AUSTRALIAN DESERT EXPEDITIONS
PROJECT 138

2018 Ecological Summary Report
ADE Membership

Compiled by Dr Max Tischler
(ADE Chief Scientist)

www.desertexpeditions.org

1. Background

This was the fifth and final year of Australian Desert Expeditions (ADE) Project 138: a planned systematic documentation of the flora and fauna across the least known and poorly surveyed parts of the Simpson Desert. The 2018 trekking season allowed ADE to traverse many new areas, as well as revisit some points of interest from previous years. The scientific and ecological team included ADE staff and crew, former members of The Department of Conservation and Land Management (Western Australia), Parks and Wildlife (Northern Territory) and Department of Environment and Science (Queensland).

This overview presents a brief summary of the ecological results for ADE's 2018 season. Surveys began on the western fringe of the Simpson Desert ON Old Andado Station, traversed the dune fields to Poeppel Corner, before heading into South Australia through the Regional Reserve and Conservation Park, terminating near the Warburton River on Clifton Hills Station.

2. Introduction

Below average climatic conditions across much of central Australia in the last 12 months produced relatively dry conditions throughout most of the season (Figures 1 and 2), and the ecological results reflect the current 'bust' state of the Simpson Desert more generally.

Obtaining accurate climatic data for the entire Simpson Desert is difficult. Weather patterns are predictably variable in both time and space. We rely on information from the Bureau of Meteorology's online database which logs basic patterns from many remote regional centres and locations. The Mt. Dare and Birdsville weather stations were the closest to ADE's trekking program and have been used to provide generalised rainfall and temperature indices for the western and eastern sides of the desert respectively. These weather stations both have long-term continuous data sets that provide a benchmark onto which we can compare current patterns and models. The previous four years has seen Mt Dare experience mostly above-average and average rainfall with yearly totals of 89.7mm, 272.9mm, 341.8, 122.1mm recorded in 2014, 2015, 2016 and 2017 respectively. Mt. Dare's long-term average is 163.5mm per annum. Birdsville displayed a more typical average pattern with annual rainfall totals of 52.3mm, 167.5mm, 327mm, 104mm in 2014, 2015, 2016 and 2017 respectively. Birdsville's long term average is 167mm per annum. Figures 1 and 2 show the climatic conditions for Mt Dare and Birdsville for the twelve month period starting in October 2017 through to September 2018, compared to the long-term averages for both weather stations.

ADE conducted twelve surveys during the 2018 season (May to September), ranging from 3 to 24 days duration. The treks allowed fauna and botanical collections and observations to be made across a range of land types during a period of relatively low productivity. These included the fringing and central dunefields, riparian zones along ephemeral river systems

and drainage lines, floodplains, saltlakes, inter-dunal woodlands, low *Acacia* shrublands, chenopod (saltbush) communities, run-on and run-off hydro-lines (gilgai) and areas immediately surrounding a number of *mikiri* or native wells.

Data from these surveys will again be lodged with varying agencies, as per regulations via the South Australian Department of Environment and Water (Permit No. M26773-1), Queensland Department of National Parks, Sport and Racing (Permit Nos. WITK18622817 and WISP16036515), and the Northern Territory Parks and Wildlife Commission (Permit No. 61526). We will share some relevant data with the Atlas of Living Australia (mammals), Birdlife Australia (birds), South Australian Museum (reptiles), University of Queensland (gidgee), Northern Territory Herbarium (Alice Springs)(botanical specimens), and the Olive Pink Botanical Gardens (Alice Springs)(botanical specimens). Furthermore, this season's data will be collated with past years (2014-2017) to be analysed and presented in the over-arching *Project 138: Five Year Ecological Report* (due to be released 2019).

Plate 1: The camel strings walking the edge of a salt lake

In this summary, Section 2 relates to fauna trapping data, active searches and bird sightings; Section 3 reports on botanical recordings and observations; Section 3 notes the current fire patterns and regimes and; Section 4 is a brief discussion of these results.

