

Butterflies Report

Kiwirrkurra Indigenous Protected Area, Western Australia

6/9/15 – 18/9/15

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List of contributors

List of contributors to this report.			
Name	Institution/affiliation	Qualifications/area of expertise	Level/form of contribution
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Abstract

The Kiwirrkurra Indigenous Protected Area (IPA) is located near the eastern border of Western Australia, on the boundary of the Gibson Desert and Great Sandy Desert bioregions. The area was identified as a high priority for biological survey following CSIRO Gap Analysis. A Bush Blitz expedition to the IPA in September 2015 identified 15 species of butterflies from four families, and 1 species of day-flying moth. All were new records for the IPA. These collections are important because they significantly extend the ranges of some species and fill gaps in the ranges of others. The most significant collection was of *Candalides cyprotus*, which extends the range of this species by ~900 km. Several specimens of this species, both male and female, were collected at two sites – indicating that resident breeding populations occur in the area. Other substantial range extensions were also recorded. No EPBC-listed species were collected. Voucher collections are lodged in the Western Australian Museum.

1. Introduction

The Kiwirrkurra Indigenous Protected Area (IPA) was declared in September 2014. It extends from the northern edge of Lake Mackay, on the Northern Territory (NT) border, south to Lake Macdonald, and c. 300 km to the west, beyond Jupiter Well. The IPA lies in the far south-east of Western Australia's East Pilbara Shire. The IPA has an area of 45,867 km² and spans two IBRA bioregions: the Great Sandy Desert (c. 21,585 km²; subregion Mackay), which is well-represented in the National Reserve System, and the Gibson Desert (c. 24,193 km²; subregions Lateritic Plain and Dune Field), of which <10% is reserved. Kiwirrkurra IPA shares its southern boundary with the Ngaanyatjarra IPA and most of its eastern boundary with the Southern Tanami IPA, forming part of an extensive network of reserves and conservation areas in the central desert.

The climate of the Kiwirrkurra IPA is arid, with hot summers (January hottest; mean max. 40°C, mean min. 26°C), mild winters (June/July coolest, mean max. 23°C, mean min. 11°C), and an average annual rainfall of c. 220 mm (BOM data based on Kintore weather station, from 2000). The landscape is dominated by extensive spinifex (*Triodia* spp.) covered dunefields interspersed with laterised uplands and playas. Red sand dunes are typically E-W in orientation, with sandy swales c. 1 km wide between. Notable common plant taxa include *Grevillea stenobotrya* on dunes and *Corymbia chippendalei* on dune crests, with swales supporting shrubland (*Acacia*, *Grevillea* and *Hakea* spp. dominant) over spinifex. The reticulated dune fields around Jupiter Well support *Allocasuarina decaisneana* (Paltridge 2010; Tjamu Tjamu 2014).

Two large salt lakes (Mackay and Macdonald) lie on the eastern boundary of the IPA. A chain of smaller salt lakes occurs along a palaeodrainage channel running south-west of Jupiter Well, and a series of freshwater claypans occurs in dune swales to the south and west of Lake Mackay. These fill after periods of (usually localised) heavy rain. Gently undulating lateritic plains occur in the SW corner of the IPA, and support mulga shrubland over *Triodia basedowii*. There are a few low rocky ranges and hills (Pollock Hills and Angas Hills) dominated by spinifex (Paltridge 2010; Tjamu Tjamu 2014).

The IPA contains the Kiwirrkurra permanent settlement and several intermittently-used outstations, including Nyinmi and Marruwa, and is traversed from east to west by the Gary Junction Road (Paltridge 2010; Tjamu Tjamu 2014). Many Kiwirrkurra residents still engage in traditional land-use practices including hunting, gathering bush foods, patch burning, and fresh water harvesting (Paltridge 2010; Tjamu Tjamu 2014). The Tjamu Tjamu Aboriginal Corporation is highly supportive of integrating scientific and Indigenous knowledge, and fostering two-way learning opportunities between scientists and Traditional Owners, to accomplish land management aims and conservation strategies for the IPA.

Relatively little formal biological survey work has been conducted in the Kiwirrkurra IPA or nearby areas. A synthesis of biological knowledge about the IPA was produced by Paltridge (2010), summarising all known scientific data, derived from Nature Map (Department of Parks and Wildlife 2007–) and field trips undertaken by Desert Wildlife Services during 2000–2003. The survey of vascular

plants conducted during this Bush Blitz (Butcher et al., 2016) is particularly valuable in identifying the host plants on which butterflies breed.

