidae (cranes)										
Brolga	<i>Grus rubicunda</i>	+	+	+	+	+		x	x	
Otididae (bustard)										
Australian Bustard	<i>Ardeotis australis</i>	CS2	+	+	+	+		x	x	x
Turnicidae (button-quails)										
Red-backed Button-Quail	<i>Turnix maculosa</i>									
Red-chested Button-Quail	<i>Turnix pyrrhorthorax</i>				+	+				
Little Button-Quail	<i>Turnix velox</i>		+	+	+	+		x		
Scolopacidae (sandpipers, stints, godwits and allies)										
Common Sandpiper	<i>Tringa hypoleucos</i>	CS1		+					x	✓
Common Greenshank	<i>Tringa nebularia</i>	CS1	+						x	✓
Rostratulidae (painted snipe)										
Painted Snipe	<i>Rostratula benghalensis australis</i>	CS1								✓
Burhinidae (stone-curlews)										
Bush Stone-Curlew	<i>Burhinus grallarius</i>	CS2	+	+	+	+	x			
Recurvirostridae (stilts and avocets)										
Black-winged Stilt	<i>Himantopus himantopus</i>		+			+			x	✓

Table 7. (cont.)

Species	Conservation Status	Records								W sp.		
		Oct '09	Apr '10	Oct '10	May '11	Jun '11	Barrage	KDM	BA		WAM	
Charadriidae (plovers, dotterels and lapwings)												
Masked Lapwing <i>Vanellus miles</i>	CS1		+	+	+	+			x	x		
Oriental Plover <i>Charadrius veredus</i>					+							
Black-fronted Dotterel <i>Charadrius melanops</i>			+	+	+	+			x	x		✓
Red-kneed Dotterel <i>Erythronyctes alpestris</i>			+				+		x	x		✓
Glareolidae (pratincoles)												
Australian Pratincole <i>Stiltia isabellae</i>	CS1			+		+				x		
Oriental Pratincole <i>Glareola maldivarum</i>									x	x		
Laridae (gulls and terns)												
Whiskered Tern <i>Sterna hybrida</i>			+			+						✓
Columbidae (pigeons and doves)												
Flock Bronzewing <i>Phaps histrionica</i>	CS2						+				x	
Crested Pigeon <i>Ocyphaps lophotes</i>			+	+	+	+	+		x			
Spinifex Pigeon <i>Geophaps plumifera</i>					+	+	+					
Diamond Dove <i>Geopelia cuneata</i>			+	+	+	+	+		x	x		
Peaceful Dove <i>Geopelia striata</i>			+	+	+	+	+	x	x	x		
Bar-shouldered Dove <i>Geopelia humeralis</i>						+	+			x		
Psittacidae (cockatoos, parrots, lorikeets and rosellas)												
Red-tailed Black-Cockatoo <i>Calyptorhynchus banksii</i>		+	+	+	+	+	x	x	x			
Galah <i>Cacatua roseicapilla</i>		+	+	+	+	+		x	x			
Little Corella <i>Cacatua sanguinea</i>		+	+	+	+	+	x	x	x			
Sulphur-crested Cockatoo <i>Cacatua galerita</i>												
Cockatiel <i>Nymphicus hollandicus</i>		+		+	+	+		x	x			
Red-collared Lorikeet <i>Trichoglossus haematodus</i>		+							x	x		
Varied Lorikeet <i>Trichoglossus versicolor</i>		+	+	+			x	x	x			
Red-winged Parrot <i>Aprosmictus erythropterus</i>		+	+	+	+	+		x	x			
Budgerigar <i>Melopsittacus undulatus</i>		+	+	+	+	+		x	x			
Cuculidae (cuckoos)												
Pallid Cuckoo <i>Cuculus pallidus</i>		+	+	+	+	+		x	x			
Brush Cuckoo <i>Cacomantis variolosus</i>				+	+			x	x			
Black-eared Cuckoo <i>Chrysococcyx osculans</i>		+			+				x			
Horsfield's Bronze-Cuckoo <i>Chrysococcyx basalii</i>		+		+	+	+		x	x			
Common Koel <i>Eudynamis scolopacea</i>									x			
Channel-billed Cuckoo <i>Scythrops novaehollandiae</i>												
Centropodidae (pheasant coucals)												
Pheasant Coucal <i>Centropus phasianinus</i>		+		+	+		x	x	x			
Strigidae (hawk owls)												
Barking Owl <i>Ninox connivens</i>					+							
Southern Boobook <i>Ninox novaeseelandiae</i>		+	+	+		+	x	x	x			
Tytonidae (barn owls)												
Barn Owl <i>Tyto alba</i>			+			+		x				

Table 7. (cont.)

Species	Conservation Status	Records								W sp.
		Oct '09	Apr '10	Oct '10	Jun '11	Barrage	KDM	BA	WAM	
Podargidae (frogmouths)										
Tawny Frogmouth <i>Podargus strigoides</i>			+	+		+		x		
Caprimulgidae (nightjars)										
Spotted Nightjar <i>Eurostopodus argus</i>		+	+			+		x		
Aegothelidae (owlet-nightjars)										
Australian Owlet-Nightjar <i>Aegotheles cristatus</i>		+	+	+	+	+		x		
Apodidae (swifts)										
Fork-tailed Swift <i>Apus pacificus</i>	CS1			+				x		
Halcyonidae (kingfishers)										
Blue-winged Kookaburra <i>Dacelo leachii</i>		+	+	+	+	+	x	x	x	
Red-backed Kingfisher <i>Todiramphus pyrrhopygius</i>				+	+	+		x	x	x
Sacred Kingfisher <i>Todiramphus sanctus</i>			+	+	+	+		x	x	
Meropidae (bee-eaters)										
Rainbow Bee-eater <i>Merops ornatus</i>	CS1	+	+	+	+	+		x	x	
Coraciidae (dollarbirds)										
Dollarbird <i>Eurystomus orientalis</i>				+					x	
Climacteridae (treecreepers)										
Black-tailed Treecreeper <i>Climacteris melanura</i>		+	+	+				x		
Maluridae (fairy-wrens, grasswrens and emu-wrens)										
Variiegated Fairy-wren <i>Malurus lamberti</i>		+	+	+		+				
Red-backed Fairy-wren <i>Malurus melanocephalus</i>		+	+	+	+	+		x		
Pardalotidae (pardalotes)										
Red-browed Pardalote <i>Pardalotus rubricatus</i>		+	+	+	+	+		x	x	
Striated Pardalote <i>Pardalotus striatus</i>					+			x	x	
Acanthizidae (thornbills, gerygones & allies)										
White-throated Gerygone <i>Gerygone olivacea</i>			+		+	+		x	x	
Weebill <i>Smicromis brevirostris</i>		+	+		+	+		x	x	
Meliphagidae (honeyeaters and chats)										
Black Honeyeater <i>Certhionyx niger</i>			+							
Pied Honeyeater <i>Certhionyx vareigata</i>			+							
Brown Honeyeater <i>Lichmera indistincta</i>		+	+	+	+	+		x	x	
Singing Honeyeater <i>Lichenostomus virescens</i>		+	+	+	+	+		x	x	
Grey-fronted Honeyeater <i>Lichenostomus plumulus</i>								x	x	
White-plumed Honeyeater <i>Lichenostomus penicillatus</i>			+		+	+				
Yellow-tinted Honeyeater <i>Lichenostomus flavescens</i>		+	+	+	+	+		x	x	
White-gaped Honeyeater <i>Lichenostomus unicolor</i>			+						x	
White-throated Honeyeater <i>Melithreptus albogularis</i>								x	x	
Black-chinned Honeyeater <i>Melithreptus gularis</i>		+	+	+	+	+		x	x	
Little Friarbird <i>Philemon citreogularis</i>		+	+	+	+	+		x	x	
Silver-crowned Friarbird <i>Philemon argenticeps</i>								x	x	
Banded Honeyeater <i>Cissomela pectoralis</i>								x	x	

Table 7. (cont.)

Species	Conservation Status	Records								W sp.		
		Oct '09	Apr '10	Oct '10	May '11	Jun '11	Barrage	KDM	BA		WAM	
Meliphagidae (honeyeaters and chats)												
Rufous-throated Honeyeater	<i>Conopophila rufogularis</i>	+	+	+	+	+	x	x	x			
Yellow-throated Miner	<i>Manorina flavigula</i>	+	+	+	+	+		x	x			
Petroicidae (robins)												
Jacky Winter	<i>Microeca fascinans</i>							x	x			
Hooded Robin	<i>Petroica cucullata</i>							x				
Pomatostomidae (babblers)												
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>	+	+	+	+	+		x				
Neosittidae (sittellas)												
Varied Sittella	<i>Daphoenositta chrysoptera</i>	+	+	+		+		x	x			
Pachycephalidae (shrike-tits, whistlers and allies)												
Rufous Whistler	<i>Pachycephala rufiventris</i>	+	+	+	+	+		x	x			
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	+	+	+	+	+		x	x			
Dicruridae (flycatchers, magpie-larks and fantails)												
Restless Flycatcher	<i>Myiagra inquieta</i>	+	+	+	+	+	x	x	x			
Grey Fantail	<i>Rhipidura fuliginosa</i>									x		
Willie Wagtail	<i>Rhipidura leucophrys</i>	+	+	+	+	+	x	x	x			
Northern Fantail	<i>Rhipidura rufiventris</i>											
Magpie-Lark	<i>Grallina cyanoleuca</i>	+	+	+	+	+	x	x	x			
Campephagidae (cuckoo-shrikes and trillers)												
Black-faced Cuckoo-Shrike	<i>Coracina novaehollandiae</i>	+	+	+	+	+	x	x	x			
White-bellied Cuckoo-Shrike	<i>Coracina papuensis</i>		+		+		x	x	x			
Ground Cuckoo-Shrike	<i>Coracina maxima</i>							x				
White-winged Triller	<i>Lalage tricolour</i>	+	+	+	+	+		x	x			
Oriolidae (orioles and figbirds)												
Olive-backed Oriole	<i>Oriolus sagittatus</i>									x		
Artamidae (woodswallows, butcherbirds, magpies)												
White-breasted Woodswallow	<i>Artamus leucorhynchus</i>	+	+	+	+	+		x	x			
Masked Woodswallow	<i>Artamus personatus</i>							x	x			
White-browed Woodswallow	<i>Artamus superciliosus</i>							x				
Black-faced Woodswallow	<i>Artamus cinereus</i>	+	+	+	+	+		x	x			
Little Woodswallow	<i>Artamus minor</i>		+	+	+	+		x	x			
Grey Butcherbird	<i>Cracticus torquatus</i>							x				
Pied Butcherbird	<i>Cracticus nigrogularis</i>	+	+	+	+	+		x	x			
Australian Magpie	<i>Cracticus tibicen</i>	+						x	x			
Corvidae (ravens and crows)												
Torresian Crow	<i>Corvus orru</i>	+	+	+	+	+		x	x			
Little Crow	<i>Corvus bennetti</i>				+			x				
Ptilonorhynchidae (bowerbirds)												
Great Bowerbird	<i>Ptilonorhynchus nuchalis</i>		+		+		x	x	x			

Table 7. (cont.)

Species	Conservation Status	Records								W sp.		
		Oct '09	Apr '10	Oct '10	May '11	Jun '11	Barrage	KDM	BA		WAM	
Hirundinidae (swallows and martins)												
Tree Martin	<i>Hirundo nigricans</i>			+		+			x	x		
Fairy Martin	<i>Hirundo ariel</i>		+	+	+	+			x	x		
Sylviidae (old world warblers)												
Spinifexbird	<i>Eremiornis carteri</i>				+	+						
Rufous Songlark	<i>Cincloramphus mathewsi</i>	+	+	+	+	+			x	x		
Brown Songlark	<i>Cincloramphus cruralis</i>			+						x		
Golden-headed Cisticola	<i>Cisticola exilis</i>					+			x	x		
Alaudidae (larks)												
Singing Bushlark	<i>Mirafra javanica</i>	+	+	+	+	+			x	x		
Dicaeidae (flowerpeckers)												
Mistletoebird	<i>Dicaeum hirundinaceum</i>	+	+	+	+	+			x	x		
Estrilidae (grassfinches and allies)												
Zebra Finch	<i>Taeniopygia guttata</i>	+	+	+	+	+			x	x		
Double-barred Finch	<i>Taeniopygia bichenovii</i>			+	+				x	x		
Long-tailed Finch	<i>Poephila acuticauda</i>								x	x		
Masked Finch	<i>Poephila personata</i>								x			
Crimson Finch	<i>Neochmia phaeton</i>	+	+		+	+	x		x	x		✓
Star Finch	<i>Neochmia ruficauda</i>	CS2			+	+			x	x		✓
Painted Finch	<i>Emblema pictum</i>					+			x			
Pictorella Mannikin	<i>Heteromunia pectoralis</i>	CS2			+				x	x		
Gouldian Finch	<i>Erythrura gouldiae</i>	CS1							x			
Motacillidae (pipits and wagtails)												
Australian Pipit	<i>Anthus australis</i>	+		+	+	+			x	x		
# bird species expected in the study area:		163								35		
# bird species recorded in the study area in 2009 - 2011:		129								19		

Table 8. Mammals that potentially occur in the study area.

+ = species recorded in the study area during the baseline fauna surveys.

Barrage = species recorded in 2009 from the Fitzroy River at the Camballin Barrage (see Appendix 4).

KDM = species recorded on Kimberley Diamond Mine (Ninox Wildlife Consulting 2008).

WAM = species recorded in the area on the Western Australian Museum Specimen Database (see Table 1).

Int = introduced species.

W sp. = species likely only to occur in habitats such as the Fitzroy River, swamps, creeks, billabongs, dams and inundated floodplains.

Species	Conservation Status	Records								W sp.
		Oct '09	Apr '10	Oct '10	Jun '11	Barrage	KDM	WAM	TF	
Tachyglossidae (echidnas)										
Echidna <i>Tachyglossus aculeatus</i>		+					x			
Dasyuridae (dasyurid marsupials)										
Northern Quoll <i>Dasyurus hallucatus</i>	CS1									
Long-tailed Planigale <i>Planigale ingrami</i>		+					x			
Common Planigale <i>Planigale maculata</i>							x			
Striped-faced Dunnart <i>Sminthopsis macroura</i>		+	+	+	+		x			
Lesser Hairy-footed Dunnart <i>Sminthopsis youngsoni</i>										
Peramelidae (bandicoots and bilbies)										
Bilby <i>Macrotis lagotis</i>	CS1						x			
Macropodidae (kangaroos and wallabies)										
Spectacled Hare-Wallaby <i>Lagorchestes conspicillatus</i>	CS2							x		
Agile Wallaby <i>Macropus agilis</i>		+	+	+			x	x		
Antilopine Wallaroo <i>Macropus antilopinus</i>		+					x			
Euro <i>Macropus robustus</i>							x	x		
Red Kangaroo <i>Macropus rufus</i>		+	+	+	+					
Northern Nailtail Wallaby <i>Onychogalea unguifera</i>		+	+	+	+		x	x		
West Kimberley Rock Wallaby <i>Petrogale lateralis sp.</i>	CS1							x	x	
Phalangeridae (brushtail possums & cuscuses)										
Common Brushtail Possum <i>Trichosurus vulpecula</i>							x	x		
Pteropodidae (flying foxes)										
Least Blossum Bat <i>Macroglossus minimus</i>										
Black Flying-Fox <i>Pteropus alecto</i>			+		+					
Little Red Flying-Fox <i>Pteropus scapulatus</i>		+		+		x				
Hipposideridae (leaf-nosed bats)										
Northern Leaf-nosed Bat <i>Hipposideros stenotis</i>										
Orange Leaf-nosed Bat <i>Rhinonycteris aurantius</i>	CS1						x			
Megadermatidae (ghost bat)										
Ghost Bat <i>Macroderma gigas</i>	CS2									
Emballonuridae (sheathtail bats)										
Yellow-bellied Sheathtail Bat <i>Saccolaimus flaviventris</i>			+	+			x			
Common Sheathtail Bat <i>Taphozous georgianus</i>		+	+				x			
Vespertilionidae (ordinary bats)										
Gould's Wattled Bat <i>Chalinolobus gouldii</i>		+	+	+			x			
Hoary Wattled Bat <i>Chalinolobus nigrogriseus</i>							x			

Table 7. (cont.)

Species	Conservation Status	Records							W sp.	
		Oct '09	Apr '10	Oct '10	Jun '11	Barrage	KDM	WAM		TF
Vespertilionidae (ordinary bats)										
Northern Bentwing Bat	<i>Miniopterus schreibersii orianae</i>	+	+	+			x			
Southern Myotis	<i>Myotis macropus</i>									
Arnhem Land Long-eared Bat	<i>Nyctophilus arnhemensis</i>									
North-western Long-eared Bat	<i>Nyctophilus bifax</i>									
Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>						x			
Northern Pipistrelle	<i>Pipistrellus westralis</i>	+								
Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>						x			
Little Broad-nosed Bat	<i>Scotorepens greyii</i>						x			
Northern Broad-nosed Bat	<i>Scotorepens sanborni</i>									
Western Cave Bat	<i>Vespadelus caurinus</i>						x			
Yellow-lipped Cave Bat	<i>Vespadelus douglasorum</i>	CS2								
Findlayson's Cave Bat	<i>Vespadelus findlaysoni</i>									
Molossidae (freetail bats)										
Northern Freetail Bat	<i>Chaerephon jobensis</i>		+				x			
Beccari's Freetail Bat	<i>Mormopterus beccarii</i>						x			
Muridae (rats and mice)										
Water-Rat (Rakali)	<i>Hydromys chrysogaster</i>	CS2								✓
Lakeland Downs Mouse	<i>Leggadina lakedownensis</i>	CS2	+	+		+	x			
House Mouse	<i>Mus musculus</i>	Int.	+	+	+	+	x			
Delicate Mouse	<i>Pseudomys delicatulus</i>		+	+		+	x	x		
Desert Mouse	<i>Pseudomys desertor</i>		+	+	+	+		x		
Sandy Inland Mouse	<i>Pseudomys hermannsbergensis</i>			+	+					
Kimberley Pebble-mound Mouse	<i>Pseudomys laborifax</i>						x			
Western Chestnut Mouse	<i>Pseudomys nanus</i>		+	+	+	+	x			
Pale Field-Rat	<i>Rattus tunneyi</i>						x			
Common Rock-Rat	<i>Zyomys argurus</i>						x			
Canidae (dogs and foxes)										
Dingo	<i>Canis lupus dingo</i>				+	+	x			
Felidae (cats)										
Feral/House Cat	<i>Felis catus</i>	Int.	+	+	+	+	x			
Equidae (horses)										
Donkey	<i>Equus asinus</i>	Int.	+				x			
Horse	<i>Equus caballus</i>	Int.					x			
Suidae (pigs)										
Pig	<i>Sus scrofa</i>	Int.	+		+	+				
Bovidae (horned ruminants)										
Cow	<i>Bos taurus</i>	Int.	+	+	+	+	x			
# mammal species expected in the study area:			55							1
# mammal species recorded in the study area in 2009 - 2011:			26							0

Table 9. Freshwater fish that potentially occur in the study area.

Barrage = species recorded in 2009 from the Fitzroy River at the Camballin Barrage (see Appendix 4).
 Morgan = species recorded from the from the Fitzroy River at the Camballin Barrage by Morgan *et al.* (2005).
 WAM = species recorded in the area on the Westerns Australian Museum Specimen Database (see Table 1).
 TF = species recorded in the area on the DEC Threatened and Priority Fauna Database (see Table 1).
 W sp. = species likely only to occur in habitats such as the Fitzroy River, swamps, creeks, billabongs, dams and inundated floodplains.

Species	Conservation Status	Records				W sp.
		Barrage	Morgan	WAM	TF	
Clupeidae (herrings) Bony Bream <i>Nematalosa erebi</i>			x			✓
Ariidae (fork-tailed catfishes) Lesser Salmon Catfish <i>Arius graeffei</i>		x	x			✓
Plotosidae (eel-tailed catfishes) Toothless Catfish <i>Anodontiglanis dahli</i> Black Catfish <i>Neosilurus ater</i> Hyrtl's Tandan <i>Neosilurus hyrtlii</i> Rendahl's Catfish <i>Porochilus rendahli</i>			x			✓ ✓ ✓ ✓
Belonidae (longtoms or needlefishes) Freshwater Longtom <i>Strongylura krefftii</i>			x			✓
Atherinidae (hardyheads or silversides) Prince Regent Hardyhead <i>Craterocephalus lentiginosus</i>	CS2		x	x	x	✓
Melanotaeniidae (Rainbowfishes) Western Rainbowfish <i>Melanotaenia australis</i>		x	x			✓
Ambassidae (glassfishes) Northwest Glassfish <i>Ambassis sp.</i>			x			✓
Centropomidae (giant perches) Barramundi <i>Lates calcarifer</i>		x	x			✓
Terapontidae (grunters) Barred Grunter <i>Amniataba percoides</i> Greenway's Grunter <i>Hannia greenwayi</i> Jenkin's Grunter <i>Hephaestus jenkinsi</i> Spangled Perch <i>Leiopotherapon unicolor</i>	CS2	x	x x x x			✓ ✓ ✓ ✓
Apogonidae (cardinalfishes) Mouth Almighty <i>Glossamia aprion</i>			x			✓
Toxotidae (archerfishes) Seven-spot Archerfish <i>Toxotes chatareus</i> Kimberley Archerfish <i>Toxotes kimberleyensis</i>						✓ ✓
Gobiidae (gobies) Flathead Goby <i>Glossogobius giurus</i>			x			✓
Eleotridae (gudgeons) Kimberley Mogurnda <i>Mogurnda oligolepis</i>						✓
Pristidae (sawfishes) Freshwater Sawfish <i>Pristis microdon</i>	CS1	x	x	x	x	✓

Table 9. (cont.)

Species	Conservation Status	Records				W sp.
		Barrage	Morgan	WAM	TF	
Carcharhinidae (requiem or whaler sharks) Bull Shark <i>Carcharhinus leucas</i>			x			✓
Mugliidae (mullet) Diamond Mullet <i>Liza alata</i>			x			✓
Megalopidae (tarpon) Oxeye Herring <i>Megalops cyprinoides</i>			x			✓
Dasyatidae (stingrays) Freshwater Whipray <i>Himantura chaophyra</i>			x			✓
No. freshwater fish species expected:			25			25
No. freshwater fish species recorded in study area:			0			0

Table 10. Reptile captures in the study area, October 2009.

Note that numbers may include individuals captured more than once over successive days.

Species	Site											
	1	2	3	4	5	6	7	8	9	10	11	12
Dragon Lizards												
<i>Amphibolurus gilberti</i>	4				1		7					
<i>Ctenophorus isolepis</i>							3	1				
<i>Diporiphora lalliae</i>	2	28	3	13	2		2	10				
<i>Diporiphora magna</i>						10						
<i>Diporiphora pindan</i>						6				1		
<i>Pogona minor mitchelli</i>					1	3		2		1		
Geckoes												
<i>Gehyra pilbara</i>	1					2		1		2	9	10
<i>Gehyra punctata</i>									1		1	2
<i>Heteronotia binoei</i>										2		14
<i>Lucasium stenodactylum</i>					1	4						
<i>Strophurus ciliaris</i>					3							
Legless Lizards												
<i>Delma borea</i>	1		1									
Skink Lizards												
<i>Carlia munda</i>	2		1									
<i>Cryptoblepharus tythos</i>	1					2		2			2	
<i>Ctenotus inornatus</i>		19	3	12	16	1		2		2		1
<i>Ctenotus pantherinus</i>		6			5							
<i>Ctenotus saxatilis</i>		13	4	14	2		1	1				1
<i>Ctenotus serventyi</i>									7			
<i>Ctenotus uber johnstonei</i>					1				1			13
<i>Eremiascincus isolepis</i>	2	4	3	1	2	10	1	5	3	8	1	
<i>Lerista bipes</i>	1	6	9	16	11	58		8	21	84	14	9
<i>Menetia greyii</i>			1		3		4	3	1	2	1	2
<i>Morethia ruficauda</i>				2	1			3	11			5
<i>Notoscincus ornatus</i>								10	14			1
<i>Proablepharus tenuis</i>							2	2	5			1
Monitor Lizards												
<i>Varanus acanthurus</i>				1	1							
<i>Varanus brevicauda</i>			1		1	2						
<i>Varanus eremius</i>					1							1
<i>Varanus tristis</i>								1			2	
Blind Snakes												
<i>Ramphotyphlops diversus</i>				4	2			1	2		1	
<i>Ramphotyphlops grypus</i>					2							1
Elapid Snakes												
<i>Brachyuropsis roperi</i>			1	2								
<i>Demansia angusticeps</i>		1								1		
<i>Furina ornata</i>		1						1				
<i>Pseudonaja nuchalis</i>					1	1				1		
Total species:	8	8	10	9	19	11	7	16	10	10	8	13

Table 11. Reptile captures in the study area, April 2010.

Note that numbers may include individuals captured more than once over successive days.

