



Bodangora Wind Farm

Bird and Bat Adaptive Management Plan: Fourth annual report

**Prepared for Bodangora Wind Farm
Pty Ltd**

August 2023
Report No. 15124.8 (2.1)



**Nature
Advisory**

5/61-63 Camberwell Road
Hawthorn East, VIC 3123
PO Box 337, Camberwell VIC 3124
(03) 9815 2111
www.natureadvisory.com.au

Nature Advisory acknowledges the traditional owners and sovereign custodians of the land on which we work from – the Wurundjeri people of the Woi Wurrung language group. We extend our respect to their Ancestors and all First Peoples and Elders past, present, and future.

Contents

1.	Introduction	1
1.1.	Previous reporting	1
1.2.	Monitoring requirements	1
2.	Bird and bat incidental finds	4
2.1.	Operational guidance to staff and procedures	4
2.2.	Methodology	4
2.3.	Results.....	5
3.	Flying Fox monitoring.....	6
3.1.	Methodology	6
3.2.	Previous reporting and investigations.....	6
3.3.	Results.....	7
3.4.	Comparison between monitoring periods.....	7
4.	Carcass search program	9
4.1.	Methodology	9
4.1.1.	Carcass searches	9
4.1.2.	Incidental raptor monitoring	10
4.1.3.	Detectability trials.....	11
4.2.	Results.....	11
4.2.1.	Carcass searches	11
4.2.2.	Incidental raptor monitoring	11
4.3.	Discussion.....	16
5.	Impact triggers	18
5.1.	Yellow-bellied Sheathtail Bat	18
5.2.	Grey-headed Flying Fox	19
6.	Mitigation measures.....	21
6.1.	Application of mitigation measures during the monitoring period	21
6.1.1.	Removal of Carrion	21
6.1.2.	Control of Stock	21
6.1.3.	Pest Management	21
6.2.	Supplementary Mitigation Measures	22
7.	References	23

Tables

Table 1: Summary of Flying Fox records during inspections 7

Table 2. Turbine locations that were surveyed 9

Table 3: search radius for each monthly search 9

Table 4: Summary of bird and bat carcasses detected during the 2023 monitoring period 11

Table 5: Incidental raptor observations 13

Figures

Figure 1: Collection and Reporting process for incidental carcasses found at both wind farm sites 5

Figure 2: Diagram of search zone, transect width and search pattern at turbines 10

Figure 3: Raptor flight paths 15

Figure 4: monthly total bird mortalities January - June 2023 16

Figure 5: Monthly bat mortalities 17

Appendices

Appendix 1: Carcass record form 25

Appendix 2: Carcass search detailed data 26

1. Introduction

Nature Advisory Pty Ltd (formerly Brett Lane & Associates Pty Ltd) was commissioned by Iberdrola Pty Ltd to assist in the implementation of the Bird and Bat Adaptive Management Plan (BBAMP) (BL&A 2017) for Bodangora Wind Farm (BWF), located in New South Wales (NSW). BWF is in central NSW approximately 20 km northeast of Wellington, within the Dubbo Regional Council jurisdiction.

The BBAMP for BWF was approved in June 2017 and will operate for the life of the wind farm. Nature Advisory began implementing the BBAMP upon commencement of operation of BWF in June 2019 and the first two years focused on monitoring to inform impacts and mortality estimates on birds and bats at the wind farm. The results of this period were presented in annual reporting for the first 12 months (Nature Advisory 2020) and the first 24 months (Nature Advisory 2021d). This initial 24 months of monitoring informed and recommended the continued adapted BBAMP implementation. As such; during 2022, BWF staff reported any incidental carcasses and carrion removal occurrence, as per the second annual report recommendations, with results presented in the third annual report (Nature Advisory 2022a). Since then, consultations between BCS, BWF and Nature Advisory resulted in the decision to implement a third year of carcass monitoring using a scent detection dog (BCS 2022), which commenced in January 2023.

This report is the fourth annual report on BBAMP implementation for BWF during July 2022 – June 2023 and is based on the project Conditions of Consent, and outcomes of consultation with representatives from the NSW Office of Environment and Heritage (OEH) (Central West region) (now the Biodiversity, Conservation and Science Directorate (BCS)) under the Department of Planning, Industry and Environment (DPIE) (now the Department of Planning and Environment (DPE)).

1.1. Previous reporting

Annual reporting on implementation of the BBAMP, including refinements to the monitoring methods based on progress each year, are outlined below. Each annual report contains references to other subsequently required reporting, such as trigger investigations, the details of which can be found in the relevant reports below:

- Nature Advisory (2020) 'Annual Report on the Implementation of the Bird and Bat Adaptive Management Plan'. Consultant's report to Bodangora Wind Farm Pty Ltd, Report 15124 (20.0).
- Nature Advisory (2021) 'Bird and Bat Adaptive Management Plan – Second Annual Report'. Consultant's report to Bodangora Wind Farm Pty Ltd, Report 15124 (20.3).
- Nature Advisory (2022) 'Bird and Bat Adaptive Management Plan – Third Annual Report'. Consultant's report to Bodangora Wind Farm Pty Ltd, Report 15124.8 (1.1).

1.2. Monitoring requirements

The condition for approval C6 for BWF requires annual reporting as outlined below (BL&A 2017):

“(b) set out monitoring requirements in order to assess the impact of the project on bird and bat populations including details on survey locations, parameters to be measured, frequency of surveys and analyses and reporting;

(f) identify matters to be addressed in periodic reports in relation to the outcomes of monitoring, the application of the decision making framework, the mitigation measures identified, progress with the implementation of such measures, and their success.

The reports referred to under part (f) shall be submitted to the Secretary [of the Department of Planning and Environment (DPE)] and [Office of Environment and Heritage] OEH on an annual

basis for the first five years of operation and every two years thereafter (unless otherwise agreed to by the Secretary), and shall be prepared within two months of the end of the reporting period. The Secretary may, at the request of the Proponent at anytime, vary the reporting requirement or period by notice in writing to the Proponent.”

Monitoring during June 2022 - July 2023 was conducted to meet previous recommendations and BCS's requirements as outlined below:

- All incidental carcasses found shall be recorded on the appropriate record form and shall be removed after being photographed for species identification and stored where required.
- Any carcasses of threatened species (*Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Biodiversity and Conservation Act 2016* (BC Act) listed will be reported to BCS as soon as practicable but within two business days of the identification of species.
- BWF staff will identify the carcasses of impacted species, however, when there is uncertainty, carcass identification must be clarified with an expert prior to reporting.
- Wedge-tailed Eagle (WTE) (*Aquila audax*) mortalities to be documented photographically to ensure the age estimate can be recorded, and to be reported to BCS as soon as possible within five business days of species identification.
- Any rabbit warrens, sheep or kangaroo carcasses within close proximity of operating turbines continue to be monitored, controlled and carcasses swiftly removed (within 200 metres) where feasible and in consultation with the landowner.
- No lambing 200 metres of turbines, where feasible, and in consultation with the landowner.
- Targeted Little Red Flying Fox (LRFF) (*Pteropus scapulatus*) and Grey-Headed Flying Fox (GHFF) (*Pteropus poliocephalus*) surveys including:
 - Monthly inspections of the known camp in Wellington to determine LRFF and GHFF presence. These surveys were conducted by a Nature Advisory staff member proven competent in Flying Fox identification. Results must be maintained in a log-book or database for submission as part of annual reporting. Additionally, in the event LRFF are observed to return, the following actions need to be undertaken:
 - BCS will be notified within two business days of presence and estimated numbers at the Wellington camp;
 - Carry out nocturnal surveys within the wind farm to determine presence, flight paths, and occupation by Flying Foxes;
 - Assessment of the floral resources on site and in the surrounding areas; and
 - Undertake additional carcass searches to determine high-risk turbines.

Discussion with BCS resulted in recommendations to continue monitoring impacts to avifauna at BWF through a third year of carcass searches. This began in January 2023 and as a result, only data collected up until June 2023 is available to present in this annual report. The carcass searches will continue until December 2023 and data will be presented in the fifth annual report, unless requested otherwise.

- Monthly carcass searches (out to 60m to target small carcasses) and searches every 4 months out to 100 m (to detect WTE) using the scent detection dog (Nature Advisory 2022a, BCS 2022).
- Incidental raptor monitoring has also been undertaken opportunistically to provide additional data on presence and activity of raptors on site.
- Matters to be addressed in the annual reports must include:
 - Report on outcomes of the above monitoring activities;

- Summary of any events recorded as a significant impact;
- Report on status of rabbit warrens, lambing and kangaroo/sheep carcasses in close proximity of the turbines. Details on how many carcasses removed from within 200 metres of turbines;
- Report on results of the Flying Fox camp monitoring and any related/consequent surveys at BWF
- Need for mitigation measures;
- Progress with implementation of mitigation measures;
- Effectiveness of mitigation measures;
- Discussion on overall trend in results as the years go by including changes in species seen, or carcasses found; and
- Reference significant results from previous years.

This annual report includes the following sections:

Section 2 provides bird and bat incidental mortalities.

Section 3 flying fox monitoring methods and results.

Section 4 continued carcass search program method, results, and discussion.

Section 5 Summarises impact triggers that have occurred during this monitoring period.

Section 6 provides information and results of mitigation measure implementation.

This investigation was undertaken by a team from Nature Advisory, comprising Jess Johnson (Zoologist and Dog Handler), “Kitty” Scent Detection Canine, Rebecca Spence (Zoologist and Project Officer), Jackson Clerke (Senior Ecologist and Project Manager) and Bernard O’Callaghan (Director).

