Vertebrate Survey in Cane River Conservation Park with a focus on the Nanutarra Block

Cane River Conservation Park, Western Australia

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Reptile and Mammals

Acanthophis wellsi-Photo M. Cowan

Contents

List of contributors

List of contributors to this report.			
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Abstract

We undertook standardised sampling with pit, funnel and elliot traps for terrestrial vertebrates in the Nanutarra Block at the southern end of Cane River Conservation Park. Opportunistic sampling was also conducted across a larger area of the overall Conservation Park. More than 276 captures and observations were made representing six species of native mammal, two frogs and 45 reptiles. While eight of these species were new records for the park, there were many new records for the Nanutarra Block as it had not previously been the focus of any formal fauna survey.

Targeted survey was also undertaken for the *Dasyurus hallucatus* (northern quoll) using large elliots, cage and camera traps. Despite sampling at several locations, including a location in the Parry Range where this species had been recorded on previous surveys, we did not detect it or sight any evidence of its presence.

1. Introduction

Cane River Conservation Park is situated across the boundary between the Roebourne Plains and the Hamersley subregions of the Pilbara Bioregion (Thackway, 1995). The Park is comprised of three adjoining blocks, Mt Minnie in the north-western corner, Cane River in the central and eastern extent and Nanutarra or Range block at the southern end. Mt Minnie and Cane River Blocks have been the focus of a considerable level of vertebrate survey work including systematic sampling at more than 29 locations over a two year period from 1999- 2001 by staff from the Department of Environment and Conservations Pilbara Regional Office (P. Kendrick pers comm.*). The Pilbara Biodiversity Survey from 2002 to 2007 sampled a further seven locations (McKenzie et al., 2009). While this has resulted in the vertebrate fauna being comparatively well known in the northern and central areas of the Park, almost no work has been undertaken in the southern areas of the Nanutarra Block and this is where this survey concentrated. Due to the extent and comprehensiveness of these earlier surveys, we did not envisage identifying unrecorded taxa. However almost all our records are new for the Nanutarra Block.

2. Methods

2.1 Site selection

Access through most of the Nanutarra block was constrained to old fence line tracks and this restricted where work could be undertaken. The south western corner was unsurveyed, had comparatively easy access and, also supported a number of geological surfaces and habitat types over a relatively short distance (Figure 1a). This area then became the primary focus for the trapping program. The first site selected, Site 1 was both on, and at the base of, a granite dome, much of which was covered by boulders and exfoliating rock. Vegetatively it was quite bare, other than for a few areas of spinifex with eremophilas, although fractures in the base rock, the gullies and the course granitic sands around the periphery supported a variety of herbs, grasses and woody shrubs. Site 2 was on a broad sandy plain with dense spinifex and scattered low acacias. Linear dune systems of deep red sands, again supporting spinifex, are a prominent feature through much of the park. We established two trapping grids on separate dunes, Site 3 in the south western corner and Site 5 located just off the North West Coastal Highway towards the northern boundary of the Nanutarra block. Site 4 was on top and around the rim of a small mesa of sedimentary rock. The habitat was predominantly of scattered broken rocks and pavements, Site 4a, although towards the northern edge was an area of perched red sand which also formed part of the sampling area-Site 4b. Targeted trapping for *Dasyurus hallacatus* was undertaken at a single location in the Parry Range, Site 6, where they had been recorded ten years earlier (P. Kendrick pers comm.*). Site images are presented in Appendix 2.

Opportunistic sampling was undertaken at a number of locations across the conservation park. This included the recording of sightings as well active searching of specific habitats or features and some road driving.

Geographic coordinates for this and previous survey trapping grids are given in Table 1 and survey and opportunistic sampling locations in relation landsystem mapping are provided in figures 1a and 1b.

