

# Vertebrate Fauna Survey of Millstream Chichester National Park Naturebank Envelope: Palm Pool

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May 2017*



*Planigale* species photo M.A. Cowan



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## Executive Summary

A survey of vertebrate fauna was undertaken over a period of seven nights from the 27<sup>th</sup> April to the 4<sup>th</sup> of May 2017 at a potential Naturebank site, Palm Pool, within the Millstream-Chichester National Park. Remote camera traps were established in the survey area on the 16<sup>th</sup> March 2017 and remained in operation until the end of the survey. Data collected from this work, incorporating frogs, reptiles, mammals and birds is presented here, along with records for the National Park extracted from reports and electronic database sources including those of the Western Australian Museum, the Department of Parks and Wildlife and Atlas of Living Australia.

We identified a total of 73 species, including one frog, 24 reptiles, 40 birds and 8 mammals, within the survey area. None of these species were new records for the National Park and all but one, the Pilbara Olive Python, are relatively common and widespread.

Within the National Park there are records for 16 species of conservation significance including eight species of birds, five species of mammals and three reptiles. Six of these are listed as threatened (one endangered and five vulnerable) and five as priority species under State legislation, and another five, all birds, are protected under international treaties for migratory birds. Of these conservation significant species only two were recorded during this survey and they were *Liasis olivaceus barroni* (Pilbara Olive Python) and *Merops ornatus* (Rainbow Bee-eater), with the former listed as vulnerable under both State and National legislation and the latter protected under international treaties for migratory birds.

## 1. Introduction

Naturebank sites are aimed at developing ecotourism opportunities, including accommodation, in an environmentally sensitive manner within Western Australia's conservation estate. The identification of prospective locations is coordinated and managed by the Department of Parks and Wildlife in conjunction with Tourism WA. The Millstream Chichester National Park has previously been flagged as a prospective location for such development opportunities with two locations close to the tourist attraction of Python Pool being investigated in 2013. The current site considered here is that of Palm Pool, a section of the Fortescue River, approximately 5km north-west of the Millstream Visitors Centre in the south-western corner of the park. Figure 1 shows the position of Palm Pool within the National Park as well as the earlier prospective sites of Narina Gorge and Ashburton sites near Python Pool. Palm Pool is located in the Pilbara Bioregion and the Chichester Subregion of the Interim

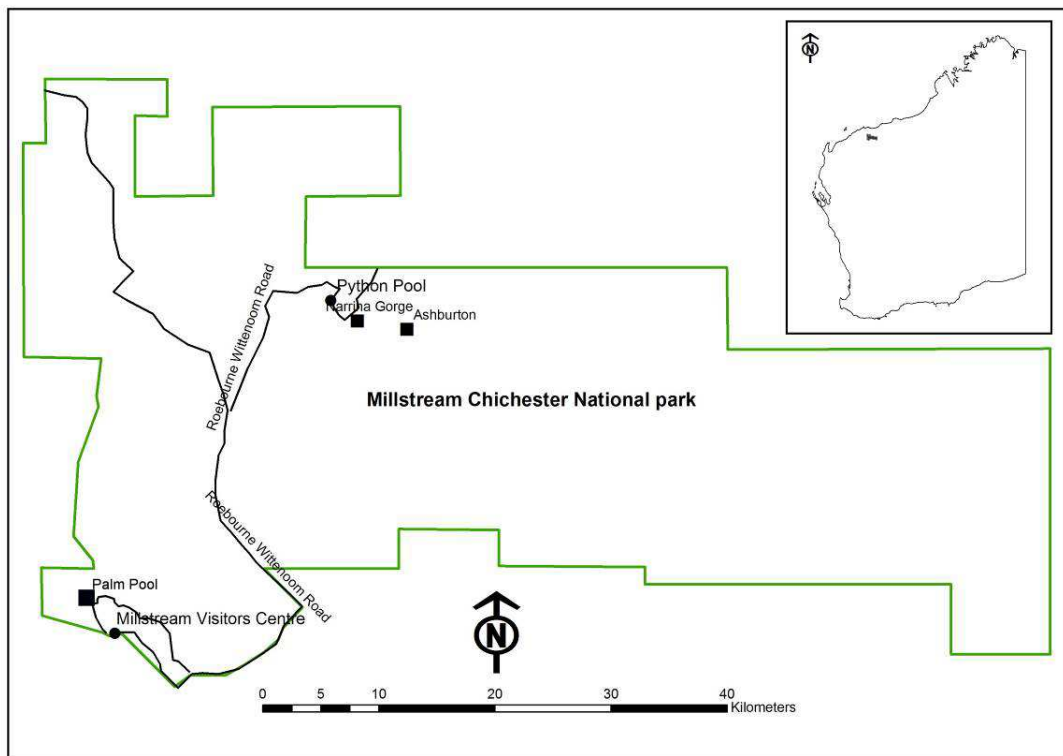
Biogeographic Regionalisation of Australia (IBRA) as defined by Thackway and Cresswell (1995).

There are three broad habitat types within the proposed Naturebank envelope. The majority of the footprint, which totals approximately 105 hectares, is comprised of scattered *Corymbia* species over hummock grasslands on low rounded stony hills. Fire has impacted much of this area within the last three or so years and as a result the spinifex is currently low and sparse. Along the edge of the actual Palm Pool there is a narrow strip of riparian vegetation comprising tall *Melaleuca* and *Eucalyptus* trees over sedges, tussock grasses on coarse sand and rounded pebbles. Between the riparian strip and the rounded hills is a narrow plain comprising of *Acacia* shrubs over mature spinifex on a sandy substrate (see Davis and Huisman, 2017 for a more detailed vegetation descriptions and species lists).

Drainage from the hills converges on an ephemeral stony creek bed running from the northern boundary of the footprint and at a slight angle, ending in Palm Pool. Along the eastern and western margins of the footprint there is exposed bedrock forming low cliffs and rocky ridges with associated boulders.

For sites to become available for development it is necessary to have pre-release clearances that meet environmental and cultural objectives. One of the environmental clearances required is a preliminary fauna assessment to 1) provide an inventory of species present within the development envelope and 2) identify species that occur or are likely to occur and have threatened, specially protected, or priority conservation status under State and/or Commonwealth legislation and that may be adversely impacted on by any development of the area.

The work reported on here was targeted at terrestrial vertebrates and birds.



**Figure 1.** Map showing position of Palm Pool Naturebank location (solid square bottom left) along with earlier proposed Naturebank sites located near Python Pool within the Millstream Chichester National Park. Inset map shows position of the Park within Western Australia.

## 2. Desktop Assessment

Records were collated for the entire Park from Atlas of Living Australia (2017) along with the records from the WA Museum database (Western Australian Museum, 2017), from NatureMap (Department of Parks and Wildlife, 2017) and the Johnstone and Burbidge Pilbara bird database (Johnstone and Burbidge, 2013). A number of written sources were also examined for additional records (Burbidge, 1971; Ecologia, 1999; Gibson and McKenzie, 2009; Doughty *et al*, 2011). An inventory from these sources is presented in Appendix B (frogs, reptiles and mammals) and Appendix E (birds).

The focus of most of this historic work has been in the south-western corner of the Park in relatively close proximity to the larger permanent waters of the Fortescue River such as at Deep Reach and Crossing Pool.

Four of the thirteen Pilbara biological survey sites within the Park are less than two and a half kilometres from the Palm Pool footprint and encompass similar habitat to that of the Palm Pool.

While a relatively comprehensive species list exists for the Park, detailed knowledge of the spatial occurrence of different taxa within the Park remains less well known. For frog and reptile species the list comprises of four frogs, one turtle, 16 geckoes, four legless lizards, six dragons, 30 skinks, nine varanids and 18 snakes. This totals 88 species, however at least four species of skinks remain unverified within any collections. These are: *Ctenotus robustus*, *C. serventyi*, *C. schomburgkii* and *Lerista jacksoni*. While these species may be present, it is possible that they may have been confused with other similar species that are known to be present in the Park. Without confirmation through photographs, tissue samples or specimens verification of these records remains unresolved.

For birds there are observational and specimen records totalling more than 156 species from 52 families. For mammals there are records of the echidna, ten marsupials, eight rodents, 14 bats and two introduced carnivores, *Canis lupus dingo* (Dingo) and *Felis catus* (Cat). Two of the marsupials are large macropods- *Macropus robustus* (Hills Kangaroo or Euro) and *M. rufus* (Red Kangaroo).

A number of species have special conservation status under State (*Wildlife Conservation Act 1950*) and Commonwealth (*Environment Protection and Biodiversity Conservation Act 1999*) legislation. Species listed as Endangered under both State and Commonwealth legislation include; *Dasyurus hallucatus* (Northern Quoll) and *Rostratula australis* (Painted Snipe). Species listed as Vulnerable include; *Liasis olivaceus barroni* (Pilbara olive python), *Falco hypoleucos* (Grey Falcon), *Macroderma gigas* (Ghost Bat), and *Rhinonictes aurantius* (Pilbara Leaf-nosed Bat).

