Tathra Wind Farm

Bird and Bat Utilisation Surveys Year 1 Summary Report

Final

November 2025

umwelt

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Summary Report

Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Synergy Renewable Energy Development (SynergyRED)

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Report No.:	24316/R06
Date:	November 2025

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Document Status

Rev No.	Reviewer Name	Date	Approved for Issue Name	Date
V1	I. Marshall M. Roberts J. Ringma	22/05/2025	M. Ramgobin	26/06/2025
V2	M. Roberts P. Coventry	17/09/2025	M. Ramgobin	17/09/2025
V3	J. Garnham	8/10/2025	P. Coventry	8/10/2025
V4	P. Coventry	18/11/2025	M. Ramgobin	19/11/2025
V5	M. Ramgobin	21/11/2025	M. Ramgobin	21/11/2025

Executive Summary

Umwelt was engaged by Synergy Renewable Energy Development (SynergyRED) to undertake Bird and Bat Utilisation Surveys (BBUS) at the proposed Tathra Wind Farm, approximately 240 km north of Perth in Western Australia's Mid-West Region. This interim summary consolidates findings from four completed seasonal survey events (Spring 2024 to Autumn 2025) to support ecological impact assessment and inform environmental referrals under the WA *Environmental Protection Act 1986* (EP Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Survey Methodology

Bird surveys utilised a Before-After-Control-Impact (BACI)-based vantage point design, with structured 30-minute observations conducted at multiple times of day and seasons. Observers recorded species presence, abundance, flight height and behaviour, along with incidental sightings of high-interest species. Bat activity was captured using passive ultrasonic detectors placed at ground level and at 30 m and 100 m on a meteorological mast (met mast). All echolocation data were analysed by an external specialist.

Key Findings

- Species Diversity: 98 bird species from 34 families were recorded, including Galah (*Eolophus roseicapilla*), Australian Raven (*Corvus coronoides)* and Nankeen Kestrel *(Falco cenchroides*) as the most frequently observed. Multiple microbat species were also detected.
- Conservation Significant Species: Carnaby's Black-Cockatoo (EN; 53 records), Peregrine Falcon (OS; 4), and Pacific Swift (MI; 1) were observed, with confirmed flight activity within the potential RSA.
- Raptor Activity: At least 10 raptor species were recorded. Wedge-tailed Eagle (69 records) and Nankeen Kestrel (46) were the most common within the RSA. Peregrine Falcon was also detected flying up to 200 m AGL.
- Bat Activity: Six species of microbat were recorded from ultrasonic devices during the BBUS Program. None of these are of current conservation significance, however three species were recorded on devices deployed at RSA (30 m and 100 m).
- At-Risk Species: 41 bird species were observed flying within the RSA, including high-frequency species such as Australian Raven and Tree Martin. The families Cacatuidae (Cockatoos), Corvidae (Crows and Magpies), and Accipitridae (Hawks and Eagles) had the highest number of RSA-altitude records. Three microbat species were recorded on devices deployed at RSA, being the White-striped Free-tailed Bat (*Austronomus australis*), Gould's Wattled Bat (*Chalinolobus gouldii*) and South-western Free-tailed Bat (*Ozimops kitcheneri*).

Conclusion

This interim report provides a preliminary dataset to inform turbine design, micrositing, and risk mitigation strategies at the Tathra Wind Farm. All findings remain subject to refinement pending the results of ongoing ultrasonic analysis and future BBUS events through 2025 and 2026. Continued data collection will enhance understanding of bird and bat use of the area and support the preparation of environmental referrals under state and federal legislation.

Abbreviations

Abbreviation	Definition
AGL	Above Ground Level
BACI	Before-After-Control-Impact
BBUS	Bird and Bat Utilisation Survey
BUS	Bird Utilisation Survey
BaUS	Bat Utilisation Survey
BBUS01	Spring 2024 BBUS
BBUS02	Spring 2024 BBUS
BBUS03	Summer 2025 BBUS
BBUS04	Autumn 2025 BBUS
°C	Degrees Celsius
CR	Critically Endangered under the BC Act or EPBC Act
Cth	Commonwealth
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EN	Endangered under the BC Act or EPBC Act
BC Act	*Biodiversity Conservation Act 2016* (WA)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
Km/h	Kilometres per hour
MI	Migratory under the BC Act or EPBC Act
mm	Millimetres
OS	Other Specially Protected under the BC Act
P1-P4	Priority –4 species listed by DBCA
RSA	Rotor Swept Area
VP	Vantage Point
VU	Vulnerable under the BC Act or EPBC Act
WA	Western Australia