Table 1

Site #	Latitude	Longitude	Datum	Survey
BB1	-22.4342	115.2896	GDA94	Bush Blitz-Survey Site
BB2	-22.4369	115.2925	GDA94	Bush Blitz-Survey Site
BB3	-22.4301	115.3273	GDA94	Bush Blitz-Survey Site
BB4a	-22.4295	115.3510	GDA94	Bush Blitz-Survey Site
BB4b	-22.4291	115.3513	GDA94	Bush Blitz-Survey Site
BB5	-22.3168	115.5280	GDA94	Bush Blitz-Survey Site
BB6	-22.1922	115.5531	GDA94	Bush Blitz-Survey Site
CR1	-22.0463	115.6201	GDA94	Regional Survey Site
CR2	-22.0626	115.6190	GDA94	Regional Survey Site
CR3	-22.0915	115.6216	GDA94	Regional Survey Site
CR4	-22.1354	115.6890	GDA94	Regional Survey Site
CR5	-22.1456	115.7180	GDA94	Regional Survey Site
CR5	-22.1456	115.7180	GDA94	Regional Survey Site
CR6	-22.1493	115.7306	GDA94	Regional Survey Site
CR7	-22.1478	115.7742	GDA94	Regional Survey Site
CR7	-22.1478	115.7742	GDA94	Regional Survey Site
CR8	-22.1507	115.7936	GDA94	Regional Survey Site
CR9	-22.1552	115.7974	GDA94	Regional Survey Site
CR10	-22.1688	115.5723	GDA94	Regional Survey Site
CR11	-22.1903	115.5518	GDA94	Regional Survey Site
CR12	-22.1993	115.5488	GDA94	Regional Survey Site
CR13	-22.2656	115.5888	GDA94	Regional Survey Site
CR14	-22.2664	115.5811	GDA94	Regional Survey Site
CR15	-22.2696	115.6422	GDA94	Regional Survey Site
CR15	-22.2696	115.6422	GDA94	Regional Survey Site
CR16	-22.2679	115.6519	GDA94	Regional Survey Site
CR16	-22.2679	115.6519	GDA94	Regional Survey Site
CR17	-22.2493	115.4900	GDA94	Regional Survey Site
CR18	-22.2590	115.4637	GDA94	Regional Survey Site
CR19	-22.2529	115.3910	GDA94	Regional Survey Site
CR20	-22.2554	115.3764	GDA94	Regional Survey Site
MM1	-21.8760	115.1548	GDA94	Regional Survey Site
MM2	-21.8747	115.1563	GDA94	Regional Survey Site
MM3	-21.8694	115.1615	GDA94	Regional Survey Site
MM4	-21.9738	115.3735	GDA94	Regional Survey Site
MM5	-22.0241	115.4433	GDA94	Regional Survey Site
MM6	-22.0577	115.4523	GDA94	Regional Survey Site
MM7	-22.0058	115.3425	GDA94	Regional Survey Site

Site #	Latitude	Longitude	Datum	Survey
MM8	-22.1018	115.3073	GDA94	Regional Survey Site
MM9	-22.2824	115.2979	GDA94	Regional Survey Site
WYW01	-22.1041	115.5680	GDA94	Pilbara Biological Survey Site
WYW02	-22.1201	115.5700	GDA94	Pilbara Biological Survey Site
WYW03	-22.1697	115.5610	GDA94	Pilbara Biological Survey Site
WYW04	-22.1886	115.5540	GDA94	Pilbara Biological Survey Site
WYW05	-22.1933	115.5540	GDA94	Pilbara Biological Survey Site
WYW06	-22.2560	115.4910	GDA94	Pilbara Biological Survey Site
WYW07	-22.2554	115.4370	GDA94	Pilbara Biological Survey Site