Species	Site											
	1	2	3	4	5	6	7	8	9	10	11	12
Dragon Lizards												
<i>Amphibolurus gilberti</i>	6		1			1	3					
<i>Ctenophorus isolepis</i>											1	
<i>Diporiphora lalliae</i>	1	12	8	9	1	3	1	1				
<i>Diporiphora magna</i>						2						
<i>Pogona minor mitchelli</i>					1	2						
Geckoes												
<i>Gehyra pilbara</i>			1			2				5	3	11
<i>Gehyra punctata</i>			2	1		3				4	1	1
<i>Gehyra variegata</i>						3				2		
<i>Heteronotia binoei</i>			1	2		1		2			2	18
<i>Lucasium stenodactylum</i>						2				3		1
<i>Strophurus ciliaris</i>				1	2	3		2		1		
Legless Lizards												
<i>Delma borea</i>				1			1					
Skink Lizards												
<i>Carlia munda</i>		1	1		1							
<i>Cryptoblepharus tyttos</i>			2			2				3	1	
<i>Ctenotus inornatus</i>	1	19	21	15	23	2	1	3	2			6
<i>Ctenotus pantherinus</i>		2				1	1		1	1		
<i>Ctenotus plankai</i>		1										
<i>Ctenotus saxatilis</i>		4	1	6	6	1				2		2
<i>Ctenotus serventyi</i>								1	1			
<i>Ctenotus uber johnstonei</i>									1			4
<i>Cyclodomorphus melanops</i>								2	1			
<i>Eremiascincus isolepis</i>		1	4		5	7	4	4	2	3	5	
<i>Lerista bipes</i>		2		6	7	43	1	10	20	63	12	11
<i>Menetia greyii</i>	1		2	5			6		4	2	1	2
<i>Morethia ruficauda</i>				1	1		2		4	1	1	11
<i>Notoscincus ornatus</i>						1		6	7			2
<i>Proablepharus tenuis</i>							1		2			
<i>Tiliqua scincoides</i>			1	1								
Monitor Lizards												
<i>Varanus acanthurus</i>				1	1							
<i>Varanus brevicauda</i>			1					2				
<i>Varanus eremius</i>						2						
<i>Varanus gouldii</i>									1			1
<i>Varanus scalaris</i>	1											
<i>Varanus tristis</i>									1		1	
Blind Snakes												
<i>Ramphotyphlops diversus</i>		2		1	2		1			1	1	
<i>Ramphotyphlops grypus</i>					4							
Elapid Snakes												
<i>Brachyurophis roperi</i>										2		
<i>Demansia angusticeps</i>		1	1		1							
<i>Furina ornata</i>			1						2			
<i>Pseudechis australis</i>	1	2										
<i>Pseudonaja nuchalis</i>		1										
<i>Suta punctata</i>			1					1				1
Total species:	6	12	16	13	13	18	11	11	14	14	11	13

Table 12. Amphibian and reptile captures in the study area, October 2010.

Note that numbers may include individuals captured more than once over successive days.

Species	Site							
	13	14	15	16	17	18	19	20
Tree frogs & water-holding frogs								
<i>Cyclorana australis</i>		1	1					1
<i>Cyclorana longipes</i>			2	1				
<i>Cyclorana vagitus</i>								1
Dragon Lizards								
<i>Amphibolurus gilberti</i>	1							
<i>Diporiphora lalliae</i>	2		2	1			1	
Geckoes								
<i>Gehyra australis</i>	1							
<i>Gehyra nana</i>					1			
<i>Gehyra pilbara</i>	2		2					
<i>Heteronotia binoei</i>	8		2	1	2	2	2	1
<i>Lucasium stenodactylum</i>			1	5				
<i>Strophurus ciliaris</i>					2			
Legless Lizards								
<i>Delma tincta</i>								2
Skink Lizards								
<i>Ctenotus inornatus</i>	27	9	17	11	11	21	12	2
<i>Ctenotus pantherinus</i>	6	2	14	7	3	5	1	
<i>Ctenotus plankai</i>		2	1		1	2		
<i>Menetia greyii</i>								1
<i>Morethia ruficauda</i>			1		2		1	
<i>Notoscincus ornatus</i>	1							
<i>Proablepharus tenuis</i>					2			
<i>Tiliqua multifasciata</i>				5	2			
Monitor Lizards								
<i>Varanus acanthurus</i>	6	1			1	2	1	
Blind Snakes								
<i>Ramphotyphlops diversus</i>	2		1		1		1	
Pythons								
<i>Antaresia stimsoni</i>	2							
Elapid Snakes								
<i>Furina ornata</i>		1						
<i>Suta punctata</i>	3							
Total species:	12	6	11	7	11	5	7	6

Table 13. Reptile captures in the study area, June 2011.

Note that numbers may include individuals captured more than once over successive days.

Species	Site											
	13	14	15	16	17	20	21	22	23	24	25	26
Dragon Lizards												
<i>Ctenophorus isolepis</i>					2			1	5		1	
<i>Diporiphora lalliae</i>	7	3	1	8			4			9	1	9
<i>Pogona minor mitchelli</i>					1		1			3	1	1
Geckoes												
<i>Gehyra nana</i>	2											
<i>Heteronotia binoei</i>	1	1							1	2		
<i>Lucasium stenodactylum</i>									1			
<i>Strophurus ciliaris</i>		1							2			
Legless Lizards												
<i>Delma borea</i>					3	1					2	
<i>Lialis burtonis</i>			1									
Skink Lizards												
<i>Carlia munda</i>												
<i>Ctenotus inornatus</i>	10	10	20	5	5	3	3	1	10	11	6	3
<i>Ctenotus pantherinus</i>	9	7	9	4	4			2	8	9	2	1
<i>Ctenotus piankai</i>		1			2			6		2		
<i>Ctenotus robustus</i>						6						
<i>Ctenotus uber johnstonei</i>			1							2		1
<i>Lerista bipes</i>		1									1	
<i>Menetia greyii</i>				1	5		1			1		1
<i>Morethia ruficauda</i>	1			2	3			1	4		1	1
<i>Notoscincus ornatus</i>												
<i>Proablepharus tenuis</i>									1			
Monitor Lizards												
<i>Varanus acanthurus</i>	3			1	1		1	1	1	1	3	1
<i>Varanus scalaris</i>							1					
Blind Snakes												
<i>Ramphotyphlops grypus</i>					1							
Elapid Snakes												
<i>Demansia angusticeps</i>	1											
<i>Furina ornata</i>		1										
<i>Suta punctata</i>							1					
Total species:	8	8	5	6	10	3	7	6	9	9	9	8

Table 14. Mammal captures in the study area, October 2009.

Note that numbers may include individuals captured more than once over successive days.

Species	Site											
	1	2	3	4	5	6	7	8	9	10	11	12
Dasyurid marsupials												
<i>Planigale ingrami</i>	1											
<i>Sminthopsis macroura</i>			1					1				
Rodents												
<i>Leggadina lakedownensis</i>		1										
<i>Mus musculus</i>			4	4			1					
<i>Pseudomys delicatulus</i>	1											
<i>Pseudomys desertor</i>	1		2									
<i>Pseudomys nanus</i>							1					
Total species:	3	1	3	1	0	0	2	1	0	0	0	0

Table 15. Mammal captures in the study area, April 2010.

Note that numbers may include individuals captured more than once over successive days.

Species	Site											
	1	2	3	4	5	6	7	8	9	10	11	12
Dasyurid marsupials												
<i>Sminthopsis macroura</i>							1					
Rodents												
<i>Leggadina lakedownensis</i>				1								
<i>Mus musculus</i>			6									
<i>Pseudomys delicatulus</i>										1		
<i>Pseudomys desertor</i>				8	4		3					
<i>Pseudomys hermannsbergensis</i>										2		
<i>Pseudomys nanus</i>		1		1								
Total species:	0	1	1	3	1	0	2	0	0	2	0	0

Table 16. Mammal captures in the study area, October 2010.

Note that numbers may include individuals captured more than once over successive days.

Species	Site							
	13	14	15	16	17	18	19	20
Dasyurid marsupials								
<i>Sminthopsis macroura</i>					1			
Rodents								
<i>Mus musculus</i>								1
<i>Pseudomys desertor</i>			1				3	
<i>Pseudomys hermannsbergensis</i>		1			1			
<i>Pseudomys nanus</i>			6	4			1	
Total species:	0	1	2	1	2	0	2	1

Table 17. Mammal captures in the study area, June 2011.

Note that numbers may include individuals captured more than once over successive days.

Species	Site											
	13	14	15	16	17	20	21	22	23	24	25	26
Dasyurid marsupials												
<i>Sminthopsis macroura</i>				1	1						1	1
Rodents												
<i>Leggadina lakedownensis</i>										1	1	1
<i>Mus musculus</i>	1	1										1
<i>Pseudomys delicatulus</i>		1			7				1			
<i>Pseudomys desertor</i>									5			
<i>Pseudomys nanus</i>	2	2	6	21	1		1	2	21	5		
Total species:	2	3	1	2	3	0	1	1	3	2	2	3

Table 18. Birds observed at sites 1 - 12, October 2009.

Note that species are listed in taxonomic order. See Table 7 for scientific names.

Species	Site											
	1	2	3	4	5	6	7	8	9	10	11	12
Whistling Kite	+											
Brown Goshawk	+											
Brown Falcon			+									
Nankeen Kestrel						+						+
Little Button-Quail					+							
Crested Pigeon						+				+		
Diamond Dove		+	+	+			+	+				
Peaceful Dove	+	+						+				
Red-tailed Black-Cockatoo			+									
Galah					+		+	+	+		+	+
Little Corella			+		+	+	+			+	+	+
Cockatiel								+				
Red-winged Parrot		+		+	+	+				+		+
Red-collared Lorikeet							+					
Varied Lorikeet	+		+		+		+					
Budgerigar		+		+	+				+			
Pallid Cuckoo									+		+	+
Black-eared Cuckoo					+							
Horsfield's Bronze-Cuckoo			+					+	+			+
Pheasant Coucal						+						
Southern Boobook	+											
Australian Owlet-Nightjar						+						
Blue-winged Kookaburra									+			
Rainbow Bee-eater						+						+
Black-tailed Treecreeper											+	
Red-backed Fairy-wren	+	+	+	+	+	+		+	+	+		+
Variegated Fairy-wren	+											
Red-browed Pardalote				+	+	+	+	+	+	+		+
Weebill	+								+			
Brown Honeyeater	+		+		+	+				+		+
Singing Honeyeater				+	+	+		+	+	+	+	+
Black-chinned Honeyeater						+		+				
Rufous-throated Honeyeater			+	+	+	+	+	+	+		+	+
Yellow-tinted Honeyeater											+	
Little Friarbird	+		+			+		+	+		+	
Yellow-throated Miner					+	+				+	+	+
Grey-crowned Babbler	+		+		+	+	+	+	+	+	+	+
Varied Sittella								+	+			
Rufous Whistler			+					+				
Grey Shrike-Thrush						+	+	+			+	+
Restless Flycatcher						+	+					
Willie Wagtail			+		+		+		+	+	+	
Magpie-Lark						+	+	+				
Black-faced Cuckoo-shrike	+			+	+			+		+		+
White-winged Triller					+	+	+	+	+		+	+
Black-faced Woodswallow	+		+		+	+	+	+	+	+	+	+
Pied Butcherbird				+	+	+	+	+		+	+	+
Torresian Crow						+						
Rufous Songlark					+	+		+		+		+
Singing Bushlark		+		+	+	+		+				+
Mistletoebird						+				+		+
Zebra Finch				+			+	+	+		+	+
Total species:	12	6	14	11	21	26	15	23	17	15	16	23

Table 19. Birds observed sites 1 - 12, April 2010.

Note that species are listed in taxonomic order. See Table 7 for scientific names.

Species	Site											
	1	2	3	4	5	6	7	8	9	10	11	12
Black-breasted Buzzard												+
Whistling Kite	+											
Black Kite	+	+										
Collared Sparrowhawk			+									
Brown Goshawk		+										
Brown Falcon				+					+		+	
Nankeen Kestrel												+
Little Black Cormorant	+											
Little Pied Cormorant	+											
White-necked Heron	+											
Intermediate Egret	+											
Australian White Ibis	+											
Royal Spoonbill	+											
Black-necked Stork	+											
Brolga	+											
Australian Bustard						+						
Common Greenshank	+											
Black-winged Stilt	+											
Black-fronted Dotterel	+											
Red-kneed Dotterel	+											
Crested Pigeon	+		+			+					+	
Diamond Dove							+					
Peaceful Dove	+	+					+		+			
Red-tailed Black-Cockatoo												
Galah	+			+	+	+	+		+		+	
Little Corella											+	
Red-winged Parrot	+			+	+			+	+	+	+	+
Varied Lorikeet										+		
Pallid Cuckoo	+											
Australian Owlet-Nightjar											+	
Blue-winged Kookaburra	+											
Sacred Kingfisher	+											
Rainbow Bee-eater	+	+	+		+	+				+	+	+
Black-tailed Treecreeper											+	
Red-backed Fairy-wren	+	+	+		+		+	+	+			+
Variegated Fairy-wren	+											
Red-browed Pardalote					+		+	+		+	+	
Weebill	+				+				+		+	+
Black Honeyeater								+				
Brown Honeyeater				+	+	+	+	+	+	+		+
Singing Honeyeater		+		+		+	+	+	+	+	+	+
Black-chinned Honeyeater						+	+			+		
Rufous-throated Honeyeater					+			+	+		+	+
White-plumed Honeyeater	+											
Yellow-tinted Honeyeater	+				+		+	+			+	+
Little Friarbird			+			+		+	+	+		+
Yellow-throated Miner					+	+	+	+	+	+	+	+
Grey-crowned Babbler	+	+	+		+	+	+	+	+	+	+	+
Varied Sittella	+							+			+	
Rufous Whistler			+			+	+	+	+			+
Grey Shrike-Thrush										+		

Table 19. (cont.)

Species	Site											
	1	2	3	4	5	6	7	8	9	10	11	12
Restless Flycatcher	+						+					
Willie Wagtail	+			+	+	+	+		+	+	+	+
Magpie-Lark	+						+				+	+
Black-faced Cuckoo-Shrike	+						+		+		+	+
White-bellied Cuckoo-Shrike							+					
White-winged Triller	+				+			+	+		+	
Black-faced Woodswallow	+				+	+	+	+	+	+	+	+
Little Woodswallow	+						+					
White-breasted Woodswallow	+						+					
Pied Butcherbird		+					+	+	+	+	+	
Torresian Crow							+					
Fairy Martin	+											
Rufous Songlark											+	
Singing Bushlark		+			+		+	+	+			+
Mistletoebird							+					
Zebra Finch	+	+		+	+	+	+	+	+			
Total species:	39	10	7	7	16	17	23	18	20	14	24	19

Table 20. Birds observed at sites 13 - 20, October 2010.

Note that species are listed in taxonomic order. See Table 7 for scientific names.

Species	Site							
	13	14	15	16	17	18	19	20
Brown Quail		+						
Pacific Black Duck								+
Whistling Kite								+
Black Kite	+		+	+				+
Brown Goshawk				+				
Wedge-tailed Eagle	+							
Brown Falcon		+	+				+	
Nankeen Kestrel	+						+	
Pied Cormorant								+
White-faced Heron								+
Great Egret								+
Straw-necked Ibis								+
Black-necked Stork								+
Brolga			+					+
Australian Bustard			+		+	+		
Australian Pratincole								+
Crested Pigeon	+	+	+	+		+		+
Diamond Dove		+						+
Peaceful Dove		+						+
Spinifex Pigeon					+			
Red-tailed Black-Cockatoo							+	+
Galah	+	+	+	+				+
Little Corella			+		+	+	+	+
Cockatiel	+	+	+	+				+
Red-winged Parrot					+			
Varied Lorikeet		+	+				+	
Pallid Cuckoo	+	+	+		+		+	+
Horsfield's Bronze-Cuckoo	+	+	+	+		+		+
Pheasant Coucal							+	+
Fork-tailed Swift		+						
Blue-winged Kookaburra						+		+
Sacred Kingfisher		+						
Red-backed Kingfisher						+		
Dollarbird				+				
Red-backed Fairy-wren	+	+	+	+	+	+	+	+
Variegated Fairy-wren		+	+	+		+		
Red-browed Pardalote		+						
Brown Honeyeater	+	+	+	+				
Singing Honeyeater	+	+	+	+	+	+	+	
Black-chinned Honeyeater	+	+				+		
Rufous-throated Honeyeater	+	+	+	+	+	+	+	+
Yellow-tinted Honeyeater		+	+					
Little Friarbird	+	+	+	+	+	+	+	
Yellow-throated Miner	+	+	+		+			
Grey-crowned Babbler	+	+	+	+		+	+	+
Rufous Whistler		+						
Grey Shrike-Thrush		+	+	+	+			
Restless Flycatcher								
Willie Wagtail	+	+	+	+	+	+	+	+
Magpie-Lark	+	+	+	+		+	+	+
Black-faced Cuckoo-Shrike	+	+	+	+	+	+	+	+
White-bellied Cuckoo-Shrike								
White-winged Triller	+	+	+					+

Table 20. (cont.)

Species	Site							
	13	14	15	16	17	18	19	20
Black-faced Woodswallow	+	+	+	+	+	+	+	
Little Woodswallow			+					
White-breasted Woodswallow	+	+		+				+
Pied Butcherbird	+	+	+		+	+	+	
Torresian Crow	+	+			+			
Brown Songlark					+			+
Rufous Songlark			+					
Singing Bushlark	+	+	+	+	+	+	+	+
Mistletoebird			+					
Zebra Finch	+	+	+	+	+		+	+
Australian Pipit					+			
Total species:	26	35	32	23	19	19	20	31

Table 21. Birds observed at Sites 13 - 17 and 20 - 26, June 2011.

Note that species are listed in taxonomic order. See Table 7 for scientific names.

Species	Site											
	13	14	15	16	17	20	21	22	23	24	25	26
Brown Quail						+				+		+
Whistling Kite				+			+	+		+		+
Black Kite	+		+		+	+		+		+		
Square-tailed Kite									+			
Black-breasted Buzzard												+
Collared Sparrowhawk				+								
Wedge-tailed Eagle	+	+					+		+			
Brown Falcon		+			+	+		+				+
Nankeen Kestrel	+	+	+			+	+		+	+		+
Straw-necked Ibis						+						
Brolga		+		+	+	+	+	+				+
Australian Bustard		+		+	+							
Red-chested Button-Quail						+						
Little Button-Quail						+			+	+	+	
Crested Pigeon	+	+	+	+			+	+	+		+	+
Diamond Dove		+	+	+	+	+		+	+	+	+	
Peaceful Dove						+						
Red-tailed Black-Cockatoo											+	
Galah	+	+	+	+	+	+	+	+		+	+	+
Little Corella			+	+	+							+
Cockatiel	+	+	+			+			+			
Red-winged Parrot		+	+	+		+	+					+
Pallid Cuckoo		+			+		+	+	+		+	+
Horsfield's Bronze-Cuckoo		+						+		+	+	
Blue-winged Kookaburra		+									+	
Red-backed Kingfisher		+						+		+		
Rainbow Bee-eater	+	+			+	+	+	+	+	+	+	+
Red-backed Fairy-wren	+	+	+	+	+	+	+	+	+	+	+	+
Variegated Fairy-wren		+							+	+	+	
Red-browed Pardalote		+			+		+	+	+	+	+	+
Weebill				+			+				+	
Brown Honeyeater		+	+			+	+		+	+	+	
Singing Honeyeater	+	+	+	+	+		+	+	+	+	+	+
Black-chinned Honeyeater	+	+							+		+	
Rufous-throated Honeyeater	+	+	+	+					+		+	
Little Friarbird		+			+	+	+			+	+	
Yellow-throated Miner	+	+	+	+	+		+	+	+	+	+	+
Grey-crowned Babbler	+	+	+	+	+	+	+			+	+	
Varied Sittella					+		+					
Rufous Whistler	+	+	+	+	+		+		+	+	+	+
Grey Shrike-Thrush		+			+							
Restless Flycatcher		+					+					
Willie Wagtail	+	+	+	+	+	+	+	+	+	+	+	+
Magpie-Lark	+	+	+		+	+	+	+	+	+	+	+
Black-faced Cuckoo-Shrike	+	+		+	+	+		+	+	+	+	+
White-winged Triller	+	+	+	+	+	+	+	+	+	+	+	+
Black-faced Woodswallow	+	+	+	+	+	+	+	+	+	+	+	+
White-breasted Woodswallow	+	+					+					
Pied Butcherbird	+	+	+	+	+	+	+	+	+	+	+	+
Torresian Crow	+	+	+	+	+	+	+	+	+	+	+	+
Fairy Martin								+				
Tree Martin						+	+			+		

Table 21. (cont.)

Species	Site											
	13	14	15	16	17	20	21	22	23	24	25	26
Spinifexbird		+		+								
Rufous Songlark	+	+	+		+	+	+	+			+	+
Golden-headed Cisticola				+								
Singing Bushlark	+	+	+	+	+	+		+				
Mistletoebird		+		+					+			
Zebra Finch	+	+	+	+	+	+	+	+	+		+	+
Australian Pipit								+				
Total species:	25	40	25	27	28	28	30	27	27	27	30	26

Table 22. Summary of conservation significant (CS) fauna in the study area.

Species	Status	Records in study area	Records in wider area	Habitat preferences	Likely habitat use in study area							
					Plains				Sand ridges	Low rocky ridges	Dry swamps	Creeks, swamps & floodplains
					Woodland	Shrubland	Spinifex	Tussock grass				
REPTILES												
<i>Crocodylus johnstonei</i> Freshwater Crocodile	CS1	Yes – Snake Creek (2010 & 2011)	Camballin Barrage (2009)	Freshwater rivers & billabongs								✓
<i>Ctenotus uber johnstonei</i> Skink	CS2	Yes – Sites 5, 9, 10, 15, 24 and 26	-	Spinifex grassland on plains	✓	✓	✓					
<i>Lerista simillima</i> Skink	CS3	-	WA Museum record (Table 6)	Acacia thickets & woodland on sandy soils					✓			
<i>Vermicella intermedia</i> Wide-banded Northern Bandy-bandy	CS3	-	Livinginga Station (Wilson and Swan 2003)	Unknown	?	?	?			?		
BIRDS												
<i>Ardea alba</i> Great Egret	CS1	Yes – at Snake Creek (2010 & 2011)	Camballin Barrage (2009)	Shallow wetlands, permanent water								✓
<i>Ardea ibis</i> Cattle Egret	CS1	-	Birds Australia record (Table 7)	Wetlands, pasture								✓
<i>Plegadis falcinellus</i> Glossy Ibis	CS1	Yes – in billabong near Snake Creek (2010)	Birds Australia record (Table 7)	Wetlands, pasture								✓
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	CS1	-	Camballin Barrage (2009)	Large rivers and coastal habitats								✓
<i>Falco peregrinus</i> Peregrine Falcon	CS1	-	Kimberley Diamond Mine (Table 7)	Nest on cliffs, open pits or tall trees, forages over open areas	✓	✓	✓	✓	✓	✓	✓	

Table 22. (cont.)

Species	Status	Records in study area	Records in wider area	Habitat preferences	Likely habitat use in study area							
					Plains				Sand ridges	Low rocky ridges	Dry swamps	Creeks, swamps & floodplains
					Woodland	Shrubland	Spinifex	Tussock grass				
BIRDS (continued)												
<i>Tringa hypoleucos</i> Common Sandpiper	CS1	-	Lake west of Paradise Camp (2010)	Wetlands								✓
<i>Tringa nebularia</i> Common Greenshank	CS1	Yes – in billabong near Snake Creek (2010)	Birds Australia record (Table 7)	Wetlands								✓
<i>Rostratula benghalensis australis</i> Australian Painted Snipe	CS1	-	-	Wetlands								✓
<i>Charadrius veredus</i> Oriental Plover	CS1	Yes – Audrey's Tank (2010)	-	Open plains				✓				✓
<i>Stiltia Isabella</i> Oriental Pratincole	CS1	-	Camballin Irrigation Area (2009)	Open plains				✓				✓
<i>Apus pacificus</i> Fork-tailed Swift	CS1	Yes – Site 14 (2010)	Kimberley Diamond Mine (Table 7)	Overfly any habitat	✓	✓	✓	✓	✓	✓	✓	✓
<i>Merops ornatus</i> Rainbow Bee-eater	CS1	Yes – near Sites 6 & 12 (2009) and Sites 1-3, 5, 6 & 10-12 (2010) and sites 13, 14 & 17 – 26 (2011).	Birds Australia record (Table 7)	Forages in wodlands, breeds in sandy areas	✓						✓	✓
<i>Erythrura gouldiae</i> Gouldian Finch	CS1	-	Kimberley Diamond Mine (Table 7)	Grasslands, savannah woodlands. Breeds in Snappy Gums	✓	✓	✓					

Table 22. (cont.)