Others given priority listing under State legislation are the reptiles *Notoscincus butleri* (Lined Soil-crevice Skink) (P4), *Anolios ganei* (species of blind snake) (P1), the bird *Amytornis striatus* (Striated Grasswren) (P4); the rodents *Leggadina lakedownensis* (P4) and *Pseudomys chapmani* (Western Pebble-mound Mouse) (P4).

A number of birds are also listed under international treaties for migratory birds (schedule 3) and these include *Numenius phaeopus* (Whimbrel), *Ardea modesta* (Great Egret), *A. ibis* (Cattle Egret), *Merops ornatus* (Rainbow Bee-eater) and *Charadrius veredus* (Oriental Plover).

### 3. Methodology

Pit trap lines, Elliott traps and cage traps were established within the Palm Pool envelope to sample the broad habitat types. Figure 2 shows the layout and numbering of traps relative to the footprint.

Each pit trap line (1-5 in Figure 2) consisted of an aluminium flywire fence approximately 60-70 m long and 30 cm high with the bottom few centimetres buried in the soil. At approximately three to five metres in from either end of the fence, and then at around 8 metre intervals, a pitfall trap was positioned with its opening centrally located under the fence and flush to the ground. The pitfall traps used were 250 mm wide by 400 mm deep plastic buckets (20 L) with eight established along each trap line. Sections from egg cartons, along with small amounts of soil and litter, were placed in the bottom of buckets to provide insulation and protection from both weather and predation for trapped animals. Along each pit trap line six funnel traps were also established. These were set in pairs on either side of the aluminium fence line and located approximately centrally between two pit traps. Figure 3 shows a typical trap line schematic.

Elliott lines (A, C, D and E in Figure 2) consisted of 20 (lines C and D) or 10 (lines A and E) medium sized traps (type A). These were placed with a spacing of 15 to 20 metres between each trap. Two cage traps lines, lines B and F had 15 and 5 traps each, respectively. Each Elliott and cage trap was baited with a small ball of universal bait (combination of oats, peanut butter and sardines). Bait was replenished as required and all traps were re-baited after three days.

All traps were checked and cleared early each morning. Elliott and cage traps were closed after checking and re-opened late afternoon. Pit traps and funnels were rechecked at around 11am each day to remove any animals caught after the early morning check, ensuring no captures were exposed to the maximum heat of the day.

All pit trapping sites, including funnel traps, were opened on 27<sup>th</sup> April and remained open for seven days/nights through to the 4<sup>th</sup> of May 2017. Elliott and cage trap lines were established on the 28<sup>th</sup> April and operated for five nights through to the 3<sup>rd</sup> May 2017. Coordinate details for traps at each site are given in Appendix D while a general habitat photo for pit and Elliott trapping sites is provided in Appendix F.

Captured animals were identified to species level and had body mass (g), sex and reproductive status recorded. For reptiles, snout-vent length (mm) was also recorded with a plastic ruler, and for mammals additional measurements taken were cranium (mm) and pes length (mm) with a set of vernier callipers. A small mark from a paint pen or marker pen (xylene free)

was applied to the outside of one ear for mammals and to the abdomen of reptiles so it was possible to determine recaptures over the trapping period. Tissue samples in the form of a tail clip for reptiles, or small ear notch for mammals, were taken and preserved in 100% ethanol.

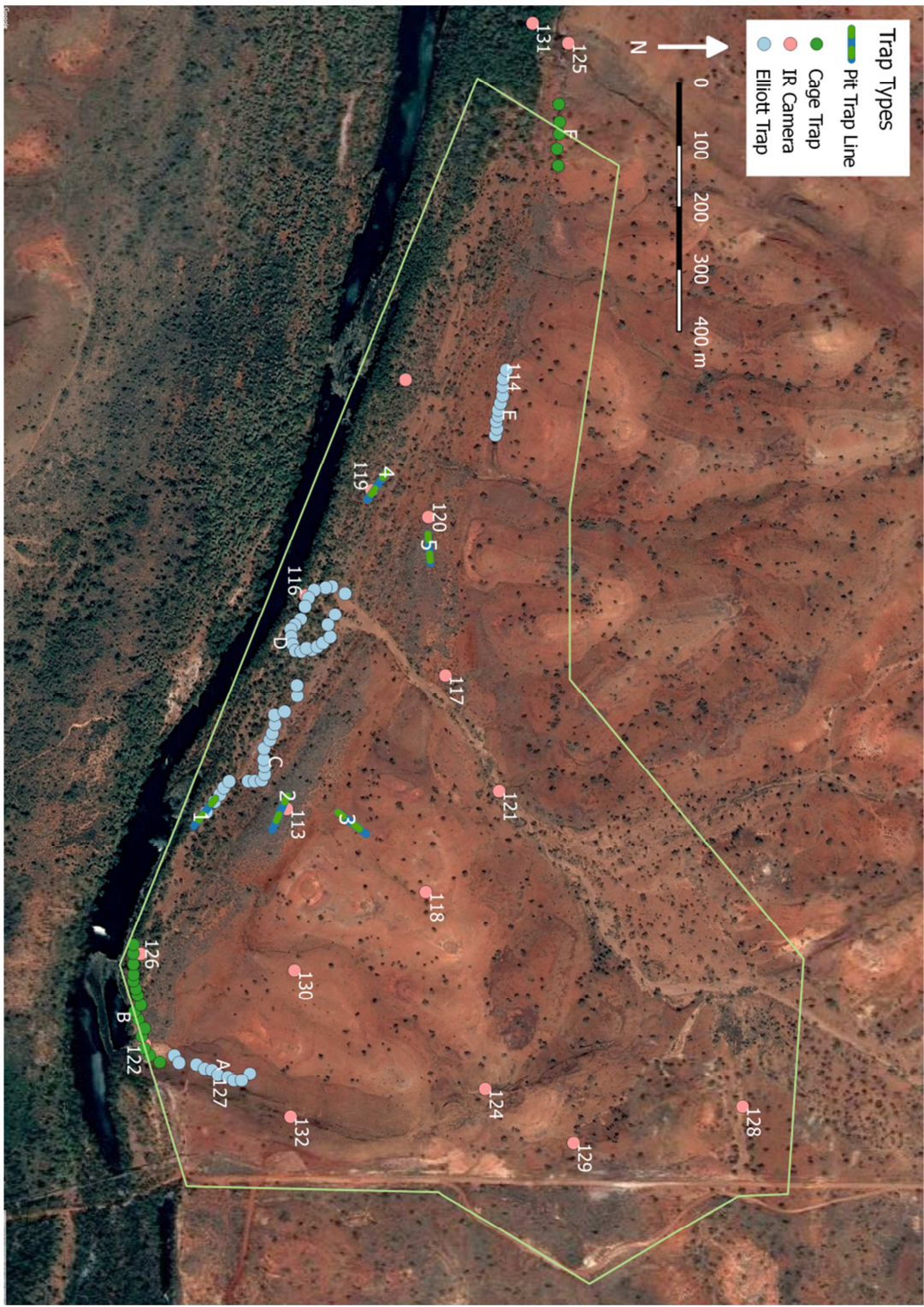
During the course of each day and during the process of checking traps a list of bird species seen and heard was collated.

Prior to the trapping survey 20 “motion sensitive” cameras (Reconyx PC900’s) were established within the Palm Pool Naturebank envelope on 16<sup>th</sup> March 2017. Individual locations for these are numbered and shown in Figure 2 and coordinates are given in Appendix F. Each camera was attached to a short (600mm) galvanised metal pole hammered in to the ground with the camera facing south to minimise optical aberrations from direct sunlight. The lens was directed at a slight angle towards the ground 1.5 to 2 m in front of the camera and a small amount of universal bait was placed on the ground as an attractant for animals. Cameras were left in situ until the 2<sup>nd</sup> of May and were thus in position for 47 days.

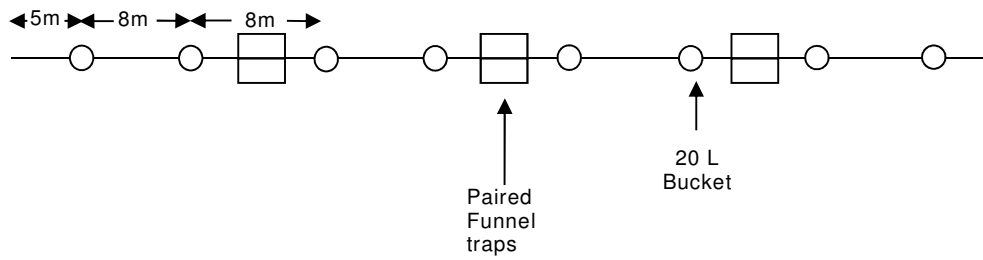
Species nomenclature for amphibians, reptiles, birds and mammals followed that of the Western Australian Museum. The Western Australian Museum field guides were the primary source used for reptile species identification (Storr et al. 1983, 1990, 1999 and 2002) although natural history information was also sought from ‘A Complete Guide to Reptiles of Australia’ (Wilson and Swan 2013). Reference material for mammals was from ‘The Mammals of Australia’ (Van Dyck and Strahan 2008) and ‘A Field Guide to the Mammals of Australia’ (Menkhorst and Knight 2011). Bird identification was through a ‘Field Guide to Australian Birds’ (Morcombe 2004).