Figure1a

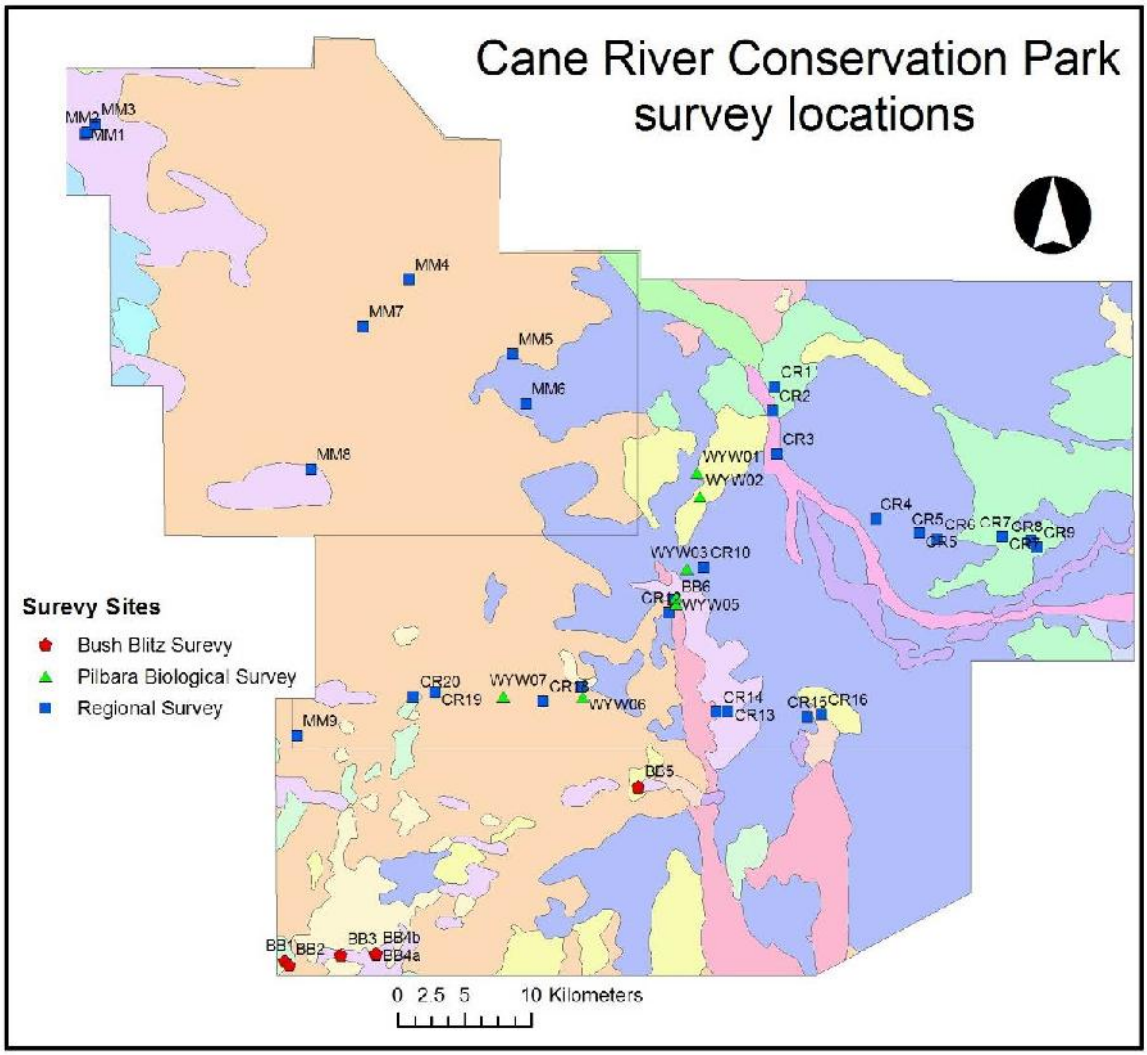
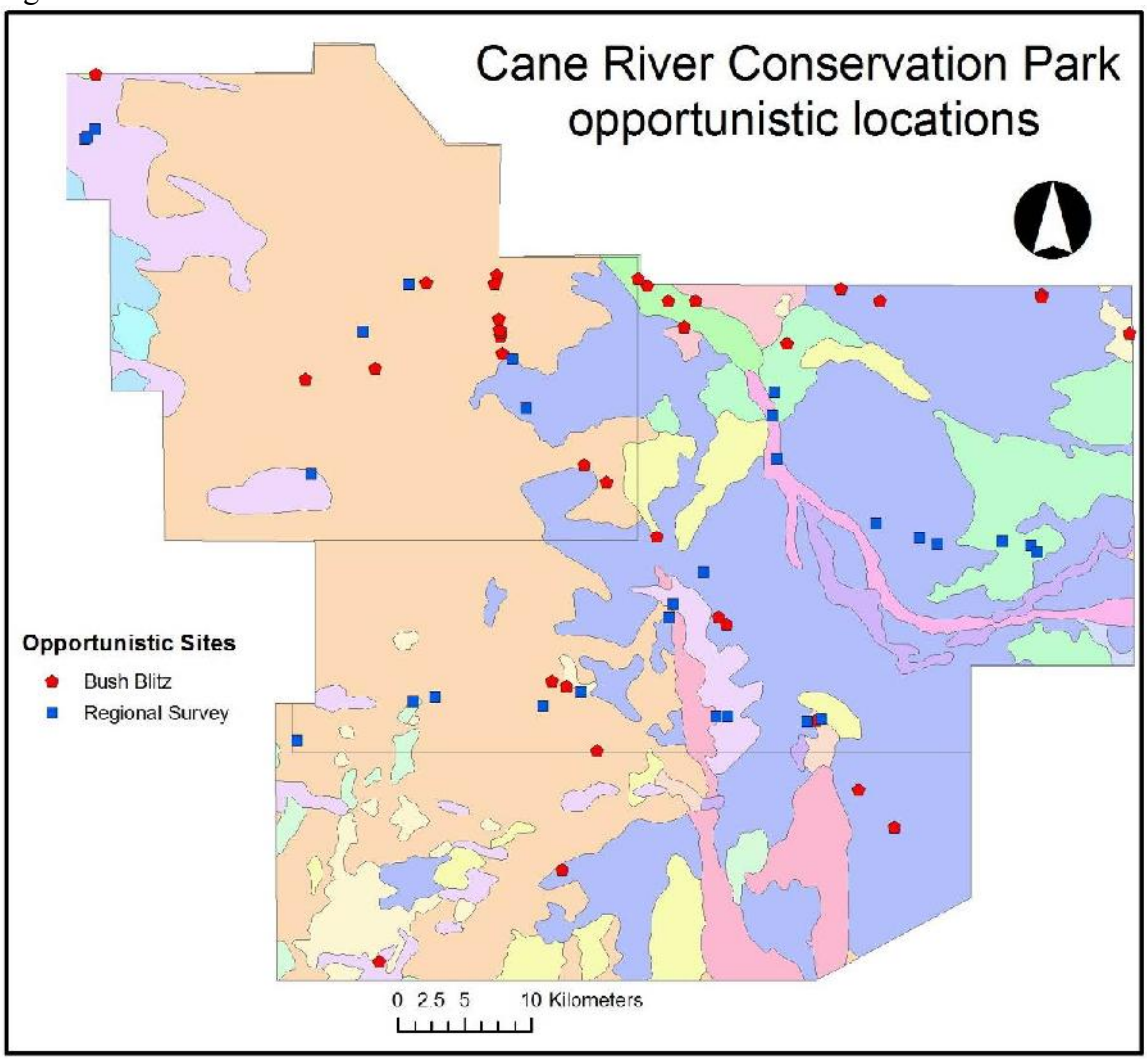