2. Bird and bat incidental finds

On-going recording and reporting of bird and bat incidental carcasses were required to be undertaken in 2021/2022 in accordance with annual reporting requirements.

2.1. Operational guidance to staff and procedures

BWF has adopted a standard methodology, based on the BCS protocol, for field staff to collect incidental records. This is illustrated in ***Infigen is now Iberdrola Australia Pty Ltd**

Figure 1. Elements include:

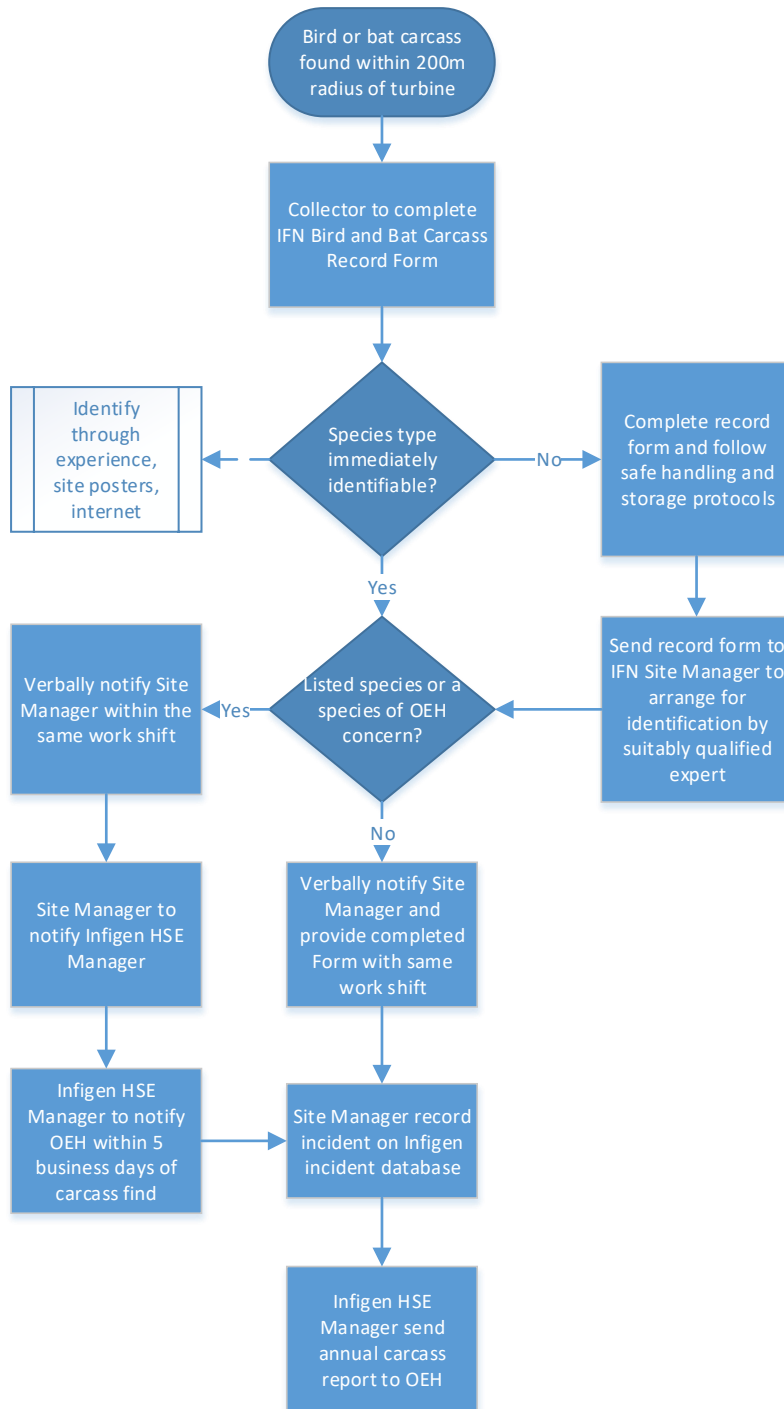
- Any bird or bat carcass (or scavenged remains i.e., wing, skeleton, leg etc) or feather spot (i.e., 10 or more feathers or 2 or more primaries) encountered incidentally on site should be recorded.
- All site personnel shall follow this guidance, including contractors. It contains the requirements of the BCS's recommended methodology for incidental finds of dead or injured birds and bats or feather spots.
- A copy of the requirements shall also be posted on the site noticeboard.
- All carcasses, feather spots or injured birds or bats encountered within 200m of a turbine outside of formal searches are considered as incidental fatalities.
- All incidental finds of injured and dead bats and birds within the site must be identified, recorded, and reported to BCS.
- Familiarisation training through site induction, toolbox talk or other appropriate forum, shall be provided to all site personnel, including BWF's contractors, to ensure they are equipped with the understanding and knowledge required with respect to the appropriate protocols for reporting injuries and fatalities and handling injured animals and carcasses.

2.2. Methodology

1. Photograph the carcass where it is found and record all details on the Bird and Bat Carcass sheet (Appendix 2).
2. Complete carcass record sheet prior to removing the carcass.
3. Wear protective latex or rubber gloves to remove or mark the carcass once details have been recorded to avoid recounting (if within 200m of a turbine it must be removed). Only dispose of carcass if the species can be readily identified. If the species cannot be readily identified, then the carcass must be placed in a sealed plastic bag or appropriate container and clearly labelled before storing in the on-site dedicated freezer so that it can be preserved until it is identified by a suitably qualified expert. Once identified, it can be appropriately disposed of.
4. Inform the BWF Site Manager and provide a copy of the record sheet before the end of the same working shift.
5. BWF Site Manager to record finding on the incident management system and notify the Iberdrola HSE Manager who shall notify the appropriate authorities as required.
6. All alive, but injured wildlife, must be transported to the nearest veterinary clinic.

Notifiable matters include any carcass, feather-spot or injured bird or bat of a threatened species or WTE. The relevant representative of the NSW BCS is to be notified as soon as practicable by email, within maximum two business days (for threatened species), after species identification. Details must be emailed to the BCS Central West Planning Team.

Infigen Bird and Bat Carcass Find – Collection and Reporting Process



Last updated by A. McCormack 07/01/2016

***Infigen is now Iberdrola Australia Pty Ltd**

Figure 1: Collection and Reporting process for incidental carcasses found at both wind farm sites

2.3. Results

In this reporting period 2022/2023, one incidental find was recorded of a Grey-headed Flying Fox. This is discussed further in Section 5.2.

3. Flying Fox monitoring

Previously, LRFF and GHFF were found to have collided with turbines at BWF and were documented flying through the site to obtain floral resources during nocturnal spotlighting surveys (Nature Advisory 2019, Nature Advisory 2021b). Subsequently, BWF has been monitoring the Flying Fox camp at Wellington on a weekly (August-November 2021) or fortnightly (March-August 2022), and Nature Advisory has monitored the camp monthly from January 2023.

The results of the monitoring efforts specified above are summarised below.

3.1. Methodology

The daytime inspections of the Flying Fox camp at Wellington consisted of the following:

- A visit to the location of the Flying Fox camp at Wellington during the day, on a weekly or fortnightly basis;
- Inspection of the camp location for the presence of Flying Foxes
- If Flying Foxes are present, identification of which species are present, and estimation of numbers present

The presence of Flying Foxes at the Wellington camp would trigger the following:

- A notification of presence of the Flying Foxes, which species are present, and their estimated numbers to BCS

If the Flying Foxes were found to be LRFF, this would trigger:

- Nocturnal spotlighting surveys to determine Flying Fox presence, flight paths and occupation at BWF.
- Assessment of floral resources at BWF and the surrounding areas that could potentially attract the Flying Foxes and induce them to fly into or through the site
- Additional carcass searches to identify high-risk turbines

Since the carcass search program commenced in January 2023, zoologists from Nature Advisory have undertaken inspection of the flying fox camp on a monthly basis:

- A daytime visit to the location of the Flying Fox camp at Wellington during the day, on a monthly basis; and
- If Flying Foxes are present, identification of which species are present, and estimation of numbers.

3.2. Previous reporting and investigations

Reporting on investigations into flying fox activity and presence at Wellington and BWF is presented in the following reports:

- Nature Advisory 2019, Bodangora Wind Farm BBAMP Implementation: Grey-headed Flying-Fox Field Investigation – Part II, Report no. 15124 (7.1) prepared for Bodangora Wind Farm Pty Ltd.
- Nature Advisory 2021a, Bodangora Wind Farm - Impact Trigger Lighting Trial Little Red Flying-fox (*Pteropus scapulatus*) (LRFF), June 2022 Nature Advisory Ref 15124.6 (3.0) – Report 15124 (26.0). Letter to Michael Bullock, Bodangora Wind Farm.
- Nature Advisory 2021b, Bodangora Wind Farm: Little red flying-fox Impact Assessment Report, Report no. 15124 (23.1) prepared for Infigen Energy Limited, April 2021
- Nature Advisory 2022, 'Bird and Bat Adaptive Management Plan – Third Annual Report'. Consultant's report to Bodangora Wind Farm Pty Ltd, Report 15124.8 (1.1).

A summary is provided below:

Nature Advisory has conducted targeted Flying Fox surveys and investigations at BWF in 2019 and 2021. These consisted of intensive carcass searches to identify high-risk turbines, monitoring of the Flying Fox camp flyout to determine the numbers present and understand the proportion headed towards BWF, nocturnal spotlighting surveys to determine flight paths used and occupancy on site, and assessment of nature, extent, location, and duration of floral resources that could attract them to fly into or through BWF. Additionally, in 2021 a trial was held to determine if lights around turbines could reduce collisions (Nature Advisory 2021a).