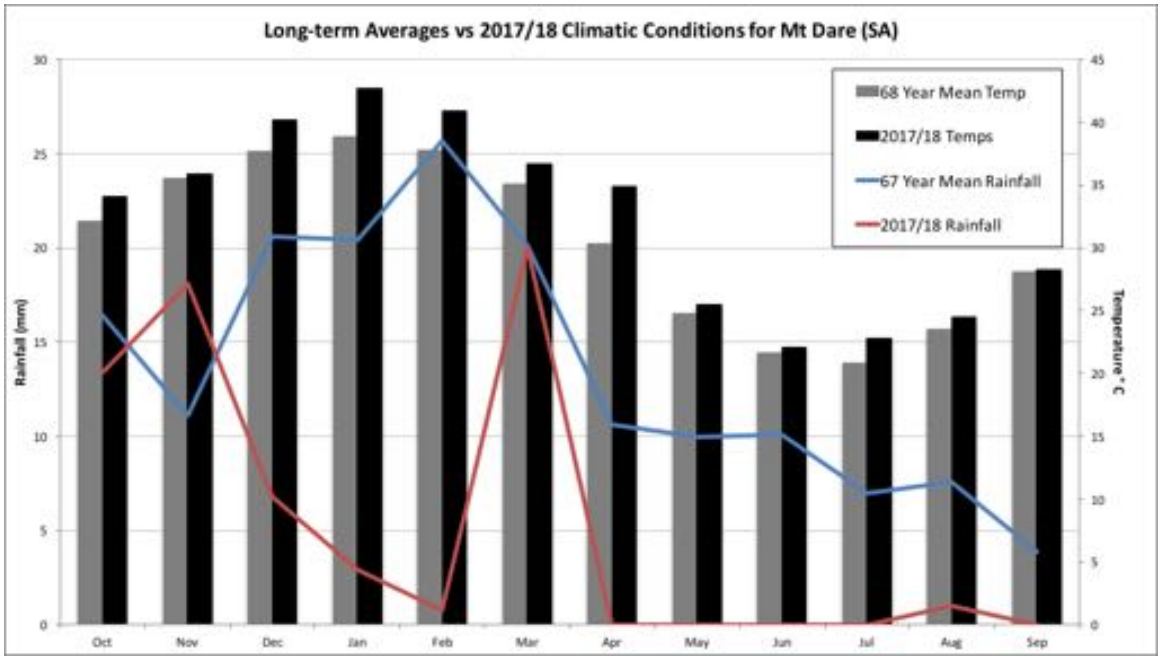

Figure 1: Comparative historical climate data for Mt Dare (SA)- Western Simpson Desert