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1.0 Introduction

Umwelt has been engaged by Synergy Renewable Energy Development (SynergyRED) to undertake Bird and Bat Utilisation Surveys (BBUS) to support impact assessment and mitigation of ecological impacts, and environmental referrals under the *Environmental Protection Act 1986 (*WA) (EP Act) and *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) at the proposed Tathra Wind Farm (the Project). The Project is located in the Mid-West Region of Western Australia, approximately 240 km north of Perth. This report is a summary of the BBUS effort undertaken to date for the Project.

1.1 Scope of Works

The scope of this work is to consolidate and summarise the findings from all BBUS undertaken to date for the Project (2024–2025). Four BBUS events have been completed; BBUS01 (Spring 2024), BBUS02 (Spring 2024), BBUS03 (Summer 2025), and BBUS04 (Autumn 2025). At minimum, a further four BBUS events are planned for the project over the next 12 months.

This report is intended to document bird and bat species present within the surveyed area, and assess which species, based on flight data, have potential for blade strike. This report serves as an interim summary report intended to inform considerations during the next phase of design and planning for the Project. An updated summary report will be prepared following the completion of future planned BBUS to support environmental referrals.

Specific objectives of this scope include:

- Determine the status of bird and bat species within the BBUS Area based on the results of desktop assessments and all BBUS undertaken to date.
- Synthesise and summarise the results gathered from all BBUS undertaken to date.
- Identify which bird and bat species are susceptible to blade strike in the BBUS Area through an analysis of flight behaviour recorded on site, expert advice, available literature and unpublished reports.