There are no documented collections of butterflies from the Kiwirrkurra IPA, and relatively few from inland Western Australia. The only comparable study is that of Williams et al. (1996), who recorded butterflies from several inland sites several hundred kilometres to the south.

2. Methods

2.1 Site selection

CSIRO Gap Analysis and environmental modelling identified a number of target areas within the IPA, suggesting survey locations that sampled the full range of biophysical characteristics (soils, elevation, temperature, moisture, etc.). Prior to arrival, the area was explored using Google Earth and GIS imagery, including maps of tenure, base geology, soil categories, vegetation and fire history provided by Bush Blitz. Discussions were held with field botanists with experience in the region to identify landforms and habitats that should be targeted. As broad a range of habitats and vegetation communities as possible were selected for field sampling.

Two standard survey sites were established near Kiwirrkurra. The first was in dunefields to the north-east of the settlement, and the second in mulga woodland on a laterised plain to the south of the settlement. At both sites the area within and around the 20 × 20 m quadrat was searched for butterflies.

2.2 Collection methods

The majority of Lepidoptera observations and collections were made by the author, although other Bush Blitz team members reported some additional observations or collected specimens. Standard butterfly sweep nets were used to collect specimens, which were euthanased and papered in the field. Voucher specimens were either retained in papers or set at the base camp.

2.3 Identifying the collections

Collections were identified in the field or at the base camp, and confirmed at the conclusion of the expedition. The identifications and nomenclature conforms with Braby (2016). All voucher specimens collected from the Kiwirrkurra IPA in 2015 were lodged in the collection of the Western Australian Museum (WAM).

3. Results

Weather conditions during the survey period were good, with fine, sunny weather and low or moderate cloud cover. Targeted surveys were conducted at 8 sites, and opportunistically at various other locations, over the 11 day period 7–17 September 2015 (Tables 1, 2). Maximum temperatures were moderate (mid to high 20's C). Sampling effort at each site varied, with the largest effort at the Base camp, and sites WP930 and SSS2. The Base camp was sampled frequently simply because of the many opportunities available; the latter two sites, both located on red dunes, were targeted for additional survey effort because they produced the most diverse range of taxa. A total of 15 butterfly taxa from four families, and one day-flying moth, were recorded (Table 3; Fig. 1). Voucher specimens for all but three taxa were collected. No un-named taxa were recorded.

3.1 Named taxa newly recorded for the reserve

As there have been no previous records of butterflies from Kiwirrkurra IPA, all of the 16 taxa collected represent new records for the reserve.

3.3 Putative new species (new to science)

No new species were recorded.

3.4 Weed or pest species

No weed or pest species were recorded.

3.5 Vulnerable, threatened or endangered species

No EPBC-listed taxa were collected during this Bush Blitz.

Table 1. Targeted survey sites, Kiwirrkurra IPA, 7–17 September 2015.

Site name	Longitude Decimal degrees	Latitude Decimal degrees	Longitude Degrees, minutes, seconds	Latitude Degrees, minutes, seconds	Longitude Easting	Latitude Northing	Description
Base (Kiwirrkurra settlement)	127.765375° E	22.819577° S	127° 45' 55.4" E	22° 49' 10.5" S	373300	7475920	Settlement with exotic plants
SSS1	127.761357° E	22.859692° S	127° 45' 40.9" E	22° 51' 34.1" S	372924	7471478	Standard Survey Site - Mulga woodland
SSS2	127.834030° E	22.804469° S	127° 50' 25.1" E	22° 48' 16.1" S	380332	7477653	Standard Survey Site - Red sand dune
Snail alternate	128.157044° E	22.971021° S	128° 9' 25.4" E	22° 58' 15.7" S	414086	7459200	Rocky hill and adjacent sand plain
PW	128.099731° E	22.341646° S	128° 5' 59.0" E	22° 20' 29.9" S	407295	7529080	Red sand dune adjacent to salt pan
RL	128.403671° E	22.328360° S	128° 24' 13.2" E	22° 19' 42.1" S	438588	7530706	Sandplain adjacent to temporary freshwater lake
Walla Walla	127.641256° E	22.835744° S	127° 38' 28.5" E	22° 50' 8.7" S	360576	7474021	Rocky hills
WP930	127.635925° E	22.816519° S	127° 38' 9.3" E	22° 48' 59.5" S	360010	7476145	Red sand dunes

Table 2. Sampling dates of targeted survey sites, Kiwirrkurra IPA, 7–17 September 2015.