Species accumulation data was analysed for vertebrate captures (pit-fall and funnel trapping survey only) in Primer-E (Clarke and Gorley 2006) using the Jackknife 1 and Chao1 richness estimators, which are considered two of the best performers for analysing abundance data (Magurran 2004).





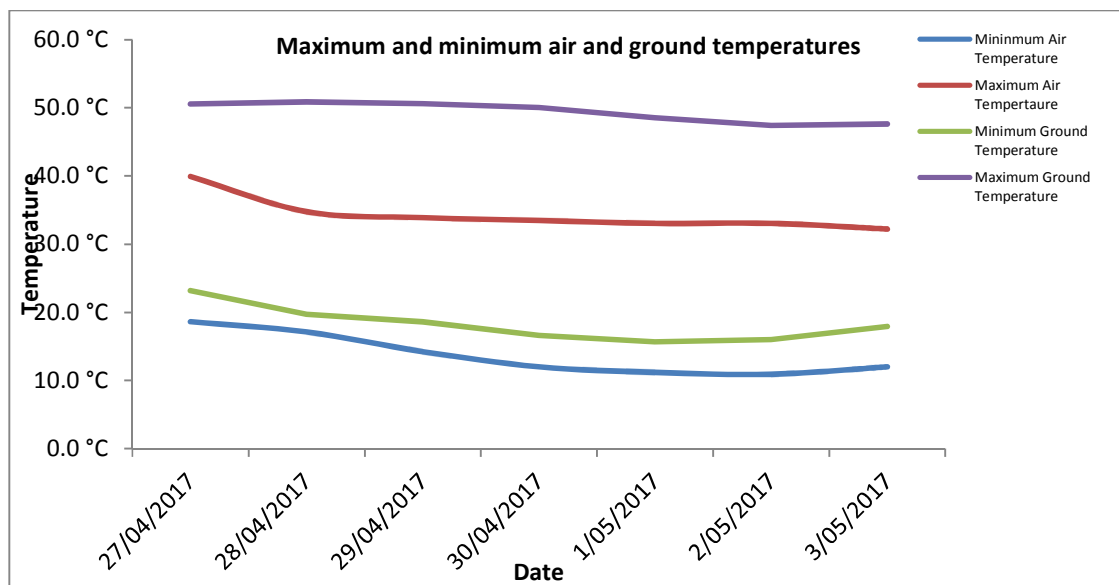
**Figure 2.** Layout of pit trap lines, Elliott trap lines, cage traps, and the position of the camera traps for the Palm Pool envelope. Numbers and letters identify the trap lines and individual cameras.



**Figure 3.** Drift fence and trap layout showing spacing and arrangement of each of the traps types. Spacing between each of the buckets was approximately 8 m with a three pairs of funnel traps positioned in between buckets.

#### 4. Field Investigation

The survey was undertaken over seven nights from the 27<sup>th</sup> April to 4<sup>th</sup> May 2017. While this timing was not ideal for reptile activity, conditions remained warm throughout the survey (mean maximum air temperature of  $33.4 \pm 2.6$  SD and mean minimum air temperature of  $13.7 \pm 3.0$  SD). Temperatures data are presented in Figure 4 for mean maximum and minimum air and ground temperatures. There was no precipitation during the survey period.



**Figure 4.** Temperature data from the 27<sup>th</sup> of April to 3<sup>rd</sup> of May 2017 was recorded with temperature data loggers at the Palm Pool site.

Over the course of the survey there were 175 captures of reptiles and mammals, with 91 individuals caught in pits, 43 in funnel traps, 11 in Elliott traps, two in cages and the remainder were hand captures or camera detections. The total number of species of ground vertebrates recorded for the survey was 34, with 27 of these identified through trapping, three through hand captures or observation and another four recorded by motion sensitive cameras only. Captures from different survey methods are as follows: pits recorded 17 species; funnels 12 species; Elliott traps six species; cage traps two species; and camera traps eight species. Many species were detected with multiple methods. However, funnel traps accounted for three species not detected by other methods, camera traps accounted for four species and pit traps for eight species not detected by other methods. For the birds, 40 species from 27 families were recorded with one of these, *Centropus phasianinus* (Pheasant Coucal) detected by camera only.

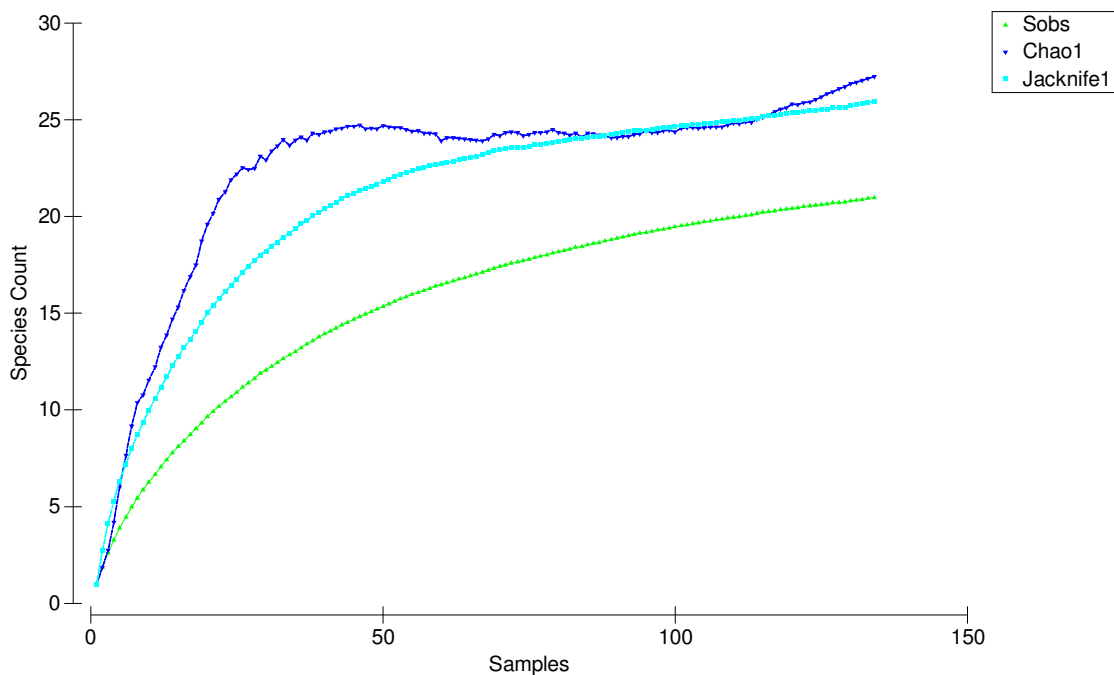
Of the mammals, only one species was relatively abundant; *Pseudomys delicatulus* (Delicate Mouse) with 16 captures. The next most frequent was *Sminthopsis macroura* (Stripe-faced Dunnart) with 5 detections. For *P. delicatulus* captures were almost exclusively associated with the riparian areas while *S. macroura* was closely associated with spinifex dominated sites.

Of the reptiles the most common species were *Ctenotus saxatilis* (Rock Ctenotus, n = 33) followed by *Ctenophorus caudicinctus* (Ring-tailed Rock Dragon, n = 32), *Ctenotus duricola* (Pilbara Striped Ctenotus, n = 8) and *Gowidon longirostris* (Long-nosed Dragon, n = 7). These species are primarily associated with spinifex and/or stony substrates, apart from *G. longirostris* which was only recorded in the riparian zone at sites 1 and 4. Species most regularly sighted were *C. caudicinctus* and *G. longirostris*, both primarily within the same habitats they were trapped in. Three geckos, *Oedura fimbria* (Western Marbled Velvet Gecko), *Gehyra punctata* (Spotted Rock Dtella) and *Gehyra pilbara* (Pilbara Dtella) were readily observed at night with the first two associated with the vertical rock faces, boulder piles and rocky ridges and the third, termite mounds.

Introduced species recorded included *Rattus rattus* (Black Rat) and *Felis catus* (Cat), *Canis lupus* (Wild Dog or Dingo) as well as cattle.

One bird and one reptile species of conservation significance were recorded and these were *Merops ornatus* (Rainbow Bee-eater) which is protected under international migratory bird agreements and *Liasis olivaceus barroni* (Pilbara Olive Python), with the former regularly heard and seen along the riparian zone of the footprint and the latter recorded on a remote camera (number 114).