Species	Status	Records in study area	Records in wider area	Habitat preferences	Likely habitat use in study area							
					Plains				Sand ridges	Low rocky ridges	Dry swamps	Creeks, swamps & floodplains
					Woodland	Shrubland	Spinifex	Tussock grass				
BIRDS (continued)												
<i>Falco hypoleucos</i> Grey Falcon	CS2	-	-	Nests along rivers with Eucalypts, forages in open areas	✓	✓	✓				✓	✓
<i>Ardeotis australis</i> Australian Bustard	CS2	Yes – near Sites 1 - 4, 8 & 10	Birds Australia record (Table 7)	Plains	✓	✓	✓	✓				
<i>Phaps histrionica</i> Flock Bronzewing	CS2	Yes – near Egans Bore (2011)	WA Museum record (Table 7)	Blacksoil plains & Spinifex plains			✓	✓				
<i>Burhinus grallarius</i> Bush Stone-Curlew	CS2	Yes	Camballin Barrage (2009)	Creeks & lightly wooded plains	✓	✓	✓	✓			✓	✓
<i>Neochmia ruficauda subclarescens</i> Star Finch (western)	CS2	Yes – near Snake Creek (2011)	Birds Australia record (Table 7)	Major creeks & permanent water								✓
<i>Heteromunia pectoralis</i> Pictorella Mannikin	CS2	Yes – near Snake Creek and Mt Wynne Creek (2011)	Birds Australia record (Table 7)	Grasslands & savannah woodlands	✓	✓	✓					✓
MAMMALS												
<i>Dasyurus hallucatus</i> Northern Quoll	CS1	-	-	Rocky hills, rivers & woodlands	✓					✓		✓
<i>Macrotis lagotis</i> Greater Bilby	CS1	-	Kimberley Diamond Mine (Table 8)	Red earths, dunes & alluvial plains	✓	✓	✓		✓			
<i>Petrogale lateralis sp.</i> West Kimberley Rock Wallaby	CS1	-	Camballin & Erskine Range (Appendix 3)	Ranges of flat-topped hills with scree slopes								

Table 22. (cont.)

Species	Status	Records in study area	Records in wider area	Habitat preferences	Likely habitat use in study area								
					Plains				Sand ridges	Low rocky ridges	Dry swamps	Creeks, swamps & floodplains	
					Woodland	Shrubland	Spinifex	Tussock grass					
<i>Rhinonictis aurantius</i> Orange Leaf-nosed Bat	CS1	-	Kimberley Diamond Mine (Table 8)	Roosts in deep caves in dry season & possibly in trees in the wet season	✓								
<i>Lagorchestes conspicillatus leichardti</i> Spectacled Hare-Wallaby	CS2	-	WA Museum record (Table 8)	Tall Spinifex grasslands	✓	✓	✓						
<i>Macroderma gigas</i> Ghost Bat	CS2	-	-	Roosts in deep caves. Forages over plains	✓		✓						
<i>Vespadelus douglasorum</i> Yellow-lipped Cave Bat	CS2	-	-	Roosts in limestone or sandstone caves & forages in woodland	✓								
<i>Hyrdomys chrysogaster</i> Rakali (Water-Rat)	CS2	-	-	Permanent wetlands									✓
<i>Leggadina lakedownensis</i> Lakeland Downs Mouse	CS2	Yes - Sites 2 (2009), 4 (2010) and 24 – 26 (2011).	Kimberley Diamond Mine (Table 8)	Seasonally inundated sandy-clay soils, also ridges and Spinifex grassland	✓	✓	✓	✓		✓	✓	✓	✓
FRESHWATER FISH													
<i>Pristis microdon</i> Freshwater Sawfish	CS1	-	Camballin Barrage (2009)	Large rivers, estuaries and coastal waters									✓
<i>Craterocephalus lentiginosus</i> Prince Regent Hardyhead	CS2	-	Camballin Barrage (Morgan <i>et al.</i> 2005)	Streams over sandy, muddy or rocky bottoms									✓
<i>Hannia greenwayi</i> Greenway's Grunter	CS2	-	Camballin Barrage (Morgan <i>et al.</i> 2005)	Flowing streams over mixed sandy and rocky bottoms									✓

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Appendix 1. Dates of trapping and number of trap-nights.

Survey	Site	Date opened	Date closed	Number of trap-nights				
				Pitfalls	Funnels	Elliotts	Cages	Totals
October 2009	1	21/10/09	27/10/09	60	48	60	12	
	2	21/10/09	27/10/09	60	48	60	12	
	3	21/10/09	27/10/09	60	48	60	12	
	4	21/10/09	27/10/09	60	48	60	12	
	5	19/10/09	26/10/09	70	56	70	14	
	6	19/10/09	26/10/09	70	56	70	14	
	7	19/10/09	25/10/09	60	48	60	12	
	8	19/10/09	26/10/09	70	56	70	14	
	9	19/10/09	25/10/09	60	48	60	12	
	10	19/10/09	25/10/09	60	48	60	12	
	11	19/10/09	25/10/09	60	48	60	12	
	12	19/10/09	26/10/09	70	56	70	14	
Subtotal:				760	608	760	152	2,280
April 2010	1	22/4/10	28/4/10	60	48	60	12	
	2	22/4/10	28/4/10	60	48	60	12	
	3	22/4/10	28/4/10	60	48	60	12	
	4	22/4/10	28/4/10	60	48	60	12	
	5	21/4/10	28/4/10	70	56	70	14	
	6	21/4/10	28/4/10	70	56	70	14	
	7	21/4/10	27/4/10	60	48	60	12	
	8	20/4/10	26/4/10	60	48	60	12	
	9	20/4/10	26/4/10	60	48	60	12	
	10	20/4/10	26/4/10	60	48	60	12	
	11	20/4/10	26/4/10	60	48	60	12	
	12	21/4/10	27/4/10	60	48	60	12	
Subtotal:				740	592	740	148	2,220
October 2010	13	11/10/10	19/10/10	80	64	80	16	
	14	11/10/10	19/10/10	80	64	80	16	
	15	11/10/10	19/10/10	80	64	80	16	
	16	11/10/10	19/10/10	80	64	80	16	
	17	10/10/10	19/10/10	90	72	90	18	
	18	10/10/10	14/10/10	40	32	40	8	
	19	10/10/10	14/10/10	40	32	40	8	
	20	10/10/10	14/10/10	40	32	40	8	
Subtotal:				530	424	530	106	1,590
June 2011	13	10/06/11	17/06/11	70	56	70	14	
	14	9/06/11	16/06/11	70	56	70	14	
	15	11/06/11	18/06/11	70	56	70	14	
	16	11/06/11	18/06/11	70	56	70	14	
	17	10/06/11	17/06/11	70	56	70	14	
	20	11/06/11	18/06/11	70	56	70	14	
	21	10/06/11	17/06/11	70	56	70	14	
	22	10/06/11	17/06/11	70	56	70	14	
	23	9/06/11	16/06/11	70	56	70	14	
	24	9/06/11	16/06/11	70	56	70	14	
	25	11/06/11	18/06/11	70	56	70	14	
	26	9/06/11	16/06/11	70	56	70	14	
	Subtotal:				840	672	840	168
Total trap-nights:				2,870	2,296	2,870	574	8,610

Appendix 2. EPBC Protected Matters Search Tool results.

Species listed for the area 17.7445°S to 18.3742°S and 124.2192°E to 124.9205°E on the EPBC Protected Matters Search Tool.

Species	Status	Author's Comment
Mulgara <i>Dasyercus cristicaudata</i>	Vulnerable	Unlikely to occur in study area – study area too far north.
Northern Quoll <i>Dasyurus hallucatus</i>	Endangered	May potentially occur but probably locally extinct.
Greater Bilby <i>Macrotis lagotis</i>	Vulnerable	May potentially occur.
Kimberley Black-footed Rock-Wallaby <i>Petrogale lateralis ssp.</i>	Vulnerable	Unlikely to occur in study area – lack of suitable habitat.
Purple-crowned Fairy-wren <i>Malurus coronatus coronatus</i>	Vulnerable	Unlikely to occur in study area – lack of suitable habitat.
Australian Painted Snipe <i>Rostratula benghalensis australis</i>	Vulnerable & Migratory (wetland)	Unlikely to occur in study area – lack of suitable habitat.
Freshwater Sawfish <i>Pristis microdon</i>	Vulnerable	May possibly occur in Snake Creek and recorded near study area from the Fitzroy River during 2009 fauna survey.
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>	Migratory (terrestrial)	Recorded near study area on Fitzroy River during 2009 fauna survey.
Barn Swallow <i>Hirundo rustica</i>	Migratory (terrestrial)	Unlikely to occur – usually near-coastal.
Rainbow Bee-eater <i>Merops ornatus</i>	Migratory (terrestrial)	Recorded in study area during 2009 fauna survey.
Derby White-browed Robin <i>Poecilodryas superciliosa cerviniventris</i>	Migratory (terrestrial)	Unlikely to occur – usually near-coastal.
Great Egret <i>Ardea alba</i>	Migratory (wetland)	Recorded at Camballin Barrage during 2009 fauna survey.
Cattle Egret <i>Ardea ibis</i>	Migratory (wetland)	May possibly occur.
Oriental Plover <i>Charadrius veredus</i>	Migratory (wetland)	Recorded in study area during 2010 fauna survey.
Oriental Pratincole <i>Glareola maldivum</i>	Migratory (wetland)	Recorded near study area on Camballin Irrigation Area during 2009 fauna survey.
Marsh Sandpiper <i>Tringa stagnatalis</i>	Migratory (wetland)	May possibly occur in seasonally inundated areas.
Fork-tailed Swift <i>Apus pacificus</i>	Migratory (marine)	Recorded in study area during 2010 fauna survey.
Salt-water Crocodile <i>Crocodylus porosus</i>	Migratory (marine)	Unlikely to occur – usually estuarine and coastal.

Appendix 3. DEC Threatened and Priority Fauna Database results.

Species listed for the area 17.7445°S to 18.3742°S and 124.2192°E to 124.9205°E on the DEC Threatened and Priority Fauna Database.

Species	Status	DEC records	Author's Comments
Kimberley Black-footed Rock-Wallaby <i>Petrogale lateralis</i> ssp.	Schedule 1 (Vulnerable)	Ten from Liveringa Station/Camballin (1901), two from Erskine Range (1992), four from Erskine Range (1995).	Unlikely to occur in study area due to lack of suitable habitat.
Prince Regent Hardyhead <i>Craterocephalis lentiginosus</i>	Priority 2	One from Camballin (2001).	May possibly occur in Snake (Uralla) Creek in study area.
Freshwater Sawfish <i>Pristis microdon</i>	Priority 3	One from Camballin (2001), 17 from Camballin/Geegully Creek (2003).	Recorded from Fitzroy River during 2009 fauna survey, may possibly occur in Snake (Uralla) Creek in study area.
Australian Bustard <i>Ardeotis australis</i>	Priority 4	One from Mt Hardman (2008).	Recorded in study area during 2009 - 2011 fauna surveys.

Appendix 4. Opportunistic records.

Includes spot-lighting records. See Tables 5-9 for scientific names.

Date	Location	Species	Notes
15/10/09	Camp	<i>Litoria rothi</i>	Fitzroy River
15/10/09	Camp	<i>Litoria rubella</i>	Fitzroy River
15/10/09	Camp	<i>Chelodina rugosa</i>	female carapace
16/10/09	Camp	Little Black Cormorant	
16/10/09	Camp	Nankeen Night-Heron	
16/10/09	Camp	Little Corella	very abundant
16/10/09	Camp	Varied Lorikeet	
16/10/09	Camp	Magpie-Lark	
16/10/09	Camp	Freshwater Crocodile	x 6
16/10/09	Camp	Glossy Ibis	
16/10/09	Camp	Little Pied Cormorant	
16/10/09	Camp	Whistling Kite	
16/10/09	Camp	Black Kite	
16/10/09	Camp	Freshwater Sawfish	Fitzroy River
16/10/09	near Site 1	Northern Nailtail Wallaby	
16/10/09	near Site 1	Australian Bustard	
16/10/09	Site 2	Australian Pipit	
16/10/09	Site 4	Australian Bustard	
16/10/09	Site 4	<i>Amphibolurus gilberti</i>	x 2
16/10/09	Site 4	<i>Diporiphora bennetti</i>	
17/10/09	near Site 4	<i>Ctenophorus nuchalis</i>	
17/10/09	near Site 9	Emu	x 2
17/10/09	Site 6	<i>Tachyglossus aculeata</i>	tracks on dune
17/10/09	Site 7	<i>Delma tincta</i>	
17/10/09	Site 8	Brown Falcon	
17/10/09	Site 9	<i>Ctenophorus isolepis</i>	
18/10/09	near Site 10	Nankeen Kestrel	
18/10/09	near Site 10	Cockatiel	
18/10/09	near Site 10	Mistletoebird	
18/10/09	near Site 10	Brown Honeyeater	
18/10/09	near Site 10	Black-faced Woodswallow	
18/10/09	near Site 8	Red-collared Lorikeet	
18/10/09	near Site 8	Antilopine Wallaby	pouch young
18/10/09	near Site 9	Weebill	
18/10/09	near Site 9	Willie Wagtail	
19/10/09	Camp	Red-tailed Black-Cockatoo	
19/10/09	Site 10	Singing Honeyeater	
19/10/09	Site 10	Galah	
19/10/09	Site 10	Grey-crowned Babbler	
19/10/09	Site 11	Pallid Cuckoo	
19/10/09	Site 11	Black-faced Woodswallow	
19/10/09	Site 11	Mistletoebird	
19/10/09	Site 12	Budgerigar	
19/10/09	Site 12	Little Corella	
19/10/09	Site 12	Red-browed Pardalote	
19/10/09	Site 12	Rufous Whistler	

Appendix 4. (cont.)

Date	Location	Species	Notes
20/10/09	Churchill's Tank	Black-faced Woodswallow	
20/10/09	Churchill's Tank	Yellow-tinted Honeyeater	
20/10/09	Churchill's Tank	Little Friarbird	
20/10/09	Churchill's Tank	Peaceful Dove	
20/10/09	Churchill's Tank	Galah	
20/10/09	Churchill's Tank	Zebra Finch	
20/10/09	Site 6	Nankeen Kestrel	
20/10/09	Site 6	Pied Butcherbird	
20/10/09	Site 6	Yellow-throated Miner	
20/10/09	Site 6	White-winged Triller	
20/10/09	Site 6	Red-browed Pardalote	
20/10/09	Site 6	Galah	
20/10/09	Site 6	Singing Honeyeater	
21/10/09	Access road	Crimson Finch	
21/10/09	Camp	White-necked Heron	
21/10/09	Camp	Black-breasted Buzzard	
21/10/09	Camp	<i>Cyclorana vagitus</i>	
21/10/09	Camp	Black-shouldered Kite	
21/10/09	Churchill's Tank	Red-tailed Black-Cockatoo	
21/10/09	near Site 1	Peaceful Dove	
21/10/09	near Site 3	Varied Lorikeet	x 6
21/10/09	near Site 3	Blue-winged Kookaburra	
21/10/09	Site 10	Australian Bustard	
21/10/09	Site 3	Variegated Fairy-wren	
21/10/09	Site 6	<i>Diporiphora magna</i>	
22/10/09	Audrey's Tank	Willie Wagtail	
22/10/09	Audrey's Tank	Galah	
22/10/09	Audrey's Tank	Crested Pigeon	
22/10/09	Audrey's Tank	Rufous-throated Honeyeater	
22/10/09	Audrey's Tank	Little Friarbird	
22/10/09	Audrey's Tank	Peaceful Dove	
22/10/09	Camp	Barred Grunter	in Fitzroy River
22/10/09	Camp	Kimberley Archerfish	in Fitzroy River
22/10/09	Camp	Great Egret	
22/10/09	Camp	Sacred Kingfisher	
22/10/09	Camp	Great Bowerbird	
22/10/09	Camp	Rainbow Bee-eater	
22/10/09	Dam to N of Site 6	Darter	
22/10/09	Dam to N of Site 6	Crested Pigeon	
22/10/09	Dam to N of Site 6	Rufous-throated Honeyeater	
22/10/09	Dam to N of Site 6	Galah	
22/10/09	Dam to N of Site 6	Cockatiel	
22/10/09	Dam to N of Site 6	Little Corella	
22/10/09	Dam to N of Site 6	Magpie-Lark	
22/10/09	Dam to N of Site 6	Zebra Finch	
22/10/09	Dam to N of Site 6	Restless Flycatcher	
22/10/09	Dam to N of Site 6	Yellow-throated Miner	
22/10/09	Dam to N of Site 6	Little Friarbird	

Appendix 4. (cont.)

Date	Location	Species	Notes
22/10/09	Dam to N of Site 6	Singing Honeyeater	
22/10/09	Dam to N of Site 6	Brown Honeyeater	
22/10/09	Dam to N of Site 6	Brown Falcon	nesting in Boab
22/10/09	Dam to N of Site 6	Australian Bustard	
22/10/09	Dam to N of Site 6	Red Kangaroo	
22/10/09	Hardman Dam	Rufous-throated Honeyeater	very common
22/10/09	Hardman Dam	Little Corella	
22/10/09	Hardman Dam	Crested Pigeon	
22/10/09	Hardman Dam	Zebra Finch	
22/10/09	Hardman Dam	Willie Wagtail	
22/10/09	Hardman Dam	Black Kite	
22/10/09	Hardman Dam	Peaceful Dove	
22/10/09	Hardman Dam	White-necked Heron	
22/10/09	Hardman Dam	Magpie-Lark	
22/10/09	Hardman Dam	White-breasted Woodswallow	
22/10/09	Hardman Dam	Red Kangaroo	
22/10/09	Hardman Dam	Rainbow Bee-eater	
22/10/09	near Site 7	Black-faced Cuckoo-shrike	
22/10/09	near Site 8	Australian Bustard	
22/10/09	near Site 9	<i>Felis catus</i> (cat)	tracks
22/10/09	Site 1	Southern Boobook	roosting in hollow tree
22/10/09	Site 12	<i>Morethia ruficauda</i>	
22/10/09	Site 5	<i>Eremiascincus isolepis</i>	x 3 raked from old burrow
23/10/09	Camp	Common Sandpiper	
23/10/09	Camp	Peregrine Falcon	
23/10/09	Camp	White-bellied Sea-Eagle	
23/10/09	near Site 2	Black-shouldered Kite	
23/10/09	Site 1	Dog/Dingo	tracks
23/10/09	Site 1	Pig	tracks
23/10/09	Site 1	<i>Felis catus</i> (cat)	tracks
23/10/09	Site 1	Grey-crowned Babbler	
23/10/09	Site 1	Red-winged Parrot	
23/10/09	Site 3	Red-tailed Black-Cockatoo	foraging on Acacia seed
23/10/09	Site 3	<i>Diporiphora lalliae</i>	
23/10/09	Site 4	Red-tailed Black-Cockatoo	
23/10/09	Site 8	<i>Felis catus</i> (cat)	tracks
24/10/09	Access road	Pig	tracks
24/10/09	Access road	Dog/Dingo	tracks
24/10/09	Access road	Agile Wallaby	
24/10/09	near Site 11	Brolga	x 2
24/10/09	near Site 3	Brolga	x 2
24/10/09	Site 12	Pheasant Coucal	
24/10/09	Site 12	<i>Felis catus</i> (cat)	black and skinny
24/10/09	Site 12	<i>Aspidites melanocephalus</i>	crossing road
24/10/09	Site 5	Black-faced Woodswallow	
24/10/09	Site 5	Willie Wagtail	
24/10/09	Site 5	White-winged Triller	
25/10/09	Audrey's Tank	Brolga	x 2

Appendix 4. (cont.)

Date	Location	Species	Notes
25/10/09	Camp	Straw-necked Ibis	
25/10/09	near Camp	Budgerigar	x 50
25/10/09	near Site 10	Brown Quail	x 2
25/10/09	near Site 2	Australian Bustard	
25/10/09	Site 11	Red Kangaroo	
25/10/09	Site 12	Red Kangaroo	x 2
25/10/09	Camp	Western Rainbowfish	Abundant in Fitzroy River
25/10/09	Camp	Lesser Salmon Catfish	Fitzroy River
26/10/09	Camp	White-faced Heron	
26/10/09	Camp	Australian White Ibis	
26/10/09	near Site 3	Australian Bustard	
26/10/09	Camp	Bush Stone-Curlew	Heard
27/10/09	Camp	Crimson Finch	x 14
27/10/09	near Site 8	Agile Wallaby	dead on road
27/10/09	Site 1	Australian Bustard	
27/10/09	Site 2	Spotted Nightjar	
27/10/09	Site 4	Pheasant Coucal	
27/10/09	Site 6	Rainbow Bee-eater	x 2
21/04/10	Site 10	Agile Wallaby	x 1
21/04/10	Site 7	<i>Varanus gouldii</i>	
21/04/10	Site 12	Black-breasted Buzzard	
21/04/10	Audrey's Tank	Brolga	x 2
21/04/10	Audrey's Tank	Whistling Kite	
21/04/10	Audrey's Tank	Magpie-Lark	
21/04/10	Site 2	Rainbow Bee-eater	x 20
21/04/10	near Site 4	Black-shouldered Kite	
22/04/10	Churchill's Tank	Masked Lapwing	x 2
22/04/10	Churchill's Tank	Crested Pigeon	
22/04/10	Churchill's Tank	Magpie-Lark	
22/04/10	Churchill's Tank	Bush Stone-Curlew	reported by Pilbara Flora
22/04/10	near Site 4	Nankeen Kestrel	
22/04/10	near Site 4	White-winged Fairy-wren	
22/04/10	Site 2	Zebra Finch	
22/04/10	Site 2	Black Kite	
22/04/10	Site 2	Grey-crowned Babbler	
22/04/10	Site 1	Peaceful Dove	
22/04/10	Site 1	Weebill	
22/04/10	Site 3	Rufous Whistler	
22/04/10	Audrey's Access Rd	Australian Bustard	x 1
22/04/10	Audrey's Access Rd	Red Kangaroo	
22/04/10	Site 7	<i>Varanus gouldii</i>	
22/04/10	Site 4	<i>Diporiphora lalliae</i>	
23/04/10	near Site 2	Northern Nailtail Wallaby	Rocky ridge, Acacia scrub
23/04/10	Site 1	Royal Spoonbill	x 3 flying
23/04/10	near Site 1	Little Woodswallow	x 5
23/04/10	Audrey's Access Rd	<i>Varanus gouldii</i>	
23/04/10	Audrey's Access Rd	Red Kangaroo	x 2

Appendix 4. (cont.)

Date	Location	Species	Notes
23/04/10	Billabong W of Site 1	Northern Nailtail Wallaby	x 2 Spot-lighting
23/04/10	Study Area	Spotted Nightjar	x 3, Spot-lighting
23/04/10	Study Area	<i>Gehyra pilbara</i>	x 8 on termitaria, Spot-lighting
23/04/10	Study Area	<i>Varanus acanthurus</i>	x 1 on termitaria, Spot-lighting
23/04/10	Near Duchess Dam	Bush Stone-Curlew	Spot-lighting
23/04/10	Study Area	Australian Bustard	x 4, Spot-lighting
23/04/10	Study Area	Red Kangaroo	x 2, Spot-lighting
23/04/10	Study Area	Spotted Nightjar	Spot-lighting
23/04/10	Site 12	<i>Heternotia binoei</i>	Spot-lighting
23/04/10	Near Site 12	<i>Lucasium stenodactylum</i>	Spot-lighting
23/04/10	Study Area	<i>Gehyra pilbara</i>	x 8 on termitaria, Spot-lighting
23/04/10	Study Area	Masked Lapwing	Spot-lighting
23/04/10	Study Area	Northern Nailtail Wallaby	Spot-lighting
23/04/10	Study Area	Southern Boobook	Spot-lighting
24/04/10	Site 9	Brown Falcon	
24/04/10	near Site 8	Feral Cat	sheltering by termite mound
24/04/10	Paradise camp	Rainbow Bee-eater	x 2
24/04/10	Audrey's Tank	Crested Pigeon	
24/04/10	Churchill's Tank	Little Friarbird	
24/04/10	Churchill's Tank	Crested Pigeon	
24/04/10	Churchill's Tank	Galah	
24/04/10	Churchill's Tank	Little Corrella	
24/04/10	Churchill's Tank	Masked Lapwing	
24/04/10	Churchill's Tank	Magpie-Lark	
24/04/10	Churchill's Tank	Little Crow	
24/04/10	Churchill's Tank	Red-tailed Black-Cockatoo	
24/04/10	Churchill's Tank	Willie Wagtail	
24/04/10	N of S11	Rainbow Bee-eater	
24/04/10	N of S11	White-breasted Woodswallow	
24/04/10	N of S11	Black-faced Woodswallow	
24/04/10	N of S11	Galah	
24/04/10	N of S11	Red-winged Parrot	
24/04/10	N of S11	Grey-crowned Babbler	
24/04/10	S of Churchill's	Dog	
24/04/10	S of Churchill's	Spotted Nightjar	
24/04/10	N of Audrey's	Northern Nailtail Wallaby	
24/04/10	Duchess Rd	Spotted Nightjar	x 2
24/04/10	Snake Creek	Darter	
24/04/10	Snake Creek	Nankeen Night-Heron	x 5 (2 juvenile)
24/04/10	Snake Creek	White-plumed Honeyeater	
24/04/10	Snake Creek	White-gaped Honeyeater	
24/04/10	Snake Creek	Freshwater Crocodile	x 4
24/04/10	Snake Creek	Crimson Finch	x 2
24/04/10	Snake Creek	Little Black Flying Fox	5 + roosting in <i>Pandanus</i>
24/04/10	Snake Creek	Tawny Frogmouth	x 3
24/04/10	Snake Creek	Variagated Fairy-wren	
24/04/10	Snake Creek	Pallid Cuckoo	

Appendix 4. (cont.)