Site number	Site name	Sampling dates
1	Base (Kiwirrkurra settlement)	7–17 Sept 2015
2	SSS1	7 Sept 2015
3	SSS2	7, 10, 13 Sept 2015
4	Snail alternate	8 Sept 2015
5	PW	9 Sept 2015
6	RL	11 Sept 2015
7	Walla Walla	13 Sept 2015
8	WP930	15, 16 Sept 2015

3.6 Range extensions

As there have been no previous records of butterflies from Kiwirrkurra IPA, all of the taxa collected represent range extensions. While ten taxa (*Papilio demoleus*, *Belenois java*, *Eurema smilax*, *Danaus petilea*, *Lampides boeticus*, *Nacaduba biocellata*, *Ogyris ?amaryllis*, *Theclinesstes miskini*, *T. serpentatus*, and *Zizina otis*) were presumed by Braby (2016) to occur in the region, the remaining five (*Candalides cyprotus*, *C. delospila*, *C. erinus*, *Famegana alsulus*, and *Catopsilia ?pomona*) all represent collections outside their known or presumed ranges, as detailed below.

Candalides cyprotus occurs as two subspecies, *C. c. cyprotus* and *C. c. pallescens*. The specimens collected from Kiwirrkurra IPA conform with the subspecies *cyprotus*; the subspecies *pallescens* is restricted to south-eastern Qld and north-east NSW. *Candalides cyprotus cyprotus* has been recorded widely across southern Australia, south of about 27° S latitude (Braby, 2000). An outlying, northern

Figure 1. Voucher specimens collected at Kiwirrkurra IPA, 7–17 September 2015. Top row, L to R: *Papilio demoleus* x2; *Belenois java* x1; *Eurema smilax* x3. Second row: *Candalides cyprotus* x6 males; *Theclinessthes serpentata* x1 (not pinned). Third row: *Candalides cyprotus* x3 females; *Candalides delospila* x4; *Candalides erinus* x2. Bottom row: *Famegana alsulus* x2; *Nacaduba biocellata* x2; *Theclinessthes miskini* x3; *Zizina labrudus* x1; *Utetheisa pulchelloides* x1.



Table 3. Butterfly species recorded in Kiwirrkurra IPA, 7–17 September 2015. Species known to be highly dispersive or migratory in habit are indicated by *.

Family	Scientific name	Number of sites	Total number observed	Vouchers collected
Papilionidae	<i>Papilio demoleus</i> *	6	30	2
Pieridae	<i>Belenois java</i> *	1	1	1
	<i>Catopsilia ?pomona</i> *	1	1	-
	<i>Eurema smilax</i> *	4	9	3
Nymphalidae	<i>Danaus petilia</i> *	5	9	-
Lycaenidae	<i>Candalides cyprotus</i>	2	8	8
	<i>Candalides delospila</i>	1	4	4
	<i>Candalides erinus</i>	1	2	2
	<i>Famegana alsulus</i>	1	2	2
	<i>Lampides boeticus</i> *	1	1	-
	<i>Nacaduba biocellata</i>	4	6	2
	<i>Ogyris ?amaryllis</i>	1	1	-
	<i>Theclinessthes miskini</i>	5	28	4
	<i>Theclinessthes serpentata</i>	1	1	1
	<i>Zizina otis</i>	1	1	1
Arctiidae	<i>Utetheisa pulchelloides</i>	1	1	1

population was recorded at North West Cape by Williams et al. (1992). This record and that from near Queen Victoria Spring, 200 km E of Kalgoorlie (Williams et al., 1996), are the nearest known occurrences to Kiwirrkurra. These are located about 1,400 km to the west and 900 km to the south-west, respectively. The records from two sites in Kiwirrkurra IPA therefore represent a substantial range extension.

Candalides erinus has been recorded from north-western, northern, and north-eastern Australia, from North West Cape in the west to almost as far south as Newcastle in the east. Most records are from coastal or near-coastal areas, with an outlying inland record from the Selwyn Range in eastern Qld. The record from Kiwirrkurra IPA represents a range extension of about 600km from known occurrences, in the south-west and east of the Kimberley region.

Famegana alsulus is widespread across northern Australia, but with relatively few records from the inland. The record from Kiwirrkurra IPA represents a range extension of around 500 km from Hermannsburg, in the southern NT.