When species accumulation data were plotted for the entire survey trapping captures, the graph had not quite approached an asymptote (Figure 5). This permuted data was then compared against the Chao1 and Jackknife1 indicators. The results suggest that this work detected a reasonable proportion of species likely to be present with 84% for Jackknife1 and 78.8% for Chao1 indices. This level of diversity however is less than that of other studies which will be due in part to the timing and duration of this work but also as a consequence of much of the area having had fire in recent years.



**Figure 5.** Species accumulation curves for species observed (Sobs) in green, for the Chao1 species richness estimator in dark blue and, for the first order Jackknife1 estimator in light blue.

## 5. Discussion

Of the three broad habitat types in the proposed Naturebank envelope, scattered *Corymbia* over spinifex on subdued hills is the most homogeneous and extensive across the landscape, particularly as fire has been a relatively recent element within it. The riparian zone contains the greatest structural habitat complexity while the mature spinifex, situated between the other two habitat types, provides an important additional element for spinifex and sand dependent species.

The fauna recorded within the envelope, while somewhat depauperate in diversity, were typical of what would be expected across these habitat types within the Pilbara. The spinifex on sand was the most diverse with 16 species, followed by the riparian areas with 12 and, only 9 species recorded in the Corymbia over spinifex. However, the latter habitat type would be expected to have increased diversity as ground cover improves post fire. Sampling over warmer months would also likely detect additional species across all sites. The fauna recorded represented 28% of the reptile fauna, 25% of the mammal fauna (excluding bats) and 26% of the bird fauna known for the Millstream Chichester National Park. Species richness results are lower than those of other surveys in the National Park (Appendix B) however given the limited geographic extent of the survey area, and timing, this is not surprising.

For a number of the specially protected species recorded within the broader area of the National Park there is little suitable habitat present within the Palm Pool envelope. Of the threatened species only *Liasis olivaceus barroni* was recorded and this was only at a single location. Invariably this species, a top order predator, is not found in large numbers at any location but individuals could use a variety of areas within the foot print such as boulder piles, small caves, deposited woody debris from flood events, as well as in and along the periphery of the water course. There were no detections of *Dasyurus hallucatus* and there is little habitat extent that might be considered suitable for this species, primarily the cliffs and boulder piles adjacent to the water at either end of the foot print. Even then it is doubtful these areas are large enough to support this species long term. For the wading bird *Rostratula australis* (Painted Snipe) and the raptor *Falco hypoleucos* (Grey Falcon), there are records of both species within the Millstream Chichester National Park however given the small footprint containing common widespread habitat types, along with neither species observed during our survey, they should not be considered as a risk. Similarly *Rhinonicteris aurantius* (Orange Leaf-nosed Bat) and *Macroderma gigas* (Ghost Bat), both of which could potentially forage along water courses or broader areas, only roost in caves of which there are none of suitable dimensions within the envelope.

Of the priority species *Anolis ganei* is recorded from the south-western corner within the Park but little is known of its habitat requirements other than it may be associated with moist gorges and gullies (Wilson and Swan, 2008). The skink *Notoscincus butleri* is generally associated with rocky substrates with spinifex, often along creek lines or watercourses (Wilson and Swan, 2008) and has been recorded at one site within close proximity of the Naturebank envelope (Doughty *et al.* 2011)). Only one priority bird species is recorded from the Park, *Amytornis striatus* (Striated Grasswren), but was not recorded in our survey. For mammals, the rodents, *Leggadina lakedownensis* (Lakeland Downs Short-tailed Mouse) and *Pseudomys chapmani* (Western Pebble-mound Mouse), are recorded within the National Park but there are no records within the immediate vicinity of the



envelope and there were no detections of these species from surveys undertaken in close proximity to the Palm pool site (Gibson and McKenzie 2009).

Five species of bird recorded from the Millstream Chichester National Park are protected under international treaties for migratory species (Schedule 5) and these species are identified in Appendix E. Of these only one was recorded during the survey and this was *Merops ornatus* (Rainbow Bee-eater) where they were heard and observed in and adjacent to the riparian zone along the edge of the Fortescue. This species migrates towards southern areas of Australia from as far north as Indonesia from around September and October to breed (Johnstone and Storr, 1998).

There was a single camera detection of *Felis catus* and *Canis lupus dingo* was only observed through the presence of tracks. Within the riparian zone there were two captures of *Rattus rattus* with cage traps but many detections with remote cameras, indicating there is a reasonable population of this introduced pest species.

## **6. Conclusions and Recommendations**

The majority of species identified within the Palm Pool footprint are common and widespread throughout the Pilbara. Only two species of conservation significance were identified, *Liasis olivaceus barroni* and *Merops ornatus*. Neither are likely to be significantly detrimentally impacted as their numbers are low in the survey area, only a single detection in the case of *Liasis olivaceus barroni*, and they both occur at many locations within the National Park, and more broadly across the Pilbara. However to further minimise potential impacts for *Liasis olivaceus barroni* in particular, disturbance on and immediately around any of the rock areas should be avoided. Nesting sites for *Merops ornatus* are often in loamy soils, particularly along banks. This type of environment occurs adjacent to the riparian zone and along parts of the dry water course in the middle of the footprint so these are areas where disturbance could be minimised.

Maintaining naturalness including the extant biodiversity should be of high importance for any sensitive ecotourism development and to this end it is important to maintain connectivity within and between all of the identified habitats. The mature spinifex on sandplain in particular have limited extent but from this survey are the most speciose for ground vertebrates so impacts here should be carefully considered. Water courses and their surrounding areas are often sensitive to disturbance through erosion and contamination. The complex structural characteristics of these areas are also important habitat attributes and support the highest bird diversity in the footprint. Continuity of this habitat along the river banks is also potentially important for movement along corridors so the

overall integrity of this should not be disrupted. Development should allow for a buffer of vegetation up to the water.

With further work and as part of a formal site environmental impact assessment process it will be necessary to undertake a review and risk assessment in relation to both formally listed invertebrate species as well as those groups considered short range endemics, although there is no evidence to suggest that there are species likely to be adversely impacted present within either envelope. Feral species management in relation to *Rattus rattus* which appears to be common, and *Felis catus* should also be considered as part of the overall management strategy associated with development.

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## 8. **Acknowledgements**

We are particularly grateful to Alicia Whittington for her support and coordination throughout the project. Alicia Whittington, David Chadwick, Joanna King, Larry O'Brien along with Ngurrawaana Rangers Chet Woodley, Jessica Allen, Allan Mack, and Devan Woodley established all the pit trapping sites prior to the start of the survey which made our job much easier. Larry O'Brien tirelessly assisted with trap checking and his assistance and enthusiasm was very welcome. We also very much appreciate logistical support provided by Millstream Chichester National Park Ranger David Chadwick. We also thank Geoffrey Passmore for his contribution and support at various stages of the work. Alasdair Macdonald, the Pilbara Regional Manager, enabled Regional staff to provide assistance and support.

This work was conducted under Parks and Wildlife Reg 17 Fauna License SC/SF 1402 number and Animal Ethics number 2016/21.

## 9. Appendices

### 9.1 Appendix A- Table of survey trapping results for terrestrial vertebrates.

TAXON	Palm Pool Pit Trap Lines					Observed
	Site 1	Site 2	Site 3	Site 4	Site 5	
<b>Myobatrachidae</b>						
<i>Uperoleia saxatilis</i>	-	-	-	-	-	+
<b>Agamidae</b>						
<i>Gowidon longirostris</i>	+	-	-	-	+	+
<i>Ctenophorus caudicinctus</i>	+	+	+	+	+	+
<b>Diplodactylidae</b>						
<i>Lucasium stenodactylum</i>	-	-	+	-	-	-
<i>Oedura fimbria</i>	-	-	-	-	-	+
<b>Gekkonidae</b>						
<i>Gehyra pilbara</i>	-	-	-	-	-	+
<i>Gehyra punctata</i>	-	-	-	-	-	+
<i>Gehyra variegata</i>	-	-	+	-	-	+
<i>Heteronotia binoei</i>	-	+	-	-	-	-
<b>Pygopodidae</b>						
<i>Delma pax</i>	+	+	-	-	-	-
<b>Scincidae</b>						
<i>Carlia triacantha</i>	-	+	-	-	+	-
<i>Ctenotus duricola</i>	-	+	+	-	+	-
<i>Ctenotus grandis</i>	-	+	-	-	+	-
<i>Ctenotus helenae</i>	-	+	+	-	-	-
<i>Ctenotus pantherinus</i>	-	-	+	-	+	-
<i>Ctenotus saxatilis</i>	+	+	+	+	+	+
<i>Eremiascincus isolepis</i>	+	-	-	+	-	+
<i>Lerista verhmens</i>	+	-	-	+	-	-
<i>Menetia greyii</i>	-	+	-	+	-	-
<i>Morethia ruficauda</i>	+	-	-	+	-	-
<b>Varanidae</b>						
<i>Varanus acanthurus</i>	-	-	-	-	+	+
<i>Varanus gouldii</i>	-	-	-	-	-	+
<i>Varanus panoptes</i>	-	-	-	-	-	+