Figure 1b



Land System Descriptions

- Active flood plains, major rivers and banks supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.
- Alluvial plains and flood plains supporting snakewood shrublands, soft and hard spinifex grasslands and tussock grasslands.
- Alluvial plains supporting tall shrublands and tussock grasslands and sandy plains supporting hummock grasslands.
- Broad sandy plains supporting shrubby hard and soft spinifex grasslands.
- Gently undulating stony plains supporting hard and soft spinifex grasslands and snakewood shrublands.
- Granite hills, domes and tor fields and sandy plains with shrubby spinifex grasslands.
- Gravelly plains supporting hard spinifex grasslands and minor snakewood shrublands.
- Hills and ridges of sandstone and dolomite supporting low shrublands or shrubby spinifex grasslands.
- Linear dunes and broad sandy plains supporting hard and soft spinifex grasslands.
- Low mesas and hills of sedimentary rocks supporting soft and hard spinifex grasslands.
- Low plateaux, mesas and buttes of limonites supporting soft spinifex (and occasionally hard spinifex) grasslands.
- Plains with dunes and numerous claypans, soft spinifex and snakewood shrublands; in the west of the area.
- Rough shale hills, stony plains and broad drainage floors supporting hard spinifex grasslands and sparse shrubs.
- Rugged ranges, hills, ridges and plateaux supporting mulga shrublands in southern parts or hard spinifex grasslands in northern most parts.
- Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.
- Undulating sandplains, dunes and level clay plains supporting soft spinifex grasslands and minor tussock grasslands.
- Undulating stony uplands, low hills and ridges and stony plains supporting mulga shrublands.

2.2 Collection methods

Each of the five primary survey sites were sampled with a single 50 to 60 metre drift fence of 30 cm high aluminium fly wire and six 20 litre buckets located at even intervals along, and buried centrally under, the drift fence (Image 1). Up to twelve funnel traps were used to supplement the pits and these were either placed along the same fence as the pits or, in areas where pits could not be used such as the rocky areas of Sites 1 and 4, they were established on a separate drift fence of approximately 30m in length. At each site other than Site 5, 20 medium sized elliot traps (type A) were placed at 10 to 20 metre intervals and baited with universal bait, including the addition of chopped bacon. Due to the expansive rocky areas of Site 1 and the potential for this area to support the *Dasyurus hallacatus* an additional 10 large elliots and 5 cage traps were used and spaced evenly along with the medium sized elliots. Where we resampled for *D. hallucatus* at Site 6 in the Parry Range we used 30 large elliots as well as 5 cage traps, again baited with universal bait and chopped bacon.

A single Reconyx HC600 camera trap was deployed at each trapping site for at least four consecutive nights while at Site 6, one camera was used for five nights and another five camera traps were used for two consecutive nights. An area within the field of view of each camera was baited with universal bait.

Active hand searching was undertaken at a number of locations across the park and this involved raking spoil piles on road edges as well as turning rocks and leaf litter in search of animals. Due to the coolness of the evenings only a limited amount of night searching or road driving was undertaken.