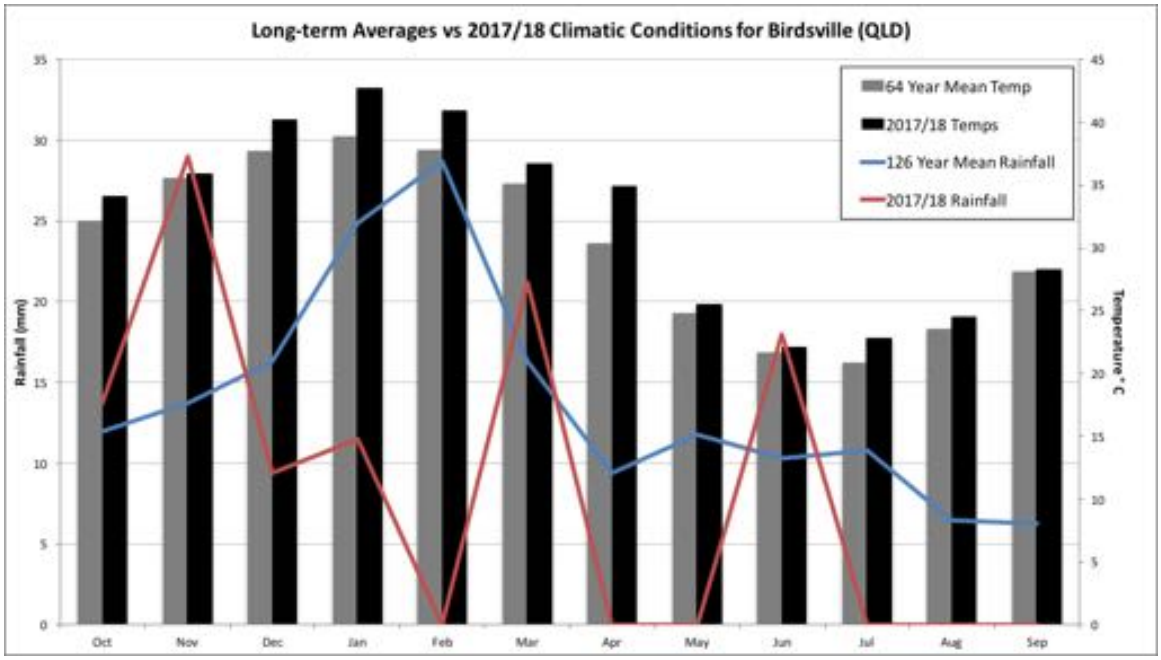

Figure 1: Comparative historical climate data for Birdsville (QLD)- Eastern Simpson Desert

3. Fauna Trapping, Active Search Results and Bird Sightings

Following average climatic conditions it was expected that most fauna species would be in low numbers, held up in small (possibly isolated) baseline populations or moving into and throughout the region to find more favourable conditions. Understanding how animals respond to these conditions, across various land systems, was the primary objective of these fauna surveys. We aimed to sample in areas where survey effort has been limited in the past. We intend to use these results to make predictions about boom-bust cycles in the region. This information can then be used to assist and inform adaptive land management decisions by the varying agencies that manage these areas (e.g. QLD National Parks).

A number of different techniques were used to survey fauna during the season. Trapping with pitfalls, belt transects, point counts, active search, and anecdotal observations were the predominant methods employed. Twelve pitfall traps were set at every overnight camp. Traps comprised 600mm length PVC pipes (150mm diameter) buried flush to the surface. We trialled a new collapsible pitfall design using thin sheets of PVC plastic and rubber plumbing rings - but these proved, for the most part, to be cumbersome and ineffective. The spatial configuration of the twelve traps was dependent on the terrain, but the most common arrangement was two perpendicular lines of six pitfalls. Each trap was spaced at 5m intervals, with a continuous length of aluminium mesh acting as a driftnet (approximately 30m in length) spanning each series of traps (Plate 2). Active searches using belt transects and point counts complimented this sampling regime, and included the exploration of other areas of interest (e.g. discrete microhabitats). Formal and anecdotal observations, including all scat, track, reptile and bird sightings, were verified and compiled on a daily basis.

Plate 2: A trap-line established in an open dune crest

Diagnostic and morphometric measurements were taken on all captured animals. The collection of this information was done swiftly and with care to ensure compliance with animal welfare regulations. All animals were released at the point of capture.

Mammals

Overall, a total of 13 species of mammals, both native and introduced, were recorded during the season (see Appendix 1). Of these, despite a total of 1308 pits being dug over the season only 4 species of small mammal (<200g) were captured using pitfall traps. Historical data for the Simpson Desert indicate 14 species of extant small mammal occur in the region, suggesting our surveys recorded a low proportion of known species.

Captured species included Sandy Inland Mouse (*Pseudomys hermannsburgensis*)(Plate 3), Spinifex Hopping Mouse (*Notomys alexis*), Hairy-footed Dunnart (*Sminthopsis hirtipes*) and Stripe-faced Dunnart (*Sminthopsis macroura*).

Climatic conditions for the previous 12 months have resulted in a period of low productivity and these results suggest that small mammal populations were in very low numbers throughout the landscape. Interestingly, in areas revisited, where some notable species were found to be in high numbers in 2016 and 2017 (e.g. Spinifex Hopping Mouse around the Hale River) these had reduced to baseline populations that proved difficult to detect. Furthermore, rodents made up the highest proportion of small mammals recorded. Dasyurids (carnivorous marsupials) are known to cope well with dry conditions, but their numbers were low also.

The Mulgara, a listed Vulnerable Species under the Environmental Protection & Biodiversity Conservation (EPBC) Act 1999 was recorded from tracks on a number of dune crests, suggesting isolated populations of this species in some regions.

Other native mammal species recorded were Red Kangaroo (*Macropus rufus*), Echidna (*Tachyglossus aculeatus*), Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) and Dingo (*Canis lupus dingo*), including a den of 3-4 week old pups (Plate 4).