Palm Pool Pit Trap Lines						
TAXON	Site 1	Site 2	Site 3	Site 4	Site 5	Observed
<b>Elapidae</b>						
<i>Pseudechis australis</i>	-	-	-	+	-	+
<b>Dasyuridae</b>						
<i>Ningauai timealeyi</i>	-	+	-	-	-	-
<i>Planigale kendricki</i>	+	-	+	+	+	-
<i>Sminthopsis macroura</i>	-	-	+	+	+	-
<b>Macropodidae</b>						
<i>Macropus robustus</i>	-	+	-	+	-	+
<b>Muridae</b>						
<i>Pseudomys delicatulus</i>	+	+	-	+	+	-
<i>Rattus rattus</i>	-	-	-	-	-	+
<i>Zyomys argurus</i>	-	-	-	-	-	+
<b>Felidae</b>						
<i>Felus catus</i>	-	-	-	-	-	+
<b>Canidae</b>						
<i>Canus lupus</i>	-	-	-	-	-	+
<b>Bovidae</b>						
<i>Bos taurus</i>	-	-	-	-	-	+
<hr/>						
<b>Species of Frogs</b>	0	0	0	0	0	1
<b>Species of Reptiles</b>	7	9	7	7	9	12
<b>Species of Mammals</b>	2	2	2	3	3	6
<b>Individuals of Frogs</b>	0	8	0	0	0	n/a
<b>Individuals of Reptiles</b>	20	26	14	13	42	n/a
<b>Individuals of Mammals</b>	2	2	3	10	3	n/a

## 9.2 Appendix B- Terrestrial vertebrates recorded in Millstream Chichester National Park.

Taxon	Museum Records	Fisheries and Wildlife	Ecologia Fauna Survey 1999	Pilbara Biological Survey	Palm Pool Naturebank Survey	Conservation Code
<b>Hylidae</b>						
<i>Cyclorana maini</i>	+					
<i>Litoria rubella</i>	+		+			
<b>Myobatrachidae</b>						
<i>Pseudophryne douglasi</i>	+					
<i>Uperoleia saxatilis</i>	+		+		+	
<b>Cheluidae</b>						
<i>Chelodina steindachneri</i>	+	+				
<b>Agamidae</b>						
<i>Ctenophorus caudicinctus</i>	+	+	+	+	+	
<i>Ctenophorus isolepis</i>	+	+		+		
<i>Ctenophorus nuchalis</i>	+			+		
<i>Gowidon longirostris</i>	+	+	+	+	+	
<i>Pogona minor</i>	+		+	+		
<i>Tympanocryptis cephalus</i>	+					
<b>Diplodactylidae</b>						
<i>Diplodactylus conspicillatus</i>	+		+	+		
<i>Diplodactylus elderi</i>			+			
<i>Diplodactylus galaxias</i>	+			+		
<i>Diplodactylus mitchelli</i>	+			+		
<i>Lucasium stenodactylum</i>	+		+	+	+	
<i>Lucasium wombeyi</i>	+			+		
<i>Oedura fimbria</i>	+				+	
<i>Rhynchoedura ornata</i>	+		+	+		
<i>Strophurus elderi</i>	+	+		+		
<b>Gekkonidae</b>						
<i>Gehyra pilbara</i>	+		+		+	
<i>Gehyra punctata</i>	+			+	+	
<i>Gehyra purpurascens</i>	+					
<i>Gehyra variegata</i>	+	+	+	+	+	
<i>Heteronotia binoei</i>	+	+	+	+	+	
<i>Heteronotia spelea</i>	+					
<i>Nephrurus wheeleri</i>	+					

Taxon	Museum Records	Fisheries and Wildlife	Ecologia Fauna Survey 1999	Pilbara Biological Survey	Palm Pool Naturebank Survey	Conservation Code
<b>Pygopodidae</b>						
<i>Delma elegans</i>	+	+	+			
<i>Delma nasuta</i>	+					
<i>Delma pax</i>	+		+		+	
<i>Lialis burtonis</i>	+	+				
<b>Scincidae</b>						
<i>Carlia munda</i>	+		+	+		
<i>Carlia triacantha</i>				+	+	
<i>Cryptoblepharus buchananii</i>	+	+		+		
<i>Cryptoblepharus plagiocephalus</i>	+					
<i>Cryptoblepharus ustulatus</i>	+					
<i>Ctenotus duricola</i>	+		+	+	+	
<i>Ctenotus grandis</i>	+		+	+	+	
<i>Ctenotus hanloni</i>						
<i>Ctenotus helenae</i>	+		+	+	+	
<i>Ctenotus pantherinus</i>	+	+	+	+	+	
<i>Ctenotus robustus</i> *						
<i>Ctenotus rubicundus</i>	+		+	+		
<i>Ctenotus saxatilis</i>	+		+	+	+	
<i>Ctenotus serventyi</i> *						
<i>Ctenotus schomburgkii</i> *			+			
<i>Cyclodomorphus melanops</i>	+	+	+	+		
<i>Egernia cygnitos</i>	+					
<i>Egernia formosa</i>	+					
<i>Egernia pilbarensis</i>	+					
<i>Eremiascincus isolepis</i>	+	+	+	+	+	
<i>Lerista bipes</i>	+					
<i>Lerista flammicauda</i>	+			+		
<i>Lerista jacksoni</i> *				+		
<i>Lerista muelleri</i>	+	+	+	+		
<i>Lerista verhmens</i>	+			+	+	
<i>Menetia greyii</i>	+			+	+	
<i>Menetia surda</i>	+			+		
<i>Morethia ruficauda</i>	+		+	+	+	
<i>Notoscincus butleri</i>	+		+	+		P4
<i>Tiliqua multifasciata</i>	+		+			
<b>Varanidae</b>						
<i>Varanus acanthurus</i>	+		+		+	
<i>Varanus brevicauda</i>	+		+	+		
<i>Varanus bushi</i>	+					
<i>Varanus eremius</i>						
<i>Varanus giganteus</i>						

Taxon	Museum Records	Fisheries and Wildlife	Ecologia Fauna Survey 1999	Pilbara Biological Survey	Palm Pool Naturebank Survey	Conservation Code
<i>Varanus gouldii</i>	+	+			+	
<i>Varanus panoptes</i>					+	
<i>Varanus pilbarensis</i>	+					
<i>Varanus tristis</i>	+	+				
<b>Boidae</b>						
<i>Antaresia perthensis</i>	+		+			
<i>Antaresia stimsoni</i> *			+			
<i>Liasis olivaceus subsp. barroni</i>		+			+	Vulnerable
<b>Elapidae</b>						
<i>Acanthophis pyrrhus</i> *			+			
<i>Brachyuropis approximans</i>	+					
<i>Demansia psammophis</i> *						
<i>Demansia rufescens</i>	+					
<i>Furina ornata</i>	+					
<i>Parasuta monachus</i>	+					
<i>Pseudechis australis</i>	+				+	
<i>Pseudonaja mengdeni</i>						
<i>Suta fasciata</i>	+					
<i>Suta punctata</i> *		+				
<i>Vermicella snelli</i>	+					
<b>Typhlopidae</b>						
<i>Aniliios ammodytes</i>	+					
<i>Aniliios ganei</i>	+			+		P1
<i>Aniliios grypus</i>	+			+		
<i>Aniliios pilbarensis</i>	+		+			
<b>Tachyglossidae</b>						
<i>Tachyglossus aculeatus</i>	+					
<b>Dasyuridae</b>						
<i>Dasykaluta rosamondae</i>	+	+	+	+		
<i>Dasyurus hallucatus</i>	+					Endangered
<i>Ningauai timealeyi</i>	+		+		+	
<i>Planigale kendricki</i>	+		+	+	+	
<i>Planigale tealeai</i> *			+	+		
<i>Pseudantechinus roryi</i>	+					
<i>Pseudantechinus woolleyae</i>	+					
<i>Sminthopsis macroura</i>	+		+	+	+	
<b>Macropodidae</b>						
<i>Macropus robustus</i>	+	+	+		+	