Information was also collated from all researchers of opportunistic sightings providing identifications could be confirmed. This usually covered the larger snakes such as *Aspidites melanocephalus* (black-headed python) and *Pseudechis australis* (mulga snake), and monitor lizards such as *Varanus panoptes*.

Image 1

2.3 Identifying the collections

Animals captured were generally identified in the field. The sex was determined and weights and lengths (pes and cranium for mammals, snout to vent and tail for reptiles) recorded prior to release at point of capture, although initially for some of the more complex species, including some members of the *Ctenotus* genus, individuals were taken back to base camp to be keyed out prior to release the following day.
Voucher specimens of most species were taken for lodgement in the WA Museum. These specimens were labelled with a field identification tag and a liver sample taken for preservation in 100% ethanol for future molecular analysis. Voucher specimens were fixed in 10% formalin for seven days and then transferred to 70% ethanol for preservation after flushing for 24 hours in water.

The primary sources of information for identification were the Western Australian Museum's reptile field guides (Storr et al., 1983, Storr et al., 1990, Storr et al., 1999, Storr et al., 2002) although reference was also sought from The Mammals of Australia (Van Dyck et al., 2008), A Field Guide to the Mammals of Australia (Menkhorst and Knight, 2004) and A Complete guide to Reptiles of Australia (Wilson and Swan, 2008)

3. Results and Discussion

3.1 Overview of collecting

Previous survey work in the area has collectively recorded just over 100 frog, reptile and mammal species. Work by P. Kendrick from DEC's Pilbara Regional Office between 1999 and 2002 identified 82 species from 29 trapping grids and opportunistic work, most of which have vouchers lodged in the WA Museum. This was the first formal survey of the Park and concentrated on the Mt Minnie and Cane River Blocks (Figure1a). Opportunistic collections were made from a number of locations (Figure1b). Records of large vertebrates such as macropods or the occurrence of cats and dingoes were not made, or at least databased, as they were not specific targets for this work.
The Pilbara Survey conducted by the Science Division of the Department of Environment and Conservation had more than 300 survey sites stratified across the Pilbara Bioregion. Seven of these sites were located within the Conservation Park (Figure 1a). Sampling was undertaken by pit trapping and 43 species of terrestrial vertebrates excluding frogs were recorded within the 2002- 2007 period of the survey (Gibson and McKenzie, 2009, Doughty et al., 2011). Five new records of reptiles were made. Acoustic bat recordings were also taken at three locations with a total of eight species identified (McKenzie and Bullen, 2009). Six of these were new records for the Park. A database of species occurrence by site from both of these earlier surveys will be amalgamated with the BushBlitz survey data.

During the BushBlitz survey the mean maximum temperature was 28.5° C (± 1.5) and the mean minimum temperature 13.5 ° C (± 2.4). Despite these comparatively cool conditions for the Pilbara, captures of reptiles in pits and general diurnal reptile activity, was quite reasonable, although considerably less than would be expected in warmer months.

The 276 captures resulted in 45 reptile species being identified with five of these new for the park. This would suggest that there may yet be more species to document. Fifteen of the reptile species were only recorded through observation or by foraging, and this was particularly the case for the larger elapid snakes and large monitor lizards as well as the pythons.

The small varanid, *Varanus eremius* (pygmy desert monitor), was especially abundant with 22 individuals caught and this number was only exceeded by the frog *Notaden nichollsi* (desert spade foot) and *Lerista bipes* with 35 and 28 captures respectively. *N. nichollsi* was present only at the sand dune sites (Sites 3 and 5) over a couple of nights during and after high levels of condensation. The small fossorial *L. bipes* was almost exclusively in the sands at the edge of the granites at Site 1, although its tracks, or those of other sand swimming skinks, were observed at the dune sites also. *V. eremius* was recorded at all sites having sand and spinifex.

Mammals were not particularly abundant at any site except Site 2 where eight *Dasykaluta rosamondae* (kaluta) were caught in elliots, funnels and pit traps. The common rock rat, *Zyzomys argurus*, was only caught on the granites at Site 1 on three occasions but the first capture was not until the traps had been out for three nights. Similarly, *Pseudantechinus woolleyae* was also not detected until after four nights of trapping had been completed thus demonstrating the requirement for a comparatively large number of continuous trapping nights to maximise likelihood of detection for these mammals. Both species were detected using remote cameras, as were a number of feral cats. Two other rodents were also caught, *Notomys alexis* (spinifex hopping mouse) and *Pseudomys hermannsburgensis* (sandy inland mouse), but there were no captures of either planigale species or the Ningaui. All of these mammals have considerable variability in both local abundance and activity patterns so this is not particularly surprising.