There were roughly 500 GHFF present at the Wellington camp during the 2019 impact trigger and 2500 present during the 2021 impact trigger. LRFF were only present at the camp during the 2021 impact trigger, when they numbered about 50,000 individuals. GHFF were found to be flying into BWF to access heavily flowering clusters of White Box in 2019, and both LRFF and GHFF were found to be flying through BWF to access heavily flowering clusters of Red Ironbark trees in 2021. The locations of high-risk turbines were dependent on the locations of these trees within and at the periphery of BWF.

Flying foxes were found at the Wellington camp in mid-May 2022, but were not identified to a species level. The observer has stated an estimated 500 individuals were present. BCS Dubbo were notified of this on 19th May 2022. The flying foxes have been observed departing from the camp in the evening and flying southeast towards Burrendong Dam, not northeast towards BWF. Monitoring continued to note their flight path from the Wellington camp, and it did not appear to have changed. It was subsequently noted that during heavy flooding activity around Wellington during July 2022 and onwards cause the camp to disperse.

3.3. Results

No Flying-Foxes were observed at the Wellington camp during January and February 2023 inspections. In March, approximately 100 Grey-headed flying fox were recorded on two consecutive days and were observed flying north-east over Macquarie Bridge in the direction of BWF. In April and May 2023, more than 500 individuals were observed above Macquarie Bridge flying north-east in the direction of BWF. In June, approximately 2,500 GHFF were observed flying north-east in the direction of BWF.

Table 1: Summary of Flying Fox records during inspections

Inspection date	Location	No. Observed	Species
25/01/2023	Wellington Camp	0	N/A
26/01/2023	Wellington Camp	0	N/A
2/02/2023	Wellington Camp	0	N/A
28/03/2023	Wellington Camp	Approx. 100	Grey-headed flying fox (<i>Pteropus poliocephalus</i>)
29/03/2023	Wellington Camp	Approx. 100	Grey-headed flying fox (<i>Pteropus poliocephalus</i>)
12/04/2023	Wellington Camp	>500	Grey-headed flying fox (<i>Pteropus poliocephalus</i>)
23/05/2023	Wellington Camp	>500	Grey-headed flying fox (<i>Pteropus poliocephalus</i>)
27/06/2023	Wellington Camp	Approx. 2500	Grey-headed flying fox (<i>Pteropus poliocephalus</i>)

Previously identified foraging resources on site were inspected to determine the flowering status. White Box (*Eucalyptus albens*) patches were visited on site from May – June 2023 and identified that some patches, but not all, had some flowering around the bases of the tree, but that this was not prolific. This indicated late stages of the flowering period.

3.4. Comparison between monitoring periods

Following the initial impact trigger in 2019, inspections were conducted at Wellington camp in June and July 2019 with approximately 500 GHFF identified roosting at the camp (Nature Advisory 2019). There

were patches of White Box on site observed to be heavily flowering, likely attracting GHFF to the site to forage (Nature Advisory 2019).

Following the LRFF impact trigger in 2021, there were inspections of the Wellington camp between March and June with a result of 2,500 GHFF observed to be present and a peak population of approximately 50,000 LRFF recorded flying in the direction of BWF (Nature Advisory 2021b). In June 2021, the camp was observed to be abandoned by both species. According to the site manager, the box-ironbark woodland present at the eastern end of BWF flowered again in spring in 2021, but it was not as abundant as it was earlier in the year during the 2021 LRFF impact triggers (Michael Bullock, pers. comm). No flying fox mortalities were detected incidentally by BWF staff in spring 2021.

About 500 individuals of unidentified species were recorded mid-May 2022, and they largely appeared to be flying southeast towards Burrendong Dam, not northeast towards BWF. This is far smaller than during the Flying Fox inspections in 2021, when there was a total of roughly 52,500 individuals (2500 GHFF and 50,000 LRFF) and it is highly likely that these were GHFF. The camp was reportedly abandoned by the flying fox again during flooding condition around July in 2022. No incidental records or impact triggers for GHFF or LRFF were reported during that period.

In 2023, there are similar results of GHFF camp size to inspections compared to inspections conducted in 2021 after the LRFF impact trigger (2,500 GHFF). However, there have been no LRFF recorded at the camp. Nature Advisory staff visited White Box eucalypt patches on site between May and June 2023 and identified that some patches, but not all, had flowering around the bases of the trees. The flowering was considered relatively light and was diminishing by the June 2023 inspection.

4. Carcass search program

This section outlines the methods for the continuation of the carcass search program at BWF

4.1. Methodology

4.1.1. Carcass searches

Mortality detection was undertaken at the same 17 turbines monitored during the initial 24-month monitoring program at BWF (Table 2). Each turbine is searched to a radius of 60 metres monthly except every fourth month, which is searched to 100 metres (Table 3).

Table 2. Turbine locations that were surveyed

Turbine number	Turbine Number
T02	T19
T04	T20
T05	T23
T07	T24
T09	T25
T12	T30
T13	T31
T14	T33
T15	-

Table 3: search radius for each monthly search

Search month	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
Radius (m)	100	60	60	100	60	60	100	60	60	100	60	60

Methods for carcass searching during the third year utilise a scent detection dog and handler team rather than trained human only searchers to identify mortalities under turbines, as was used during the initial 24 months of monitoring. The search pattern is conducted by the handler walking 20 metre transects, into or across the wind direction (depending on terrain), over the search radius and controlling the highly trained scent detection dog to find any birds and bats either side of each transect. Figure 2 provides a representation of the search method.

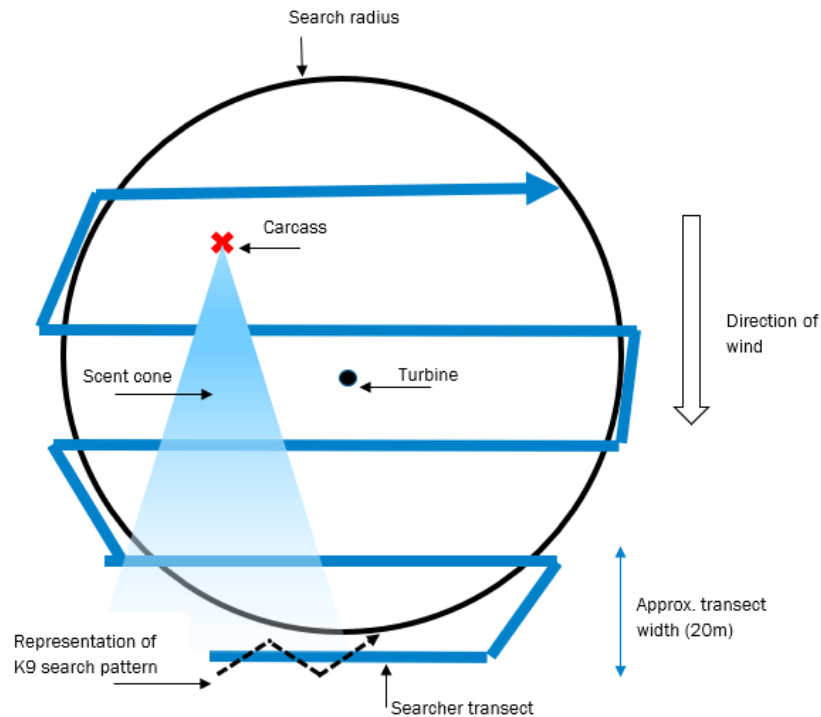


Figure 2: Diagram of search zone, transect width and search pattern at turbines

The dog's position regarding the search radius is tracked in real time via a hand-held GPS unit linked to a GPS tracking collar fitted to the dog. The searches were undertaken by one experienced zoologist and dog handler from Nature Advisory. All search tracks of the human and dog were recorded via GPS, which can be made available on request.

When a dead bird or bat was recorded under a turbine, a report was completed (Appendix 1) and a photograph of the carcass was taken. When only feathers were recorded this was recorded as a feather spot. It is likely that feather spots represent a bird that collided with a turbine and was later scavenged. Finds are removed to avoid recounting in subsequent searches and stored in a freezer on site.

4.1.2. Incidental raptor monitoring

Incidental raptor monitoring was undertaken during monthly carcass searches in order to assess utilisation of BWF. Observations were taken opportunistically using binoculars while conducting carcass searches under turbines and while traversing the site.

Information recorded included;

- Date, locations and duration of observation period,
- Time and duration of observation
- Number and age of birds
- Flight height above ground
- Habitat over which the flight was observed
- Flight behaviour,
- Other occasional behaviours,
- Nest locations of WTE.

Flight paths were plotted on maps.

4.1.3. Detectability trials

Detectability trials are intended to determine the probability with which the searcher is likely to detect a carcass on the ground. All personnel who have carried out monthly mortality searches at BWF will undertake detectability trials. The searcher is referred to as the person who regularly undertakes the mortality detection. The assessor is the person who sets up the trials and assesses the searcher.

Detectability trials (as per the BBAMP Section 3.2.5) to determine the efficiency of the detection dogs at BWF. Scavenger trials will not be repeated, as data collected to date is considered sufficient.

Detectability trials will be scheduled to be undertaken in the third year of monitoring between July – December 2023, and will be reported in the Fifth Annual Report.