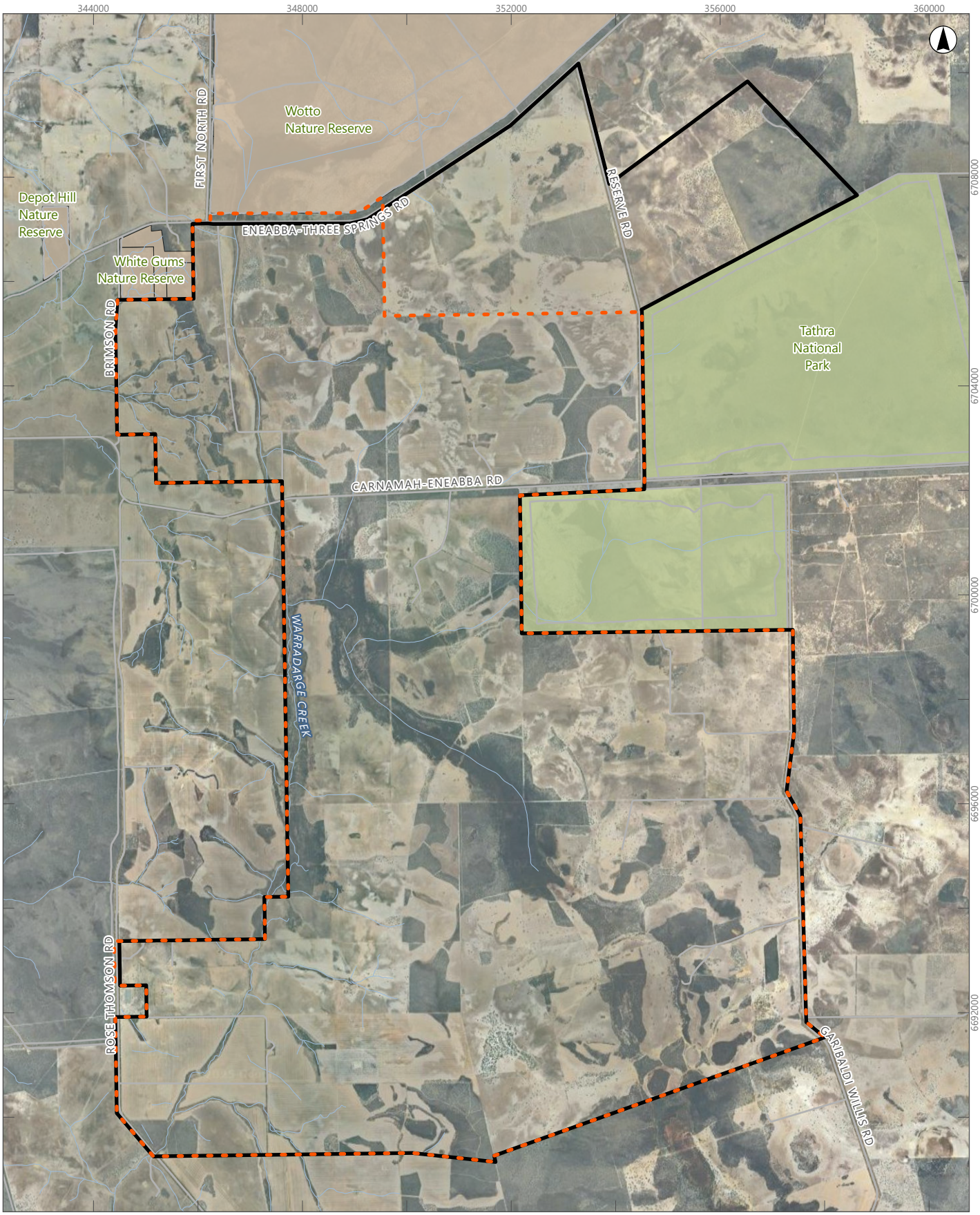
1.2 Project Description

1.2.1 Survey Area

The Survey Area has been reduced since Umwelt was engaged by SynergyRED in 2024. A summary of these changes is provided below and presented in **Figure 1.1**:

- BBUS01, BBUS02 and BBUS03: original survey area consisting of 18,337 ha
- BBUS04: 2,505 ha removed, resulting in a revised survey area of 15,832 ha.

For consistency, the term 'BBUS Area' will be used to refer to the original 18,337 ha. Although a portion of the area was formally excluded, some monitoring activities continue within the removed section. As such, referring to the original extent provides clarity and continuity throughout this report.
The refined survey area will now be referred to as the 'Tathra Wind Farm Area' (**Figure 1.1**).



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Legend

- BBUS Area
- Tathra Wind Farm Area
- Road
- Watercourse
- National Park
- Nature Reserve

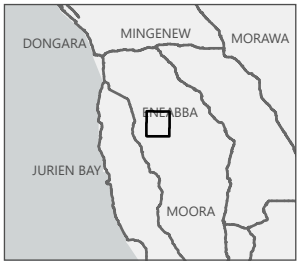


FIGURE 1.1

Project Location and Survey Area

0 2 4

Kilometres

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024), DBCA (2024), Umwelt (2024), SynergyRED (2024)