Taxon	Museum Records	Fisheries and Wildlife	Ecologia Fauna Survey 1999	Pilbara Biological Survey	Palm Pool Naturebank Survey	Conservation Code
<i>Macropus rufus</i>		+	+			
<i>Petrogale rothschildi</i>						
<b>Muridae</b>						
<i>Leggadina lakedownensis</i>	+		+	+		P4
<i>Mus musculus**</i>	+	+	+			
<i>Rattus rattus**</i>	+				+	
<i>Pseudomys chapmani</i>	+		+	+		P4
<i>Pseudomys delicatulus</i>	+		+		+	
<i>Pseudomys desertor</i>				+		
<i>Pseudomys hermannsburgensis</i>	+		+	+		
<i>Zyzomys argurus</i>	+		+		+	
<b>Emballonuridae</b>						
<i>Saccolaimus flaviventris</i>				+		
<i>Taphozous georgianus</i>	+			+		
<b>Hipposideridae</b>						
<i>Rhinonicteris aurantius</i> (Pilbara pop)						Vulnerable
<b>Megadermatidae</b>						
<i>Macroderma gigas</i>				+		Vulnerable
<b>Molossidae</b>						
<i>Chaerephon jobensis</i>				+		
<i>Mormopterus beccarii</i>				+		
<i>Tadarida australis</i>				+		
<b>Pteropodidae</b>						
<i>Pteropus alecto</i>	+	+				
<b>Vespertilionidae</b>						
<i>Chalinolobus gouldii</i>	+			+		
<i>Nyctophilus bifax daedalus</i>	+			+		
<i>Nyctophilus geoffroyi</i>				+		
<i>Nyctophilus timoriensis</i>	+					
<i>Scotorepens greyii</i>	+			+		
<i>Vespadelus finlaysoni</i>	+			+		
<b>Canidae</b>						
<i>Canis lupus dingo</i>	+	+			+	
<b>Felidae</b>						
<i>Felis catus**</i>					+	



Taxon	Museum Records	Fisheries and Wildlife	Ecologia Fauna Survey 1999	Pilbara Biological Survey	Palm Pool Naturebank Survey	Conservation Code
<b>No. Reptiles and Amphibians from all sources =88</b>	72	18	34	37	25	
<b>% Reptiles and Amphibians recorded</b>	82	20	39	42	28	
<b>% of WA Museum records for Reptiles and Amphibians</b>	100	25	47	51	35	
<b>No. of Frogs from all sources=4</b>	4	0	2	0	1	
<b>No. of Turtles from all sources= 1</b>	1	1	0	0	0	
<b>No. of Lizards from all sources= 65</b>	55	15	28	35	22	
<b>No. of Snakes from all sources=18</b>	12	2	4	2	2	
<b>No. of Mammals recorded from all sources =36</b>	24	6	13	19	9	
<b>% of Mammals recorded</b>	67	17	36	53	25	
<b>% of WA Museum records for Mammals</b>	100	25	54	79	38	
<b>No. of Monotremes from all sources=1</b>	1	0	0	0	0	
<b>No. of Dasyurids from all sources=8</b>	7	1	5	4	3	
<b>No. of Macropods from all sources=3</b>	1	2	2	0	1	
<b>No. of Rodents from all sources=8</b>	7	1	6	4	2	
<b>No. of Bats from all sources=14</b>	7	1	0	11	0	
<b>No. of Carnivores from all sources= 2</b>	1	1	0	0	2	

\* Species that are unconfirmed.

\*\* Introduced species

Note: The earliest records of collections in the Western Australian Museum (WAM) databases for reptiles, birds and mammals for the Millstream Chichester National Park area date back to 1958 when W.D.L. Ride led a Museum expedition to the Hamersley Range (Ride, 1959). While other expeditions to the area had occurred earlier (e.g. Gregory, 1884; Whitlock, 1923) there appears to be few collections from these; although, there are a number of observational records of birds in Atlas of Living Australia (ALA) database from the Historical Bird Atlas (Birds Australia, 2013) dating back to 1922 and presumably a result of the Whitlock expedition. In September of 1969 the Department of Fisheries and Fauna undertook a survey of the area (Burbidge, 1971) however the records from this work accounts for relatively few species of the known fauna (Appendix B). A number of other individuals and organisations have contributed additional species information through the fauna collections of the WAM over the ensuing years but post the Hamersley expedition the most significant collections appear to have been those made by the late G. M. Storr (Curator of Herpetology at the WA Museum, 1962-1986) between 1961 and 1962 followed by the Department of Parks and Wildlife's (DPaW) Pilbara Biological Survey between 2002 and 2007 (George et al., 2009; Doughty et al., 2011).

### 9.3 Appendix C- Table of survey results for birds.

Order	Scientific Name	Vernacular	Palm Pool	Comment / Conservation Code
ACCIPITRIFORMES	<b>Accipitridae</b>			
	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	x	
	<i>Circus sp.</i>	Harrier	x	Could not 100% confirm if it was a spotted or swamp Harrier.
	<i>Milvus migrans</i>	Black Kite	x	
	<i>Haliastur sphenurus</i>	Whistling Kite	x	
ANSERIFORMES	<b>Anatidae</b>			
	<i>Cygnus atratus</i>	Black Swan	x	
CAPRIMULGIFORMES	<b>Caprimulgidae</b>			
	<i>Eurostopodus argus</i>	Spotted Nightjar	x	
COLUMBIFORMES	<b>Columbidae</b>			
	<i>Phaps chalcoptera</i>	Common Bronzewing	x	
	<i>Ocyphaps lophotes</i>	Crested Pigeon	x	
	<i>Geophaps plumifera</i>	Spinifex Pigeon	x	
	<i>Geopelia cuneata</i>	Diamond Dove	x	
	<i>Geopelia striata</i>	Peaceful Dove	x	
CORACIIFORMES	<b>Alcedinidae</b>			
	<i>Dacelo leachii</i>	Blue-winged Kookaburra	x	
	<i>Todiramphus sanctus</i>	Sacred Kingfisher	x	
	<b>Meropidae</b>			
	<i>Merops ornatus</i>	Rainbow Bee-eater	x	Schedule 3. Migratory bird protected under an international agreement.
	<b>Centropodidae</b>			
	<i>Centropus phasianinus</i>	Pheasant Coucal		
FALCONIFORMES	<b>Falconidae</b>			
	<i>Falco berigora</i>	Brown Falcon	x	
PASSERIFORMES	<b>Acanthizidae</b>			
	<i>Smicrornis brevirostris</i>	Weebill	x	
	<b>Artamidae</b>			
	<i>Artamus cinereus</i>	Black-faced Woodswallow	x	
	<b>Campephagidae</b>			
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	x	
	<b>Corvidae</b>			
	<i>Corvus orru</i>	Torresian Crow	x	
	<b>Cracticidae</b>			
	<i>Cracticus nigrogularis</i>	Pied Butcherbird	x	
	<i>Cracticus tibicen</i>	Australian Magpie	x	

Order	Scientific Name	Vernacular	Palm Pool	Comment / Conservation Code
	<b>Estrildidae</b>			
	<i>Emblema pictum</i>	Painted Finch	x	
	<i>Taeniopygia guttata</i>	Zebra Finch	x	
	<b>Maluridae</b>			
	<i>Malurus lamberti</i>	Variegated Fairy-wren	x	
	<b>Meliphagidae</b>			
	<i>Manorina flavigula</i>	Yellow-throated Miner	x	
	<i>Ptilotula penicillata</i>	White-plumed Honeyeater	x	
	<b>Monarchidae</b>			
	<i>Grallina cyanoleuca</i>	Magpie-lark	x	
	<b>Pachycephalidae</b>			
	<i>Pachycephala rufiventris</i>	Rufous Whistler	x	
	<b>Rhipiduridae</b>			
	<i>Rhipidura leucophrys</i>	Willie Wagtail	x	
	<b>Pardalotidae</b>			
	<i>Pardalotus rubricatus</i>	Red-browed Pardalote	x	
	<i>Pardalotus striatus</i>	Striated Pardalote	x	
	<b>Pomatostomidae</b>			
	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	x	
	<b>Ptilonorhynchidae</b>			
	<i>Ptilonorhynchus maculatus</i>	Western Bowerbird	x	
	<b>Acrocephalidae</b>			
	<i>Acrocephalus australis</i>	Australian Warbler	Reed x	
<b>PELECANIFORMES</b>	<b>Threskiornithidae</b>			
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	x	
<b>PSITTACIFORMES</b>	<b>Cacatuidae</b>			
	<i>Cacatua sanguinea</i>	Little Corella	x	
	<b>Psittacidae</b>			
	<i>Melopsittacus undulatus</i>	Budgerigar	x	
	<i>Platycercus zonarius</i>	Australian (Ring-necked Parrot)	Ringneck x	
<b>STRIGIFORMES</b>	<b>Strigidae</b>			
	<i>Ninox connivens</i>	Barking Owl	x	Heard at night