Of note was the discovery of several piles of mammal scats on a broad stony swale in South Australia. The size of the scats suggest they belong to a (locally extinct) medium-sized mammal and the shape and location suggest the Greater Bilby (*Macrotis lagotis*) another listed EPBC Vulnerable Species. Samples were collected and need to be sent for analysis and correct identification. This would be a significant record as Greater Bilbies have not been recorded in the north-eastern portion of South Australia since 1931.

Plate 3: Sandy Inland Mouse, *Pseudomys hermannsburgensis*

Plate 4: A daytime crèche of dingo whelps

Birds

Bird numbers were low throughout the season. Activity was noticeably reduced compared to previous years and only 64 bird species were seen during the surveys (see Appendix 1). Similar to the patterns found for mammals it would appear birds were responding to the average climatic conditions. Of interest, the majority of birds seen were either generalist feeders (e.g. singing honeyeaters) or insectivores (e.g. fairy wrens). These foraging guilds have been found to be the most common component of bird communities during dry periods, whereas seed-eating (e.g. budgerigars) and nectar-chasing (e.g. pied honeyeaters) birds requiring specific resources tend to move away from poor conditions to find more favourable areas leaving them generally absent from most parts of the desert.

A number of wedge-tailed eagle nests were located throughout the season (Plate 5). None were found to be active, however some had evidence of activity within the last 12-24 months and a number of (regurgitated) pellets were collected for dietary analysis.

Plate 5: Wedge-tailed Eagle nest with camels resting at lunch

A noteworthy result was the recording of a number of Rufous-crowned Emu-wren by ADE Ornithologist Boyd Wykes. This species prefers stands of dense long unburnt spinifex - much of which has been absent in recent years (see Section 4).

Reptiles and Amphibians

Considering pitfall traps were open for only short periods during diurnal hours (mostly overnight), it is not surprising that reptile (and amphibian - it didn't rain!) captures were low. As such, the majority of our survey results come from active searches and anecdotal observations. Reptiles are known to reduce their activity during the cooler winter months in the region, and most frog species are absent (or buried in a state of torpor) unless free-standing water is available. Despite this, 18 reptile species were recorded during the surveys (see Appendix 2).

2. Introduced Animals

Cats and foxes were recorded across much of the traversed land systems visited. Track plots were established adjacent to pitfall trapping sites to record activity, and these suggest predators were in high abundance. Considering the impact of feral predators is highest during the 'bust' period - when native animals are in low numbers - these results are of concern (Plate 6).

Plate 6: Active fox den found amongst spinifex

Rabbits were present, albeit in low numbers, especially in the south-eastern portion of the desert (Plate 7). No rabbit activity was recorded on the western side of the desert.

Plate 7: Extensive (but inactive) rabbit warrens found on a gypsiferous inter-dunal swale

Feral camels were in relatively low numbers, compared to previous years. Small family groups were recorded on the western fringe, along with a number of lone bulls - obviously following the flush of ephemeral vegetation from late summer rains. Very few camels were recorded on the eastern side of the desert.

3. Plant Collections and surveys

Much of the Simpson Desert flora is comprised of expansive hummock grasslands with interspersed ephemeral or short-lived grasses and forbs. These ephemerals are mostly absent from the vegetation during dry times, and also tend to be small and inconspicuous. The below average rainfall preceding the treks meant that ephemeral forbs and grasses were in low numbers across most habitat types. Surveys on the western side of the desert where late summer rain had fallen in March provided the opportunity to collect and record some ephemeral species.

Specimens collected by ADE Botanist Charlie Nicholson have been lodged with the Northern Territory Herbarium in Alice Springs. Some seeds were collected and donated to the Olive Pink Botanical Gardens (Alice Springs).

a. Vegetation Transects

At each pitfall trapping site a 100m belt transect was measured to record plant species. All species along the 100m x 5m transect were recorded and given an overall abundance index, as well as all floristic (i.e. flowering and fruiting) aspects recorded. These provide a measure of species richness and resource abundance at each side. Results are used in the analysis of pitfall trapping data.