Vouchers of 40 specimens including tissue samples were lodged with the WA Museum.

3.2 Named taxa newly recorded for the reserve

Table 2 lists all species not previously recorded. The larger species such as *Varanus giganteus* (perentie) and *Tachyglossus aculeatus* (echidna) have probably been seen in the past but not formally recorded as the trapping methods utilised in general survey are not designed for species such as these. This would also be true for *Macropus robustus* (euro) and *Macropus rufus* (red kangaroo) that occur across the Conservation Park and were observed on numerous occasions. Our records of *V. giganteus* were through a camera trap (Image 2) and a single observation. The other newly recorded taxa on this survey are all within their known ranges and would have been reasonably expected to occur within certain habitats in the park. It is surprising that *Pseudantechinus woolleyae* has not been recorded earlier as this species is readily captured in rocky habitats with the use of elliot traps and is quite common through much of the arid zone. It probably reflects

the limited use of elliot traps in past surveys. While *Amphibolurus longirostris* is also wide spread and quite common throughout the arid region of WA it often seems to go undetected with the use of pit traps and in this survey was only ever observed.

Image 2

Table 2. Named taxa newly recorded from Cane River Conservation Park

Taxon	Comment
Amphibolurus longirostris	Sighting at two separate locations
Ctenotus calurus	Single specimen (#MAC0984) from Site 2
Diporiphora winneckei	Sighting only
Pseudantechinus woolleyae	Caught on remote camera and in elliot trap at Site 6 on the Parry Range
Simoselaps anomalus	Sighted one and caught one specimen (#MAC0966) at Site 3
Tachyglossus aculeatus	Scats collected
Tadarida australis	Frequently heard and recorded at Mt Minnie Homestead
Varanus giganteus	Photographed by remote camera at Site 1 and observed at Site 4

3.3 Un-named taxa

There were no un-named or non-formalised vertebrate taxa recorded.

3.4 New species to be described

No new species awaiting description have resulted from this survey however specimens and associated tissue samples collected may contribute towards resolution of cryptic taxa in future taxonomic examinations.

3.5 Weed or pest species

Feral cats appear to be reasonably common across the reserve and tracks were regularly seen on sandy substrates along with numerous sightings of individuals by BushBlitz team members as they worked across the park. Remote cameras recorded cats at two locations, both dune sites, with one camera recording two different individuals on the same evening.
While wild dogs or dingoes were not visually observed, their tracks were regularly seen over our vehicle tracks towards and adjacent to Site 1 in the south western corner. It is likely that the large boulder piles associated with the granite dome at Site 1 would provide good refuge for these animals.
A herd of domestic cattle was observed on an almost daily basis grazing along the edge of the main highway a few kilometres south of the Onslow turnoff.

Table 4. State or National weed or pest species recorded in Cane River Conservation Park

Pest/weed species	Location sighted/observed	Indication of abundance
Felis catus	Caught on remote cameras and tracks observed at Site 3 and Site 5. Several sightings by other members of BushBlitz Survey team at a variety of locations.	Common
Canis lupus	Tracks seen regularly adjacent to and along track by Site 1.	Likely to be common

3.6 Vulnerable, threatened or endangered species

Although no vulnerable, threatened or endangered species were recorded on this survey, past work has identified the presence of both extinct and active *Pseudomys chapmani* (pebble mound mouse) mounds. This is a priority listed species in WA. *Macroderma gigas* (ghost bat) , which is also listed as a priority species under State legislation, was recorded during the Pilbara biological survey through the analysis of continuous Anabat Recordings (McKenzie and Bullen, 2009). *Dasyurus hallucatus* was recorded in the Park on four occasions in 1999 and with a single record in 2002 and despite our trapping effort in one of the previously recorded locations (BB6) we did not detect it. Parry Range however is a substantial range with difficult access along most of its length and it is likely that there are numerous suitable locations for this species to continue to occur.

4. General comment on species lists

Historic records of species from the reserve are quite comprehensive but are not well captured in the database information provided prior to this survey with only 45 reptile species identified. While *Lerista muelleri* is identified in the database this is known to be a complex of at least nine species (Smith and Adams, 2007) and the records of the WA Museum do not include *L. muelleri* but rather identify through vouchered specimens *L. clara, L. rolfei* and *Lerista verhmens.*

All other provided records would appear to be correct aside from that of a *Pseudorca crassidens* (False killer whale).

5. Conclusions

The total number of species recorded for Cane River Conservation Park demonstrates that it has a remarkably rich vertebrate fauna. This is particularly the case for the reptiles with at least 76 species recorded. The level of previous survey limited the likelihood that new records would be found for the park during this survey, however a number were still made. Continued survey may yet reveal a small number of additional species, particularly in the eastern parts of the Nanutarra block which still remain unsurveyed.