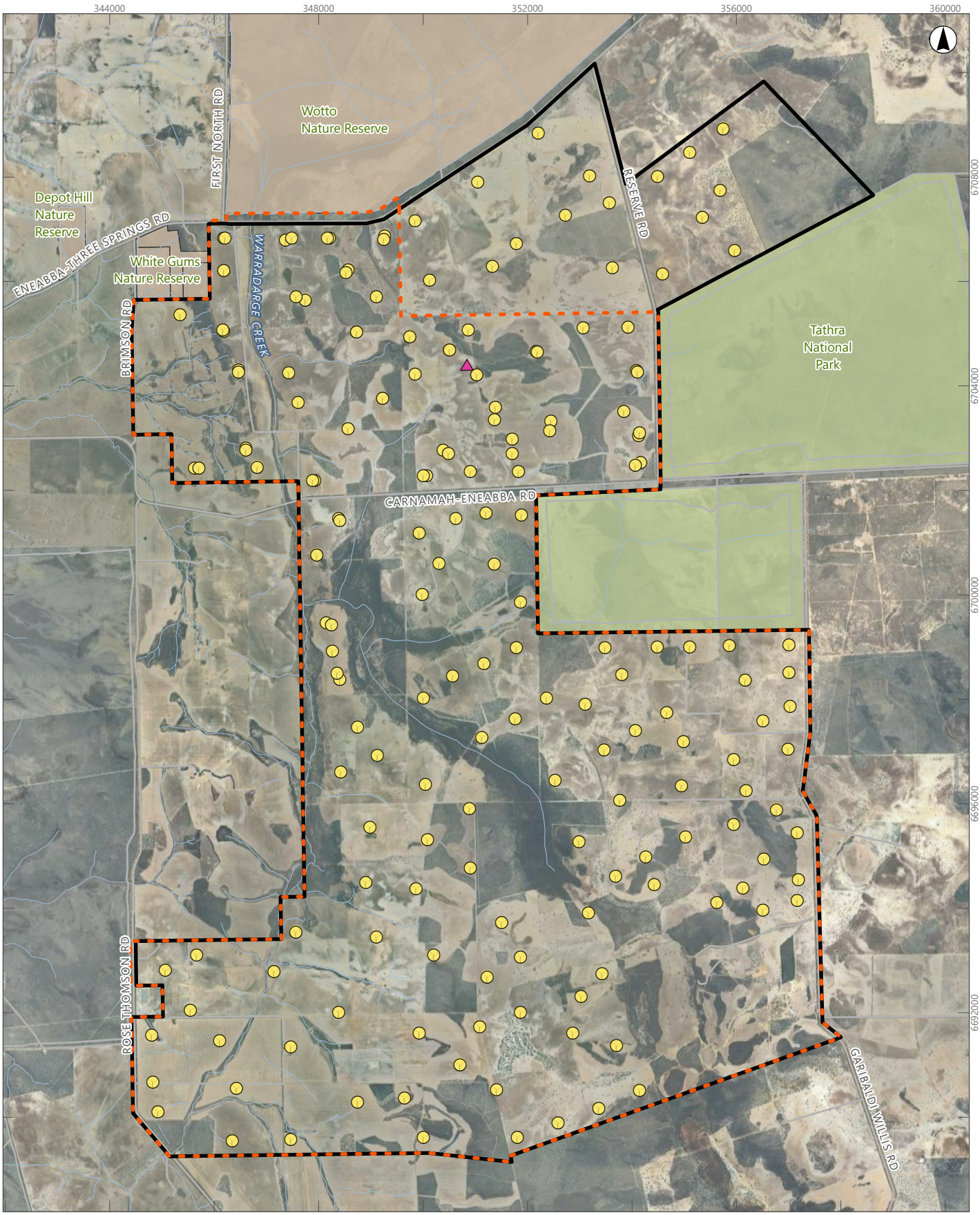
1.2.2 Wind Turbines and Rotor Swept Area

As of September 2024, up to 187 turbine locations were being considered for the Project. However, 17 of these are now located outside the refined area, leaving a total of 170 potential turbines within the Tathra Wind Farm Area (**Figure 1.2**).

Several turbine models are currently being considered for the Project so the minimum and maximum overall heights have been based on all current options. The current turbine models being considered for the Project will have a maximum overall height (tip height) of 250 m above ground level (AGL) and a minimum lower blade height of 30 m AGL.

The rotor swept area (RSA) refers to the physical area swept by the rotating blades during operation. Based on information provided by SynergyRED, the RSA will be located 30 m AGL to 250 m AGL. The minimum (30 m AGL) and maximum (250 m AGL) turbine blade heights have been used to represent the 'RSA height range' in this assessment to identify bird or bat species which may be at risk of turbine strike.

The turbine specifications and total number of turbines provided by SynergyRED may be subject to future changes (total turbine numbers will be below 170).



Scale: 1:100,000 at A4, GDA2020 MGA Zone 50

Legend

- BBUS Area
- Tathra Wind Farm Area
- Road
- Watercourse
- Met Mast
- Indicative Turbine Layout (September 2024)
- National Park
- Nature Reserve

FIGURE 1.2

Potential Wind Turbine Locations

0 2 4

Kilometres

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024), DBCA (2024), Umwelt (2024), SynergyRED (2024)

2.0 Methodology

2.1 Likelihood of Occurrence

Two desktop assessments were previously undertaken to determine the likelihood of bird and bat species occurring within the BBUS Area (Umwelt, 2024, 2025). A description of the methods used for the desktop assessment is provided in the Bird and Bat Utilisation Desktop Risk Assessment (Umwelt, 2024) and Tathra Wind Farm Basic and Targeted Fauna Report (Umwelt, 2025).

The results of the likelihood of occurrence were updated to reflect the presence of any new species recorded during subsequent BBUS and are summarised in **Section 3.1**.

2.2 Field Surveys

2.2.1 Survey Timing and Personnel

Four BBUS events have been undertaken across Spring, Summer and Autumn 2024–2025. The timings and personnel associated with each BBUS are presented in **Table 2.1**.