Over the survey season a total of 109 belt transects were established and measured.

b. Gidgee Profiling

In 2018 ADE began a joint research project with the University of Queensland looking at Georgina Gidgee (*Acacia georginae*). The project aims to look at:

1. Distribution of gidgee across the Simpson Desert
2. Extent and connectivity of gidgee stands
3. The morphometrics of gidgee trees
4. The botanical associations of gidgee stands
5. The animals using gidgee stands

Gidgee is restricted to the eastern half of the desert allowing data to be collected in the second half of the 2018 season only. Sites were established at most overnight camps during July, August and September. At each site a 100m x 10m belt transect was measured to look at morphometrics including tree height, densities, and canopy widths/depths. (Plate 8) Adjacent to these transects birds were also surveyed, using a standardised 15 minute point count over three independent locations.

Overall 569 trees were measured across 45 unique sites. These included sites on the far western and southern extents of gidgee distribution in the Simpson Desert. This data will be incorporated into a larger metadata set to be analysed (and added to) over the next two years. Initial interpretation of the results suggest stands with higher tree densities, in close proximity to adjacent groves are important habitat for birds within the dunefields, especially during periods of low productivity. These areas may be acting as dry period refuge sites from which birds (and other animals such as small mammals) can colonise the broader landscape with conditions become more favourable.

Plate 8: Typical gidgee stand used in diagnostics project

4. Fire

Following the significant rainfall events of 2010/11 the resulting productivity led to a mass accumulation of vegetative growth. Unfortunately this fuelled widespread wildfires in the summer of 2012, started by dry-storm lightening strikes (Figure 3). One of the aims of Project 138 has been to document the extent, impact and regeneration of these burnt areas.

A major finding of the last five years has been the demise of many fire-sensitive plant communities (e.g. Mulga *Acacia aneura*) especially on the western side of the desert, as well as the slow recruitment of spinifex (*Triodia* basedowii) in those areas severely burnt. Long unburnt spinifex appears to be restricted, and our survey results have found these areas are often isolated and fragmented.

Surveys this year support these findings. A number of good stands of spinifex were located and surveyed within the central parts of the desert, however, it does appear that it will be many more years before the distribution of spinifex will re-establish to pre-2012 extents and condition.