The attempted re-recording of *D. hallucatus* was of particular interest due to its conservation status in the Pilbara and the lack of detection was disappointing. However, the extensive areas of suitable habitat for this species across the park, and the rather limited effort we were able to undertake, would not indicate any specific concern for continued occupancy. While we only examined one of the previous known locations it would be useful for future survey to target some of the others.

The methods employed for this survey, trapping with pits, elliots and funnels along with active foraging and remote cameras, all made contributions to the collective species

richness recorded.

A general observation throughout this trip was the relatively high number of feral cats, with many scientists working on other biotic groups during this survey observing individuals quite regularly. We recorded four individuals on remote cameras, mostly on the dune systems, and also observed fresh tracks regularly as well as a couple of individuals while driving.

Acknowledgements

Vertebrate sampling records from regional survey work were made available by the kind permission of Peter Kendrick. Allan Burbidge and Jim Rolfe provided reptile species data and access to the herpetofauna manuscript from the Pilbara Biodiversity Survey. Permission was given by staff of the Western Australian Museum to access the vertebrate collection records. Karl Newport and Kate Gillespie from BushBlitz are mentioned in the contributors section but also their combined contribution to establishing, running and decommissioning trapping grids was essential to the success of the vertebrate work.

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Appendices

Appendix 1. List of Frogs, Reptiles and Mammals occurring on Cane River Conservation Park.

Number of taxa: 106 native species

FAMILY	Species	Regional Survey 1999-2001	Pilbara Survey 2002-2007	BushBlitz Survey 2011	New record	Pest	EPBC Listed	State Listed
Hylidae	*Cyclorana maini*	+						
Hylidae	*Litoria rubella*	+		+				
Limnodynastidae	*Neobatrachus aquilonius*	+						
Limnodynastidae	*Notaden nichollsi*	+		+				
Limnodynastidae	*Platyplectrum spenceri*	+						
Agamidae	*Amphibolurus longirostris*			+	✓			
Agamidae	*Ctenophorus caudicinctus*	+		+				
Agamidae	*Ctenophorus femoralis*	+	+	+				
Agamidae	*Ctenophorus isolepis*	+	+	+				
Agamidae	*Ctenophorus nuchalis*	+	+	+				
Agamidae	*Ctenophorus reticulatus*	+						
Agamidae	*Ctenophorus rubens*	+		+				
Agamidae	*Diporiphora winneckei*			+				
Agamidae	*Pogona minor*	+	+					
Boidae	*Antaresia perthensis*	+						
Boidae	*Antaresia stimsoni*	+						
Boidae	*Aspidites melanocephalus*	+		+				
Carphodactylidae	*Nephrurus levis*	+	+	+				
Carphodactylidae	*Nephrurus wheeleri*							
Diplodactylidae	*Diplodactylus conspicillatus*	+	+	+				
Diplodactylidae	*Lucasium stenodactylum*	+	+	+				
Diplodactylidae	*Lucasium wombeyi*	+	+					
Diplodactylidae	*Rhynchoedura ornata*	+	+					
Diplodactylidae	*Strophurus elderi*	+						
Diplodactylidae	*Strophurus strophurus*	+		+				
Elapidae	*Acanthophis wellsi*	+		+				
Elapidae	*Demansia psammophis*	+		+				
Elapidae	*Demansia rufescens*			+	✓			