4.2. Results

4.2.1. Carcass searches

A total of 42 bird and bat carcasses were found comprising of 12 bird carcasses and 23 bat carcasses during formal searches from January – June 2023. Out of the 18 bird records there were nine feather spots and three carcasses could not be identified due to decomposition or a lack of identifying features remaining due to scavenging. A total of six bat carcasses could not be identified due to the same issues. Table 4 presents the results of carcass searches and detailed carcass data is provided in Appendix 2.

Table 4: Summary of bird and bat carcasses detected during the 2023 monitoring period

Common Name	Scientific Name	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
Birds							
Australian Noisy Miner	<i>Manorina melanocephala</i>		1				
Brown Falcon	<i>Falco berigora</i>				1		
Galah	<i>Eolophus roseicapilla</i>						2
Musk Lorikeet	<i>Glossopsitta concinna</i>					1	1
Nankeen Kestrel	<i>Falco cenchroides</i>				1	1	1
Unknown Bird spp.	NA						3
Bats							
White Striped Freetail Bat	<i>Austronomus australis</i>	2		3			
Little Forest Bat	<i>Vespadelus vulturnus</i>		3		1	1	
Chocolate Wattled Bat	<i>Chalinolobus morio</i>		2				
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>		1				
Chalinolobus spp.	<i>Chalinolobus spp.</i>		1				
Southern Freetail Bat	<i>Mormopterus planiceps</i>			1	1		
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>			1			
Unknown Bat spp.	NA		5	1			
Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>					1	

4.2.2. Incidental raptor monitoring

Four species of raptors were recorded date the wind farm site during the monitoring period from January – June 2023. The data for each raptor flight is presented in Table 5: Incidental raptor observationsTable

5 and Figure 3. No listed species have been recorded in this survey period and all raptor species recorded were common farmland/grassland/ woodland species of NSW.

Table 5: Incidental raptor observations

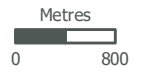
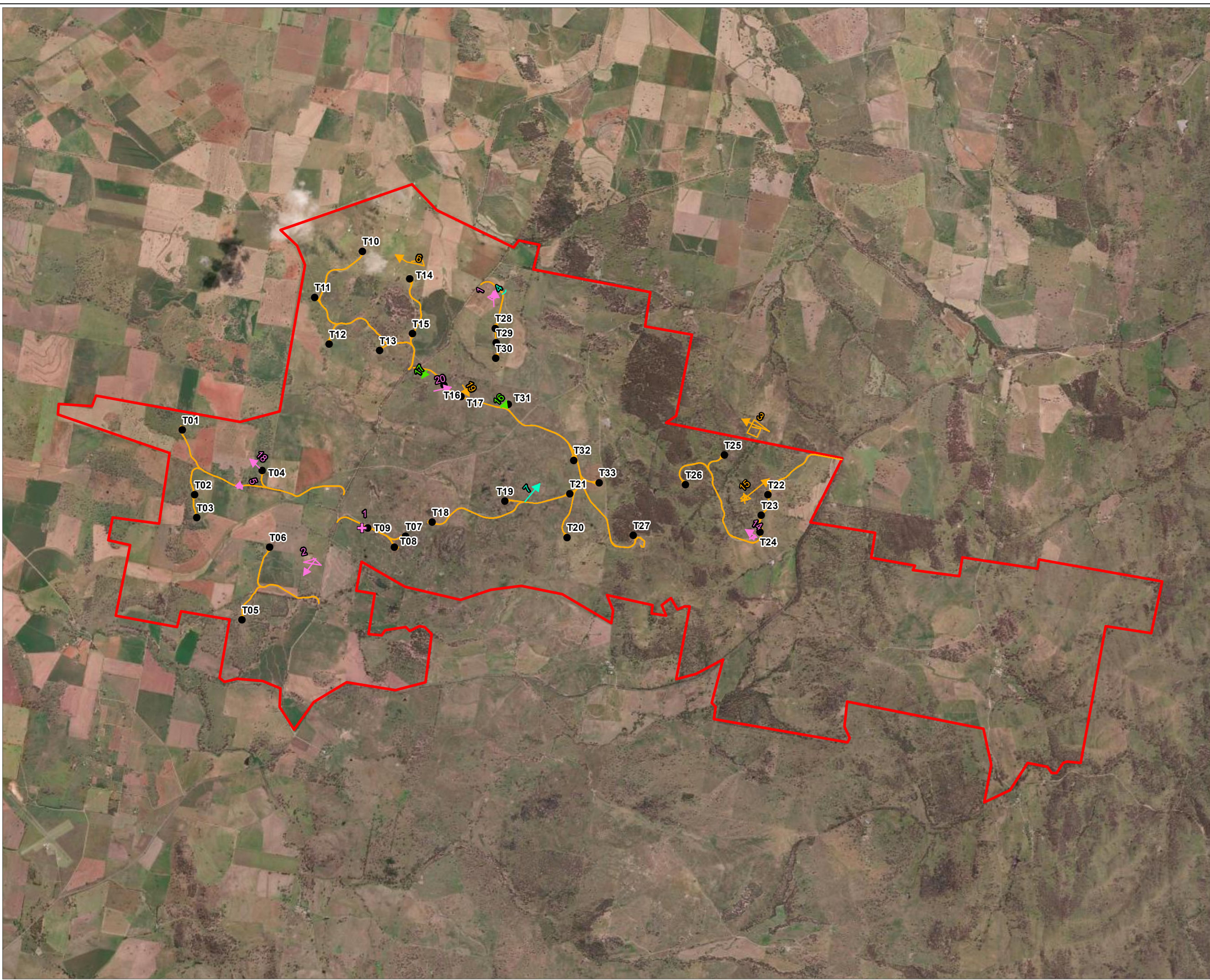
Flight no.	Species	Scientific name	Date	Start time	End time	Species count	Height	Flight Direction	Duration (min)	Comments
1	Brown Falcon	<i>Falco berigora</i>	24/01/2023	12:05	12:06	1	25m	NW	1	direct flight for about 50m
2	Brown Falcon	<i>Falco berigora</i>	24/01/2023	13:30	13:31	1	10m	-	1	Perched
3	Wedge-tailed Eagle	<i>Aquila audax</i>	25/01/2023	10:00	10:05	1	200m	SE	5	soaring in updraft. Seen from T30
4	Brown Falcon	<i>Falco berigora</i>	26/01/2023	10:47	10:48	1	6m	NE	1	flew into tree near T16 and perched
5	Brown Falcon	<i>Falco berigora</i>	2/03/2023	14:04	14:07	1	50m	N	3	powered flight, and then glided in circles
6	Brown Falcon	<i>Falco berigora</i>	2/03/2023	14:32	14:34	1	60m	SW	1	glided in a single circle then powered flight
7	Wedge-tailed Eagle	<i>Aquila audax</i>	3/03/2023	10:58	10:59	1	150m	NW	1	glided in circles
8	Black-shouldered Kite	<i>Elanus axillaris</i>	28/03/2023	-	-	1	-	-	-	-
9	Brown Falcon	<i>Falco berigora</i>	23/05/2023	14:28	14:35	1	30-50m	SE	7	Circling
10	Wedge-tailed Eagle	<i>Aquila audax</i>	23/05/2023	16:10	16:15	1	200m	NW	5	Soaring
11	Black-shouldered Kite	<i>Elanus axillaris</i>	23/05/2023	11:40	11:41	1	5-100m	NE	1	Powered (flapping) flight
12	Brown Falcon	<i>Falco berigora</i>	23/05/2023	14:45	14:48	1	50-100m	E	3	Gliding
13	Wedge-tailed Eagle	<i>Aquila audax</i>	23/05/2023	15:30	15:34	2	200m	S	4	Soaring
14	Nankeen Kestrel	<i>Falco cenchroides</i>	27/06/2023	7:35	7:36	1	2.5m	NE	1	Perched on post then flew North, adjacent to T31 for approx. 100m
15	Nankeen Kestrel	<i>Falco cenchroides</i>	27/06/2023	8:27	8:28	1	2.5m	S	1	Perched on post then flew South towards woodlands
16	Brown Falcon	<i>Falco berigora</i>	25/07/2023	13:25	13:27	1	15m	SW	2	Was hovering, then got chased south by other birds (ravens)
17	Wedge-tailed Eagle	<i>Aquila audax</i>	26/07/2023	10:19	10:25	1	100m	W	6	Circling over woodlands then soared really high
18	Wedge-tailed Eagle	<i>Aquila audax</i>	26/07/2023	10:33	10:35	1	150m	N	2	Gliding parallel to ridge, could be same individual as previous observation

Flight no.	Species	Scientific name	Date	Start time	End time	Species count	Height	Flight Direction	Duration (min)	Comments
19	Nankeen Kestrel	<i>Falco cenchroides</i>	26/07/2023	10:58	11:01	1	30m	W	3	hovering, then glided, hovered again, then glided and hovered
20	Nankeen Kestrel	<i>Falco cenchroides</i>	23/08/2023	12:42	12:44	1	1m	W	2	Sitting on a rock, then flew to fence post, the flew west
21	Nankeen Kestrel	<i>Falco cenchroides</i>	23/08/2023	12:48	12:49	1	-	SW	1	Likely to be the same Kestrel as Obs1, hovering then flew 10m, hovered again

Figure 3: Incidental raptor observations from January 2023- June 2023

Project: Bodangora Wind Farm
Client: Iberdrola Australia Pty Ltd
Date: 7/09/2023

- ▭ Wind Farm boundary
- Turbine
- Access tracks
- Flight path observations**
- Black-shouldered Kite
- Brown Falcon
- Nankeen Kestrel
- Wedge-tailed Eagle
- Perched observations**
- + Brown Falcon



PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
 03 9815 2111 - info@natureadvisory.com.au

4.3. Discussion

Bird Mortality

A total of 12 bird strikes were recorded within the BWF site from January to June. Feather spots formed most bird mortalities identified with nine finds, and the remaining three were carcasses. It has been assumed that feather spots discovered beneath turbines are the result of an initial turbine collision, with scavengers such as Foxes Ravens later consuming the carcass and leaving feather remains (Bernardino et al. 2020). Zero to seven mortalities were recorded each month during formal searches, with June having the highest count at seven mortalities (Figure 4).