#### 9.4 Appendix D- List of species recorded with motion sensitive cameras

Group	Vernacular	Species	Camera Number
<b>Reptiles</b>	Pilbara Olive Python	<i>Liasis olivaceus barroni</i>	114
	Rock Ctenotus	<i>Ctenotus saxatilis</i>	117
	Giant Desert Skink	<i>Ctenotus grandis</i>	120
	Yellow-spotted Monitor	<i>Varanus panoptes</i>	122
	Yellow-spotted Monitor	<i>Varanus panoptes</i>	116
	Spiny-tailed monitor	<i>Varanus acanthurus</i>	127
<b>Birds</b>	Pheasant Coucal	<i>Centropus phasianinus</i>	119
	Blue-winged Kookaburra	<i>Dacelo leachii</i>	115
	Blue-winged Kookaburra	<i>Dacelo leachii</i>	116
	Painted Finch	<i>Emblema pictum</i>	117
	Diamond Dove	<i>Geopelia cuneata</i>	119
	Diamond Dove	<i>Geopelia cuneata</i>	120
	Peaceful Dove	<i>Geopelia striata</i>	115
	Peaceful Dove	<i>Geopelia striata</i>	119
	Spinifex Pigeon	<i>Geophaps plumifera</i>	119
	Spinifex Pigeon	<i>Geophaps plumifera</i>	120
	Spinifex Pigeon	<i>Geophaps plumifera</i>	121
	Spinifex Pigeon	<i>Geophaps plumifera</i>	127
	Spinifex Pigeon	<i>Geophaps plumifera</i>	130
	Magpie-lark	<i>Grallina cyanoleuca</i>	115
	Magpie-lark	<i>Grallina cyanoleuca</i>	116
	Magpie-lark	<i>Grallina cyanoleuca</i>	119
	Magpie-lark	<i>Grallina cyanoleuca</i>	123
	Common Bronzewing	<i>Phaps chalcoptera</i>	115
	Willie Wagtail	<i>Rhipidura leucophrys</i>	116
	Willie Wagtail	<i>Rhipidura leucophrys</i>	119
Willie Wagtail	<i>Rhipidura leucophrys</i>	127	
<b>Mammals</b>	Cattle	<i>Bos taurus</i>	116
	Cattle	<i>Bos taurus</i>	119
	Cattle	<i>Bos taurus</i>	120
	Cattle	<i>Bos taurus</i>	126
	Cattle	<i>Bos taurus</i>	130
	Black Rat	<i>Rattus rattus</i>	116
	Black Rat	<i>Rattus rattus</i>	122
	Black Rat	<i>Rattus rattus</i>	131
	Euro	<i>Macropus robustus</i>	116
	Euro	<i>Macropus robustus</i>	118
	Euro	<i>Macropus robustus</i>	119
	Euro	<i>Macropus robustus</i>	121
Euro	<i>Macropus robustus</i>	122	

Group	Vernacular	Species	Camera Number
	Euro	<i>Macropus robustus</i>	126
	Euro	<i>Macropus robustus</i>	130
	Cat	<i>Felis catus</i>	129
	Common Rock Rat	<i>Zyomys argurus</i>	127
	Common Rock Rat	<i>Zyomys argurus</i>	132

## 9.5 Appendix E- List of birds recorded from Millstream Chichester National Park.

Order	Scientific Name	Vernacular	Comment	
<b>Anseriformes</b>	<b>Anatidae</b>			
	<i>Anas gracilis</i>	Grey Teal		
	<i>Anas superciliosa</i>	Pacific Black Duck		
	<i>Anseranas semipalmata</i>	Magpie Goose (Pied Goose)		
	<i>Aythya australis</i>	Hardhead		
	<i>Cygnus atratus</i>	Black Swan		
	<i>Dendrocygna eytoni</i>	Plumed Whistling Duck		
<b>Caprimulgiformes</b>	<b>Aegotheidae</b>			
	<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		
	<b>Caprimulgidae</b>			
	<i>Eurostopodus argus</i>	Spotted Nightjar		
	<b>Podargidae</b>			
	<i>Podargus strigoides</i>	Tawny Frogmouth		
<b>Charadriiformes</b>	<b>Burhinidae</b>			
	<i>Burhinus grallarius</i>	Bush Stone-curlew		
	<b>Charadriidae</b>			
	<i>Charadrius melanops</i>	Black-fronted Dotterel		
	<i>Charadrius veredus</i>	Oriental Plover	Schedule 5. Migratory birds under international agreement.	
	<i>Erythronyx cinctus</i>	Red-kneed Dotterel		
	<i>Vanellus tricolor</i>	Banded Lapwing		
	<b>Haematopodidae</b>			
	<b>Laridae</b>			
	<i>Larus novaehollandiae</i>	Silver Gull		
	<b>Recurvirostridae</b>			
	<i>Himantopus himantopus</i>	Black-winged Stilt		
<b>Rostratulidae</b>				

Order	Scientific Name	Vernacular	Comment
	<i>Rostratula australis</i>	Painted Snipe	Schedule 2. Endangered
	<b>Scolopacidae</b>		
	<i>Numenius phaeopus</i>	Whimbrel	Schedule 5. Migratory birds under international agreement.
	<i>Philomachus pugnax</i>	Ruff	
	<i>Tringa hypoleucos</i>	Common Sandpiper	
<b>Ciconiiformes</b>	<b>Ardeidae</b>		
	<i>Ardea modesta</i>	Great Egret	Schedule 5. Migratory birds under international agreement.
	<i>Ardea garzetta</i>	Little Egret	
	<i>Ardea ibis</i>	Cattle Egret	Schedule 5. Migratory birds under international agreement.
	<i>Ardea intermedia</i>	Intermediate Egret	
	<i>Ardea novaehollandiae</i>	White-faced Heron	
	<i>Ardea pacifica</i>	White-necked Heron	
	<i>Ixobrychus flavicollis</i>	Black Bittern	
	<i>Nycticorax caledonicus</i>	Rufous Night Heron	
	<b>Threskiornithidae</b>		
	<i>Platalea flavipes</i>	Yellow-billed Spoonbill	
	<i>Threskiornis molucca</i>	Australian White Ibis	
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	
<b>Columbiformes</b>	<b>Columbidae</b>		
	<i>Geopelia cuneata</i>	Diamond Dove	
	<i>Geopelia striata</i>	Zebra Dove	
	<i>Geophaps plumifera</i>	Spinifex Pigeon	
	<i>Ocyphaps lophotes</i>	Crested Pigeon	
	<i>Phaps chalcoptera</i>	Common Bronzewing	
	<i>Phaps histrionica</i>	Flock Bronzewing (Flock Pigeon)	
<b>Coraciiformes</b>	<b>Coraciidae</b>		
	<i>Eurystomus orientalis</i>	Dollarbird	
	<b>Halcyonidae</b>		
	<i>Dacelo leachii</i>	Blue-winged Kookaburra	
	<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher	
	<i>Todiramphus sanctus</i>	Sacred Kingfisher	
	<b>Meropidae</b>		

Order	Scientific Name	Vernacular	Comment
	<i>Merops ornatus</i>	Rainbow Bee-eater	Schedule 5. Migratory birds under international agreement.
	<b>Centropodidae</b>		
	<i>Centropus phasianinus</i>	Pheasant Coucal	
	<b>Cuculidae</b>		
	<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo	
	<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	
	<i>Cuculus pallidus</i>	Pallid Cuckoo	
<b>Falconiformes</b>	<b>Accipitridae</b>		
	<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	
	<i>Accipiter fasciatus</i>	Brown Goshawk	
	<i>Aquila audax</i>	Wedge-tailed Eagle	
	<i>Aquila morphnoides</i>	Little Eagle	
	<i>Circus approximans</i>	Swamp Harrier	
	<i>Circus assimilis</i>	Spotted Harrier	
	<i>Elanus caeruleus</i>	Black-shouldered Kite	
	<i>Elanus scriptus</i>	Letter-winged Kite	
	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	
	<i>Haliastur indus</i>	Brahminy Kite	
	<i>Haliastur sphenurus</i>	Whistling Kite	
	<i>Hamirostra isura</i>	Square-tailed Kite	
	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	
	<i>Milvus migrans</i>	Black Kite	
	<i>Pandion haliaetus</i>	Osprey	
	<b>Falconidae</b>		
	<i>Falco berigora</i>	Brown Falcon	
	<i>Falco cenchroides</i>	Australian Kestrel	
	<i>Falco hypoleucos</i>	Grey Falcon	Schedule 3. Vulnerable
	<i>Falco longipennis</i>	Australian Hobby	
<b>Galliformes</b>	<b>Phasianidae</b>		
	<i>Coturnix ypsilophora</i>	Brown Quail	
<b>Gruiformes</b>	<b>Gruidae</b>		
	<i>Grus rubicunda</i>	Brolga	
	<b>Otididae</b>		
	<i>Ardeotis australis</i>	Australian Bustard	
	<b>Rallidae</b>		