Table 2.1 Bird and Bat Utilisation Survey Timing

Survey	Season	Personnel	Start	End
BBUS01	Spring	Madison Roberts – Senior Zoologist Belinda Howe – Senior Zoologist	04/10/2024	11/10/2024
BBUS02	Spring	Madison Roberts – Senior Zoologist David James – Senior Zoologist	18/11/2024	24/11/2024
BBUS03	Summer	Madison Roberts – Senior Zoologist Ross Crates – Senior Zoologist	10/01/2025	17/01/2025
BBUS04	Autumn	Brittany Osbourne – Senior Zoologist Liam Chirio – Zoologist Samantha Lostrom – Senior Zoologist	10/03/2025	14/03/2025

2.2.2 Weather Conditions and Access

Weather conditions were recorded using daily observations from the Bureau of Meteorology's (BoM) Carnamah Weather Station (Station No. 008025) (BOM, 2025), located approximately 40 km east of the BBUS Area, along with direct field observations. While Carnamah was the closest station with long-term climate records, its daily data was incomplete during the survey period, resulting in some gaps in daily records. Consequently, available BoM data from this station is summarised in **Table 2.2**, while supplementary weather data collected in the field via the BoM app and direct observations is presented in **Table 2.3**.

Table 2.2 Weather Conditions from Carnamah Station (Bureau of Meteorology (BOM), 2025)

Survey	Max Daily Temp	Min Daily Temp	Max Daily Wind Gusts	Days with Rain	Total Rainfall
BBUS01	31.5°C	10.5°C	NA	0	0 mm
BBUS02	37.5°C	11.5°C	NA	1	1.2 mm
BBUS03	38.0°C	14°C	NA	0	0 mm
BBUS04	29.5 °C	14.5°C	NA	2	2.9 mm

Table 2.3 Field-recorded Weather Observations During Survey Period

Survey	Max Survey Temp	Min Survey Temp	Max Daily Wind Gusts	Days with Rain
BBUS01	33°C	11°C	Strong (39–61 km/h)	0
BBUS02	34°C	14°C	Strong (39–61 km/h)	4
BBUS03	40°C*	16°C	Strong (39–61 km/h)	0
BBUS04	38°C	11°C	Strong (39–61 km/h)	1

*Daily maximum temperatures reached 44°C on 16 January 2025, however surveys were not conducted over 40°C (see **Table 2.5**).

2.2.3 Site Selection

A total of 18 survey sites (vantage points) for BBUS were originally established across the BBUS Area during BBUS01 with best attempts made to position them near proposed wind turbine locations, and in areas with good visibility of the sky and surrounding habitats. Passive ultrasonic recorders (Titley Scientific Rangers) were deployed to detect the presence of bat species within approximately 30 m of each vantage point during each BBUS event (here on referred to as Bat Utilisation Survey (BaUS) points). Sites were configured such that representativeness and coverage of the BBUS Area were maximised.