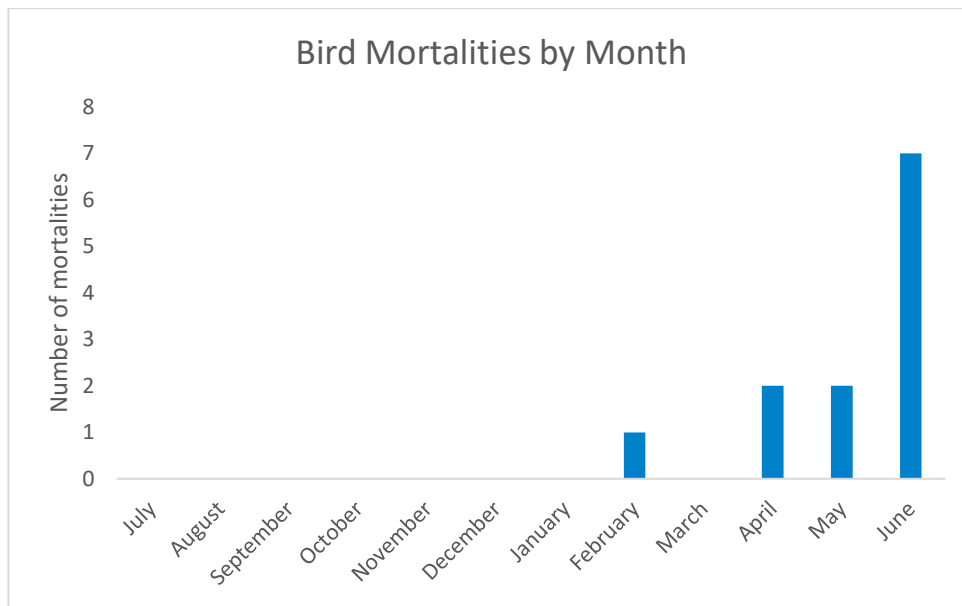


Figure 4: monthly total bird mortalities January - June 2023

The most common species found were Nankeen Kestrel (3) during the survey period. The unidentified bird finds (3) were mostly white and/or grey down feathers and were either clumped or spread 0.5 – 1.5 metres which made identification of species difficult. The high number of feather spots generally may be indicative of a high rate of scavenging of small carcasses, such as small birds and microbats.

In previous years there have been large numbers of Nankeen Kestrel carcasses with the highest recorded in May 2021 being 25 carcasses and 30 in total for the second year of carcass monitoring. A trigger investigation for Nankeen Kestrel occurred during May 2021 after a high number of mortalities occurred during April and May 2021 (Nature Advisory 2021a). This species is widespread and common, frequently recorded from farmland habitats (Marchant and Higgins 1993, Morcombe 2021), and often flies at RSA height putting it at risk of collision with turbines (Smales 2012). Three collisions represent a large reduction in annual mortality by comparison.

One Brown Falcon has been recorded beneath turbines during formal searches. This species is common and widespread, frequently recorded from farmland habitats (Marchant and Higgins 1993, Morcombe 2021), and often flies at RSA height putting it at risk of collision with turbines (Smales 2012).

Two Galah, One Noisy Miner and two Musk Lorikeet remains were recorded beneath turbines. These species are widespread and common in open country (Morcombe 2021), such as agricultural landscapes.

Mortality numbers observed do not indicate a significant impact to any of the species recorded during the monitoring period, however further analyses will be undertaken once the third year of monitoring has been completed and will be presented in a Fifth Annual Report.

Bat Mortality

A total of 23 bat carcasses were detected within the BWF site during the survey period. Between zero to twelve bat remains were recorded each month during formal searches, with February having the highest count (Figure 6). Microbats are typically more active during these warmer months of the year (Geiser 2004), so this pattern of mortality over time is not unexpected.

Two listed threatened species carcasses have been reported during the monitoring period; the Yellow-Bellied Shearwater Bat (YBSB) (*Saccolaimus flaviventris*) was recorded under turbines during March 2023 and is listed under the BC Act. An impact trigger notification was sent to BCS on the 31st March 2023. A GHFF was incidentally found by BWF staff during May 2023 and is listed as Vulnerable under the EPBC Act. An impact trigger notification was sent to BCS on the 16th May 2023. These are further discussed in Section 4.

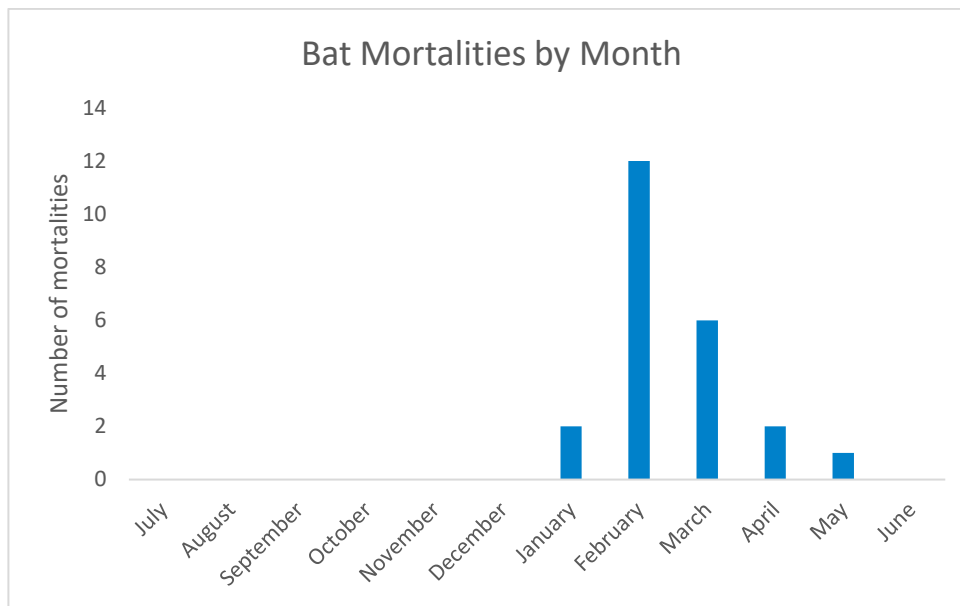


Figure 5: Monthly bat mortalities

Five White-striped Freetail Bats, five Little Forest Bats, one Gould's Wattled Bat, two Southern Freetail Bats and two Chocolate Wattled Bats were recorded as mortalities under turbines during the monitoring period. These species are all common and widespread, found in a wide range of habitats across south eastern Australia (Churchill 2008) and often fly at RSA height, putting them at risk of collision with turbines (Smales 2012).

Several studies (Symbolix 2020, Moloney *et al.* 2019, Smales 2012) have identified that these species are commonly impacted by wind farm operation generally and that particularly White-striped Freetail and are over-represented as mortalities across many wind farms. Observations by Nature Advisory (unpublished data) at various wind farms in other parts of these species' range are consistent with these findings. This is related to the foraging habits of many species in which these will fly many times the height of the tree canopy in pursuit of high-flying insects (Churchill 2008). This unfortunately brings the species into collision with turbines. These species have previously been identified during initial carcass searches.

Six of the bat mortalities at BWF could not be identified to species level. Five of these were mainly skeletal remains and one had only the forearm remaining. This made species identification difficult. Further analyses will be undertaken in regards to bat impacts once the third year of monitoring has been completed and will be presented in a Fifth Annual Report.

5. Impact triggers

Generally, an impact trigger is where there is evidence of death or injury to birds and/or bats by collision or other interaction with turbines. Under this BBAMP, the circumstances that define an impact trigger and unacceptable impact for threatened birds and/or bats are detailed below.

Impact Trigger for Threatened Species: A threatened bird/bat species (or recognisable parts thereof) listed under the Commonwealth *EPBC Act* or NSW *TSC Act* (now *Biodiversity Conservation Act 2016*), is found dead or injured under or close to a wind turbine during any mortality search or incidentally by wind farm personnel. The fatality shall be able to be attributed to the wind farm operations.

The significance of any threatened species impacts will be determined at a population scale relevant to that species as part of the decision-making framework outlined in Section 5.1.2. of the BBAMP and submitted in a report to BCS for review.

Impact Trigger for Non-threatened Species: In any two successive monthly carcass searches, two or more bird or bat carcasses (or parts thereof) of a non-threatened species, other than ravens, magpies, White Cockatoos, corellas, and introduced species, are found at the same turbine (i.e. a total of four or more carcasses of the same species in two successive searches at the same turbine).

Definition of Unacceptable Impact on Non-threatened Species:

Where population numbers are known and reported by BCS for the period concerned, the definition of an unacceptable impact on non-threatened species is any impact that is likely to:

- lead to a greater than 50% reduction in the immediate population (i.e., local population, where known) that utilises the wind farm over a five year period; AND
- act in an ongoing way to reduce the wider, regional population (where known) by more than 30% over a five-year period; OR
- reduce the total species' population (where known) by more than 10% over a five-year period.