Order	Scientific Name	Vernacular	Comment
	<i>Fulica atra</i>	Eurasian Coot	
	<i>Gallinula ventralis</i>	Black-tailed Native-hen	
	<i>Gallirallus philippensis</i>	Buff-banded Rail	
	<i>Porphyrio porphyrio</i>	Purple Swampphen	
	<i>Porzana fluminea</i>	Australian Spotted Crake	
	<i>Porzana tabuensis</i>	Spotless Crake	
<b>Passeriformes</b>	<b>Acanthizidae</b>		
	<i>Gerygone fusca</i>	Western Gerygone	
	<i>Smicrornis brevirostris</i>	Weebill	
	<b>Alaudidae</b>		
	<i>Mirafrja javanica</i>	Horsfield's Bushlark (Singing Bushlark)	
	<i>Artamus cinereus</i>	Black-faced Woodswallow	
	<i>Artamus leucorynchus</i>	White-breasted Woodswallow	
	<i>Artamus minor</i>	Little Woodswallow	
	<i>Artamus personatus</i>	Masked Woodswallow	
	<b>Campephagidae</b>		
	<i>Coracina maxima</i>	Ground Cuckoo-shrike	
	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	
	<i>Lalage tricolor</i>	White-winged Triller	
	<b>Climacteridae</b>		
	<i>Climacteris melanura</i>	Black-tailed Treecreeper	
	<b>Corvidae</b>		
	<i>Corvus bennetti</i>	Little Crow	
	<i>Corvus orru</i>	Torresian Crow	
	<b>Cracticidae</b>		
	<i>Cracticus nigrogularis</i>	Pied Butcherbird	
	<i>Cracticus tibicen</i>	Australian Magpie	
	<i>Cracticus torquatus</i>	Grey Butcherbird	
	<b>Dicaeidae</b>		
	<i>Dicaeum hirundinaceum</i>	Mistletoebird	
	<i>Grallina cyanoleuca</i>	Magpie-lark	
	<i>Rhipidura fuliginosa</i>	Grey Fantail	
	<i>Rhipidura leucophrys</i>	Willie Wagtail	
	<b>Estrildidae</b>		
	<i>Emblema pictum</i>	Painted Finch	
	<i>Neochmia ruficauda</i>	Star Finch	
	<i>Taeniopygia guttata</i>	Zebra Finch	
	<b>Hirundinidae</b>		
	<i>Cheramoeca leucosternus</i>	White-backed Swallow	
	<i>Hirundo ariel</i>	Fairy Martin	



Order	Scientific Name	Vernacular	Comment
	<i>Hirundo neoxena</i>	Welcome Swallow	
	<i>Hirundo nigricans</i>	Tree Martin	
	<b>Maluridae</b>		
	<i>Amytornis striatus</i>	Striated Grasswren	P4
	<i>Malurus lamberti</i>	Variiegated Fairy-wren	
	<i>Malurus leucopterus</i>	White-winged Fairy-wren	
	<i>Stipiturus ruficeps</i>	Rufous-crowned Emu-wren	
	<b>Meliphagidae</b>		
	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	
	<i>Sugomel niger</i>	Black Honeyeater	
	<i>Certhionyx variegatus</i>	Pied Honeyeater	
	<i>Epthianura tricolor</i>	Crimson Chat	
	<i>Ptilotula keartlandi</i>	Grey-headed Honeyeater	
	<i>Ptilotula penicillatus</i>	White-plumed Honeyeater	
	<i>Ptilotula plumulus</i>	Grey-fronted Honeyeater	
	<i>Lacustroica whitei</i>	Grey Honeyeater	
	<i>Lichenostomus virescens</i>	Singing Honeyeater	
	<i>Lichmera indistincta</i>	Brown Honeyeater	
	<i>Manorina flavigula</i>	Yellow-throated Miner	
	<i>Melithreptus gularis</i>	Black-chinned Honeyeater	
	<b>Motacillidae</b>		
	<i>Anthus Australia</i>	Australian Pipit	
	<b>Neosittidae</b>		
	<i>Daphoenositta chrysoptera</i>	Varied Sittella	
	<b>Pachycephalidae</b>		
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	
	<i>Oreoica gutturalis</i>	Crested Bellbird	
	<i>Pachycephala rufiventris</i>	Rufous Whistler	
	<b>Pardalotidae</b>		
	<i>Pardalotus rubricatus</i>	Red-browed Pardalote	
	<i>Pardalotus striatus</i>	Striated Pardalote	
	<i>Petroica cucullata</i>	Hooded Robin	
	<i>Petroica goodenovii</i>	Red-capped Robin	
	<b>Pomatostomidae</b>		
	<i>Pomatostomus superciliosus</i>	White-browed Babbler	
	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	
	<b>Ptilonorhynchidae</b>		
	<i>Ptilonorhynchus maculatus</i>	Western Bowerbird	
	<b>Sylviidae</b>		
	<i>Acrocephalus australis</i>	Australian Reed Warbler	
	<i>Cincloramphus cruralis</i>	Brown Songlark	

Order	Scientific Name	Vernacular	Comment
	<i>Cincloramphus mathewsi</i>	Rufous Songlark	
	<i>Cisticola exilis</i>	Golden-headed Cisticola	
	<i>Eremiornis carteri</i>	Spinifex-bird	
	<b>Zosteropidae</b>		
	<i>Zosterops luteus</i>	Yellow White-eye	
<b>Pelecaniformes</b>	<b>Ardeidae</b>		
	<i>Ixobrychus flavicollis</i>	Black Bittern	
	<b>Anhingidae</b>		
	<i>Anhinga melanogaster</i>	Darter	
	<b>Pelecanidae</b>		
	<i>Pelecanus conspicillatus</i>	Australian Pelican	
	<b>Phalacrocoracidae</b>		
	<i>Phalacrocorax carbo</i>	Great Cormorant	
	<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	
	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	
	<i>Phalacrocorax varius</i>	Pied Cormorant	
<b>Podicipediformes</b>	<b>Podicipedidae</b>		
	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe (Black-throated Grebe)	
	<i>Podiceps cristatus</i>	Great Crested Grebe	
	<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe	
<b>Psittaciformes</b>	<b>Psittacidae</b>		
	<i>Cacatua roseicapilla</i>	Galah	
	<i>Cacatua sanguinea</i>	Little Corella	
	<i>Calyptornis banksii</i>	Red-tailed Black Cockatoo	
	<i>Melopsittacus undulatus</i>	Budgerigar	
	<i>Nymphicus hollandicus</i>	Cockatiel	
	<i>Platycercus varius</i>	Mulga Parrot	
	<i>Platycercus zonarius</i>	Australian Ringneck (Ring-necked Parrot)	
<b>Strigiformes</b>	<b>Strigidae</b>		
	<i>Ninox connivens</i>	Barking Owl	
	<i>Ninox novaeseelandiae</i>	Boobook Owl	
	<i>Tyto alba</i>	Barn Owl	
<b>Struthioniformes</b>	<b>Casuariidae</b>		
	<i>Dromaius novaehollandiae</i>	Emu	

Order	Scientific Name	Vernacular	Comment
<b>Turniciformes</b>	<b>Turnicidae</b>		
	<i>Turnix velox</i>	Little Button-quail	

## 9.6 Appendix F- Site coordinates from trapping locations and remote cameras.

Trap site	traps	Datum	Latitude	Longitude
Pit line 1	8 pits, 6 funnels	WGS84	-21.5692	117.0490
Pit line 2	8 pits, 6 funnels	WGS84	-21.5681	117.0490
Pit line 3	8 pits, 6 funnels	WGS84	-21.5671	117.0488
Pit line 4	8 pits, 6 funnels	WGS84	-21.5667	117.0439
Pit line 5	8 pits, 6 funnels	WGS84	-21.5658	117.0449
Elliot Line A	10 elliotts	WGS84	-21.5689	117.0528
Cage B	15 cages	WGS84	-21.5700	117.0518
Elliot Line C	20 elliotts	WGS84	-21.5682	117.0481
Elliot Line D	20 elliotts	WGS84	-21.5678	117.0460
Elliot Line E	10 elliotts	WGS84	-21.5648	117.0425
Cage F	5 cages	WGS84	-21.5639	117.0382

Remote Camera sites	Datum	Latitude	Longitude
Camera 113	WGS84	-21.5679	117.0487
Camera 114	WGS84	-21.5648	117.0422
Camera 115	WGS84	-21.5662	117.0420
Camera 116	WGS84	-21.5676	117.0454
Camera 117	WGS84	-21.5656	117.0466
Camera 118	WGS84	-21.5659	117.0500
Camera 119	WGS84	-21.5666	117.0438
Camera 120	WGS84	-21.5658	117.0442
Camera 121	WGS84	-21.5648	117.0484
Camera 122	WGS84	-21.5699	117.0524
Camera 123	WGS84	-21.5699	117.0524
Camera 124	WGS84	-21.5650	117.0531
Camera 125	WGS84	-21.5638	117.0368
Camera 126	WGS84	-21.5700	117.0510
Camera 127	WGS84	-21.5687	117.0529
Camera 128	WGS84	-21.5613	117.0533
Camera 129	WGS84	-21.5637	117.0539
Camera 130	WGS84	-21.5678	117.0512
Camera 131	WGS84	-21.5643	117.0365
Camera 132	WGS84	-21.5678	117.0535

**9.7 Appendix G**  
**Photographs of the habitats for most trap lines**



Site 1 (Pit and Funnel Traps)



Site 2 (Pit and Funnel Traps)





Site 3 (Pit and Funnel Traps)



Site 4 (Pit and Funnel Traps)





Site 5 (Pit and Funnel Traps)



Site A (Elliott Traps along ridge top)





Site B (Cage Traps)



Site C (Elliott Traps)





Site D (Elliott Traps)



Site F (Cage Traps)