Date	Location	Species	Notes
24/04/10	Snake Creek	Galah	
24/04/10	Snake Creek	Peaceful Dove	
24/04/10	Billabong W of Site 1	Torresian Crow	
24/04/10	Billabong W of Site 1	Weebill	
24/04/10	Billabong W of Site 1	Black-faced Cuckoo-shrike	
24/04/10	Billabong W of Site 1	Australian White Ibis	
24/04/10	Billabong W of Site 1	Peaceful Dove	
24/04/10	Billabong W of Site 1	Common Greenshank	x 1
24/04/10	Billabong W of Site 1	Whiskered Tern	x 1
24/04/10	Billabong W of Site 1	Glossy Ibis	x 1
24/04/10	Billabong W of Site 1	Magpie-Lark	
25/04/10	Site 9	Nankeen Kestrel	
25/04/10	near Site 9	Brown Falcon	
25/04/10	near Site 3	<i>Tiliqua scincoides</i>	
25/04/10	Site 4	<i>Diporiphora lalliae</i>	
25/04/10	Site 4	<i>Ctenophorus isolepis</i>	
25/04/10	Audrey's Tank	Little Corrella	x 2
25/04/10	Peglars	Red Kangaroo	x 1
25/04/10	Duchess Dam	Red Kangaroo	
25/04/10	Audrey's Tank	Tawny Frogmouth	x 1 Spot-lighting
25/04/10	Audrey's Access Rd	Spotted Nightjar	x 2 Spot-lighting
25/04/10	Audrey's Access Rd	Southern Boobook	x 2 Spot-lighting
25/04/10	Study Area	Dingo/Dog	Spot-lighting
25/04/10	Study Area	Spotted Nightjar	x 4 Spot-lighting
25/04/10	Study Area	Northern Nailtail Wallaby	x 2 Spot-lighting
25/04/10	Near Site 4	Barn Owl	Spot-lighting
25/04/10	Billabong W of Site 1	Nankeen Night-Heron	4 juvenile, 2 adult, Spot-lighting
25/04/10	Near Site 4	<i>Suta punctata</i>	Spot-lighting
25/04/10	Near camp	Brown Falcon	Spot-lighting
25/04/10	Near camp	Spotted Nightjar	Spot-lighting
25/04/10	Duchess Dam	Plumed Whistling Duck	Over 400
25/04/10	Duchess Dam	Little Black Cormorant	x 2
25/04/10	Duchess Dam	Brown Falcon	
25/04/10	Duchess Dam	Crested Pigeon	
25/04/10	Duchess Dam	Galah	
25/04/10	Duchess Dam	Red-winged Parrot	
25/04/10	Duchess Dam	Red-backed Fairywren	
25/04/10	Duchess Dam	Brown Honeyeater	
25/04/10	Duchess Dam	Restless Flycatcher	
25/04/10	Duchess Dam	White-breasted Woodswallow	
25/04/10	Duchess Dam	Magpie-Lark	
25/04/10	Duchess Dam	Zebra Finch	
26/04/10	Site 7	<i>Menetia greyii</i>	
26/04/10	Site 1	<i>Amphibolurus gilberti</i>	
26/04/10	Site 1	<i>Cryptoblepharus tythos</i>	
26/04/10	Site 1	<i>Gehyra pilbara</i>	
26/04/10	Site 4	Red Winged Parrot	
26/04/10	Site 5	Grey-crowned Babbler	

Appendix 4. (cont.)

Date	Location	Species	Notes
26/04/10	Site 5	Galah	
26/04/10	Site 1	Sacred Kingfisher	
26/04/10	Near Site 4	<i>Varanus panoptes</i>	
26/04/10	Site 12	White-throated Gerygone	
26/04/10	Hardman Dam	Red Kangaroo	x 2
26/04/10	Churchill's Tank	Brolga	x 2
26/04/10	Churchill's Tank	Little Corrella	x 8
26/04/10	Hardman Dam	Brown Falcon	
26/04/10	Hardman Dam	Crested Pigeon	
26/04/10	Hardman Dam	Peaceful Dove	
26/04/10	Hardman Dam	Galah	
26/04/10	Hardman Dam	Red-winged Parrot	
26/04/10	Hardman Dam	Budgerigar	
26/04/10	Hardman Dam	Rainbow Bee-eater	x 5
26/04/10	Hardman Dam	Black Honeyeater	
26/04/10	Hardman Dam	Brown Honeyeater	
26/04/10	Hardman Dam	Black-chinned Honeyeater	
26/04/10	Hardman Dam	Yellow-tinted Honeyeater	
26/04/10	Hardman Dam	Little Friarbird	
26/04/10	Hardman Dam	Yellow-throated Miner	
26/04/10	Hardman Dam	Grey-crowned Babbler	
26/04/10	Hardman Dam	Magpie-Lark	
26/04/10	Hardman Dam	White-breasted Woodswallow	
26/04/10	Hardman Dam	Zebra Finch	
26/04/10	S of Churchill's	Black-shouldered Kite	
26/04/10	S of Churchill's	Crested Pigeon	
26/04/10	S of Churchill's	Blue-winged Kookaburra	
26/04/10	S of Churchill's	Pied Honeyeater	
26/04/10	S of Churchill's	Singing Honeyeater	
26/04/10	S of Churchill's	Black-chinned Honeyeater	
26/04/10	S of Churchill's	Willie Wagtail	
26/04/10	S of Churchill's	Magpie-Lark	
26/04/10	S of Churchill's	Black-faced Cuckoo-Shrike	
26/04/10	S of Churchill's	Little Woodswallow	
26/04/10	S of Churchill's	Black-faced Woodswallow	
26/04/10	S of Churchill's	Singing Bushlark	
26/04/10	S of Churchill's	Zebra Finch	
26/04/10	Audrey's Access Rd	Spotted Nightjar	Spot-lighting
26/04/10	Audrey's Access Rd	<i>Gehyra punctata</i>	Spot-lighting
26/04/10	North of Audreys	Northern Nailtail Wallaby	Juvenile
26/04/10	Near Site 5	Black-shouldered Kite	Spot-lighting
26/04/10	North of Audrey's	Northern Nailtail Wallaby	Spot-lighting
26/04/10	Billabong W of Site 1	Bush Stone-Curlew (possible)	Spot-lighting
26/04/10	South of Peglars	Emu	Spot-lighting
26/04/10	Billabong W of Site 1	Magpie-Lark	Spot-lighting
26/04/10	Billabong W of Site 1	Glossy Ibis	Spot-lighting
26/04/10	Billabong W of Site 1	Black-winged Stilt	Spot-lighting
26/04/10	Billabong W of Site 1	Galah	Spot-lighting

Appendix 4. (cont.)

Date	Location	Species	Notes
26/04/10	Billabong W of Site 1	Australian White Ibis	Spot-lighting
26/04/10	Billabong W of Site 1	Willy Wagtail	Spot-lighting
26/04/10	Billabong W of Site 1	<i>Litoria pallida</i>	x many
27/04/10	Site 6	Mistletoebird	
27/04/10	near Churchill's	Bush Stone-Curlew	
27/04/10	Near Site 11	Red Kangaroo	
27/04/10	Near Site 11	Northern Nailtail Wallaby	
27/04/10	Near Paradise Camp	Tawny Frogmouth	
27/04/10	Billabong W of Site 1	Brolga	x 2
27/04/10	Billabong W of Site 1	Black-necked Stork	x 2
27/04/10	Billabong W of Site 1	Pacific Black Duck	x 1
27/04/10	Billabong W of Site 1	White-faced Heron	x 1
27/04/10	Billabong W of Site 1	Common Greenshank	x 1
27/04/10	Billabong W of Site 1	Black-winged Stilt	x 3
27/04/10	Billabong W of Site 1	Royal Spoonbill	x 8
27/04/10	near Site 1	Australian Bustard	x 1
27/04/10	South of Peglars	<i>Varanus panoptes</i>	
27/04/10	Site 1	<i>Pseudechis australis</i>	
9/10/10	Old Proposed Airport Site Rd	Australian Bustard	x2
9/10/10	Site 1	Australian Kestrel	
9/10/10	Paradise Camp	Black Kite	
9/10/10	Site 1	Black-faced Cuckoo-shrike	
9/10/10	Audrey's Access Road	Crested Pigeon	
9/10/10	Audrey's Access Road	Diamond Dove	
9/10/10	near Peglars	Double-barred Finch	drinking from a puddle
9/10/10	Paradise Camp	Double-barred Finch	x2
9/10/10	Paradise Camp	Galah	
9/10/10	Site 1	Grey-crowned Babbler	
9/10/10	Site 2	Grey-crowned Babbler	
9/10/10	Site 5	Grey-crowned Babbler	
9/10/10	Site 4	Little Button-Quail	
9/10/10	Paradise Camp	Little Corella	
9/10/10	Site 1	Little Friarbird	
9/10/10	Site 2	Little Friarbird	
9/10/10	Paradise Camp	Magpie-Lark	
9/10/10	Site 1	Magpie-Lark	
9/10/10	Site 1	Red-backed Fairy-wren	
9/10/10	Paradise Camp	Red-tailed Black-Cockatoo	x24
9/10/10	Site 2	Singing Honeyeater	
9/10/10	Site 5	Singing Honeyeater	
9/10/10	Site 1	Torresian Crow	
9/10/10	Site 2	Torresian Crow	
9/10/10	Site 1	Variegated Fairy-wren	
9/10/10	Paradise Camp	Whistling Kite	
9/10/10	Audrey's Access Road	Willie Wagtail	
9/10/10	Paradise Camp	Willie Wagtail	
9/10/10	near Peglars	Zebra Finch	drinking from a puddle
10/10/10	Audrey's Access Road	Australian Bustard	x2

Appendix 4. (cont.)

Date	Location	Species	Notes
10/10/10	Old Proposed Airport Site Rd	Australian Bustard	x1
10/10/10	Audrey's Access Road	Australian Kestrel	
10/10/10	Audrey's Tank	Brolga	x2
10/10/10	near Site 2	Cockatiel	x12
10/10/10	Paradise Camp	Cockatiel	
10/10/10	Paradise Camp	Crested Pigeon	
10/10/10	Site 1	<i>Ctenophorus isolepis</i>	
10/10/10	Paradise Camp Dam	Darter	In tree over water
10/10/10	near Site 2	Diamond Dove	
10/10/10	Paradise Camp Dam	<i>Litoria caerulea</i>	At waters edge
10/10/10	Paradise Camp Dam	<i>Litoria inermis</i>	At waters edge
10/10/10	Paradise Camp	<i>Litoria inermis</i>	in dam
10/10/10	Paradise Camp	<i>Litoria rothii</i>	in dam
10/10/10	Paradise Camp Dam	<i>Litoria rubella</i>	At waters edge
10/10/10	Audrey's Access Road	Little Woodswallow	
10/10/10	Audrey's Tank	Oriental Plover	x6
10/10/10	Paradise Camp	Red-tailed Black-Cockatoo	x6
10/10/10	Paradise Camp Dam	<i>Suta punctata</i>	Crossing path
10/10/10	Paradise Camp	<i>Suta punctata</i>	
10/10/10	near Site 2	Varied Lorikeet	
11/10/10	near Site 6	Australian Bustard	
11/10/10	Duchess Dam	Brown Falcon	
11/10/10	Duchess Rd	Brown Goshawk	
11/10/10	Duchess Dam	Brown Honeyeater	
11/10/10	Dune near Site 6	Budgerigar	
11/10/10	Audrey's Tank	Bush-stone Curlew	x1 spot-lighting
11/10/10	Duchess Dam	Crested Pigeon	
11/10/10	Duchess Dam	Feral Pig	
11/10/10	Audrey's Tank	<i>Gehyra pilbara</i>	x20 spot-lighting
11/10/10	Dune near Site 6	Grey-crowned Babbler	
11/10/10	Audrey's Tank	<i>Litoria rothii</i>	x5 spot-lighting
11/10/10	Duchess Dam	Little Corella	
11/10/10	Dune near Site 6	Little Woodswallow	
11/10/10	Duchess Dam	Magpie-Lark	
11/10/10	Dune near Site 6	Mistletoebird	
11/10/10	668774 E, 7999729 N	Oriental Plover	Foraging in cow pats
11/10/10	Duchess Dam	Plumed Whistling Duck	
11/10/10	Dune near Site 6	Rufous Whistler	
11/10/10	Duchess Dam	Rufous-throated Honeyeater	
11/10/10	Duchess Dam	Straw-necked Ibis	
11/10/10	Duchess Dam	Torresian Crow	
11/10/10	Dune near Site 6	Varied Sittella	
11/10/10	Dune near Site 6	White-breasted Woodswallow	
11/10/10	Duchess Dam	Willie Wagtail	
11/10/10	Duchess Dam	Zebra Finch	
12/10/10	Snake Creek	<i>Amphibolurus gilberti</i>	x1
12/10/10	Snake Creek	Black Kite	x1
12/10/10	Snake Creek	Black-faced Cuckoo-shrike	

Appendix 4. (cont.)

Date	Location	Species	Notes
12/10/10	Paradise Camp	Black-fronted Dotterel	
12/10/10	Snake Creek	Brown Honeyeater	
12/10/10	Snake Creek	Brown Honeyeater	x5
12/10/10	Snake Creek	Brush Cuckoo	
12/10/10	Snake Creek	Brush Cuckoo	x1
12/10/10	Audrey's Tank	Bush Stone-Curlew	calling
12/10/10	Snake Creek	<i>Carlia munda</i>	
12/10/10	Snake Creek	<i>Cryptoblepharus sp.</i>	
12/10/10	Site 3	<i>Ctenophorus isolepis</i>	
12/10/10	Snake Creek	Darter	
12/10/10	Paradise Camp	Dingo	
12/10/10	664443 E, 8012210 N	<i>Diporiphora lalliae</i>	Active on road at night
12/10/10	Snake Creek	Freshwater Crocodile	x4
12/10/10	Snake Creek	Galah	
12/10/10	termite mounds on Audrey's Access Rd	<i>Gehyra pilbara</i>	x20 Spot-lighting
12/10/10	Snake Creek	Great Egret	x1
12/10/10	Snake Creek	Grey-crowned Babbler	x5
12/10/10	Audrey's Tank	<i>Litoria rothii</i>	x5 Spot-lighting
12/10/10	Snake Creek	Little Corella	
12/10/10	Snake Creek	Little Corella	x4
12/10/10	Snake Creek	Little Friarbird	
12/10/10	Snake Creek	Little Friarbird	x2
12/10/10	near Site 2	Little Red Flying Fox	
12/10/10	Snake Creek	Magpie-Lark	x1
12/10/10	Site 3	<i>Notoscincus ornatus</i>	
12/10/10	Snake Creek	Peaceful Dove	x2
12/10/10	Site 5	Red Kangaroo	x2
12/10/10	Snake Creek	Red-backed Fairy-wren	x2
12/10/10	Peglars Access Rd	Red-backed Kingfisher	
12/10/10	Audrey's Laneway	Red-browed Pardalote	
12/10/10	Audrey's Laneway	Red-winged Parrot	
12/10/10	Snake Creek	Red-winged Parrot	x4
12/10/10	Snake Creek	Restless Flycatcher	
12/10/10	Snake Creek	Restless Flycatcher	x2
12/10/10	Snake Creek	Rufous Whistler	x1
12/10/10	Snake Creek	Rufous-throated Honeyeater	x1
12/10/10	Snake Creek	Sacred Kingfisher	
12/10/10	Snake Creek	Sacred Kingfisher	x2
12/10/10	Paradise Camp	Spinifex Pigeon	x2
12/10/10	Snake Creek	<i>Varanus tristis</i>	x1
12/10/10	Snake Creek	Varied Sittella	x3
12/10/10	Site 4	Variegated Fairy-wren	
12/10/10	Audrey's Laneway	Wedge-tailed Eagle	
12/10/10	Snake Creek	Whistling Kite	x2
12/10/10	Snake Creek	Willie Wagtail	x1
12/10/10	Site 4	Yellow-throated Miner	
12/10/10	Snake Creek	Yellow-tinted Honeyeater	
12/10/10	Snake Creek	Yellow-tinted Honeyeater	x4

Appendix 4. (cont.)

Date	Location	Species	Notes
13/10/10	Paradise Camp	<i>Antaresia stimsoni</i>	Under tin
13/10/10	near Site 7	Australian Bustard	x1
13/10/10	Site 2	Australian Bustard	x1 flying over
13/10/10	New Proposed Airport Site	Australian Owlet-Nightjar	x1
13/10/10	New Proposed Airport Site	Australian Owlet-Nightjar	
13/10/10	Proposed Airport Site	Brown Falcon	x1
13/10/10	Proposed Airport Site	Brown Honeyeater	x2
13/10/10	New Proposed Airport Site	Brown Honeyeater	
13/10/10	Proposed Airport Site	Brown Songlark	x3
13/10/10	Proposed Airport Site	Cockatiel	x4
13/10/10	New Proposed Airport Site	Cockatiel	
13/10/10	New Proposed Airport Site	<i>Cryptoblepharus sp.</i>	
13/10/10	Site 1	<i>Ctenophorus isolepis</i>	x1
13/10/10	Paradise Camp	<i>Ctenotus inornatus</i>	Under tin
13/10/10	Paradise Camp Dam	<i>Cyclorana australis</i>	At waters edge
13/10/10	New Proposed Airport Site	<i>Diporiphora lalliae</i>	
13/10/10	Paradise Camp	<i>Eremiascincus isolepis</i>	Under tin
13/10/10	Paradise Camp	Fairy Martin	nests
13/10/10	Site 8	Feral Pig	
13/10/10	Paradise Camp	<i>Gehyra australis</i>	Under tin
13/10/10	New Proposed Airport Site	Grey-crowned Babbler	x1
13/10/10	New Proposed Airport Site	Grey-crowned Babbler	
13/10/10	Paradise Camp	<i>Heteronotia binoei</i>	Under tin
13/10/10	Proposed Airport Site	Little Friarbird	x1
13/10/10	New Proposed Airport Site	Little Friarbird	x1
13/10/10	New Proposed Airport Site	Little Friarbird	
13/10/10	Proposed Airport Site	Little Woodswallow	x2
13/10/10	New Proposed Airport Site	Little Woodswallow	x1
13/10/10	New Proposed Airport Site	Magpie-Lark	x1
13/10/10	New Proposed Airport Site	Magpie-Lark	
13/10/10	Paradise Camp	<i>Morethia ruficauda</i>	Under tin
13/10/10	New Proposed Airport Site	Pallid Cuckoo	
13/10/10	New Proposed Airport Site	Pied Butcherbird	
13/10/10	New Proposed Airport Site	Red-backed Fairy-wren	x3
13/10/10	New Proposed Airport Site	Red-backed Fairy-wren	
13/10/10	Proposed Airport Site	Restless Flycatcher	x1
13/10/10	New Proposed Airport Site	Rufous-throated Honeyeater	x1
13/10/10	New Proposed Airport Site	Rufous-throated Honeyeater	
13/10/10	New Proposed Airport Site	Sacred Kingfisher	x1
13/10/10	New Proposed Airport Site	Singing Bushlark	
13/10/10	New Proposed Airport Site	Singing Honeyeater	x1
13/10/10	New Proposed Airport Site	Singing Honeyeater	
13/10/10	New Proposed Airport Site	Torresian Crow	
13/10/10	Proposed Airport Site	Varied Sittella	x4
13/10/10	Proposed Airport Site	White-winged Triller	x2
13/10/10	New Proposed Airport Site	White-winged Triller	x1
13/10/10	New Proposed Airport Site	Willie Wagtail	x4
13/10/10	New Proposed Airport Site	Willie Wagtail	

Appendix 4. (cont.)

Date	Location	Species	Notes
13/10/10	New Proposed Airport Site	Yellow-throated Miner	
13/10/10	New Proposed Airport Site	Zebra Finch	
14/10/10	Mt Wynne Creek	Black Kite	x20
14/10/10	Mt Wynne Creek	Black-faced Cuckoo-shrike	x1
14/10/10	Mt Wynne Creek	Black-fronted Dotterel	x2
14/10/10	near Paradise Camp	Black-fronted Dotterel	
14/10/10	Mt Wynne Creek	Blue-winged Kookaburra	x1
14/10/10	Mt Wynne Creek	Brown Quail	x1
14/10/10	Mt Wynne Creek	Brush Cuckoo	x1
14/10/10	Mt Wynne Creek	Crested Pigeon	x1
14/10/10	Paradise Camp Dam	<i>Cyclorana australis</i>	Calling at night
14/10/10	Site 8	<i>Cyclorana australis</i>	calling
14/10/10	Paradise Camp Dam	<i>Cyclorana longipes</i>	Calling at night
14/10/10	Mt Wynne Creek	Galah	x2
14/10/10	Mt Wynne Creek	Grey-crowned Babbler	x3
14/10/10	Mt Wynne Creek	Horsefield's Bronze-Cuckoo	x1
14/10/10	near Paradise Camp	Horsefield's Bronze-Cuckoo	x2
14/10/10	Paradise Camp Dam	<i>Litoria inermis</i>	Calling at night
14/10/10	Paradise Camp Dam	<i>Litoria pallida</i>	Calling at night
14/10/10	Paradise Camp Dam	<i>Litoria rubella</i>	Calling at night
14/10/10	Mt Wynne Creek	Little Corella	x20
14/10/10	Mt Wynne Creek	Little Friarbird	x3
14/10/10	Mt Wynne Creek	Magpie-Lark	x2
14/10/10	near Paradise Camp	Magpie-Lark	
14/10/10	Site 8	<i>Notoden nicholli</i>	calling
14/10/10	Mt Wynne Creek	Pallid Cuckoo	x2
14/10/10	near Paradise Camp	Pallid Cuckoo	
14/10/10	Mt Wynne Creek	Peaceful Dove	x4
14/10/10	Mt Wynne Creek	Red-backed Fairy-wren	x2
14/10/10	Mt Wynne Creek	Red-browed Pardalote	x1
14/10/10	Mt Wynne Creek	Red-winged Parrot	x2
14/10/10	Mt Wynne Creek	Rufous-throated Honeyeater	x5
14/10/10	Mt Wynne Creek	Sacred Kingfisher	x1
14/10/10	Mt Wynne Creek	Spinifex Pigeon	x3
14/10/10	Mt Wynne Creek	Torresian Crow	x1
14/10/10	Mt Wynne Creek	Variiegated Fairy-wren	x3
14/10/10	Mt Wynne Creek	Whistling Kite	x1
14/10/10	near Paradise Camp	Whistling Kite	
14/10/10	Mt Wynne Creek	White-breasted Woodswallow	x2
14/10/10	near Paradise Camp	White-faced Heron	x5
14/10/10	Mt Wynne Creek	Willie Wagtail	x2
14/10/10	Mt Wynne Creek	Yellow-throated Miner	x3
14/10/10	near Paradise Camp	Yellow-throated Miner	
14/10/10	Mt Wynne Creek	Yellow-tinted Honeyeater	x3
14/10/10	Mt Wynne Creek	Zebra Finch	x2
15/10/10	Spot-lighting Main Access Rd	<i>Antaresia stimsoni</i>	
15/10/10	Spot-lighting Main Access Rd	Black-fronted Dotterel	
15/10/10	Duchess Dam	Brolga	x2

Appendix 4. (cont.)