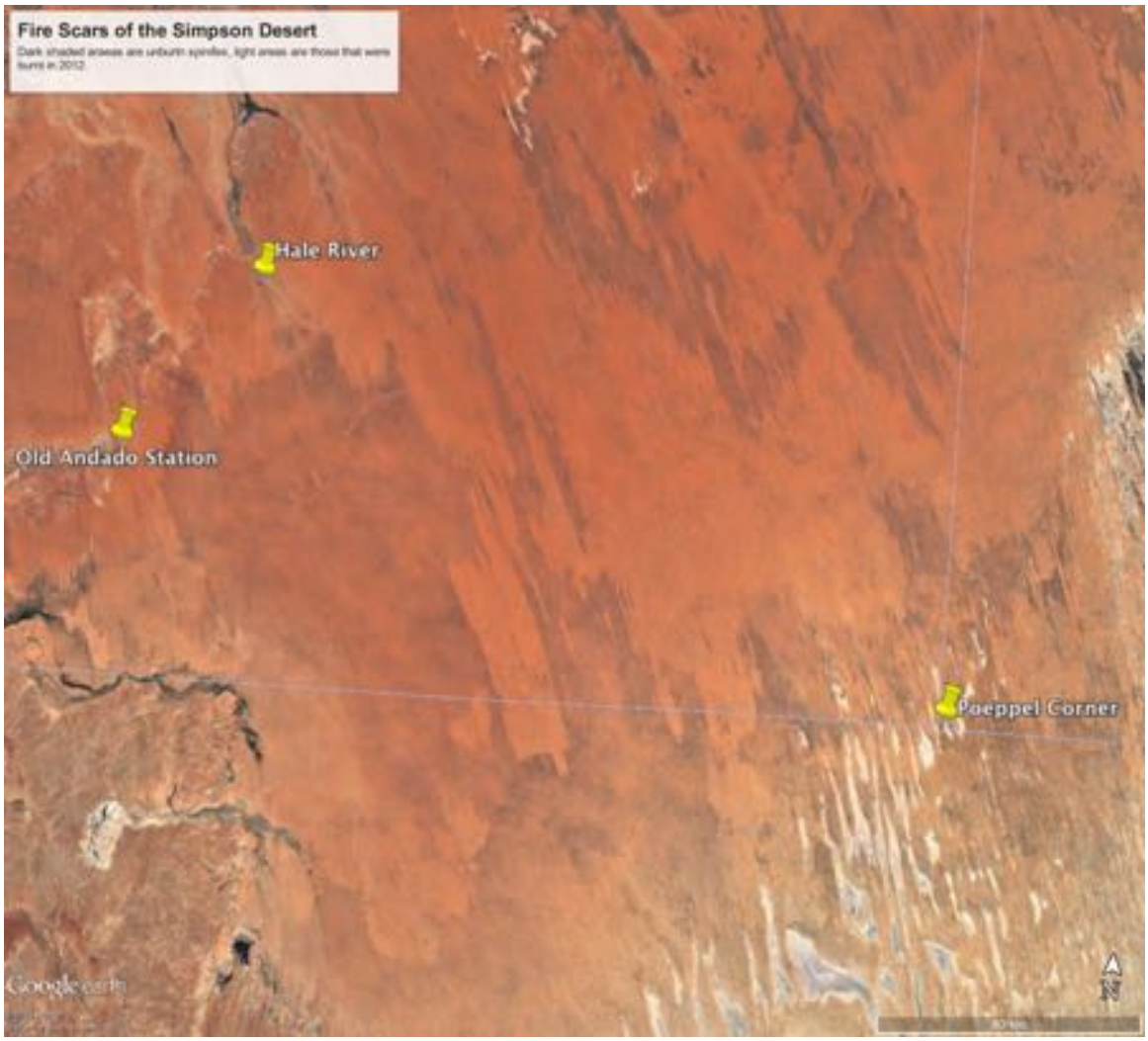

Figure 3: Fire scars of the Simpson Desert post 2012 wildfires

5. Discussion

The 2018 season was the final year of Project 138. The trekking program provided the opportunities to complete another west to east traverse of the Simpson Desert dunefields; to locate many areas previously unexplored or poorly surveyed; to revisit some areas of ecological interest; to begin a new collaborative research study.

The trajectory of the season's west-to-east transect filled in a number of gaps left by Project 138's 2014-2017 surveys. Most notably were the areas in South Australia south of the French and QAA lines (Figure 4). The area east of the K1 Line and adjacent to the Eyre Creek/Warburton River floodplain is especially of interest. This diverse mix of land-systems had not been surveyed previously and presented a fascinating landscape to walk through. Results suggest that these areas are important transition points for animals moving