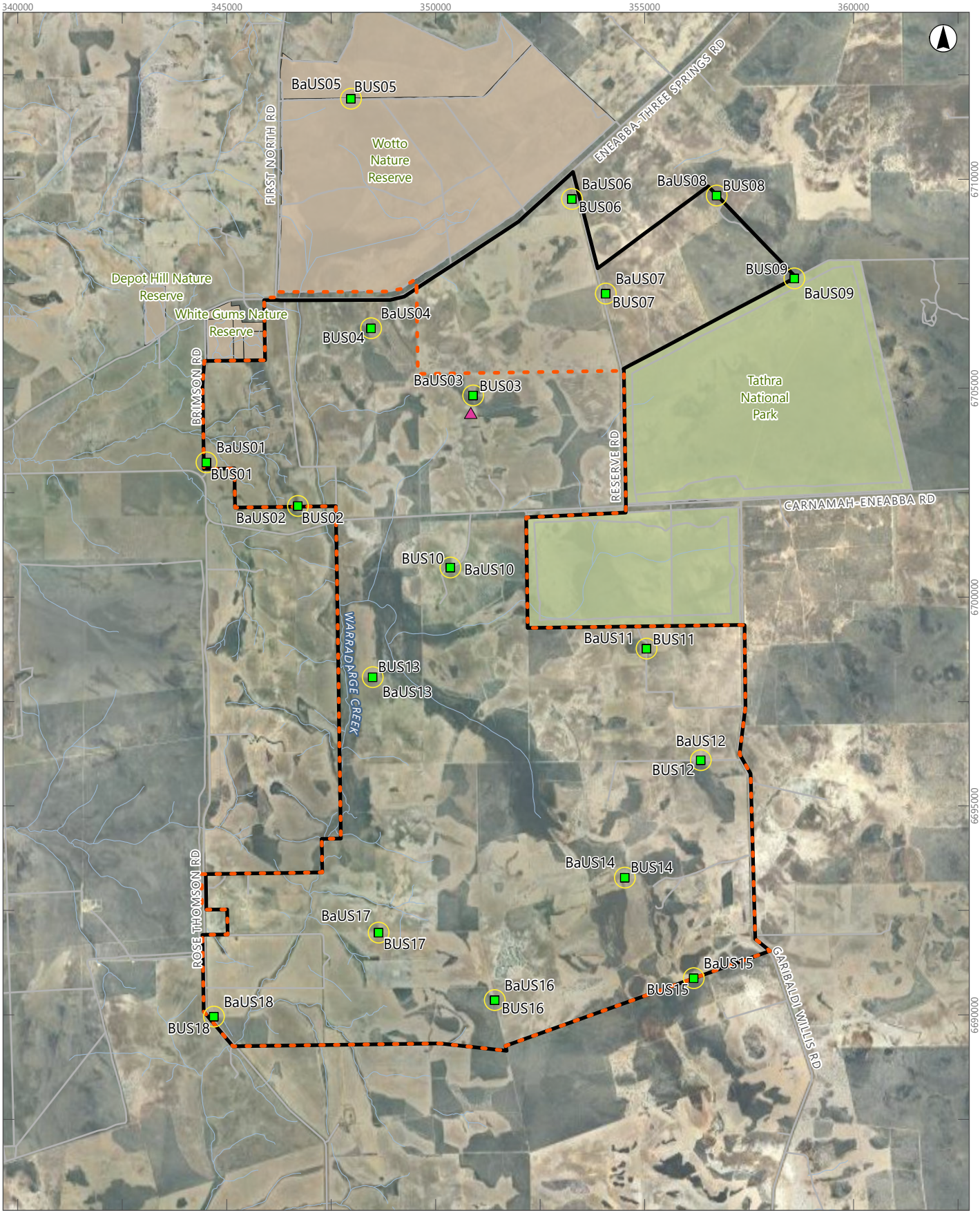
Following changes to the BBUS Area in 2025, the number of vantage points were reduced from 18 to 17 during BBUS04. Although the revised survey area would have reduced the number of vantage points by three, the decision was made to keep as many survey sites as possible with the intention that some of these may be used for future monitoring, such as control sites.

The details of sample sites utilised across the BBUS program is provided in Table 2.4 with locations displayed in Figure 2.1.

Table 2.4 Bird and Bat Utilisation Sample Sites

Vantage Point	BUS ID	BaUS ID	Habitat Description	Easting	Northing	BBUS01	BBUS02	BBUS03	BBUS04
VP01	BUS01	BaUS01	Low Shrubland on Gentle Slope bordering Cleared Agricultural Land	344515	6703224	✓	✓	✓	✓
VP02	BUS02	BaUS02	Eucalypt Woodland on Rocky Hills overlooking Cleared Agricultural Land	346702	6702181	✓	✓	✓	✓
VP03	BUS03	BaUS03	Eucalyptus Woodland on Stoney Substrate bordering Cleared Agricultural Land	350897	6704826	✓	✓	✓	✓
VP04	BUS04	BaUS04	Sparse to Open Eucalypt and Banksia Woodland on Plains and Slopes bordering Cleared Agricultural Land	348454	6706435	✓	✓	✓	✓
VP05	BUS05	BaUS05	Wotto Nature Reserve - Low Shrubland on Gentle Slope	347972	6711928	✓	✓	✓	✓
VP06	BUS06	BaUS06	Low Shrubland on Gentle Slope bordering Cleared Agricultural Land	353260	6709529	✓	✓	✓	
VP07	BUS07	BaUS07	Sparse to Open Eucalypt and Banksia Woodland on Plains and Slopes bordering Cleared Agricultural Land	354071	6707264	✓	✓	✓	✓
VP08	BUS08	BaUS08	Cleared Agricultural Land	356725	6709610	✓	✓	✓	✓
VP09	BUS09	BaUS09	Tathra National Park - Tall Shrubland Associated with Damplands, and Sparse to Open Eucalypt Woodland on Plains and Slopes	358584	6707628	✓	✓	✓	✓
VP10	BUS10	BaUS10	Planted (laneway)	350353	6700708	✓	✓	✓	✓
VP11	BUS11	BaUS11	Cleared agricultural	355046	6698767	✓	✓	✓	✓
VP12	BUS12	BaUS12	Low Shrubland on Gentle Slope bordering Cleared Agricultural Land	356345	6696098	✓	✓	✓	✓
VP13	BUS13	BaUS13	Cleared agricultural (between two riparian)	348493	6698084	✓	✓	✓	✓
VP14	BUS14	BaUS14	Cleared Agricultural Land (between Wandoo Woodland patches)	354528	6693286	✓	✓	✓	✓