Date	Location	Species	Notes
15/10/10	Mt Wynne Creek Floodplain	<i>Cyclorana australis</i>	Calling at night
15/10/10	Spot-lighting Main Access Rd	<i>Cyclorana australis</i>	
15/10/10	Mt Wynne Creek Floodplain	<i>Cyclorana longipes</i>	Calling at night
15/10/10	Mt Wynne Creek Floodplain	<i>Cyclorana vagitus</i>	Calling at night
15/10/10	Spot-lighting Main Access Rd	Dingo	
15/10/10	Spot-lighting Main Access Rd	<i>Gehyra pilbara</i>	x4
15/10/10	Mt Wynne Creek Floodplain	<i>Litoria pallida</i>	Calling at night
15/10/10	Mt Wynne Creek Floodplain	<i>Litoria rothii</i>	Calling at night
15/10/10	Mt Wynne Creek Floodplain	<i>Litoria rubella</i>	Calling at night
15/10/10	Spot-lighting Main Access Rd	<i>Lucasium stenodactylum</i>	
15/10/10	Mt Wynne Creek Floodplain	Masked Lapwing	Calling at night
15/10/10	Peglars Bore	Masked Lapwing	x2
15/10/10	Spot-lighting Main Access Rd	Northern Nailtail Wallaby	
15/10/10	Mt Wynne Creek Floodplain	<i>Notaden nicholsii</i>	Calling at night
15/10/10	Duchess Dam	Restless Flycatcher	x2
15/10/10	Spot-lighting Main Access Rd	Southern Boobook	
15/10/10	Spot-lighting Main Access Rd	Tawny Frogmouth	
15/10/10	Mt Wynne Creek Floodplain	<i>Uperoleia mjobergi</i>	Calling at night
15/10/10	Duchess Dam	Wandering Whistling Duck	x2
15/10/10	Mt Wynne Creek	White-winged Triller	x1
16/10/10	Main Access Rd (Camp to Hwy)	Australian Bustard	
16/10/10	near Site 5	Australian Bustard	
16/10/10	Main Access Rd (Camp to Hwy)	Crested Pigeon	
16/10/10	Mt Wynne Creek Floodplain	<i>Cyclorana australis</i>	Calling at night
16/10/10	Mt Wynne Creek Floodplain	<i>Cyclorana longipes</i>	Calling at night
16/10/10	Mt Wynne Creek Floodplain	<i>Cyclorana vagitus</i>	Calling at night
16/10/10	Main Access Rd (Camp to Hwy)	Grey-crowned Babbler	
16/10/10	Mt Wynne Creek Floodplain	<i>Litoria pallida</i>	Calling at night
16/10/10	Mt Wynne Creek Floodplain	<i>Litoria rothii</i>	Calling at night
16/10/10	Mt Wynne Creek Floodplain	<i>Litoria rubella</i>	Calling at night
16/10/10	Main Access Rd (Camp to Hwy)	Little Friarbird	
16/10/10	Main Access Rd (Camp to Hwy)	Magpie-Lark	
16/10/10	Mt Wynne Creek Floodplain	<i>Notaden nicholsii</i>	Calling at night
16/10/10	Churchill's Tank	Rainbow Bee-eater	
16/10/10	Main Access Rd (Camp to Hwy)	Red-browed Pardalote	
16/10/10	Main Access Rd (Camp to Hwy)	Rufous Whistler	
16/10/10	Main Access Rd (Camp to Hwy)	Singing Honeyeater	
16/10/10	Mt Wynne Creek Floodplain	<i>Uperoleia mjobergi</i>	Calling at night
16/10/10	Main Access Rd (Camp to Hwy)	Willie Wagtail	
17/10/10	Paradise Camp Dam	<i>Amphibolurus gilberti</i>	Resting in tree
17/10/10	Paradise Camp Dam	Australasian Grebe	Two adults with chick
17/10/10	Access Road	Australian Kestrel	
17/10/10	Access Road	Black Kite	
17/10/10	Access Road	Brown Falcon	
17/10/10	Access Road	Cockatiel	
17/10/10	Access Road	Crested Pigeon	
17/10/10	Access Road	<i>Ctenophorus isolepis</i>	
17/10/10	Access Road	Galah	

Appendix 4. (cont.)

Date	Location	Species	Notes
17/10/10	Duchess Access Road	<i>Lialis burtonis</i>	x1 spot-lighting
17/10/10	Paradise Camp Dam	<i>Litoria caerulea</i>	
17/10/10	Access Road	Little Friarbird	
17/10/10	Access Road	Little Woodswallow	
17/10/10	Duchess Access Road	<i>Luasium stenodactylum</i>	x1 spot-lighting
17/10/10	Access Road	Magpie Lark	
17/10/10	Access Road	Magpie-Lark	
17/10/10	Access Road	Magpie-Lark	
17/10/10	Site 3	Magpie-Lark	nest
17/10/10	Paradise Camp Dam	Masked Lapwing	
17/10/10	Access Road	Oriental Plover	x5 on road
17/10/10	Access Road	Oriental Plover	Next to road
17/10/10	Access Road	Pacific Black Duck	
17/10/10	Duchess Access Road	Pheasant Coucal	x1 spot-lighting
17/10/10	Access Road	Red-backed Fairy-wren	
17/10/10	Access Road	Restless Flycatcher	
17/10/10	Access Road	Rufous-throated Honeyeater	
17/10/10	Access Road	Rufous-throated Honeyeater	
17/10/10	Access Road	Rufous-throated Honeyeater	
17/10/10	Access Road	Sacred Kingfisher	
17/10/10	Access Road	<i>Varanus panoptes</i>	
17/10/10	Access Road	White-breasted Woodswallow	
17/10/10	Access Road	Willie Wagtail	
17/10/10	Access Road	Willie Wagtail	
17/10/10	Access Road	Zebra Finch	x6
17/10/10	Paradise Camp Dam	Zebra Finch	x8
18/10/10	Mt Wynne Creek	<i>Amphibolurus gilberti</i>	x1
18/10/10	Proposed Processing Area	Black-faced Cuckoo-shrike	x2
18/10/10	Proposed Processing Area	Black-faced Woodswallow	x2
18/10/10	666457 E, 7990984 N	Central Netted Dragon	Basking on fence
18/10/10	Proposed Processing Area	Cockatiel	x6
18/10/10	Sand Dunes	<i>Cryptoblepharus sp.</i>	
18/10/10	Sand Dunes	<i>Eremiascincus isolepis</i>	
18/10/10	Proposed Processing Area	Galah	x2
18/10/10	Sand Dunes	<i>Gehyra nana</i>	
18/10/10	Proposed Processing Area	Grey Shrike-Thrush	x3
18/10/10	Mt Wynne Creek	<i>Heteronotia binoei</i>	x1
18/10/10	Sand Dunes	<i>Lerista bipes</i>	Three underneath litter
18/10/10	Proposed Processing Area	Little Friarbird	x3
18/10/10	Peglars Bore	Little Red Flying-Fox	x1
18/10/10	Proposed Processing Area	Magpie-Lark	x1
18/10/10	Mt Wynne Creek	<i>Morethia ruficauda</i>	x1
18/10/10	664793 E, 7996630 N	Northern Nailtail Wallaby	Crossing road at night
18/10/10	see co-ord	Rainbow Bee-eater	x1
18/10/10	Proposed Processing Area	Red-backed Fairy-wren	x2
18/10/10	Proposed Processing Area	Red-backed Fairy-wren	x2
18/10/10	Proposed Processing Area	Red-browed Pardalote	x2
18/10/10	Proposed Processing Area	Rufous Songlark	x2

Appendix 4. (cont.)

Date	Location	Species	Notes
18/10/10	Proposed Processing Area	Rufous Whistler	x1
18/10/10	Sand Dunes	Rufous Whistler	
18/10/10	Proposed Processing Area	Rufous-throated Honeyeater	x3
18/10/10	Proposed Processing Area	Sacred Kingfisher	x1
18/10/10	Proposed Processing Area	Singing Bushlark	x5
18/10/10	Proposed Processing Area	Singing Honeyeater	x2
18/10/10	Proposed Processing Area	Singing Honeyeater	x2
18/10/10	Proposed Processing Area	Tawny Frogmouth	x1
18/10/10	Mt Wynne Creek	<i>Tiliqua scincoides</i>	x
18/10/10	Mt Wynne Creek	<i>Varanus gouldii</i>	x1
18/10/10	Sand Dunes	<i>Varanus tristis</i>	Underneath bark
18/10/10	Proposed Processing Area	Wedge-tailed Eagle	x1
18/10/10	Proposed Processing Area	Whistling Kite	x1
18/10/10	Proposed Processing Area	White-winged Triller	x2
18/10/10	Proposed Processing Area	Willie Wagtail	x2
18/10/10	Proposed Processing Area	Yellow-throated Miner	x2
20/10/10	Proposed admin and camp area	Australian Bustard	x1
20/10/10	Proposed admin and camp area	Brown Goshawk	x2
20/10/10	Proposed admin and camp area	<i>Ctenophorus nuchalis</i>	x1
20/10/10	Proposed admin and camp	Dingo	Tracks
20/10/10	Proposed Processing Area	<i>Diporiphora lalliae</i>	x1
20/10/10	Proposed admin and camp area	Feral Cat	x1
20/10/10	Proposed admin and camp	Feral Pig	Diggings
20/10/10	Proposed Processing Area	<i>Pogona minor mitchelli</i>	x1
20/10/10	Proposed admin and camp area	Tree Martin	x2
21/10/10	Dune 1 / woodland	Black-chinned Honeyeater	x3
21/10/10	Dune 1 / woodland	Black-faced Woodswallow	x4
21/10/10	Lake near Paradise Camp	Black-fronted Dotterel	x2
21/10/10	Dune 1 / woodland	Black-tailed Treecreeper	x2
21/10/10	Lake near camp	Brolga	x1
21/10/10	Dune 5	Brown Quail	x2
21/10/10	Lake near camp	Freshwater Crocodile	x1
21/10/10	Dune 1 / woodland	Galah	x2
21/10/10	Dune 1 / woodland	Grey Shrike-Thrush	x1
21/10/10	Lake near camp	Little Corella	x2
21/10/10	Dune 6	Little Friarbird	x2
21/10/10	Lake near camp	Masked Lapwing	x2
21/10/10	Dune 1 / woodland	Mistletoebird	x1
21/10/10	Lake near camp	Pacific Black Duck	x4
21/10/10	Dune 1 / woodland	Pallid Cuckoo	x2
21/10/10	Dune 1 / woodland	Pheasant Coucal	x1
21/10/10	Dune 1 / woodland	Pied Buctherbird	x1
21/10/10	Lake near camp	Plumed Whistling Duck	x4
21/10/10	Lake near camp	Rainbow Bee-eater	x2
21/10/10	Dune 1 / woodland	Red-browed Pardalote	x2
21/10/10	Dune 1 / woodland	Red-winged Parrot	x2
21/10/10	Lake near camp	Red-winged Parrot	x2

Appendix 4. (cont.)

Date	Location	Species	Notes
21/10/10	Lake near camp	Royal Spoonbill	x7
21/10/10	Dune 1 / woodland	Rufous-throated Honeyeater	x4
21/10/10	Dune 1 / woodland	Sacred Kingfisher	x1
21/10/10	Dune 1 / woodland	Singing Honeyeater	x1
21/10/10	Dune 1 / woodland	Tawny Frogmouth	x1
21/10/10	Dune 1 / woodland	Varied Lorikeet	x4
21/10/10	Dune 7	Varied Sittella	x4
21/10/10	Dune 1 / woodland	White-winged Triller	x2
21/10/10	Dune 1 / woodland	Willie Wagtail	x2
21/10/10	Dune 1 / woodland	Yellow-throated Miner	x3
21/10/10	Dune 1 / woodland	Zebra Finch	x2
22/10/10	Lake near camp	Common Sandpiper	x3
15/11/10	Paradise Camp	Australian Bustard	x2
15/11/10	Main Access Rd (Camp to Hwy)	Black-faced Cuckoo-shrike	
15/11/10	Main Access Rd (Camp to Hwy)	Black-faced Woodswallow	
15/11/10	Main Access Rd (Camp to Hwy)	Brown Falcon	
15/11/10	Main Access Rd (Camp to Hwy)	Brush Cuckoo	
15/11/10	Main Access Rd (Camp to Hwy)	Crested Pigeon	
15/11/10	Main Access Rd (Camp to Hwy)	<i>Ctenophorus isolepis</i>	
15/11/10	Main Access Rd (Camp to Hwy)	Pallid Cuckoo	
15/11/10	Main Access Rd (Camp to Hwy)	Rufous Whistler	
15/11/10	Main Access Rd (Camp to Hwy)	Wedge-tailed Eagle	
15/11/10	Main Access Rd (Camp to Hwy)	Willie Wagtail	
13/05/11	Plain between Peglars and Snake Creek	Australian Bustard	
13/05/11	near Site 8, over floodplain	Spotted Harrier	
14/05/11	On road between Paradise Camp and Audreys Bore	Australian Bustard	x 2
14/05/11	Between Paradise Camp and Snake Gate	Australian Bustard	
14/05/11	near Site 8	Australian Bustard	
14/05/11	Between Paradise Camp and Snake Gate	Barking Owl	
14/05/11	Between Paradise Camp and Snake Gate	Little Button-Quail	
14/05/11	Between Paradise Camp and Snake Gate	Red Kangaroo	x 2
14/05/11	near Site 2	Spotted Harrier	
15/05/11	Near Highway	Black-faced Woodswallow	
15/05/11	Near Highway	Little Friarbird	
15/05/11	Near Highway	White-throated Gerygone	
15/05/11	Near Highway	White-winged Triller	
15/05/11	Near Highway	Willie Wagtail	
16/05/11	Gate nr Site 2	Black-breasted Buzzard	
16/05/11	NE of Audreys Bore	Black-eared Cuckoo	
16/05/11	Snake Gate	Brown Falcon	
16/05/11	Duchess Dam	Brown Falcon	
16/05/11	NE of Audreys Bore	Brown Honeyeater	
16/05/11	NE of Audreys Bore	Diamond Dove	
16/05/11	Duchess Dam	Double-barred Finch	
16/05/11	Duchess Dam	Galah	
16/05/11	NE of Audreys Bore	Horsfield's Bronze-Cuckoo	

Appendix 4. (cont.)

Date	Location	Species	Notes
16/05/11	NE of Audreys Bore	Little Woodswallow	
16/05/11	Duchess Dam	Magpie-Lark	
16/05/11	Duchess Dam	Masked Lapwing	
16/05/11	Mt Wynne Creek nr Paradise camp	Pacific Black Duck	with v. young ducklings
16/05/11	Gate nr Site 2	Pheasant Coucal	
16/05/11	Duchess Dam	Plumed Whistling Duck	x 30
16/05/11	Duchess Dam	Red-browed Pardalote	
16/05/11	NE of Audreys Bore	Rufous-throated Honeyeater	
16/05/11	Duchess Dam	Rufous-throated Honeyeater	
16/05/11	Duchess Dam	White-necked Heron	
16/05/11	NE of Audreys Bore	White-winged Triller	
16/05/11	NE of Audreys Bore	Willie Wagtail	
16/05/11	Duchess Dam	Zebra Finch	50+
17/05/11	Snake Creek	Crimson Finch	x 6
17/05/11	Mt Wynne Creek nr Paradise camp	Pallid Cuckoo	
17/05/11	NE of Audreys Bore	Pallid Cuckoo	
17/05/11	Snake Creek	Pictorella Mannikins	x 2
17/05/11	Snake Creek	Red-tailed Black-Cockatoo	x 5
17/05/11	Snake Creek	Star Finch	x 2
17/05/11	Snake Creek	<i>Varanus panoptes</i>	
18/05/11	Between Audreys and Churchills	Australian Bustard	x 3
18/05/11	Mt Wynne Creek nr Paradise camp	Black-fronted Dotterel	
18/05/11	Eucalypt woodland	Budgerigar	
18/05/11	Gate nr Site 2	Little Eagle	
18/05/11	Mt Wynne Creek nr Paradise camp	Pictorella Mannikins	x 10
18/05/11	near Snake Creek	Spinifexbird	
19/05/11	Between Audreys and Churchills	Australian Bustard	
19/05/11	Snake Creek	Australian Bustard	x 3, incl. an immature bird
19/05/11	Mt Wynne Creek nr Paradise camp	Brown Quail	with chicks
19/05/11	Snake Creek	Brush Cuckoo	
19/05/11	Between Audreys and Churchills	Pheasant Coucal	
19/05/11	Snake Creek	Royal Spoonbill	Nesting, with chicks
19/05/11	Snake Creek	<i>Tiliqua scincoides</i>	
19/05/11	Snake Creek	White-bellied Cuckoo-Shrike	x 2
12 -20/05/11	Snake Creek	Australian White ibis	
12 -20/05/11	Snake Creek	Bar-shouldered Dove	
12 -20/05/11	Snake Creek	Black Kite	
12 -20/05/11	Snake Creek	Black-faced Cuckoo-shrike	
12 -20/05/11	Snake Creek	Black-faced Woodswallow	
12 -20/05/11	Snake Creek	Blue-winged Kookaburra	
12 -20/05/11	Snake Creek	Collared Sparrowhawk	
12 -20/05/11	Snake Creek	Crimson Finch	
12 -20/05/11	Snake Creek	Double-barred Finch	
12 -20/05/11	Snake Creek	Fairy Martin	
12 -20/05/11	Snake Creek	Galah	
12 -20/05/11	Snake Creek	Great Bowerbird	
12 -20/05/11	Snake Creek	Great Egret	
12 -20/05/11	Snake Creek	Grey Shrike-Thrush	

Appendix 4. (cont.)

Date	Location	Species	Notes
12 -20/05/11	Snake Creek	Grey-crowned Babbler	
12 -20/05/11	Snake Creek	Intermediate Egret	
12 -20/05/11	Snake Creek	Little Corrella	
12 -20/05/11	Snake Creek	Little Egret	
12 -20/05/11	Snake Creek	Little Friarbird	
12 -20/05/11	Snake Creek	Little Woodswallow	
12 -20/05/11	Snake Creek	Magpie-Lark	
12 -20/05/11	Snake Creek	Nankeen Night-Heron	
12 -20/05/11	Snake Creek	Pacific Black Duck	
12 -20/05/11	Snake Creek	Peaceful Dove	
12 -20/05/11	Snake Creek	Pied Butcherbird	
12 -20/05/11	Snake Creek	Rainbow Bee-eater	
12 -20/05/11	Snake Creek	Red-backed Fairy-wren	
12 -20/05/11	Snake Creek	Red-browed Pardalote	
12 -20/05/11	Snake Creek	Red-tailed Black-Cockatoo	
12 -20/05/11	Snake Creek	Red-winged Parrot	
12 -20/05/11	Snake Creek	Restless Flycatcher	
12 -20/05/11	Snake Creek	Royal Spoonbill	
12 -20/05/11	Snake Creek	Rufous Whistler	
12 -20/05/11	Snake Creek	Rufous-throated Honeyeater	
12 -20/05/11	Snake Creek	Sacred Kingfisher	
12 -20/05/11	Snake Creek	Square-tailed Kite	
12 -20/05/11	Snake Creek	Straw-necked Ibis	
12 -20/05/11	Snake Creek	Striated Pardalote	
12 -20/05/11	Snake Creek	Torresian Crow	
12 -20/05/11	Snake Creek	Weebill	
12 -20/05/11	Snake Creek	Whistling Kite	
12 -20/05/11	Snake Creek	White-faced heron	
12 -20/05/11	Snake Creek	White-plumed Honeyeater	
12 -20/05/11	Snake Creek	White-winged Triller	
12 -20/05/11	Snake Creek	Willie Wagtail	
12 -20/05/11	Snake Creek	Yellow-throated Miner	
12 -20/05/11	Snake Creek	Zebra Finch	
12 -20/05/11	Mt Wynne Creek	Black Kite	
12 -20/05/11	Mt Wynne Creek	Black-faced Cuckoo-shrike	
12 -20/05/11	Mt Wynne Creek	Black-faced Woodswallow	
12 -20/05/11	Mt Wynne Creek	Blue-winged Kookaburra	
12 -20/05/11	Mt Wynne Creek	Galah	
12 -20/05/11	Mt Wynne Creek	Great Bowerbird	
12 -20/05/11	Mt Wynne Creek	Little Corrella	
12 -20/05/11	Mt Wynne Creek	Little Friarbird	
12 -20/05/11	Mt Wynne Creek	Little Woodswallow	
12 -20/05/11	Mt Wynne Creek	Magpie-Lark	
12 -20/05/11	Mt Wynne Creek	Peaceful Dove	
12 -20/05/11	Mt Wynne Creek	Pied Butcherbird	
12 -20/05/11	Mt Wynne Creek	Rainbow Bee-eater	
12 -20/05/11	Mt Wynne Creek	Red-backed Fairy-wren	

Appendix 4. (cont.)

Date	Location	Species	Notes
12 -20/05/11	Mt Wynne Creek	Red-browed Pardalote	
12 -20/05/11	Mt Wynne Creek	Red-winged Parrot	
12 -20/05/11	Mt Wynne Creek	Restless Flycatcher	
12 -20/05/11	Mt Wynne Creek	Striated Pardalote	
12 -20/05/11	Mt Wynne Creek	Torresian Crow	
12 -20/05/11	Mt Wynne Creek	Weebill	
12 -20/05/11	Mt Wynne Creek	Whistling Kite	
12 -20/05/11	Mt Wynne Creek	White-plumed Honeyeater	
12 -20/05/11	Mt Wynne Creek	White-winged Triller	
12 -20/05/11	Mt Wynne Creek	Willie Wagtail	
12 -20/05/11	Mt Wynne Creek	Yellow-throated Miner	
12 -20/05/11	Mt Wynne Creek	Zebra Finch	
12 -20/05/11	Mt Wynne Creek	Australian Owlet-Nightjar	
12 -20/05/11	Mt Wynne Creek	Brolga	
12 -20/05/11	Mt Wynne Creek	Diamond Dove	
12 -20/05/11	Mt Wynne Creek	Red-backed Kingfisher	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Black-faced Cuckoo-shrike	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Black-faced Woodswallow	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Galah	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Little Corrella	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Magpie-Lark	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Peaceful Dove	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Pied Butcherbird	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Rainbow Bee-eater	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Red-backed Fairy-wren	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Red-browed Pardalote	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Red-winged Parrot	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Torresian Crow	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Weebill	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	White-winged Triller	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Willie Wagtail	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Yellow-throated Miner	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Grey-crowned Babbler	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Rufous Whistler	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Black-chinned Honeyeater	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Brown Honeyeater	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Little Button-Quail	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Singing Bushlark	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Singing Honeyeater	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	White-breasted Woodswallow	
12 -20/05/11	Eucalypt woodland (Quoll site 3)	Yellow-tinted Honeyeater	
8/06/11	Egans Bore	Spotted Nightjar	
8/06/11	south of Peglars	<i>Tiliqua multifasciata</i>	on road
8/06/11	south of Peglars	<i>Varanus panoptes</i>	on road
9/06/11	Site 3	<i>Litoria rothii</i>	in pitfall full of water
9/06/11	Site 12	<i>Ramphotyphlops grypus</i>	
10/06/11	Site 12	<i>Antaresia stimsoni</i>	

Appendix 4. (cont.)

Date	Location	Species	Notes
10/06/11	near Site 12	Australian Bustard	x 2
10/06/11	Site 9	Black-breasted Buzzard	
10/06/11	Paradise Access Rd	Black-headed Python	
10/06/11	Site 5	Ctenotus pantherinus	
10/06/11	near Site 2	Red Kangaroo	
10/06/11	Site 5	<i>Varanus acanthurus</i>	Juvenile
11/06/11	near Egan's Bore	Australian Bustard	x 3
11/06/11	Near Site 5	Australian Bustard	
11/06/11	near Egan's Bore	Australian Pratincole	x 1
11/06/11	Snake Creek	Bar-shouldered Dove	x 2
11/06/11	Snake Creek	Black Kite	x 1
11/06/11	Snake Creek	Black Kite	
11/06/11	Snake Creek	Black-chinned Honeyeater	x 2
11/06/11	Snake Creek	Black-faced Woodswallow	
11/06/11	Snake Creek	Brown Falcon	
11/06/11	Paradise Access Rd nr Site 10	Budgerigar	x 10
11/06/11	Site 4	<i>Ctenotus inornatus</i>	
11/06/11	Snake Creek	Diamond Dove	
11/06/11	Site 4	<i>Diporiphora lalliae</i>	
11/06/11	Site 12	Feral Cat	Tracks
11/06/11	Snake Creek	Freshwater Crocodile	x 3
11/06/11	Snake Creek	Galah	x 20
11/06/11	Snake Creek	Galah	
11/06/11	Snake Creek	Great Egret	x 1
11/06/11	Snake Creek	Great Egret	
11/06/11	Snake Creek	Grey-crowned Babbler	x 8
11/06/11	Snake Creek	Little Corrella	x 10
11/06/11	Snake Creek	Little Corrella	
11/06/11	Snake Creek	Little Friarbird	
11/06/11	Snake Creek	Little Woodswallow	x 1
11/06/11	Snake Creek	Little Woodswallow	
11/06/11	Snake Creek	Nankeen Night-Heron	
11/06/11	Snake Creek	Nankeen Night-Heron x 20	x 20
11/06/11	Snake Creek	Northern Naitail Wallaby	x 2
11/06/11	Snake Creek	Peaceful Dove	x 4
11/06/11	Snake Creek	Restless Flycatcher	x 2
11/06/11	Snake Creek	Restless Flycatcher	
11/06/11	Snake Creek	Royal Spoonbill	x 3
11/06/11	Snake Creek	Royal Spoonbill	
11/06/11	Snake Creek	Rufous Whistler	x 3
11/06/11	Snake Creek	Sacred Kingfisher	
11/06/11	Snake Creek	Star Finch	x 2
11/06/11	Paradise Access Rd nr Site 10	Whistling Kite	two young in nest in Boab
11/06/11	Snake Creek	White-breasted Woodswallow	
11/06/11	Snake Creek	Willie Wagtail	
11/06/11	Snake Creek	Yellow-tinted Honeyeater	x 4
11/06/11	Snake Creek	Yellow-tinted Honeyeater	

Appendix 4. (cont.)