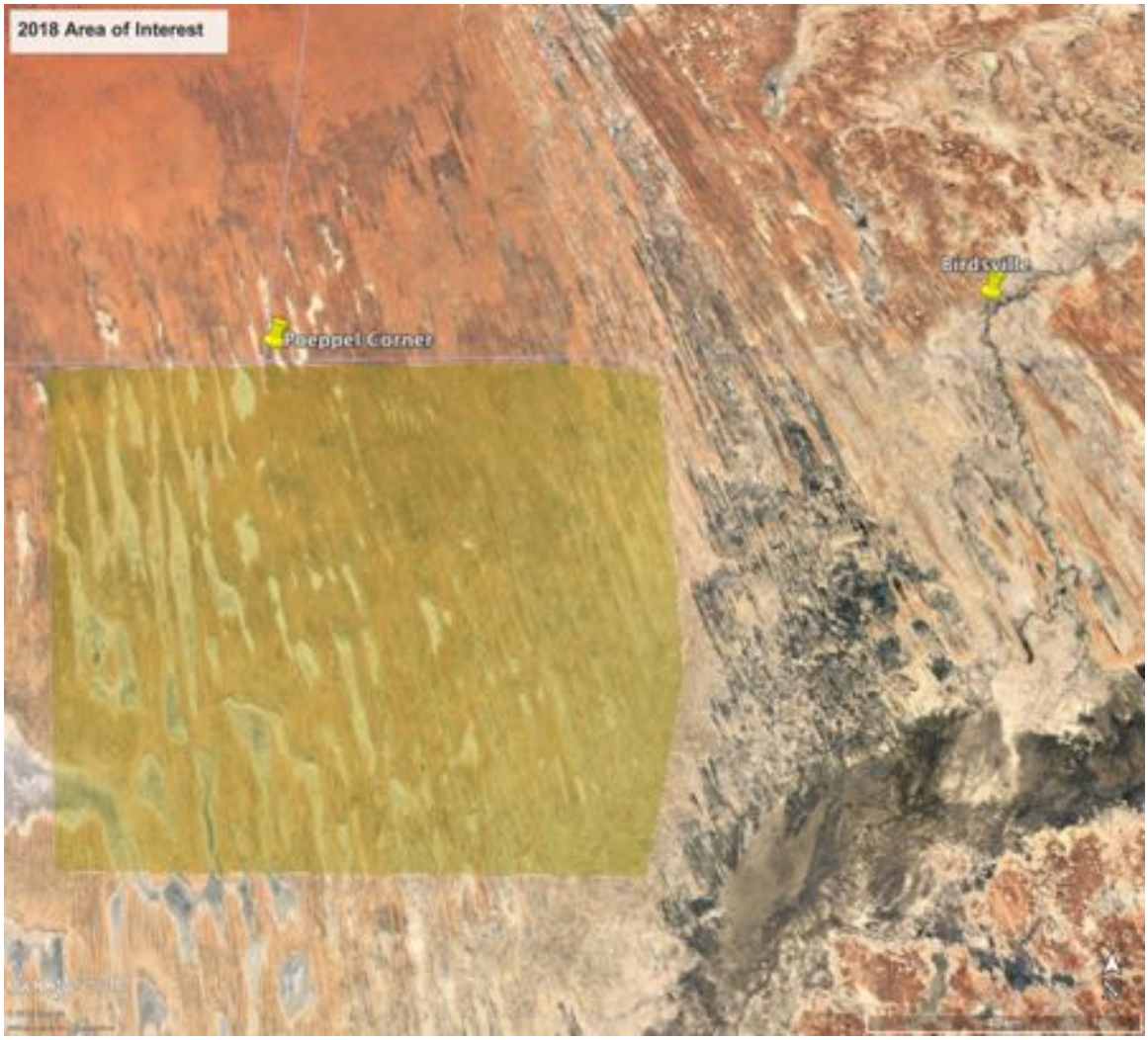

Figure 4: General survey area of the last third of 2018 season

between the varying land systems, and merits further investigation.

The commencement of the Gidgee Project with the University of Queensland is an exciting study that will extend the current knowledge base of an often overlooked yet important vegetation community. It has been projected (using historical and futuristic modelling) that Georgina Gidgee will be vulnerable to predicted climate change. If this vegetation community is an important dry-period refuge site for many species of animals it will be important to better understand its current attributes, distribution and extent. The results from our surveys will contribute significantly to these ends.

The overall paucity of captures and observations was, as noted, not unexpected given the current climatic conditions. Low numbers of animals is indicative of the 'boom-bust' cycle inherent in central Australia's desert regions. The physiological and behavioural adaptation

of the animals that were observed offer substantial insights into the resilience and fragility of these ecosystems. Considering ADE began Project 138 during the dry conditions of 2014/2015 and, has witnessed (and recorded) the subsequent spatial and temporal variability of large rainfall events throughout 2016/2017, the 2018 results are a fitting closure to the cyclical nature of these land systems.

It is hoped Project 138 will offer a significant contribution to the better understanding of the ecological dynamics of the Simpson Desert, and how to manage and conserve this remarkable and revered part of Australia for future generations.

Appendix 1. Fauna Records

Mammals

Tachyglossidae	
Tachyglossus aculeatus	Short-beaked Echidna
Canidae	
Canis lupus dingo	Dingo
Dasyuridae	
Dasycercus cristicauda	Mulgara
Sminthopsis hirtipes	Hairy-footed Dunnart
Sminthopsis macroura	Stripe-faced Dunnart
Macropodidae	
Macropus rufus	Red Kangaroo
Emballonuridae	
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat
Muridae	
Notomys alexis	Spinifex Hopping Mouse
Pseudomys hermannsburgensis	Sandy Inland Mouse

Introduced Mammals

Camelidae	
Camelus dromedaries	Dromedary Camel
Felidae	
Felis catus	Cat
Canidae	
Vulpes vulpes	Red Fox
Leporidae	
Oryctolagus cuniculus	Rabbit