Vantage Point	BUS ID	BaUS ID	Habitat Description	Easting	Northing	BBUS01	BBUS02	BBUS03	BBUS04
VP15	BUS15	BaUS15	Wandoo Woodland on Sandy Soil, bordering Cleared Agricultural Land	356176	6690880	✓	✓	✓	✓
VP16	BUS16	BaUS16	Low Shrubland on Gentle Slope, and Sparse to Open Eucalypt and Banksia Woodland on Plains and Slopes, bordering Cleared Agricultural land	351414	6690355	✓	✓	✓	✓
VP17	BUS17	BaUS17	Cleared Agricultural Land	348635	6691971	✓	✓	✓	✓
VP18	BUS18	BaUS18	Sparse to Open Eucalypt and Banksia Woodland on Plains and Slopes bordering Cleared Agricultural Land	344693	6689960	✓	✓	✓	✓
Total						**18**	**18**	**18**	**17**



Scale: 1:125,000 at A4, GDA2020 MGA Zone 50

Legend

- BBUS Area
- Tathra Wind Farm Area
- Road
- Watercourse
- National Park
- Nature Reserve
- Bat Flight Height Collection Point
- Vantage Point
- Bat Utilisation Survey Point

FIGURE 2.1

2024-2025 BBUS Sample Site Locations

0 2.5 5

Kilometres

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024), DBCA (2024), Umwelt (2024), SynergyRED (2024)

2.2.4 Bird Utilisation Surveys

2.2.4.1 Fixed Point Count (Vantage Point Surveys)

Fixed point surveys were conducted to assess site utilisation and flight behaviour of bird species in the BBUS Area using a BACI (before–after–control–impact) survey design to allow for an assessment in the post implementation phase of the Project (e.g. testing for changes to habitat utilisation as a result of turbine operations). The fixed-point count method involved an observer positioned at each vantage point for 30 minutes, documenting visual and audible bird observations with a focus on visual observations of birds in flight.

Vantage points were visited at three different times of day and across different days to allow for time-of-day differences in bird movements and activity to be recorded. Surveys were undertaken twice across each of the sampling periods, resulting in six surveys per site for a given seasonal survey. Sampling periods selected were:

- Morning (between 6.00 am and 10.00 am).
- Midday (between 10.00 am and 2.00 pm).
- Afternoon (between 2.00 pm and 6.00 pm).

During each vantage point survey, a single observer recorded the following information for each observation:

- Species and abundance.
- Observation type (visual or aural).
- Distance and direction from the observer.
- Initial, minimum and maximum height AGL of the observed bird/s (to the nearest meter beneath 100 m and in 10 m increments thereafter).
- Direction of flight.
- Flight pattern (i.e., not flying, local movement, directional flight, circling, swooping, hovering or varied).
- Behaviour (i.e., general flight, foraging/hunting, perching, mating, aggressive interactions, hollow inspection, nesting, on ground, or on waterbody).
- Flight duration (recorded only during BBUS02, BBUS03 and BBUS04).

2.2.4.2 Incidental Observations

In addition to structured surveys, incidental bird observations were recorded at various locations throughout the BBUS Area during travel between sample sites. Emphasis was placed on observations of targeted species (i.e. conservation significant birds and raptors) as well as birds moving through the BBUS Area at RSA height. For each record the following were noted:

- species
- location of the observation

- abundance
- flight behaviour
- flight height
- flight direction.