Where population numbers are not known, the definition of an unacceptable impact on non-threatened species is:

- More than four carcasses of one non-threatened species (including raptor species, magpies, ravens, and introduced species) are found during both formal and incidental carcass searches in a two month period.

Note that although the impact trigger does not include ravens, magpies, White Cockatoos, corellas, and introduced species, detected mortalities for these species will still be recorded and reported as part of the annual reporting process.

Two impact triggers occurred during the monitoring periods for bat (none for birds).

5.1. Yellow-bellied Sheathtail Bat

During ongoing carcass searches occurring at BWF; a bat carcass was identified and confirmed as a YBSB on the 30th March 2023. The carcass was located at Turbine 4, at 11 metres 200 degrees from the base of the turbine.

Previous impacts and investigation on YBST Bats are summarised below:

One YBSB carcass was identified under Turbine 4 at BWF on 16th April 2020. The investigation concluded that the loss of one individual is unlikely to contribute significantly to the overall population decline of the species. In addition, there is no evidence of specific ecological reasons that draw the species to the

vicinity of wind farm, other than this species being more common along the creek lines in valleys when compared to turbines higher on hills (Nature Advisory 2020).

A second YBSB carcass identified under Turbine 28 at BWF on 6th March 2021. The investigation concluded, given YBSB is believed to be a relatively solitary species which undertakes some migratory movements seasonally, a lack of contiguous habitat of a size that would indicate a high abundance of the species, and multiple records of the species on site but only two mortalities recorded to date across 18 months of monitoring; it is likely that BWF poses a low risk to the species and mortalities will likely be limited to an annual occurrence. Since few individuals were likely to have been impacted, and there is unlikely to be a large resident population on site owing to a lack of sufficiently large (>500 ha) remnant patches of woodland (Richards 2008), this impact was assessed as being unlikely to be significant at a population level (Nature Advisory 2021a).

In response to the first two YBSB collisions detected at BWF, a bat utilisation survey was undertaken. The investigation included bat recorders installed at BWF for several weeks from January-April 2021. It found YBSB were present at low activity levels from January – April with higher numbers recorded in March. Based on this, YBSB collisions were assessed as likely occurring in small numbers on an annual basis at BWF, potentially associated with an autumn northward migratory movement through BWF (Nature Advisory 2021b).

A third YBSB carcass was found under Turbine 7 on 23rd March, 2022 incidentally by the wind farm staff. In response, additional monitoring was proposed (Letter to BCS on 29th August 2022) to confirm previously observed patterns of mortality of YBST bat at BWF. This monitoring has been occurring monthly since January 2023 and will continue for 12 months in total.

According to the decision-making framework, each trigger has been reported to the regulator, ongoing and relative investigations in relation to each has been undertaken (as above). The most recent YBSB impact timing supports previous conclusions that low numbers of YBSB impacts may occur at BWF during Autumn annually.

It is recommended that the current 12-month carcass monitoring program continue. Upon conclusion, an annual report will be generated assessing the findings, including the significance of impacts to date on YBSB from BWF. At that stage, further recommendations in relation to YBSB at BWF will be put forward based on all investigations and recent literature to date.

5.2. Grey-headed Flying Fox

The carcass of a flying-fox was detected incidentally by BWF staff on 12th May 2023. The carcass was identified and confirmed as a GHFF on the 15th May 2023 by Nature Advisory zoologists. The carcass was located at Turbine 5, at 20 metres NNE from the base of the turbine.

Previous impacts and investigation on GHFF are summarised below from the BWF second annual report (Nature Advisory 2021a):

A trigger investigation was launched into the fatalities of the GHFF in July 2019 after several fatalities occurred during May and June of that year. The findings of the investigation were recorded in a report provided to BCD and BWF in August 2019 (Nature Advisory 2019) that concluded that GHFF utilising the wind farm site are attracted to the area due to flowering White Box (*Eucalyptus albens*) (approximately May to June). Any individuals utilising the wind farm were likely travelling from the Flying-fox camp in Wellington to BWF given the proximity and numbers observed at the Wellington camp. GHFF generally travel as individuals and disperse over a wide area, and the risk of further collisions by this species is considered to be possible, in particular while there is food in the area. This is likely to be a seasonal occurrence when the White Box flowers and a GHFF camp is resident in Wellington.

Four further fatalities have since been recorded during the BBAMP monitoring program, in March and April 2021. GHFF mortalities were identified during intensive monitoring of LRFF impacts in 2021 (Nature Advisory 2021b). This allowed for simultaneous GHFF monitoring as methods for both species are the same and as such, additional targeted investigation was not required for GHFF.

Up to 2,500 individual GHFF were found to be inhabiting the colony in Wellington during April 2021. The colony tended to disperse during flyout counts rather than in single directions, such as towards the wind farm, though individuals and small groups were sighted as travelling in that direction.

Seven GHFF mortalities have been detected at BWF to date. These individuals were likely travelling from the persistent camp located near Wellington that was abandoned in May 2021. The species will likely return to the camp at some stage, given historic annual records (DAWE 2021) and mortalities are also likely to reoccur, albeit in low numbers.

A significant impact in this case is taken from referral guidelines for migratory species (DoE 2015) wherein a development (i.e., wind turbines) has had an impact on 0.1% of the total population and this would constitute a significant impact. This would be the mortality of approximately 60 individuals occurring on an annual basis.

The species is unlikely to be attracted to the site outside of this flowering period. It is unlikely that up to 60 individuals would be impacted annually given that they would likely only be attracted to the site for three months a year, and that only seven individuals were detected across 24 months, including in three months of intensive turbine monitoring undertaken as part of other investigations.

According to the decision-making framework, each trigger has been reported to the regulator, ongoing and relative investigations in relation to each has been undertaken (as above), it was determined that impacts to date were unlikely to be significant at a population level and mitigation was not recommended, and that impacts are likely to occur in low numbers annually.

The incidental detection of a GHFF mortality during May supports the findings summarised in the annual report (above) that low numbers of casualties involving GHFF are likely to occur at BWF during the flowering period of White-box (May-June). The current find does not indicate an increase in impacts at this stage.

The additional and ongoing carcass searches will detect further mortalities and contribute further to understanding potential annual impacts on the species. It is recommended that the current 12-month carcass monitoring program continue. Upon conclusion, an annual report will be generated assessing the findings, including the significance of impacts to date on GHFF from BWF. Further recommendations in relation to GHFF at BWF will be put forward based on investigations and recent literature to date.

6. Mitigation measures

Mitigation involves the prevention, avoidance and/or reduction of the risk of an impact trigger occurring or continuing to occur. An *'impact trigger'* is defined in section 4 as a threshold of impact on birds or bats that triggers an investigation and/or management response. The overall objective of mitigation measures is to ensure that the operation of BWF does not lead to unacceptable impacts on threatened or non-threatened birds and bats.

6.1. Application of mitigation measures during the monitoring period

6.1.1. Removal of Carrion

Regular carrion removal from within 200 metres of turbines will be implemented to assist in reducing the attractiveness of the site to raptors and therefore reduce the chances of fatal collisions by this group of birds. Carrion is defined as the dead and decaying flesh of an animal that often serves as a food source for animals.

To provide for the regular removal of carcasses likely to attract raptors to areas near turbines the procedures below will be adopted.

- Designate a suitable person (such as a wind farm employee or landowner) who will undertake the following activities:
 1. Site personnel shall notify the Site Manager immediately of any identified carrion within 200 metres of an operating turbine.
 2. The Site Manager is responsible for notifying the landowner so that any carcasses and/or remains found that are within 200 metres of turbines, can be collected and disposed of as soon as possible, in a manner that will avoid attracting raptors close to turbines.
 3. The Site Manager shall continue to consult with landowners in relation to the appropriate disposal of collected carrion, to be located at least 200 metres away from the closest turbine, whilst still leaving the carrion available as a food source so as to not reduce the habitat quality for raptors.
 4. Carcass occurrence and removal will be recorded by the Site Manager.

In the 2023 period there were no instances of an animal carcass within 200 metres of a turbine being reported by BWF personnel.

6.1.2. Control of Stock

Grain feeding, trails and spillage from grain trucks, can attract cockatoos and parrots. Therefore, the Site Manager shall communicate and consult with landowners as required in relation to stop grain feeding practices within 250m of operating wind turbines if it is deemed necessary in reducing the likelihood of the birds colliding with turbines.

During lambing season (usually late autumn / early winter) young lambs are susceptible to death. Therefore, the Site Manager will consult with required landowners to request that consider restricting lambing in paddocks at least 200 metres away from turbines.

These should be undertaken in consultation with landholders. It is acknowledged here that BWF cannot control what landholders do on their property or farming practices.

6.1.3. Pest Management

If many rabbit or other feral animal carcasses or active rabbit presence is incidentally observed, it may be necessary to conduct an integrated rabbit control program (to reduce site attractiveness to WTEs) within 200 metres of turbines. Methods to control rabbits include burrow destruction, and shooting.

In this period of monitoring, rabbit warrens and activity have not been reported within 200 metres of turbines.

6.2. Supplementary Mitigation Measures

Supplementary mitigation measures will be implemented in consultation with BCS if an impact trigger occurs. The purpose of supplementary mitigation measures will be to prevent a specific impact from continuing to occur. Specific mitigation measures will be implemented depending on the nature, cause and significance of any impact recorded and in response to the results of investigations of the event and of the species concerned on the wind farm site. The purpose of investigations will be to identify clearly the most relevant and effective mitigation measures.