Date	Location	Species	Notes
12/06/11	Audrey's Bore	Australian Bustard	x 1
12/06/11	Northern block - Acacia shrubland	Australian Owlet-Nightjar	
12/06/11	Northern block - Acacia shrubland	Australian Owlet-Nightjar	
12/06/11	Egans Bore	Australian Pratincole	x 30
12/06/11	Northern block - tussock plain	Black-breasted Buzzard	
12/06/11	Northern block - Acacia shrubland	Black-faced Cuckoo-Shrike	
12/06/11	Northern block - tussock plain	Black-faced Woodswallow	
12/06/11	Northern block - Acacia shrubland	Black-faced Woodswallow	
12/06/11	Northern block - Acacia shrubland	Brolga	
12/06/11	Scholl's Bore	Brolga	
12/06/11	Northern block - Acacia shrubland	Brown Honeyeater	
12/06/11	Northern block - tussock plain	Brown Honeyeater	
12/06/11	Northern block - tussock plain	Brown Honeyeater	
12/06/11	Northern block - Acacia shrubland	Crested Pigeon	
12/06/11	Scholl's Bore	Crested Pigeon	
12/06/11	Site 3	Dingo	Tracks
12/06/11	Site 12	Feral Cat	Tracks
12/06/11	Site 13	Feral Cat	Tracks
12/06/11	Northern block - Acacia shrubland	Grey-crowned Babbler	
12/06/11	Northern block - Acacia shrubland	Grey-crowned Babbler	
12/06/11	Northern block - tussock plain	Grey-crowned Babbler	
12/06/11	Northern block - tussock plain	Magpie-Lark	
12/06/11	Northern block - Acacia shrubland	Masked Lapwing	
12/06/11	Northern block - Acacia shrubland	Masked Lapwing	
12/06/11	Northern block - tussock plain	Pallid Cuckoo	
12/06/11	Northern block - tussock plain	Pallid Cuckoo	
12/06/11	Northern block - Acacia shrubland	Pied Butcherbird	
12/06/11	Northern block - Acacia shrubland	Pied Butcherbird	
12/06/11	Northern block - tussock plain	Pied Butcherbird	
12/06/11	Northern block - Acacia shrubland	Rainbow Bee-eater	
12/06/11	Northern block - tussock plain	Rainbow Bee-eater	
12/06/11	Northern block - tussock plain	Rainbow Bee-eater	
12/06/11	Site 14	Red Kangaroo	x 2
12/06/11	Northern block - Acacia shrubland	Red-backed Fairy-wren	
12/06/11	Northern block - Acacia shrubland	Red-browed Pardalote	
12/06/11	Northern block - Acacia shrubland	Red-browed Pardalote	
12/06/11	Northern block - tussock plain	Red-browed Pardalote	
12/06/11	Northern block - Acacia shrubland	Restless Flycatcher	
12/06/11	Northern block - tussock plain	Rufous Songlark	
12/06/11	Northern block - Acacia shrubland	Rufous Whistler	
12/06/11	Northern block - tussock plain	Rufous Whistler	
12/06/11	Northern block - Acacia shrubland	Singing Honeyeater	
12/06/11	Northern block - Acacia shrubland	Singing Honeyeater	
12/06/11	Northern block - tussock plain	Singing Honeyeater	
12/06/11	Northern block - tussock plain	Singing Honeyeater	
12/06/11	Scholl's Bore	Straw-necked Ibis	
12/06/11	near Site 10	Wedge-tailed Eagle	x 2

Appendix 4. (cont.)

Date	Location	Species	Notes
12/06/11	Site 1	Wedge-tailed Eagle	x 1
12/06/11	Northern block - tussock plain	Whistling Kite	
12/06/11	Northern block - Acacia shrubland	White-breasted Woodswallow	
12/06/11	Northern block - tussock plain	White-breasted Woodswallow	
12/06/11	Northern block - tussock plain	White-breasted Woodswallow	
12/06/11	Northern block - Acacia shrubland	White-winged Triller	
12/06/11	Northern block - Acacia shrubland	White-winged Triller	
12/06/11	Northern block - tussock plain	White-winged Triller	
12/06/11	Northern block - tussock plain	White-winged Triller	
12/06/11	Northern block - Acacia shrubland	Willie Wagtail	
12/06/11	Northern block - Acacia shrubland	Willie Wagtail	
12/06/11	Northern block - tussock plain	Willie Wagtail	
12/06/11	Northern block - Acacia shrubland	Yellow-throated Miner	
12/06/11	Northern block - Acacia shrubland	Yellow-throated Miner	
12/06/11	Northern block - tussock plain	Yellow-throated Miner	
12/06/11	Northern block - tussock plain	Yellow-tinted Honeyeater	
12/06/11	Northern block - tussock plain	Zebra Finch	
13/06/11	Paradise North - dunes	Barn Owl	x 2 roosting in Boab
13/06/11	Paradise North - dunes	Brown Quail	
13/06/11	Audrey's and Paradise North	Bush Stone-Curlew	x 5 Spot-lighting
13/06/11	Site 14	Dingo	
13/06/11	near Audrey's Bore	Feral Cat	Black adult
13/06/11	Site 13	Feral Cat	Tracks
13/06/11	Paradise North - dunes	Grey Shrike-Thrush	
13/06/11	Paradise North - dunes	Little Button-Quail	
13/06/11	near Egan's Bore	Northern Naitail Wallaby	dead on road
13/06/11	Audrey's and Paradise North	Northern Naitail Wallaby	x 2 Spot-lighting
13/06/11	Paradise North - dunes	Rainbow Bee-eater	
13/06/11	Audrey's and Paradise North	Red Kangaroo	x 1 Spot-lighting
13/06/11	Paradise North - dunes	Red-winged Parrot	
13/06/11	Peglars-Churchill-Audrey	Tawny Frogmouth	x 3 Spot-lighting
13/06/11	Paradise North - dunes	Variiegated Fairy-wren	
13/06/11	Paradise North - dunes	Yellow-throated Miner	
14/06/11	Egans Bore	Australasian Grebe	
14/06/11	Egans Bore	Australian Pratincole	x 30
14/06/11	Snake Creek	Black-necked Stork	
14/06/11	Paradise Camp	Blue-winged Kookaburra	
14/06/11	Duchess Dam	Brolga	x 3
14/06/11	Duchess Dam	Brown Falcon	x 2
14/06/11	Duchess Dam	Crested Pigeon	
14/06/11	Site 12	Feral Cat	Tracks
14/06/11	Egans Bore	Flock Bronzewing	x 100
14/06/11	Duchess Dam	Galah	
14/06/11	Snake Creek	Intermediate Egret	x 5
14/06/11	Snake Creek	Little Egret	
14/06/11	Duchess Dam	Magpie-Lark	
14/06/11	Egans Bore	Magpie-Lark	

Appendix 4. (cont.)

Date	Location	Species	Notes
14/06/11	Egans Bore	Masked Lapwing	
14/06/11	Duchess Dam	Plumed Whistling-Duck	x 200
14/06/11	Duchess Dam	Red-winged Parrot	
14/06/11	Snake Creek	Star Finch	
14/06/11	Duchess Dam	Torresian Crow	
14/06/11	Hill south of Peglars	<i>Varanus panoptes</i>	
14/06/11	Egans Bore	Wandering Whistling-Duck	x 10
14/06/11	Duchess Dam	Willie Wagtail	
14/06/11	Duchess Dam	Zebra Finch	
14/06/11	Egans Bore	Zebra Finch	
15/06/11	Rocky Hill 51 660488, 7997613	Black-faced Cuckoo-Shrike	
15/06/11	Lake to SW of Peglars	Black-fronted Dotterel	
15/06/11	Rocky Hill 51 660488, 7997613	Black-headed Python	
15/06/11	Lake to SW of Peglars	Black-winged Stilt	
15/06/11	Lake to SW of Peglars	Brolga	
15/06/11	Rocky Hill 51 660488, 7997613	Brown Quail	x 4
15/06/11	Paradise Access Rd	Bush Stone-Curlew	x 1 Spot-lighting
15/06/11	Snake Creek	Darter	
15/06/11	Between Egans Bore and McRaes	Emu	x 1
15/06/11	Rocky Hill 51 660488, 7997613	Feral Cat	skull
15/06/11	Paradise Access Rd	Feral Cat	x 2 Spot-lighting
15/06/11	Between camp and Peglars	Feral Pig	4 adults, 12 babies
15/06/11	Snake Creek	Feral Pig	
15/06/11	Egans Bore	Flock Bronzewing	x 140
15/06/11	Lake to SW of Peglars	Glossy Ibis	
15/06/11	Audrey's and Paradise North	Little Button-Quail	Spot-lighting
15/06/11	Lake to SW of Peglars	Masked Lapwing	
15/06/11	Paradise Access Rd	Northern Nailtail Wallaby	x 5 Spot-lighting
15/06/11	Rocky Hill 51 660488, 7997613	Painted Finch	x 2
15/06/11	Snake Creek	Peaceful Dove	
15/06/11	Lake to SW of Peglars	Red-kneed Dotterel	
15/06/11	Rocky Hill 51 660488, 7997613	Singing Honeyeater	
15/06/11	Audrey's and Paradise North	Southern Boobook	Spot-lighting
15/06/11	Rocky Hill 51 660488, 7997613	Spinifex Pigeon	x 3
15/06/11	Paradise Access Rd	Spotted Nightjar	x 1 Spot-lighting
15/06/11	Audrey's and Paradise North	Spotted Nightjar	Spot-lighting
15/06/11	Audrey's Bore	Straw-necked Ibis	
15/06/11	Audrey's Bore	Straw-necked Ibis	
15/06/11	Lake to SW of Peglars	Whiskered Tern	
15/06/11	Lake to SW of Peglars	White-necked Heron	
16/06/11	N of McRaes	Australian Bustard	x 3
16/06/11	Paradise Camp	Bush Stone-Curlew	heard at night
16/06/11	N of McRaes	Dingo	x 1
16/06/11	Site 5	Gwardar	
16/06/11	Paradise Camp	White-necked Heron	
17/06/11	near Churchill's Bore	Australian Bustard	x 2
17/06/11	near Site 4	Australian Bustard	

Appendix 4. (cont.)

Date	Location	Species	Notes
17/06/11	near Peglars	Black-breasted Buzzard	x 1
17/06/11	Paradise Access Rd	Black-breasted Buzzard	x 3
17/06/11	Site 4	Dog/Dingo	Tracks
17/06/11	Egans Bore	Flock Bronzewing	x 170
17/06/11	Site 5	Red Kangaroo	x 2
17/06/11	Site 9	White-throated Gerygone	
18/06/11	Between camp and Peglars	Feral Pig	4 adults, 12 babies
18/06/11	Snake Creek	White-plumed Honeyeater	
19/06/11	near Camballin Barrage	Australian White Ibis	
19/06/11	S of Peglars	Brown Goshawk	
19/06/11	Egans Bore	Budgerigar	x 2
19/06/11	near Camballin Barrage	Crimson Finch	x 2
19/06/11	near Camballin Barrage	Sulphur-crested Cockatoo	

Appendix 5. Reports on bat call analysis.



Bat call identification
from the Dutchess and Paradise Project,
Western Australia

Type: Bat Call Analysis

Prepared for: Western Wildlife

Date: 4 December 2009

Job No.: SZ130

Prepared by: Specialised Zoological
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SUMMARY

Bat identifications from Anabat echolocation call recordings are provided from the Dutchess and Paradise Project Area on Liveringa Station, in the Kimberley region of Western Australia. At least ten species were identified as being present, with the possibility of others that cannot be reliably distinguished from each other based on acoustic recordings (Table 1).

Some sequences could not be identified reliably to one species. The calls of long-eared bats *Nyctophilus* spp. are typically difficult to identify to species, and the sequences identified as *Nyctophilus* sp. may derive from the northern long-eared bat *Nyctophilus arnhemensis*, the lesser long-eared bat *Nyctophilus geoffroyi* or the pallid long-eared bat *Nyctophilus daedalus*. The calls of the hoary wattled bat *Chalinolobus nigrogriseus*, little broad-nosed bat *Scotorepens greyii* and northern broad-nosed bat *Scotorepens sanborni* are also similar and cannot be distinguished reliably.

Some call types of the northern free-tailed bat *Chaerephon jobensis* can sometimes be confused with those of the yellow-bellied sheath-tailed bat *Saccolaimus flaviventris*. In some cases *C. jobensis* could be distinguished unambiguously, but other calls sequences could have been produced by either species. Likewise, some calls of the Northern bent-winged bat *Miniopterus schreibersii oriana* and Finlayson's cave bat *Vespadelus finlaysoni* are very similar, though some call sequences contained pulses with shapes typical of *M. s. oriana*.

The inland broad-nosed bat *Scotorepens balstoni* is identified based on minimum frequency, but with reduced confidence because the study location is at the very edge of the range of this species. Other species that would be at the edge of their known range in this study area would be *S. sanborni* and *V. finlaysoni*.

Details supporting the identifications are provided, as recommended by the Australasian Bat Society (ABS 2006). A summary of pulse parameters is provided in Table 2, and representative call sequences are illustrated in Figure 1. Further data is available should verification be required.

METHODS

Signals as recorded with an Anabat SD1 unit were downloaded and examined in AnalookW 3.7a software. Three call variables were measured on good quality search phase pulses in representative call sequences: pulse duration (milliseconds), maximum frequency (kHz) and characteristic frequency (equivalent to minimum frequency; kHz). Species were identified based on information in Milne (2002). Nomenclature follows Armstrong and Reardon (2006) and Parnaby (2009). Species designations of Churchill (2008) are not followed until formal publication of the relevant taxonomic study.

REFERENCES

- ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]
- Armstrong, K. and Reardon, T. (2006). Standardising common names of bats in Australia. *The Australasian Bat Society Newsletter* 26: 37–42.
- Churchill, S.K. (2008). *Australian bats*. 2nd ed. Allen and Unwin, Crows Nest, NSW.
- Milne, D.J. (2002). *Key to the bat calls of the Top End of the Northern Territory*. Parks and Wildlife Commission of the Northern Territory, Technical Report No. 71.
- Parnaby, H.E. (2009). A taxonomic review of Australian Greater Long-eared Bats previously known as *Nyctophilus timoriensis* (Chiroptera: Vespertilionidae) and some associated taxa. *Australian Zoologist* 35: 39–81.

TABLE 1. Species identifications, with the degree of confidence indicated by a code. Date correlates with site; see Table 2 for full species names.

		<i>C. gouldii</i>	<i>C. jobensis</i>	<i>C. jobensis</i> <i>S. flaviventris</i>	<i>C. nigrogriseus</i> / <i>S. greyii</i> / <i>S. sanborni</i>	<i>M. schreibersii</i>	<i>M. schreibersii</i> / <i>V. finlaysoni</i>	<i>Nyctophilus</i> sp.	<i>P. westralis</i>	<i>S. balstoni</i>	<i>T. georgianus</i>
Date	Site										
Serial 3230											
21/10/2009	9	—	H	NC	NC	—	—	—	H	—	—
22/10/2009	7	—	—	—	NC	—	—	—	H	—	H
23/10/2009	2	—	—	NC	NC	—	—	—	—	—	H
24/10/2009	6	—	—	NC	NC	—	NC	—	—	—	—
25/10/2009	10	—	H	NC	NC	—	NC	—	—	—	H
26/10/2009	3	H	H	—	NC	—	—	NC	—	—	—
Serial 5695											
18/10/2009	Camp	H	H	NC	NC	—	NC	NC	H	—	—
19/10/2009	Camp	H	H	NC	NC	—	NC	—	H	NC	H
21/10/2009	11	—	—	NC	NC	H	—	—	—	—	H
22/10/2009	1	—	—	NC	NC	—	—	NC	—	—	H
23/10/2009	5	—	—	NC	NC	H	—	—	—	NC	H
24/10/2009	12	—	—	NC	NC	—	—	—	—	—	H
25/10/2009	8	—	—	NC	NC	H	—	—	—	—	H
26/10/2009	?	—	—	NC	NC	H	—	—	—	—	—
27/10/2009	Camp	NC	H	—	NC	H	—	—	—	—	—

Definition of confidence level codes:

H High. Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or submission of a specimen/tissue to a museum.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the Summary section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

TABLE 2. Summary of variables from representative call sequences.

Species	s,p ¹	Duration (msec) ²	Max Frequency (kHz) ²	Char frequency (kHz) ²
Gould's wattled bat <i>Chalinolobus gouldii</i>	5,32	6.9 ± 1.8 3.4 – 10.2	41.4 ± 7.2 33.6 – 60.2	31.3 ± 1.2 29.3 – 33.6
Northern free-tailed bat <i>Chaerephon jobensis</i>	3,45	12.8 ± 3.1 4.3 – 20.5	28.5 ± 4.6 19.4 – 38.5	20.4 ± 1.9 17.2 – 25.6
Northern free-tailed bat <i>Chaerephon jobensis</i> / Yellow-bellied sheath-tailed bat <i>Saccolaimus flaviventris</i>	4,35	14.4 ± 3.6 7.0 – 22.9	21.5 ± 2.5 16.5 – 24.8	17.9 ± 1.4 15.2 – 20.0
Hoary wattled bat <i>Chalinolobus nigrogriseus</i> / Little broad-nosed bat <i>Scotorepens greyii</i> / Northern broad-nosed bat <i>Scotorepens sanborni</i>	5,62	6.7 ± 2.0 3.7 – 11.5	52.6 ± 11.4 38.5 – 78.4	38.6 ± 1.2 36.7 – 41.0
Northern bent-winged bat <i>Miniopterus schreibersii orianae</i>	5,48	6.4 ± 1.4 3.5 – 8.8	58.0 ± 3.7 54.1 – 69.6	53.6 ± 1.6 50.3 – 56.7
Northern bent-winged bat <i>Miniopterus schreibersii orianae</i> / Finlayson's cave bat <i>Vespadelus finlaysoni</i>	5,73	5.8 ± 0.9 3.5 – 8.0	68.1 ± 8.7 56.7 – 92.0	54.3 ± 1.8 51.6 – 58.0
Unidentified long-eared bat <i>Nyctophilus</i> sp.	5,48	3.2 ± 1.0 1.8 – 5.8	69.7 ± 7.3 47.9 – 80.8	45.7 ± 3.0 41.0 – 53.7
Northern pipistrelle <i>Pipistrellus westralis</i>	3,12	6.3 ± 1.1 4.4 – 7.7	52.7 ± 1.6 49.4 – 55.2	48.5 ± 0.7 47.1 – 49.4
Inland broad-nosed bat <i>Scotorepens balstoni</i>	6,60	5.3 ± 0.8 3.7 – 7.5	46.5 ± 6.4 36.9 – 58.8	34.0 ± 0.5 33.1 – 35.2
Common sheath-tailed bat <i>Taphozous georgianus</i>	5,44	9.7 ± 2.9 4.1 – 14.5	26.9 ± 0.9 25.6 – 29.1	24.5 ± 0.4 23.6 – 25.4

¹ s,p: number of sequences measured, combined total number of pulses measured;

² Mean ± SD; range.

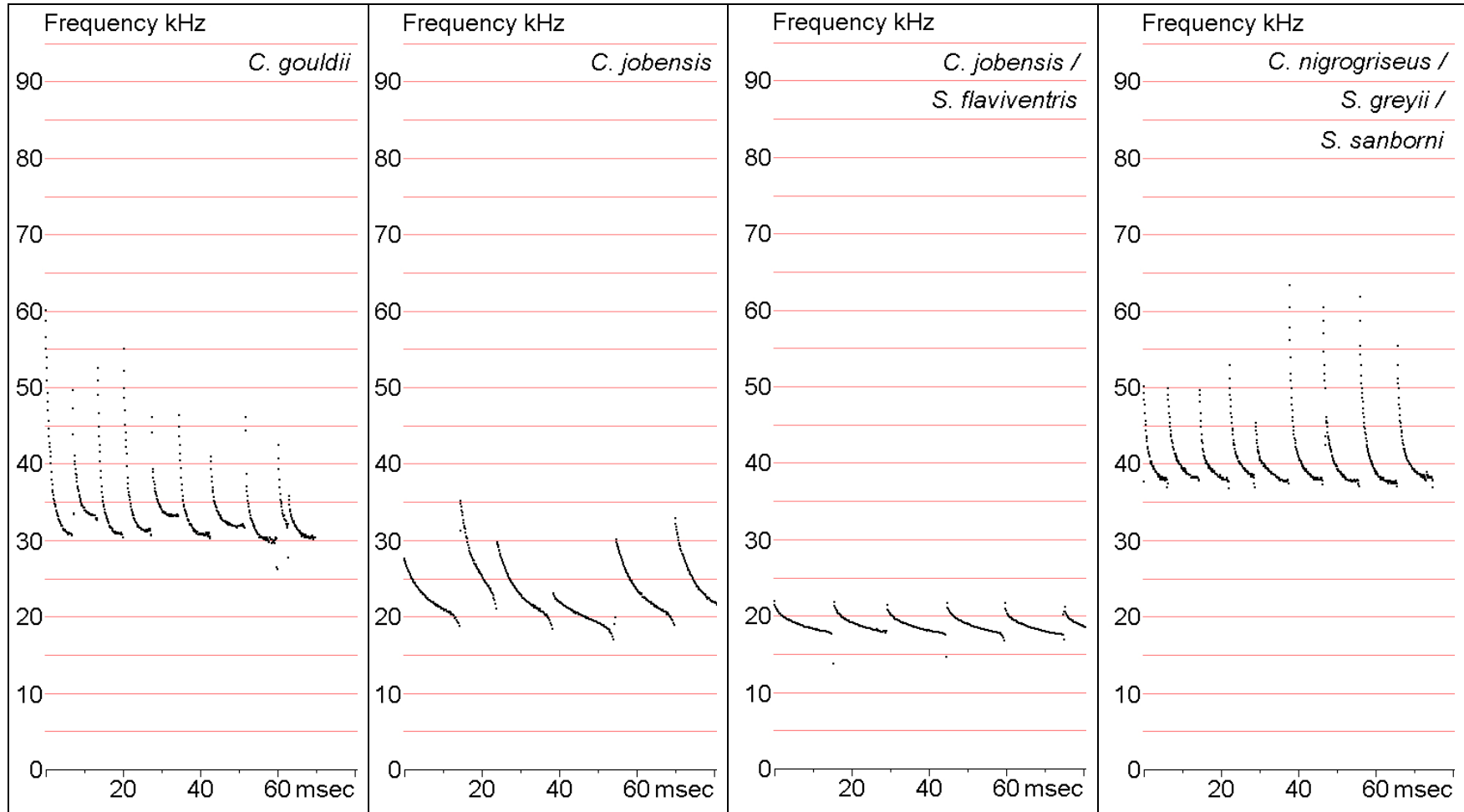


FIGURE 1A. Representative call sequences of the species identified (time is compressed between pulses).

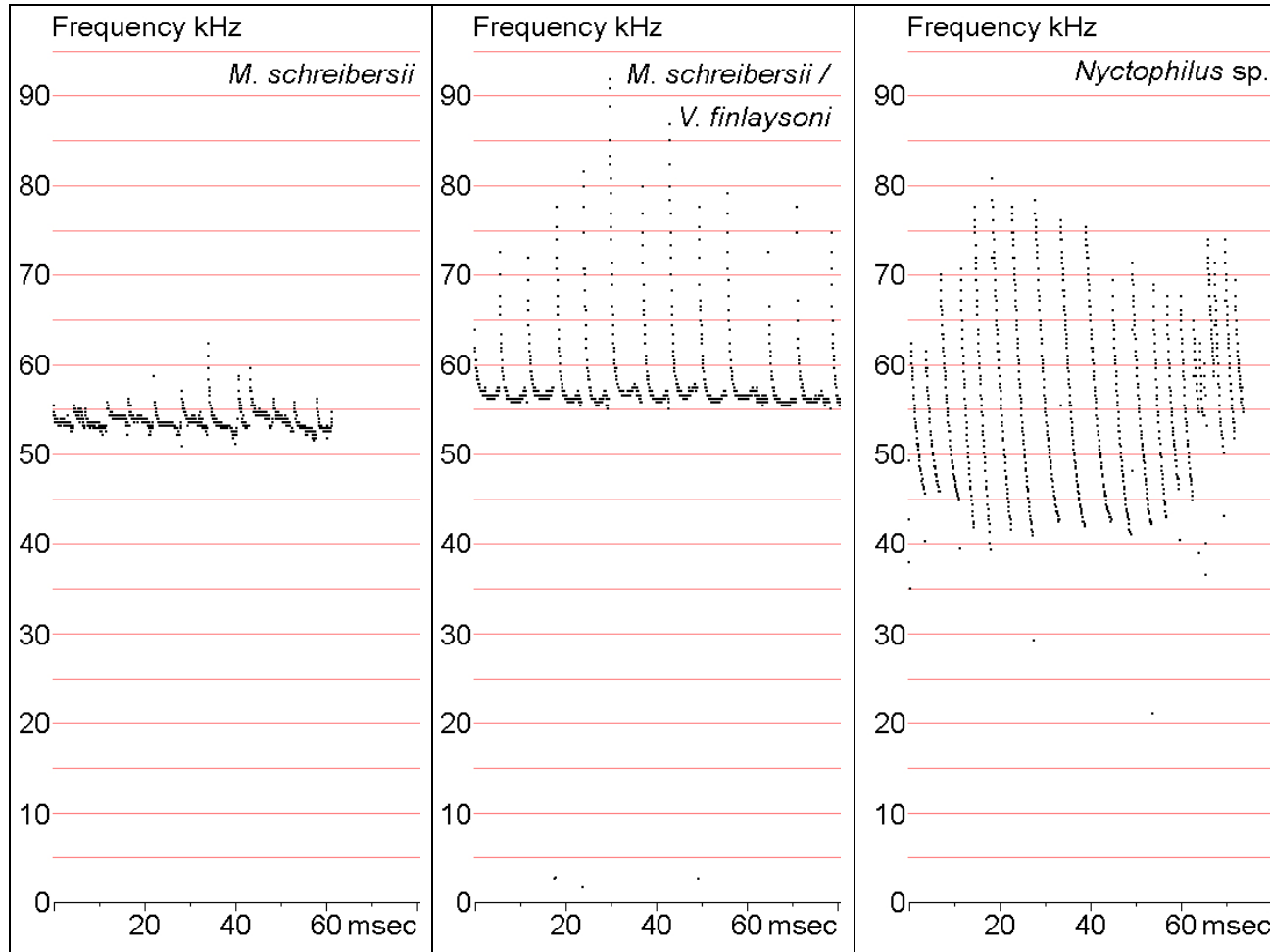


FIGURE 1B. Representative call sequences of the species identified (time is compressed between pulses).