FAMILY	Species	Regional Survey 1999-2001	Pilbara Survey 2002-2007	BushBlitz Survey 2011	New record	Pest	EPBC Listed	State Listed
Elapidae	*Furina ornata*	+		+				
Elapidae	*Pseudechis australis*	+		+				
Elapidae	*Pseudonaja modesta*	+		+				
Elapidae	*Pseudonaja nuchalis*	+		+				
Elapidae	*Simoselaps anomalus*			+	✓			
Elapidae	*Suta fasciata*	+		+				
Elapidae	*Suta punctata*	+		+				
Gekkonidae	*Gehyra pilbara*	+						
Gekkonidae	*Gehyra punctata*	+	+	+				
Gekkonidae	*Gehyra variegata*	+	+	+				
Gekkonidae	*Heteronotia binoei*	+	+	+				
Pygopodidae	*Delma nasuta*	+						
Pygopodidae	*Delma pax*	+		+				
Pygopodidae	*Delma tincta*							
Pygopodidae	*Lialis burtonis*			+				
Scincidae	*Carlia munda*	+	+					
Scincidae	*Ctenotus calurus*			+	✓			
Scincidae	*Ctenotus duricola*	+	+	+				
Scincidae	*Ctenotus grandis*	+	+					
Scincidae	*Ctenotus hanloni*	+	+	+				
Scincidae	*Ctenotus helenae*		+					
Scincidae	*Ctenotus iapetus*	+	+	+				
Scincidae	*Ctenotus maryani*	+						
Scincidae	*Ctenotus pantherinus*	+	+	+				
Scincidae	*Ctenotus rufescens*	+	+	+				
Scincidae	*Ctenotus saxatilis*	+	+	+				
Scincidae	*Ctenotus schomburgkii*	+						
Scincidae	*Ctenotus serventyi*	+						
Scincidae	*Cyclodomorphus melanops*	+		+				
Scincidae	*Egernia depressa*		+	+				
Scincidae	*Eremiascincus fasciolatus*	+	+	+				
Scincidae	*Eremiascincus richardsoni*	+						
Scincidae	*Lerista bipes*	+	+	+				
Scincidae	*Lerista clara*	+	+					
Scincidae	*Lerista onsloviana*	+						
Scincidae	*Lerista rolfei*		+					
Scincidae	*Lerista verhmens*		+					
Scincidae	*Menetia greyii*	+	+					
Scincidae	*Morethia ruficauda*	+	+	+				
Scincidae	*Notoscincus ornatus*		+					
Scincidae	*Proablepharus reginae*	+						
Scincidae	*Tiliqua multifasciata*	+						
Typhlopidae	*Ramphotyphlops ammodytes*	+	+					

FAMILY	Species	Regional Survey 1999-2001	Pilbara Survey 2002-2007	BushBlitz Survey 2011	New record	Pest	EPBC Listed	State Listed
Typhlopidae	*Ramphotyphlops diversus*	+						
Typhlopidae	*Ramphotyphlops grypus*	+	+					
Typhlopidae	*Ramphotyphlops leptosoma*	+						
Varanidae	*Varanus acanthurus*	+	+	+				
Varanidae	*Varanus brevicauda*	+	+	+				
Varanidae	*Varanus caudolineatus*	+	+					
Varanidae	*Varanus eremius*	+	+	+				
Varanidae	*Varanus giganteus*			+	✓			
Varanidae	*Varanus gouldii*	+						
Varanidae	*Varanus panoptes*	+		+				
Dasyuridae	*Dasykaluta rosamondae*	+	+	+				
Dasyuridae	*Dasyurus hallucatus*	+					✓	✓
Dasyuridae	*Ningaui timealeyi*	+	+					
Dasyuridae	*Planigale "k"*	+	+					
Dasyuridae	*Planigale "t"*	+						
Dasyuridae	*Pseudantechinus woolleyae*			+	✓			
Dasyuridae	*Sminthopsis macroura*	+	+					
Dasyuridae	*Sminthopsis youngsoni*	+	+					
Macropodidae	*Macropus robustus*			+				
Macropodidae	*Macropus rufus*			+				
Muridae	*Mus musculus*	+				✓		
Muridae	*Notomys alexis*	+	+	+				
Muridae	*Pseudomys chapmani*	+						✓
Muridae	*Pseudomys delicatulus*	+						
Muridae	*Pseudomys hermannsburgensis*	+	+	+				
Muridae	*Zyzomys argurus*	+		+				
Canidae	*Canis lupus dingo*			+				
Felidae	*Felis catus*			+		✓		
Tachyglossidae	*Tachyglossus aculeatus*			+	✓			
Emballonuridae	*Saccolaimus flaviventris*		+	+				
Megadermatidae	*Macroderma gigas*		+					✓
Molossidae	*Chaerephon jobensis*	+	+					
Molossidae	*Mormopterus beccarii*		+					
Molossidae	*Tadarida australis*			+	✓			
Vespertilionidae	*Chalinolobus gouldii*		+					

FAMILY	Species	Regional Survey 1999-2001	Pilbara Survey 2002-2007	BushBlitz Survey 2011	New record	Pest	EPBC Listed	State Listed
Vespertilionidae	*Ncytophilus geoffroyi*		+					
Vespertilionidae	*Scotorepens greyii*		+					
Vespertilionidae	*Vespadalus finlaysoni*	+	+					

Appendix 2. Site Photos

Site 1

Site 2

Site 3

Site 4

Site 5

Site 6

Appendix 3. Financial Statement

I hereby certify that all funds for this project have been spent in the manner and for the purposes specified by the contract.

Name: Mark Cowan

Signed: M L. Cowan

Date: 15 September 2011