If turbine shutdown is considered necessary by BCS, a species management strategy will be prepared with BCS that sets out:

- The nature of the ongoing unacceptable impacts, including the level of risk to the species' regional and overall populations, where known;
- The findings of detailed investigations undertaken in response to the impact trigger, focussing on the species' use of the immediate area around affected turbines;
- Clear scope for on-going monitoring to identify triggers for turbine shut-down;
- Agreed triggers for turbine shutdown and restart; and
- Reporting and consultation arrangements.

7. References

- Bernardino J, Bispo R, Martins RC, Santos S & Moreira F 2020, Response of vertebrate scavengers to power line and road rights-of-way and its implications for bird fatality estimates, *Scientific Reports* 10: Article 15014.
- Biodiversity, Conservation and Science Directorate 2022, Bodangora Wind Farm – Bird and Bat Adaptive Management Plan, August 2022 Biodiversity, Conservation and Science Directorate Ref DOC22/667367. Letter to Michael Bullock Site Manager Bodangora Wind Farm. Author Wynn, S
- Brett Lane & Associates 2017, *Bodangora Wind Farm Bird and Bat Adaptive Management Program*, Report for Bodangora Wind Farm Pty Ltd. Brett Lane & Associates Pty Ltd, Melbourne. Project No. 15124.
- Churchill S 2008, *Australian Bats* (second ed). Allen & Unwin.
- Department of Agriculture, Water and the Environment (DAWE) 2021. National Flying-fox monitoring viewer, web-based interactive map, Department of Agriculture, Water and the Environment.
- Department of Environment (DoE) 2015. Referral guidelines for 14 birds listed as migratory.
- Geiser F 2004, 'Energetics, thermal biology and torpor in Australian bats'. In Zubain, A, McCracken, GF, Kunz TH (eds) *Functional and Evolutionary Ecology of Bats* (pp. 5-22). Oxford University Press Inc. USA.
- Moloney PD, Lumsden LF & Smales I 2019. Investigation of existing post-construction mortality monitoring at Victorian wind farms to assess its utility in estimating mortality rates. Arthur Rylah Institute for Environmental Research Technical Report Series No. 302. Department of Environment, Land, Water and Planning, Heidelberg, Victoria.
- Morcombe M 2021, *Morcombe & Stewart Guide to Birds of Australia (Version 1.5)* [Mobile App]. Apple App Store.
- Nature Advisory 2019, *Bodangora Wind Farm BBAMP Implementation: Grey-headed Flying-Fox Field Investigation – Part II*, Report for Bodangora Wind Farm Pty Ltd. Nature Advisory Pty Ltd, Melbourne. Project No. 15124.
- Nature Advisory 2020, *Annual Report on the Implementation of the Bird and Bat Adaptive Management Plan*, Report for Bodangora Wind Farm Pty Ltd. Authors Callan M., O'Meara E., Doughty C., O'Callaghan B., Lane B., Nature Advisory Pty Ltd, Melbourne. Project No. 15124.
- Nature Advisory 2021a, Bodangora Wind Farm – Impact Trigger Lighting Trial Little Red Flying-fox (*Pteropus scapulatus*) (LRFF), June 2021 Nature Advisory Ref 15124.6 (26.0). Letter to Michael Bullock Manager BWF. Author O'Callaghan, B. Project No. 15124.
- Nature Advisory 2021b, *Bodangora Wind Farm: Little red flying-fox Impact Assessment Report*, Report for Infigen Energy Limited. Authors Thomas G., Sebastian M., Clerke J., O'Callaghan B., Lane B., Nature Advisory Pty Ltd, Melbourne. Project No. 15124.
- Nature Advisory 2021d, *Bird and Bat Adaptive Management Plan – Second Annual Report*, Report for Bodangora Wind Farm Pty Ltd. Authors Callan M., O'Meara E., Sebastian M., Coutin S., Doughty C., Thomas G., O'Callaghan B., Lane B., Nature Advisory Pty Ltd, Melbourne. Project No. 15124.
- Nature Advisory 2022, *Bird and Bat Adaptive Management Plan – Third Annual Report*. Consultant's report to Bodangora Wind Farm Pty Ltd, Authors Clerke. J., O'Callaghan B. Nature Advisory Pty Ltd, Melbourne. Report 15124.8 (1.1).
- Marchant S & Higgins PJ (eds) 1993, *Handbook of Australian, New Zealand and Antarctic Birds, Volume 2: Raptors to Lapwings*, Oxford University Press, Melbourne.
- Morcombe M 2021, *Morcombe & Stewart Guide to Birds of Australia (Version 1.5)* [Mobile App]. Apple App Store.

- Richards GC 2008, *An assessment of bat fauna at the proposed Glenn Innes Wind Farm, NSW*. Report for Connell Wagner Pty Ltd. Author Richards, GC.
- Smales I 2012, “Fauna Collisions with Wind Turbines: Effects and Impacts, Individuals and Populations. What Are We Trying to Assess?” In *Wind and Wildlife: Proceedings for the Conference on Wind Energy and Wildlife Impacts*, 23 – 40. Springer.
- Symbolix 2020. Post-construction bird and bat monitoring at wind farms in Victoria. Public report, 13th Wind Farm Research Meeting 2020.

BODANGORA WIND FARM – CARCASS REPORT

Please fill out details in this form for each bird/bat carcass found. Injured wildlife must be transported to the nearest veterinary and or / wildlife rescue and care.

Term	Definition
Recordable Bird / bat carcass	Birds or bats found on the ground within 200m radius of a wind turbine generator.
Feather spots	Cluster of feathers (minimum 10 feathers or two primary feathers).
Intact	Carcass that is completely intact is not badly decomposed and shows little or no sign of being predated or scavenged.
Scavenged	An entire carcass showing signs of being fed upon by a predator or scavenger or a dismembered carcass in one location.
Injured	Bird or bat found to be alive but injured.
Recordable bird or bat carcass details (If you do not know or are unsure of an answer write "unknown")	
Carcass identified by (name)	
Form completed by (name)	
Date & time	
Weather conditions in preceding 24 hours: (including wind speed and direction and any unusual weather conditions in last 48 hours. If a waterbird, note the level of water in surrounding water bodies).	
Turbine number	
Distance (m) and bearing (deg) of carcass from turbine	
Species identification (<i>type of bird / bat</i>)	
Description of carcass: Intact, Feather-spot, Scavenged or injured (and any other observations, including description of the injuries)	
Report number	
How old and what sex is the carcass estimated to be?	
If remains found, indicate type (<i>body, wings, skeleton, feather spots</i>)	
Additional comments	
Photos taken of carcass where it is found (<i>attach photos on page 2</i>)	Yes <input type="checkbox"/> No <input type="checkbox"/>

Take the photograph with the carcass in situ with a ruler (or other item at hand) next to it to allow measurements to be made. Take a photo of:

- Photo of the carcass / feather spot as found in relation to the turbine
- Photo of top and bottom sides of carcass
- Photo of spread wing.