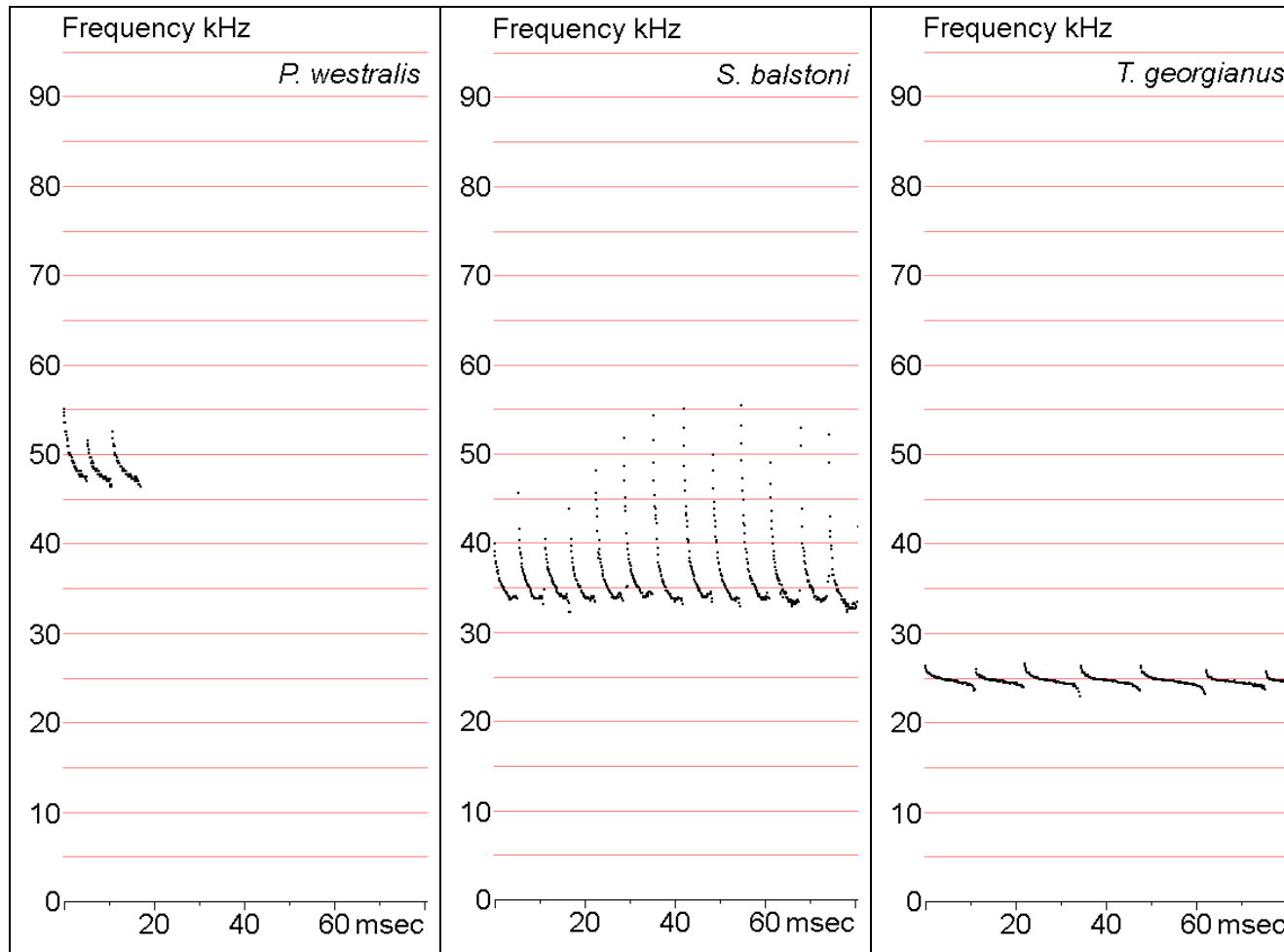


FIGURE 1C. Representative call sequences of the species identified (time is compressed between pulses).



Bat call identification
from the Duchess and Paradise Projects,
Western Australia

Type: Bat Call Analysis

Prepared for: Western Wildlife

Date: 24 May 2010

Job No.: SZ158

Prepared by: Specialised Zoological
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SUMMARY

Bat identifications from Anabat echolocation call recordings are provided from the Duchess and Paradise Project Areas on Liveringa Station, in the Kimberley region of Western Australia. At least six species were identified as being present, with the possibility of several others that cannot be distinguished reliably from each other based on acoustic recordings (Table 1).

Many call sequences could not be identified reliably to one species. The calls of long-eared bats *Nyctophilus* spp. are typically difficult to identify to species, and the sequences identified as *Nyctophilus* sp. may derive from the northern long-eared bat *Nyctophilus arnhemensis*, the lesser long-eared bat *Nyctophilus geoffroyi* or the pallid long-eared bat *Nyctophilus daedalus*. The calls of the hoary wattled bat *Chalinolobus nigrogriseus*, little broad-nosed bat *Scotorepens greyii* and northern broad-nosed bat *Scotorepens sanborni* are also similar and cannot be distinguished reliably. Some call types of the northern free-tailed bat *Chaerephon jobensis* can sometimes be confused with those of the yellow-bellied sheath-tailed bat *Saccolaimus flaviventris*. In some cases *S. flaviventris* could be distinguished unambiguously, but other calls sequences could have been produced by either species. The northern bent-winged bat *Miniopterus oceanensis oriana*e produces a variety of call types, some of which are diagnostic, and others which can appear similar to calls of Finlayson's cave bat *Vespadelus finlaysoni* and the northern pipistrelle *Pipistrellus westralis*.

Details supporting the identifications are provided, as recommended by the Australasian Bat Society (ABS 2006). A summary of pulse parameters is provided in Table 2, and representative call sequences are illustrated in Figure 1. Further data is available should verification be required.

METHODS

Signals as recorded with an Anabat SD2 unit were downloaded and examined in AnalookW 3.7w software. Three call variables were measured on good quality search phase pulses in representative call sequences: pulse duration (milliseconds), maximum frequency (kHz) and characteristic frequency (kHz). Species were identified based on information in Milne (2002). Nomenclature follows Armstrong and Reardon (2006) and Armstrong (in review). Species designations of Churchill (2008) are not followed until formal publication of the relevant taxonomic study.

REFERENCES

- ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]
- Armstrong, K. and Reardon, T. (2006). Standardising common names of bats in Australia. *The Australasian Bat Society Newsletter* 26: 37–42.
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- Churchill, S.K. (2008). *Australian bats*. 2nd ed. Allen and Unwin, Crows Nest, NSW.
- Milne, D.J. (2002). *Key to the bat calls of the Top End of the Northern Territory*. Parks and Wildlife Commission of the Northern Territory, Technical Report No. 71.

TABLE 1. Species identifications, with the degree of confidence indicated by a code. Date correlates with site; see Table 2 for full species names.

	<i>C. gouldii</i>	<i>C. jobensis</i> / <i>S. flaviventris</i>	<i>C. nigrogriseus</i> / <i>S. greyii</i> / <i>S. sanborni</i>	<i>M. oceanensis</i>	<i>M. oceanensis</i> / <i>P. westralis</i>	<i>M. oceanensis</i> / <i>V. finlaysoni</i>	<i>Nyctophilus sp.</i>	<i>S. flaviventris</i>	<i>T. georgianus</i>
Date									
Serial Beta006									
21/04/2010	—	—	—	—	—	NC	—	H	—
22/04/2010	H	—	NC	—	—	NC	NC	H	—
23/04/2010	NC	NC	NC	H	NC	—	NC	H	—
24/04/2010	H	—	NC	H	NC	NC	NC	H	—
25/04/2010	H	NC	NC	H	NC	NC	NC	H	H
27/04/2010	—	—	NC	H	—	NC	—	H	—
28/04/2010	—	NC	NC	—	—	NC	—	H	—

Definition of confidence level codes:

H High. Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or submission of a specimen/tissue to a museum.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the Summary section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

TABLE 2. Summary of variables from representative call sequences.

Species	s,p ¹	Duration (msec) ²	Max Frequency (kHz) ²	Char frequency (kHz) ²
Gould's wattled bat <i>Chalinolobus gouldii</i>	5,68	9.3 ± 2.8 5.8 – 19.4	36.9 ± 2.9 32.3 – 44.2	32.5 ± 1.0 29.3 – 34.5
Northern free-tailed bat <i>Chaerephon jobensis</i> / Yellow-bellied sheath-tailed bat <i>Saccolaimus flaviventris</i>	3,23	13.5 ± 1.0 12.1 – 15.9	28.7 ± 4.2 21.3 – 36.7	18.9 ± 1.2 17.1 – 21.7
Hoary wattled bat <i>Chalinolobus nigrogriseus</i> / Little broad-nosed bat <i>Scotorepens greyii</i> / Northern broad-nosed bat <i>Scotorepens sanborni</i>	7,71	7.7 ± 1.3 5.3 – 9.9	46.7 ± 4.9 40.0 – 60.2	38.2 ± 1.4 33.5 – 41.0
Northern bent-winged bat <i>Miniopterus oceanensis orianae</i>	6,73	6.3 ± 0.7 4.7 – 8.3	62.9 ± 6.4 53.7 – 79.2	54 ± 1.6 50.6 – 56.7
Northern bent-winged bat <i>Miniopterus oceanensis orianae</i> / Northern pipistrelle <i>Pipistrellus westralis</i>	4,30	6.6 ± 2.0 3.1 – 8.9	53.5 ± 1.9 49.4 – 58.0	48 ± 1.0 45.7 – 49.4
Northern bent-winged bat <i>Miniopterus oceanensis orianae</i> / Finlayson's cave bat <i>Vespadelus finlaysoni</i>	7,67	6.1 ± 0.7 4.9 – 7.5	67.1 ± 7 55.9 – 85.1	51.8 ± 1 49.7 – 54.1
Unidentified long-eared bat <i>Nyctophilus</i> sp.	7,45	3.3 ± 0.9 2.0 – 5.2	66.4 ± 12.0 49.1 – 92.0	43.8 ± 2.8 38.5 – 51.6
Yellow-bellied sheath-tailed bat <i>Saccolaimus flaviventris</i>	2,20	16.5 ± 5.0 8.9 – 23.5	22.9 ± 2.2 18.9 – 25.8	18.7 ± 1.3 16.7 – 20.5
Common sheath-tailed bat <i>Taphozous georgianus</i>	1,8	10.2 ± 2.7 7.3 – 13.0	27.0 ± 0.9 26.0 – 28.2	25.4 ± 0.2 25.1 – 25.7

¹ s,p: number of sequences measured, combined total number of pulses measured;

² Mean ± SD; range.

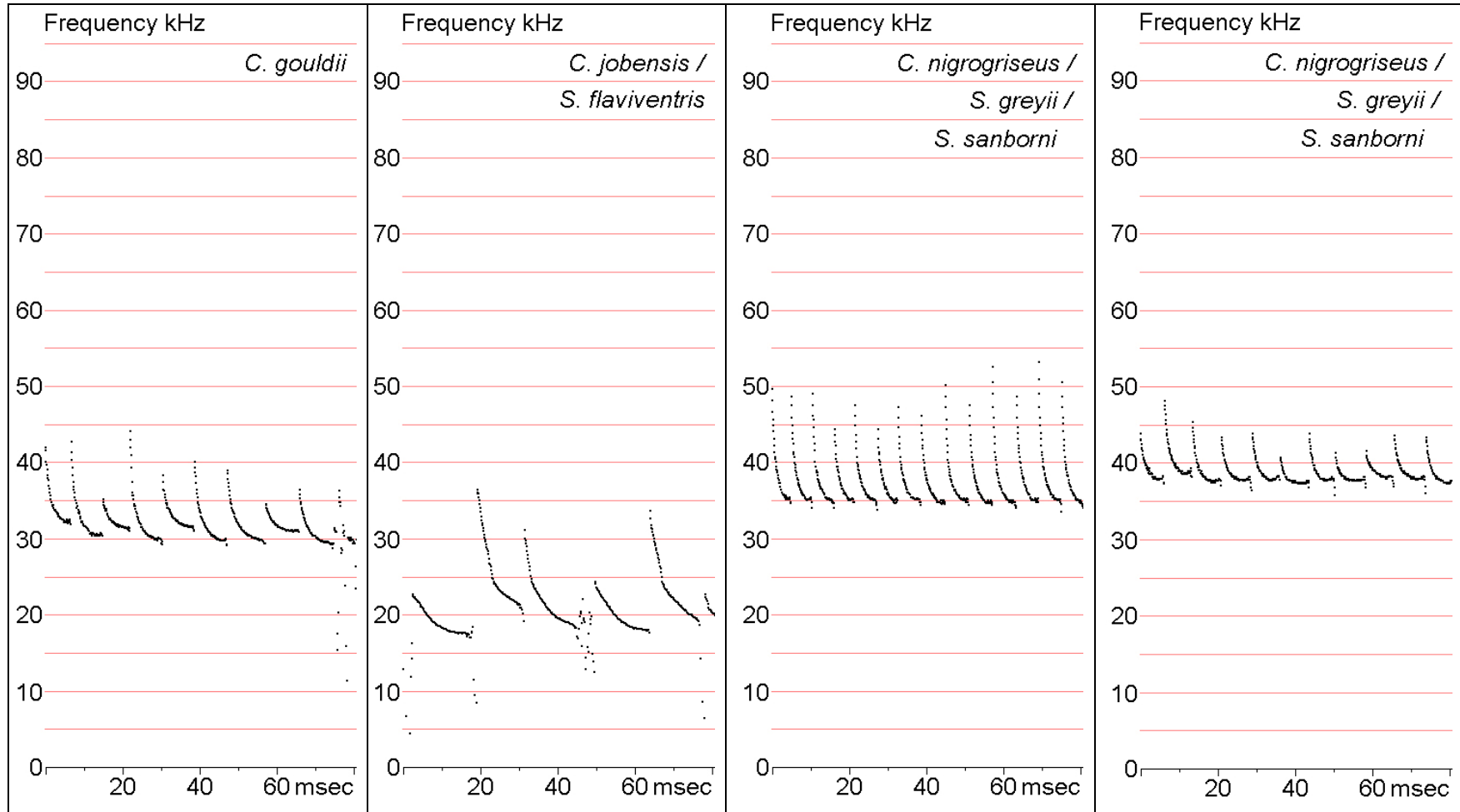


FIGURE 1A. Representative call sequences of the species identified (time is compressed between pulses).

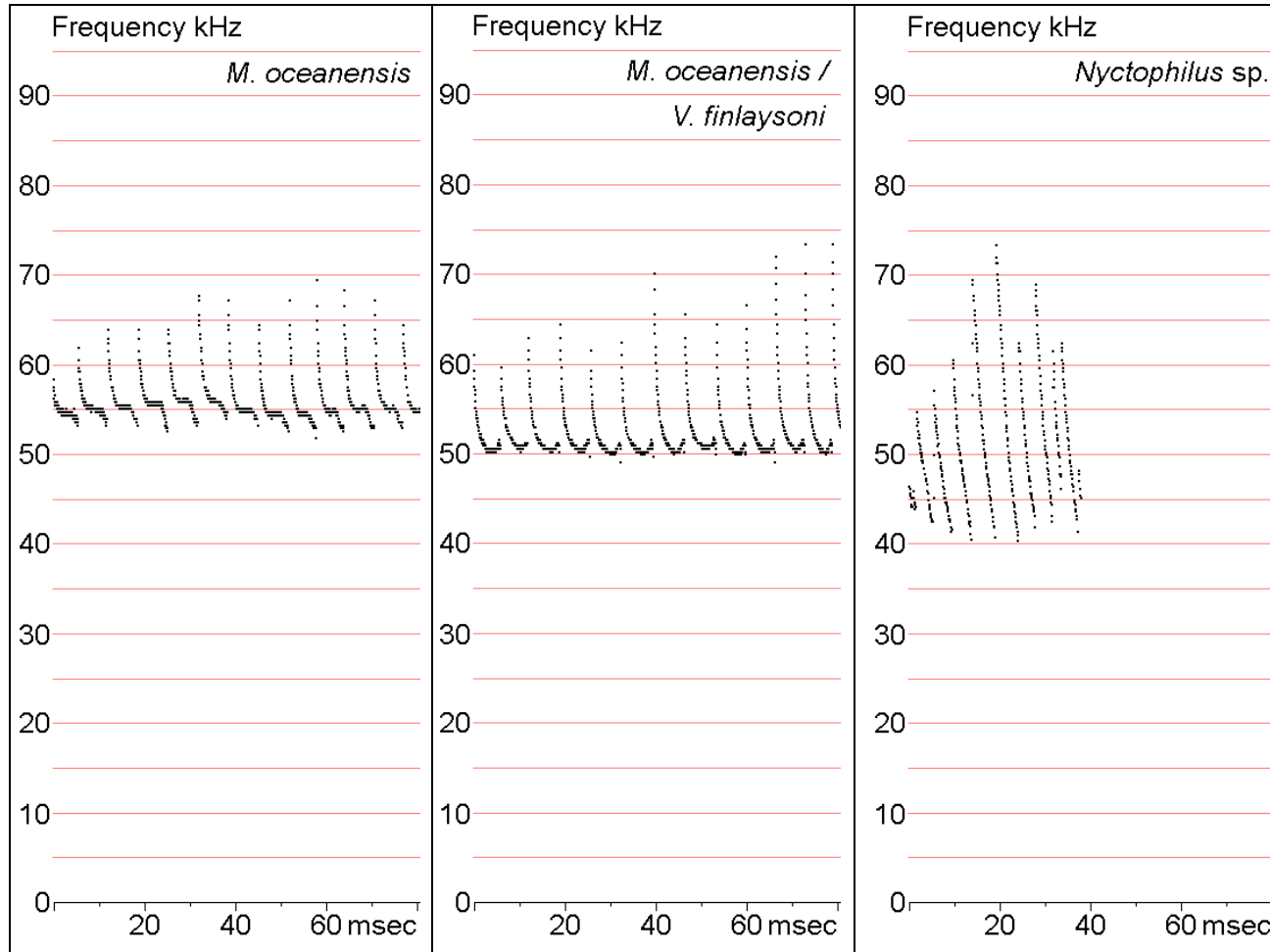


FIGURE 1B. Representative call sequences of the species identified (time is compressed between pulses).

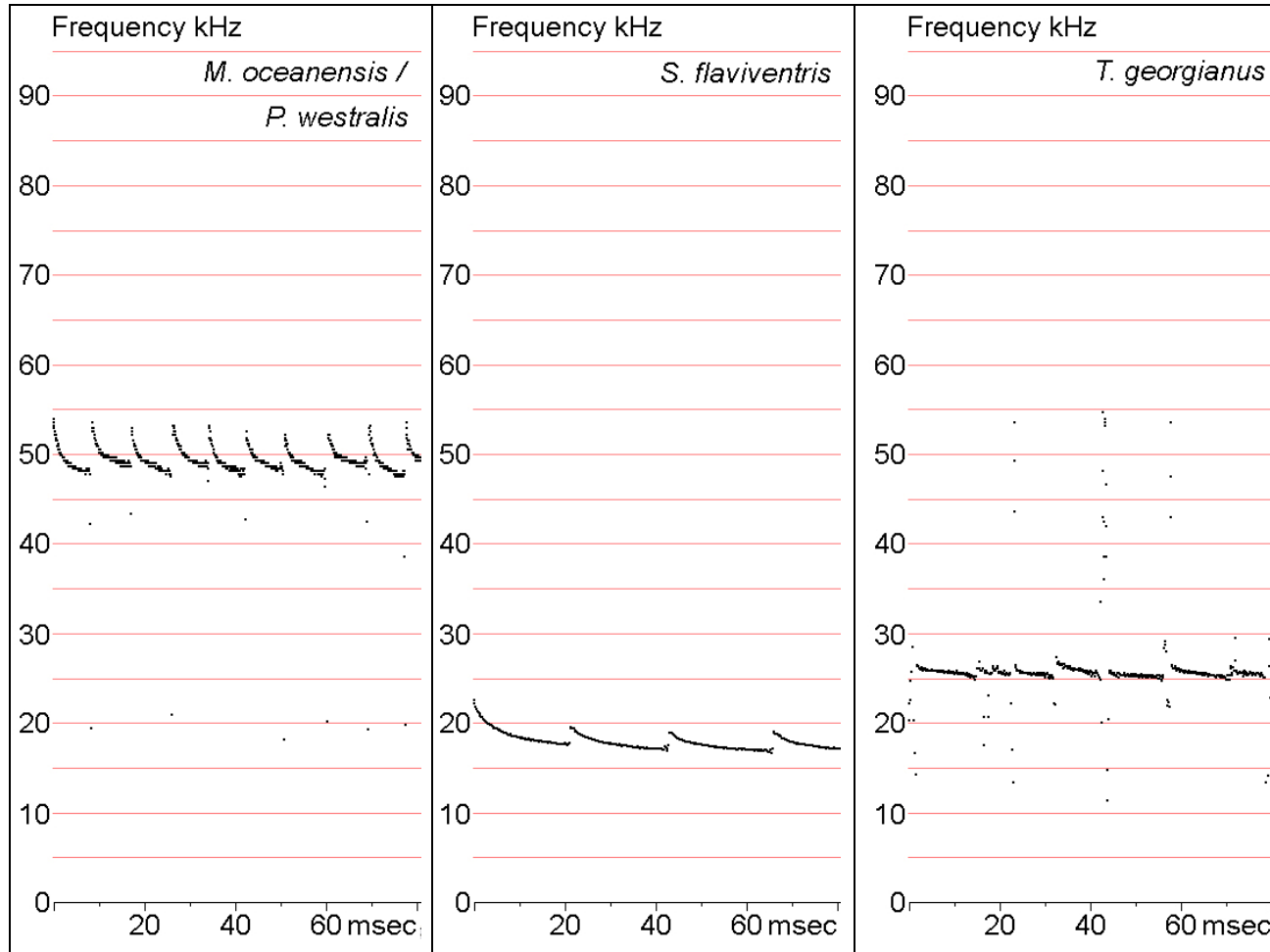


FIGURE 1C. Representative call sequences of the species identified (time is compressed between pulses).



Bat call identification
from the Paradise project area,
Kimberley region, WA

Type: Bat Call Analysis

Prepared for: Western Wildlife

Date: 20 December 2010

Job No.: SZ178

Prepared by: Specialised Zoological
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SUMMARY

Bat identifications from Anabat echolocation call recordings are provided from the Paradise project area on Liveringa Station, in the Kimberley region of Western Australia. At least five species were identified unambiguously as being present, with the possibility of several others (Table 1).

Many call sequences could not be identified reliably to one species. The calls of the hoary wattled bat *Chalinolobus nigrogriseus*, little broad-nosed bat *Scotorepens greyii* and northern broad-nosed bat *Scotorepens sanborni* are similar and could not be distinguished. Some call types of the northern free-tailed bat *Chaerephon jobensis* can sometimes be confused with those of the yellow-bellied sheath-tailed bat *Saccolaimus flaviventris*. In some cases *S. flaviventris* could be distinguished unambiguously, but other calls sequences could have been produced by either species. The northern bent-winged bat *Miniopterus oceanensis orianae* produces a variety of call types, some of which are diagnostic, and others which can appear similar to calls of Finlayson's cave bat *Vespadelus finlaysoni* and the northern pipistrelle *Pipistrellus westralis*. Both of the latter species are at the edge of their range in the project area, and while the calls attributed tentatively to *P. westralis* are typical of this species, it is apparently found only in mangal habitats along the coast (Churchill 2008). Trapping would likely help with progressing the ambiguous identifications in this study.

Details supporting the identifications are provided, as recommended by the Australasian Bat Society (ABS 2006). A summary of pulse parameters is provided in Table 2, and representative call sequences are illustrated in Figure 1. Further data is available should verification be required.