Candalides delospila occurs widely but sporadically in the dry tropics of northern Australia. In Western Australia it has been recorded from Balgo Hills, 300km to the north (Braby, 2000).

Catopsilia pomona occurs widely in northern Australia, and is well known as a migratory species. The single sight record, adjudged to probably be this species, represents a significant but not unexpected range extension. This record, however, requires confirmation.

In addition, *Zizina otis* has not previously been recorded from the arid inland areas of Western Australia, the eastern NT or north-west SA, and whereas Braby (2000) considered it to be absent from the Gibson, Great Sandy and Great Victoria deserts, he later (Braby, 2016) indicated it is likely to occur there. The record from Kiwirrkurra IPA represents a range extension of around 500 km from the nearest record in the central NT.

These range extensions are consistent with the relatively low collecting effort and poor understanding of butterfly distributions in the central desert region.

4. Discussion

The number and abundance of taxa observed far exceeded both expectations and previous records, and there were significant range extensions for several taxa. The sites situated on red sand dunes (SSS2 and WP930) produced the greatest diversity of butterfly records, and these dunes should be targeted during any future surveys.

Most butterflies breed on a single or narrow range of plant species. The distribution of butterflies therefore depends upon the distribution of these host plants. *Candalides cyprotus* breeds on several plant species (Braby, 2016), but only one known host occurs in the Kiwirrkurra IPA: *Hakea leucoptera*; *H. leucoptera* subsp. *sericipes* (Needlewood) was newly recorded for the region by Butcher et al. (2016). *Candalides erinus* has been recorded breeding on three species of *Cassytha*; one of these, *C. capillaris*, was newly recorded for the region by Butcher et al. (2016). *Cassytha capillaris* is also the only recorded host plant for *Candalides delospila*. Notably, *C. erinus* and *C. delospila* were recorded together at the same site (WP930), so it is likely that they breed on *C. capillaris* nearby. None of the recorded host plants of *Famegana alsulus* have been recorded in the Kiwirrkurra IPA, but three species of *Indigofera* (*I. georgei*, *I. linaei*, and *I. monophylla*) were recorded by Butcher et al. (2016) and one of these may be the host plant.

5. Conclusions

This was a highly successful Bush Blitz for butterfly collections. The time of year and collecting conditions were adjudged to be close to ideal for collecting butterflies in this region, and a wide range

of species were recorded. This suggests that these inland areas, in suitable conditions, are far richer in butterfly species than previously supposed.

Acknowledgements

I thank the Bush Blitz team for an excellent and professionally run expedition, Robby and Olive for sustenance, and the helicopter pilots for getting us there and back safely. Brian Hawkins made several valuable observations and collections that significantly enhanced this survey, and collected the two specimens of *Famegana alsulus*. Corey Whisson, Alan Yen, Conrad Bilney and Brian Hawkins assisted with surveys and provided good company during them. The efforts of Kate Crossing, Andrew Drennan, Boyd Wright and Rachel Paltridge in facilitating access to country and two-way learning opportunities with the Kiwirrkurra community were greatly appreciated. Yalti, Ishmael and Giselle kindly shared their knowledge of Maku.

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Appendices

Appendix 1. Butterfly records (number observed at each site), Kiwirrkurra IPA.

Family	Scientific name	Site							
		1	2	3	4	5	6	7	8
Papilionidae	<i>Papilio demoleus</i>	6		7	1	5	10	1	
Pieridae	<i>Belenois java</i>		1						
	<i>Catopsilia ?pomona</i>			1					
	<i>Eurema smilax</i>	6		1				1	1
Nymphalidae	<i>Danaus petilia</i>	2		2		1	3		1
Lycaenidae	<i>Candalides cyprotus</i>			4					4
	<i>Candalides delospila</i>								4
	<i>Candalides erinus</i>								2
	<i>Famegana alsulus</i>	2							
	<i>Lampides boeticus</i>								1
	<i>Nacaduba biocellata</i>			1	1	3			1
	<i>Ogyris sp. (?amaryllis)</i>			1					
	<i>Theclinesthes miskini</i>			23	1	2		1	1
	<i>Theclinesthes serpentatus</i>			1					
	<i>Zizina otis</i>			1					
Arctiidae	<i>Utetheisa pulchelloides</i>	1							

Appendix 2. 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: Matthew R Williams

Signed: 

Date: 6 September 2016