Appendix 2: Carcass search detailed data

Year	Season	Month	Date	Common Name	Scientific Name	Carcass type	Threatened Status	*Find Reference	Turbine number	Distance from turbine (m)	Bearing from turbine (°)	Notes
Year 3	Summer	January	24/01/2023	White Striped Freetail Bat	<i>Austronomus australis</i>	Carcass	None	C23.01.01	4	1	166	Forearm 6cm, freetail, fresh 24 hours
Year 3	Summer	January	25/01/2023	White Striped Freetail Bat	<i>Austronomus australis</i>	Carcass	None	C23.01.02	9	4	220	Fresh <3 days, visible damage
Year 3	Summer	February	2/03/2023	Australian Noisy Miner	<i>Manorina melanocephala</i>	Bird	None	C23.02.02	14	17	250	damage to back; <3 days old
Year 3	Summer	February	2/03/2023	Chocolate Wattled Bat	<i>Chalinolobus morio</i>	Bat	None	C23.02.04	30	41	251	4.3cm forearm, damage to back
Year 3	Summer	February	2/03/2023	Little Forest Bat	<i>Vespadelus vulturnus</i>	Bat	None	C23.02.01	12	35	312	Old >1 week old; male; 2.7cm forearm; damage to left side
Year 3	Summer	February	2/03/2023	Unknown Bat spp.	NA	Bat	None	C23.02.03	14	19	88	only forearm, 3.7cm forearm
Year 3	Summer	February	3/03/2023	Chalinolobus spp.	<i>Chalinolobus</i> spp.	Bat	None	C23.02.06	25	13	222	4.8cm forearm; old; missing bottom half, missing one wing, other wing is deteriorating; very dark brown, almost black fur
Year 3	Summer	February	3/03/2023	Chocolate Wattled Bat	<i>Chalinolobus morio</i>	Bat	None	C23.02.07	25	18	193	4.6cm forearm, very dark brown on back and face, stomach is light grey; <24 hours old
Year 3	Summer	February	3/03/2023	Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	Bat	None	C23.02.12	25	45	308	2.4cm forearm, < 24 hours old; damage to abdomen; light brown fur on tip, but dark brown close to body, underside is lighter; male
Year 3	Summer	February	3/03/2023	Little Forest Bat	<i>Vespadelus vulturnus</i>	Bat	None	C23.02.08	25	46	287	> 3 days old; light brown fur on underside and darker brown on back; 2.8cm forearm; damage to back
Year 3	Summer	February	3/03/2023	Little Forest Bat	<i>Vespadelus vulturnus</i>	Bat	None	C23.02.09	25	34	315	< 24 hours old; same sp as 8 and 13; male; 2.5cm forearm; damage under mouth
Year 3	Summer	February	3/03/2023	Unknown Bat spp.	NA	Bat	None	C23.02.05	9	42	193	Skull, spine, some wing bones and some fur; 2.5cm forearm
Year 3	Summer	February	3/03/2023	Unknown Bat spp.	NA	Bat	None	C23.02.10	25	5	105	skeletal remains and some fur; fur is brown and grey; 3.9cm forearm
Year 3	Summer	February	3/03/2023	Unknown Bat spp.	NA	Bat	None	C23.02.11	25	33	112	skeletal remains; spine, forearm and ear; forearm 3.9cm; fur grey
Year 3	Summer	February	3/03/2023	Unknown Bat spp.	NA	Bat	None	C23.02.13	19	59	210	part of a skull
Year 3	Autumn	March	28/03/2023	Freetail spp.	NA	Bat	None	C23.03.02	14	0	7	<24hours, no damage, forearm 3.6cm
Year 3	Autumn	March	28/03/2023	White Striped Freetail Bat	<i>Austronomus australis</i>	Bat	None	C23.03.01	14	3	36	<24hours, no damage, mastiff-like face, forearm 5.8cm
Year 3	Autumn	March	28/03/2023	White Striped Freetail Bat	<i>Austronomus australis</i>	Bat	None	C23.03.03	15	45	167	<24hours old, mastiff face, no damage, forearm 5.9cm
Year 3	Autumn	March	28/03/2023	White Striped Freetail Bat	<i>Austronomus australis</i>	Bat	None	C23.03.04	20	15	167	<24hours, female, no damage, 5.8cm forearm
Year 3	Autumn	March	29/03/2023	Unknown Bat spp.	NA	Bat	None	C23.03.06	25	47	288	skeletal remains, some brown fur, forearm 4.1cm
Year 3	Autumn	March	29/03/2023	Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	Bat	Vulnerable	C23.03.05	4	11	200	>1 week old, wing membranes deteriorated, face missing fur, white on belly, black on back, teeth visible, forearm 7.6cm
Year 3	Autumn	April	12/04/2023	Nankeen Kestrel	<i>Falco cenchroides</i>	Bird	None	FS23.04.01	5	61	249	feathers spread over 3m, mainly downy feathers, some wing feathers -striped
Year 3	Autumn	April	13/04/2023	Little Forest Bat	<i>Vespadelus vulturnus</i>	Bat	None	C23.04.01	25	30	88	damage to face, <1 week old, male, 2.5cm forearm
Year 3	Autumn	April	14/04/2023	Brown Falcon	<i>Falco berigora</i>	Bird	None	C23.04.02	2	104	248	complete carcass, <3 days old
Year 3	Autumn	April	14/04/2023	Southern Freetail Bat	<i>Mormopterus planiceps</i>	Bat	None	C23.04.03	2	39	320	<3 days old, 3.8cm forearm, freetail, male, 7mm penis
Year 3	Autumn	May	24/05/2023	Little Forest Bat	<i>Vespadelus vulturnus</i>	Bat	None	C2305-1	25	45	125	Forearm 29mm, <3 days, started to decay
Year 3	Autumn	May	24/05/2023	Musk Lorikeet	<i>Glossopsitta concinna</i>	Feather Spot	None	FS2305-1	23	38	270	Feather spot covering ~30cm
Year 3	Autumn	May	12/05/2023	Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>	Bat	Vulnerable	INC2305-1	5	20	25	found by BWF staff. Partially scavenged. > 3 days
Year 3	Autumn	May	24/05/2023	Nankeen Kestrel	<i>Falco cenchroides</i>	Feather Spot	None	C2305-3	25	45	219	Spread of 1m, mostly down feathers
Year 3	Winter	June	27/06/2023	Galah	<i>Eolophus roseicapilla</i>	Feather Spot	None	FS23.06.1	12	38m	-	Spread of 0.5m, mostly grey down & grey & pink semiplume feathers
Year 3	Winter	June	27/06/2023	Galah	<i>Eolophus roseicapilla</i>	Feather Spot	None	FS23.06.2	12	42m	-	Spread of 1m, mostly wing & down feathers (6cm-12cm long)
Year 3	Winter	June	27/06/2023	Musk Lorikeet	<i>Glossopsitta concinna</i>	Feather Spot		FS23.06.4	4	70m	-	Spread of 0.2m, 4x wing feathers (8cm long)

Year	Season	Month	Date	Common Name	Scientific Name	Carcass type	Threatened Status	*Find Reference	Turbine number	Distance from turbine (m)	Bearing from turbine (°)	Notes
Year 3	Winter	June	27/06/2023	Nankeen Kestral	<i>Falco cenchroides</i>	Feather Spot	None	FS23.06.3	4	65m	-	Spread of 1.5m, 4x wing feathers (avg. 16cm long)
Year 3	Winter	June	27/06/2023	Unknown Bird spp.	NA	Feather Spot		FS23.06.5	4	13m	-	Spread 0.5m, white & grey down feathers, grey & pinky/red semiplume feathers
Year 3	Winter	June	28/06/2023	Unknown Bird spp.	NA	Feather Spot		FS23.06.6	5	12m	-	clumped together, 5x white & grey wing feathers, approx. 12cm long
Year 3	Winter	June	28/06/2023	Unknown Bird spp.	NA	Feather Spot		FS23.06.7	5	70m	-	Spread 1.5m, predominately grey wing feathers
Year 3	Winter	July	24/07/2023	Australian Magpie	<i>Gymnorhina tibicen</i>	Bird	None	C23.07.3	9	36m	175	Partial carcass, 2x pieces of beak (4.5cm long), Feather spread 0.5m, white & black wing and tail feathers, white downing feathers, previously recorded as FS23.07.1
Year 3	Winter	July	24/07/2023	Unknown Bird spp.	NA	Feather Spot	None	FS23.07.2	5	38m	243	Spread 1.2m, 2x clumps of white downing/semiplume feathers, found on top of bunch of sticks
Year 3	Winter	July	24/07/2023	White Striped Freetail Bat	<i>Auromus australis</i>	Bat	None	C23.07.1	9	48m	254	very decomposed, forearm length ~ 65mm, white fur on chest, damage to wing, wedged amongst rocks,
Year 3	Winter	July	25/07/2023	Juvenile Grey Currawong	<i>Strepera versicolor</i>	Feather Spot	None	FS23.07.3	15	15m	55	Spread 1.5m, 8x black wing feathers with light brown tips and grey, brown semi-plumage feathers
Year 3	Winter	July	25/07/2023	Nankeen Kestral	<i>Falco cenchroides</i>	Bird	None	C23.07.2	13	18m	213	Spread 0.3m, 3x wing/tail feathers, 9x bones including keel/sternum and pelvis
Year 3	Winter	July	25/07/2023	Nankeen Kestral	<i>Falco cenchroides</i>	Feather Spot	None	FS23.07.4	4	86m	246	Spread 1m, 5x wing/tail feathers, 3x semi-plumage, found approx. 10m from the Nankeen Kestral FS last month
Year 3	Winter	July	27/07/2023	Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	Feather Spot	None	FS23.07.5	2	6m	194	Spread 0.2m, mostly wing feathers
Year 3	Winter	August	22/08/2023	Unknown Bat spp.	NA	Bat	None	C23.08.2	20	50m	79	Very decomposed, forearm length ~ 6cm, width of mouth opening 16mm
Year 3	Winter	August	22/08/2023	Unknown Bird spp.	NA	Feather Spot	None	FS23.08.1	33	3m	215	Spread of 5m, grey wing & plumage feathers
Year 3	Winter	August	22/08/2023	Yellow-Rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	Bird	None	C23.08.1	19	20m	205	Damange to left wing, no eyes
Year 3	Winter	August	23/08/2023	Australian Magpie	<i>Gymnorhina tibicen</i>	Bird	None	C23.08.3	14	77m	253	Both wings attached to scapula, part Sternum and vertebrae
Year 3	Winter	August	23/08/2023	Australian Magpie	<i>Gymnorhina tibicen</i>	Bird	None	C28.08.5	9	30m	190	Whole wing, downing feathers 0.2m away
Year 3	Winter	August	23/08/2023	Brown Falcon	<i>Falco berigora</i>	Bird	None	C23.08.4	13	37m	220	5x wing feathers connected to metacarples
Year 3	Winter	August	23/08/2023	Grey Fantail	<i>Rhipidura albiscapa</i>	Feather Spot	None	FS23.08.3	5	34m	114	Spread 0.3m, small grey & white feathers, 3-5cm long wing feathers
Year 3	Winter	August	23/08/2023	Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	Feather Spot	None	FS23.08.4	2	21m	240	Spread 0.3m, located ~6m from last months FS
Year 3	Winter	August	23/08/2023	Southern Freetail Bat	<i>Mormopterus planiceps</i>	Bat	None	INC23.08.1	13	53m	358	Bat still alive, blood on nose, collected and given to WIRES
Year 3	Winter	August	23/08/2023	Unknown Bird spp.	NA	Feather Spot	None	FS23.08.2	7	77m	33	Spread of 1m, downing feathers
Year 3	Winter	August	24/08/2023	Australian Magpie	<i>Gymnorhina tibicen</i>	Bird	None	INC23.08.2	16	50m	NA	<1hr, blood on face, broken wing
Year 3	Winter	August	24/08/2023	Crimson Rosella	<i>Platycercus elegans</i>	Feather Spot	None	FS23.08.5	25	40m	100	Clump of downing feathers, 1x 13cm long blue & grey wing feather found ~7m away