Reptiles

Gekkonidae	
Gehyra purpurascens	
Gehyra variegata	
Heteronotia binoei	Bynoe's Gecko
Lucasium damaeum	Beaded Gecko
Lucasium stenodactylum	Sandplain Gecko
Rhynchodeura eyrensis	
Scincidae	
Ctenotus calurus	Blue-tailed Skink
Ctenotus regius	Royal Skink
Ctenotus taeniatus	
Menetia greyii	
Agamidae	
Ctenophorus clayey	Black-collared Dragon
Ctenophorus isolepsis	Military Dragon
Ctenophorus nuchalis	Central Netted Dragon
Ctenophorus pictus	Painted Dragon
Pogona vitticeps	Bearded Dragon
Varanidae	
Varanus gouldii	Gould's Sand Monitor
Elapidae	
Pseudonaja modesta	Ringed Brown Snake
Pseudonaja nucahlis	Western Brown Snake

Birds

Dromaius novaehollandiae	Emu
Anas gracilis	Grey Teal
Phaps chalcoptera	Common Bronzewing
Ocyphaps lophotes	Crested Pigeon
Geopilia cuneate	Diamond Dove
Eurostopodus argus	Spotted Nightjar
Haliastur sphenurus	Whistling Kite
Milvus migrans	Black Kite
Circus assimilis	Spotted Harrier
Aquila audax	Wedge-tailed Eagle
Falco cenchroides	Nankeen Kestrel
Falco berigora	Brown Falcon
Falco longipennis	Australian Hobby
Ninox boobook	Southern Boobook
Grus rubicunda	Brolga
Ardeotis australis	Australian Bustard
Himantopus himantopus	Black-winged Stilt
Charadrius australis	Inland Dotterel
Vanellus tricolor	Banded Lapwing
Turnix velox	Little Button-quail
Eolophus roseicapillus	Galah
Cacatua sanguinea	Little Corella
Nymphicus hollandicus	Cockatiel
Melopsittacus undulatus	Budgerigar
Chalcites basalis	Horsfield's Bronze-Cuckoo
Cacomantis pallidus	Pallid Cuckoo
Todiramphus pyrrhopygius	Red-backed Kingfisher
Malurus leucopterus	White-winged Fairy-wren
Malurus lamberti	Variegated Fairy-wren
Stipiturus ruficeps	Rufous-crowned Emu-wren
Amytomis goyderi	Eyrean Grasswren
Aphelocephala nigricincta	Banded Whiteface
Pardalotus rubricatus	Red-browed Pardalote
Pyrrholaaemus brunneus	Redthroat
Acanthiza uropygialis	Chestnut-rumped Thornbill
Certhionyx variegatus	Pied Honeyeater
Lichenostomus virescens	Singing Honeyeater
Lichenostomus penicillatus	White-plumed Honeyeater
Manorina flavigula	Yellow-throated Miner
Acanthagenys rufogularis	Spiny-cheeked Honeyeater
Epthianura tricolor	Crimson Chat
Epthianura aurifrons	Orange Chat
Sugomel niger	Black Honeyeater
Pomatostomus superciliosus	White-browed Babbler
Cinclosoma cinnamomeum	Cinnamon Quail-thrush
Psophodes occidentalis	Chiming Wedgebill
Pachycephala rufiventris	Rufous Whistler
Colluricincla harmonica	Grey Shrike-thrush
Oreoica gutturalis	Crested Bellbird

Artamus cinereus	Black-faced Woodswallow
Artamus superciliosus	White-browed Woodswallow
Cracticus tibicen	Australian Magpie
Rhipidura leucophrys	Willie Wagtail
Corvus coronoides	Australian Raven
Corvus bennetti	Little Crow
Petroica goodenovii	Red-capped Robin
Melanodryas cucullata	Hooded Robin
Cincloramphus cruralis	Brown Songlark
Cincloramphus mathewsi	Rufous Songlark
Cheramoeca leucosterna	White-backed Swallow
Hirundo ariel	Fairy Martin
Hirundo nigricans	Tree Martin
Dicaeum hirundinaceum	Mistletoebird
Taeniopygia guttata	Zebra Finch
Anthus novaeseelandiae	Australian Pipit