METHODS

Signals as recorded with AnaBat SD1 bat detectors were downloaded via CFC Read 4.3r software and examined in AnalookW 3.7w software. The frequency division ratio was set to a factor of 8 to maximise resolution of short duration, low amplitude broadband calls. Identification to species was made from two sets of AnaBat data: 1. the individual sequence files produced during interpretation by CFC Read software, which are organised into folders representing a single night's recording (or multiple nights if the unit was left with sufficient battery power); and 2. the continuous representation of the AnaBat recordings in ZCA and MAP files, which show all of the signals detected by the AnaBat microphone but which has not been parsed into individual sequence files according to default interpretation parameters.

Identifications were made according to information in Milne (2002) and the unpublished observations and data of the author. Three call variables were measured on good quality search phase pulses in representative call sequences: pulse duration (milliseconds), maximum frequency (kHz) and characteristic frequency (kHz). The recording and analytical methods are consistent with those recommended in State and Commonwealth guidelines (DEWHA 2010a, b; Environmental Protection Authority and Department of Environment and Conservation 2010). Nomenclature follows Armstrong and Reardon (2006) and the IUCN (2010) for bent-winged bats.

REFERENCES

- ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]
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- Milne, D.J. (2002). *Key to the bat calls of the Top End of the Northern Territory*. Parks and Wildlife Commission of the Northern Territory, Technical Report No. 71.

TABLE 1. Species identifications, with the degree of confidence indicated by a code. Date correlates with site; see Table 2 for full species names.

Date	Site	<i>C. gouldii</i>	<i>C. jobensis</i> / <i>S. flaviventris</i>	<i>C. nigrogriseus</i> / <i>S. greyii</i> / <i>S. sanborni</i>	<i>P. westralis</i>	<i>S. flaviventris</i>	<i>M. oceanensis</i>	<i>M. oceanensis</i> / <i>V. finlaysoni</i>
Serial 5215								
15/10/2010	Camp	—	—	NC	NC	H	—	NC
16/10/2010	creek at homestead	—	—	NC	—	H	—	—
17/10/2010	Duchess Dam	H	NC	NC	—	H	H	NC
18/10/2010	Dune 4	—	—	NC	—	H	—	NC
19/10/2010	Site 1	—	—	—	—	—	—	NC
20/10/2010	pool on floodplain	—	—	NC	—	H	—	NC
Serial 5395								
19/10/2010	Site 2	—	—	NC	NC	—	—	NC

Definition of confidence level codes:

H High. Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or submission of a specimen/tissue to a museum.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the Summary section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

TABLE 2. Summary of variables from representative call sequences.

Species	s,p ¹	Duration (msec) ²	Max Frequency (kHz) ²	Char frequency (kHz) ²
Gould's wattled bat <i>Chalinolobus gouldii</i>	1,17	5.6 ± 1.4 3.1 – 8.2	35.4 ± 2.9 31.1 – 41.1	30.0 ± 0.7 29.0 – 31.4
Northern free-tailed bat <i>Chaerephon jobensis</i> / Yellow-bellied sheath-tailed bat <i>Saccolaimus flaviventris</i>	1,15	12.2 ± 3.3 8.2 – 20.4	26.8 ± 3.3 22.3 – 33.2	21.4 ± 0.8 20.0 – 22.8
Hoary wattled bat <i>Chalinolobus nigrogriseus</i> / Little broad-nosed bat <i>Scotorepens greyii</i> / Northern broad-nosed bat <i>Scotorepens sanborni</i>	3,31	6.1 ± 1.7 2.7 – 9.7	49.7 ± 6.4 41.5 – 62.0	37.6 ± 1.3 34.9 – 39.6
Northern pipistrelle <i>Pipistrellus westralis</i>	2,15	6.5 ± 0.9 4.3 – 8.2	55.4 ± 2.9 50.3 – 62.5	46.9 ± 0.7 45.7 – 48.2
Yellow-bellied sheath-tailed bat <i>Saccolaimus flaviventris</i>	5,44	14.7 ± 1.6 10.4 – 17.6	19.9 ± 2.2 17.0 – 24.7	16.5 ± 0.6 15.5 – 18.2
Northern bent-winged bat <i>Miniopterus oceanensis orianae</i>	4,68	6.2 ± 0.8 4.2 – 9.0	57.5 ± 3.4 49.7 – 65.6	52.1 ± 1.2 49.1 – 54.1
Northern bent-winged bat <i>Miniopterus oceanensis orianae</i> / Finlayson's cave bat <i>Vespadelus finlaysoni</i>	2,51	5.1 ± 1.0 3.1 – 8.9	70.9 ± 9.5 59.3 – 95.2	53.0 ± 0.6 52.0 – 54.4

¹ s,p: number of sequences measured, combined total number of pulses measured;

² Mean ± SD; range.

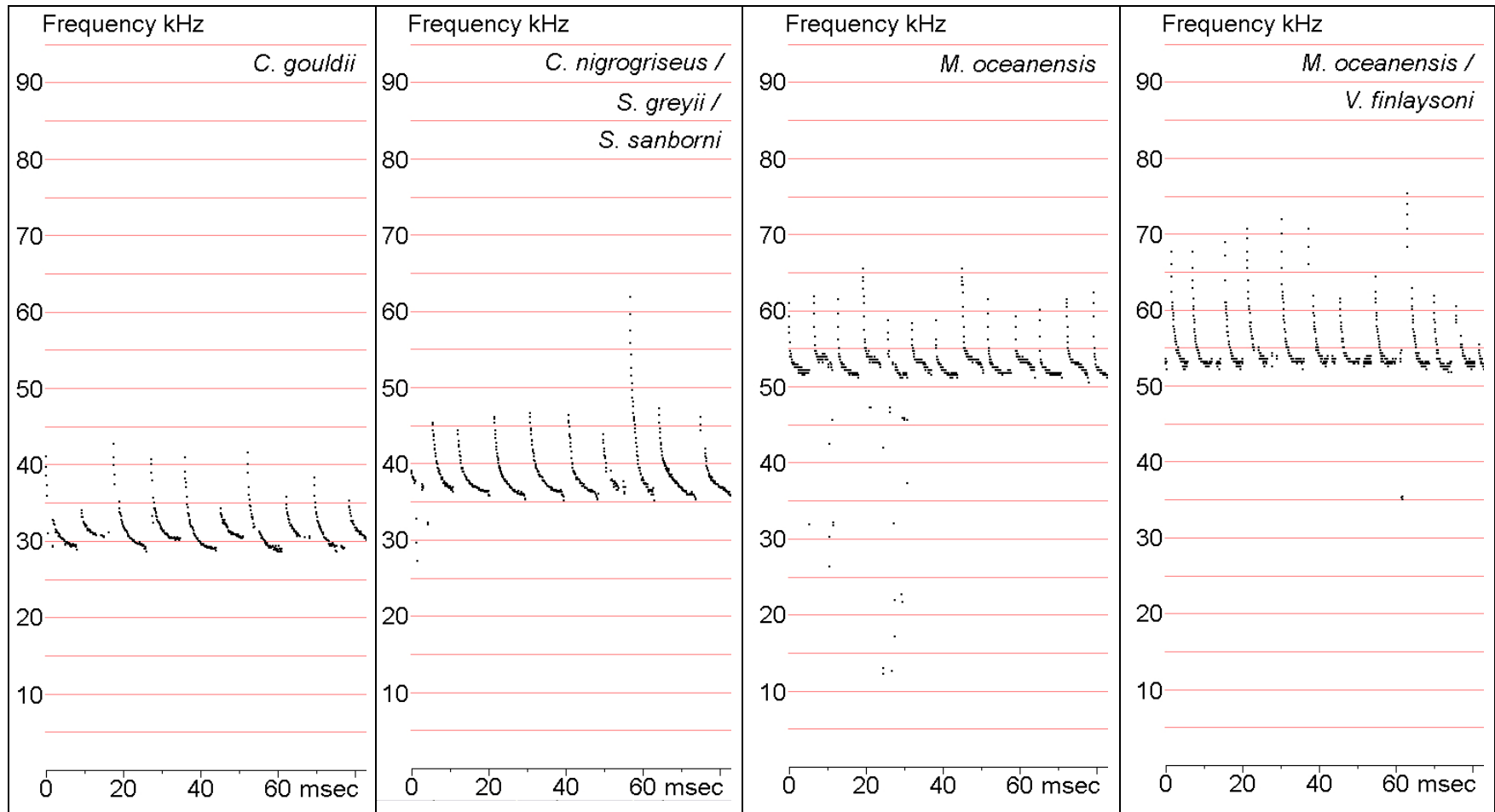


FIGURE 1A. Representative call sequences of the species identified (time is compressed between pulses).

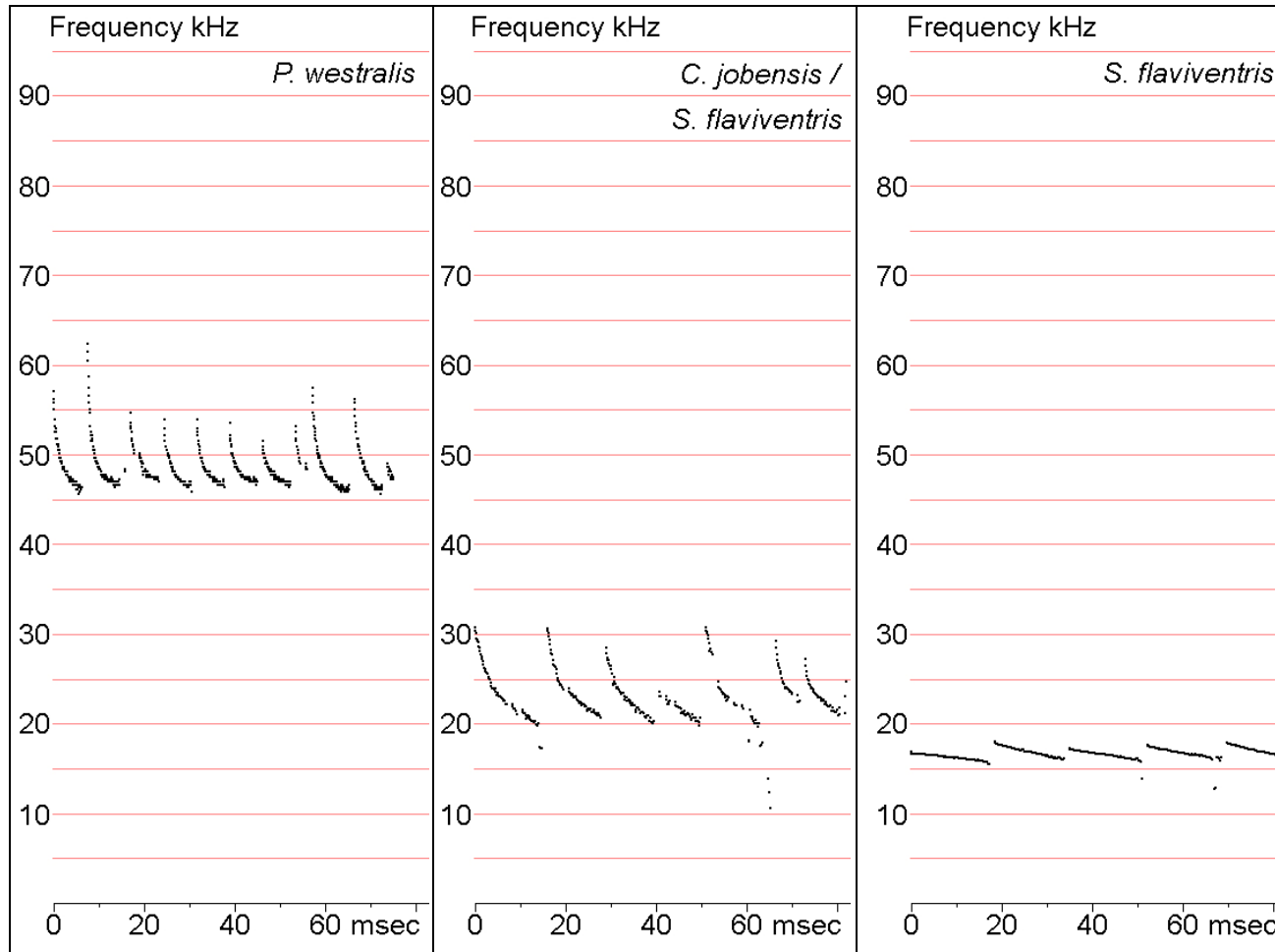


FIGURE 1B. Representative call sequences of the species identified (time is compressed between pulses).



Bat call identification
from the Duchess and Paradise Projects,
Western Australia

Type: Bat Call Analysis

Prepared for: Western Wildlife

Date: 21 July 2011

Job No.: SZ208

Prepared by: Specialised Zoological
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SUMMARY

Bat identifications from Anabat echolocation call recordings are provided from the Duchess and Paradise Project Areas on Liveringa Station, in the Kimberley region of Western Australia. At least five species were identified as being present (Table 1).

Many call sequences could not be identified reliably to one species. The calls of the hoary wattled bat *Chalinolobus nigrogriseus* and the little broad-nosed bat *Scotorepens greyii* are similar and cannot be distinguished reliably. The northern bent-winged bat *Miniopterus oceanensis oriana*e produces a variety of call types, some of which are diagnostic, and others which can appear similar to calls of Finlayson's cave bat *Vespadelus finlaysoni*, yellow-lipped cave bat *V. douglasorum* and the northern pipistrelle *Pipistrellus westralis*. Most of these species have distribution limits near the project area, and it is likely that all calls with a characteristic frequency of 45 kHz and above derived from *M. oceanensis*. The identification of the common sheath-tailed bat *Taphozous georgianus* was made on the basis of two pulses that had a characteristic frequency around 25 kHz, but their shape is not completely diagnostic of this species.

Details supporting the identifications are provided, as recommended by the Australasian Bat Society (ABS 2006). A summary of pulse parameters is provided in Table 2, and representative call sequences are illustrated in Figure 1. Further data is available should verification be required.

METHODS

Signals as recorded with AnaBat SD1 bat detector units were downloaded and examined in AnalookW 3.7w software. The division ratio was set to 8 to ensure adequate resolution of short duration broadband calls. Three call variables were measured on good quality search phase pulses in representative call sequences: pulse duration (milliseconds), maximum frequency (kHz) and characteristic frequency (kHz). A continuous representation of the AnaBat signal as represented in the ZCA and MAP files, equivalent to making a continuous recording with an externally connected digital recorder, was downloaded and examined to ensure that no single pulses with a characteristic frequency of c. 100 kHz and above had been missed by the file parsing process during the data download. Species were identified based on information in Milne (2002). Nomenclature follows Armstrong and Reardon (2006) and Armstrong (2010 in press). Species designations of Churchill (2008) are not followed until formal publication of the relevant taxonomic study.

REFERENCES

- ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]
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- Churchill, S.K. (2008). *Australian bats*. 2nd ed. Allen and Unwin, Crows Nest, NSW.
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TABLE 1. Species identifications, with the degree of confidence indicated by a code. Date correlates with site; see Table 2 for full species names.

		<i>C. nigrogriseus / S. greyii</i>	<i>M. oceanensis</i>	<i>M. oceanensis / V. finlaysoni</i>	<i>S. balstoni</i>	<i>S. flaviventris</i>	<i>T. georgianus</i>
Date	Site						
Serial 5334							
11/06/2011		—	—	—	—	—	—
12/06/2011		—	—	—	—	—	—
13/06/2011	Site 11	—	—	—	—	—	—
14/06/2011		NC	—	—	—	H	—
15/06/2011	Site 1	—	—	NC	—	—	—
16/06/2011		NC	—	NC	—	H	—
17/06/2011		NC	H	—	—	H	—
18/06/2011		NC	—	NC	H	H	—
19/06/2011		—	—	NC	—	—	NC
Serial 5395							
11/06/2011		NC	H	—	—	H	—
12/06/2011		—	—	—	—	—	—
13/06/2011		—	—	NC	—	—	—
14/06/2011	Site 13	—	—	NC	—	—	—
15/06/2011		—	H	—	—	—	—
16/06/2011		NC	H	—	—	H	—
17/06/2011		—	—	—	—	—	—
19/06/2011		—	H	—	—	H	—

Definition of confidence level codes:

H High. Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or submission of a specimen/tissue to a museum.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the Summary section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

TABLE 2. Summary of variables from representative call sequences.

Species	s,p ¹	Duration (msec) ²	Max Frequency (kHz) ²	Char frequency (kHz) ²
Hoary wattled bat <i>Chalinolobus nigrogriseus</i> / Little broad-nosed bat <i>Scotorepens greyii</i>	3,71	5.1 ± 0.9 3.2 – 7.0	46.6 ± 4.0 40.0 – 61.8	38.2 ± 0.6 37.0 – 39.6
Northern bent-winged bat <i>Miniopterus oceanensis oriana</i>	3,79	6.9 ± 1.3 4.0 – 12.3	53.0 ± 4.0 48.6 – 68.7	47.5 ± 0.5 46.5 – 48.5
Northern bent-winged bat <i>Miniopterus oceanensis oriana</i> Finlayson's cave bat <i>Vespadelus finlaysoni</i>	2,35	4.6 ± 1.0 3.0 – 6.2	60.6 ± 7.0 53.5 – 84.2	52.9 ± 0.8 51.0 – 54.6
Yellow-bellied sheath-tailed bat <i>Saccolaimus flaviventris</i>	5,51	13.9 ± 2.0 10.8 – 19.9	20.5 ± 3.6 15.4 – 29.8	16.9 ± 1.3 14.8 – 18.7
Inland broad-nosed bat <i>Scotorepens balstoni</i>	3,48	8.1 ± 1.0 5.9 – 10.0	43.1 ± 4.7 35.4 – 56.1	32.8 ± 0.5 31.6 – 33.8
Common sheath-tailed bat <i>Taphozous georgianus</i>	1,1	15.7	24.3	23.9

¹ s,p: number of sequences measured, combined total number of pulses measured;

² Mean ± SD; range.

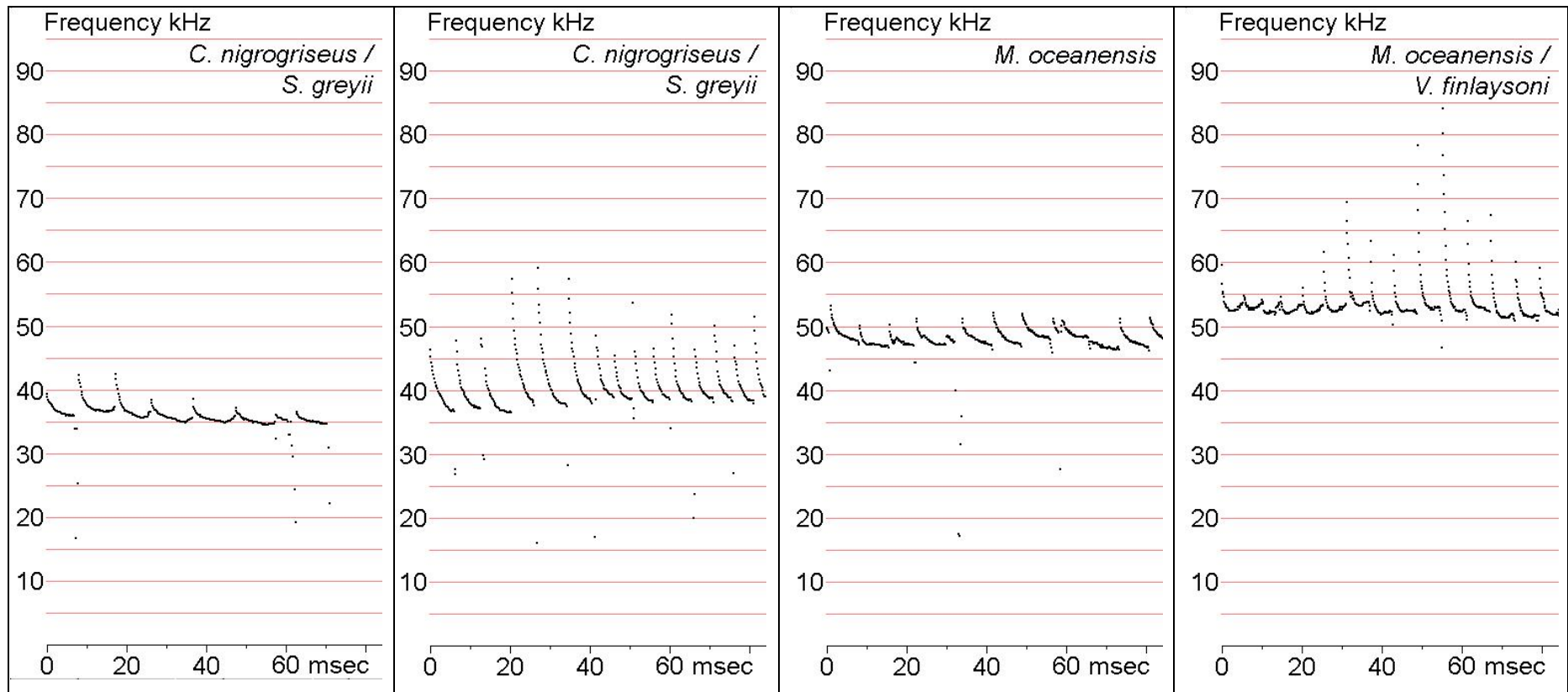


FIGURE 1A. Representative call sequences of the species identified (time is compressed between pulses).

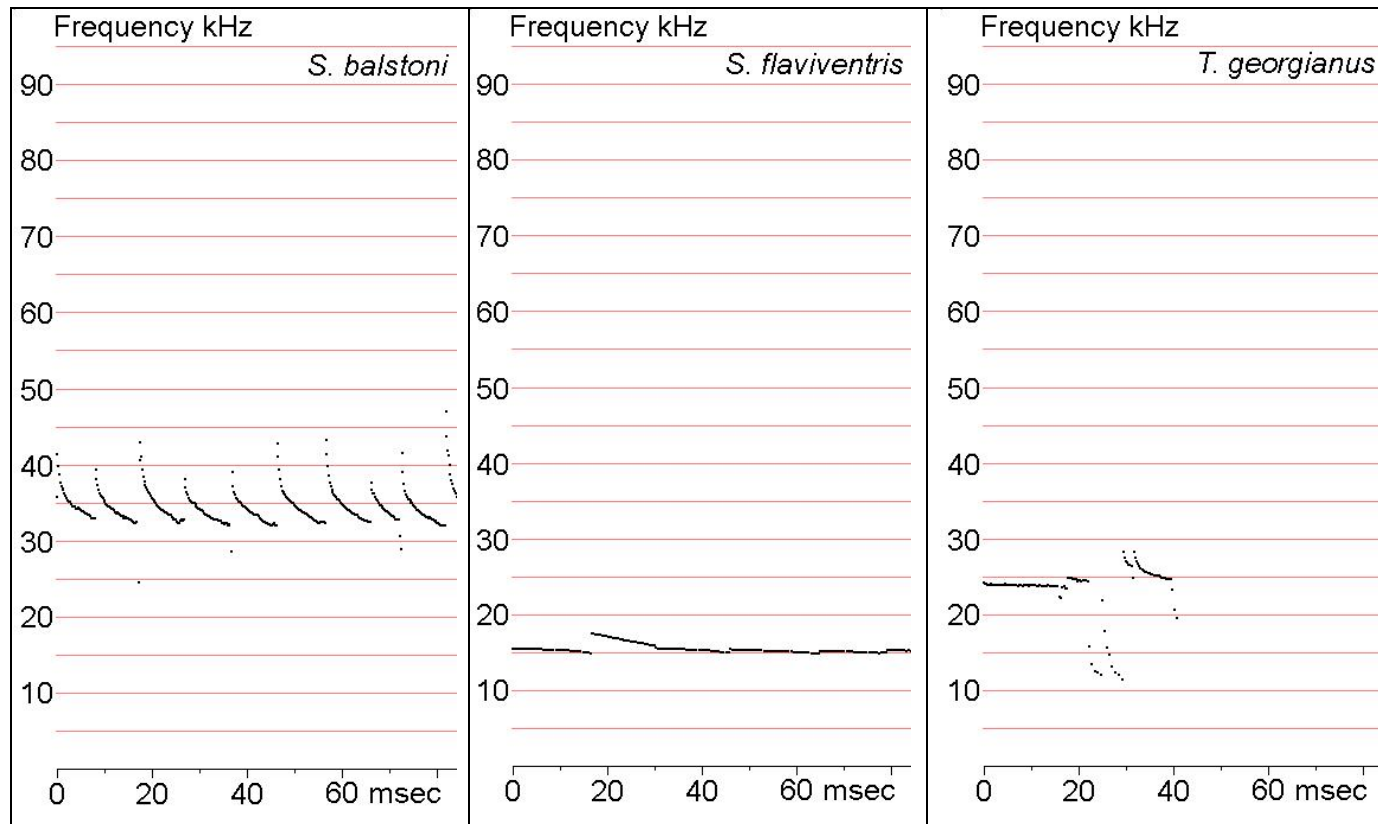


FIGURE 1B. Representative call sequences of the species identified (time is compressed between pulses).