2.2.4.3 Exposure Risk Models

Flight height data was taken from vantage point surveys and used as inputs to Exposure Risk Models (ERMs). The ERMs use the minimum, maximum and most frequent (modal) height observed in an individual instance of flight as inputs to a beta-PERT (REF, R mc2d package) distribution. Distribution hulls for all records of a given species were culminated into a frequency distribution hull of flight height allowing for relative comparison of flight frequency at different heights above ground level. We note that this is a preliminary ERM and subject to change with additional data collection.

2.2.5 Bat Surveys

Microchiropteran (microbat) echolocation calls were sampled using passive ultrasonic recorders at each survey site during each survey event. Devices were placed approximately 2 m AGL facing a cleared area or flyway (flight route used by bats) for a total of 2–3 nights per site. Call data was sent to recognised microbat call expert Dr Kyle Armstrong for analysis and species identification.

In addition to ground-based recording, passive detectors were installed on a meteorological (Met) mast to gather data on bat flight height. Microphones were installed at three heights on the Met Mast; 30 m AGL (corresponding to the lowest assigned RSA), 100 m AGL (the maximum height able to reliably collect ultrasonic calls as advised by the microphone provider), and 2 m AGL (ground level activity). Two uni-directional microphones were installed at each selected height (30 m and 100 m), pointing both east (into native vegetation) and west (into agricultural cleared land). An omni-directional microphone was used for the ground level recorder. Titley Scientific Ranger devices were connected to each microphone and operated during each survey event for a period of 3 to 14 nights.

The likelihood that bat species detected within the BBUS Area fly at RSA height was inferred based on both flight height data collected from devices installed up the Met Mast, and on literature relevant to the flight behaviour of recorded species. A precautionary approach has been applied in some instances where there is a paucity of available literature or records.

2.2.6 Survey Limitations

A summary of survey limitations is presented in **Table 2.5**.

Table 2.5 Survey Limitations

Survey	Limitations
BBUS01	The Met Mast had not been installed during this survey, so bat flight height data was not collected.
BBUS02	Access to Wotto Nature Reserve (VP05) and Tathra National Park (VP09) were restricted during periods where the soil was wet, as requested by the Turquoise Coast District of Parks and Wildlife Services, DBCA. This impacted access to VP05 & VP09 for two days out of the seven day survey period. During these days, survey personal performed vantage point assessments as close to the original locations as practical. As a result, BUS05 was surveyed from a location approximately 2 km west on the 19 November, and BUS09 was surveyed from approximately 2.7 km southwest on 19 and 20 November 2024. Wildlife interactions prevented access to BUS09 on 18 November resulting in the surveyor performing the vantage point assessment from 3.2 km southwest. No other access issues were reported.
BBUS03	The predicted maximum temperature for 16 January was 44°C. Due to health and safety requirements, staff were unable to perform lone working after temperatures exceeded 40°C so worked in a pair and performed fewer vantage point surveys during this time. Missing vantage points were supplemented with additional surveys on other days. This may have resulted in an overrepresentation of bird activity during the midday and afternoon survey periods, however bird activity was generally low during these periods for the duration of the survey so the limitation is not considered to be major.
BBUS04	No limitations were reported.
All surveys	Due to health and safety requirements, survey durations were limited to a maximum of 12 consecutive hours. While efforts were made to commence surveys during the early morning dawn chorus (approximately 6:00 am), this constraint occasionally resulted in reduced coverage of the dusk period during warmer months, when sunset occurred well beyond the survey window. As a result, bird activity during the late afternoon and dusk period may be underrepresented in the dataset.

3.0 Results

3.1 Likelihood of Occurrence

A desktop likelihood of occurrence assessment was previously undertaken (Bird and Bat Utilisation Risk Assessment (Umwelt, 2024)) for conservation significant bird and bat species with potential to occur within the BBUS Area which was later updated following a Basic and Targeted Fauna survey (Umwelt, 2025).

The results of this assessment have been further updated to reflect any additional data gathered during the BBUS events. All conservation significant birds with a Moderate or greater likelihood of occurrence are listed in Table 3.1. The complete likelihood of occurrence assessment is presented in Appendix A**.**

The desktop assessment indicates that no bat species of conservation significance are likely to occur within the BBUS Area.

Table 3.1 Conservation Significant Birds with Moderate or Greater Likelihood of Occurrence

Common Name	Scientific Name	Cth Listing	WA Listing	Likelihood of Occurrence
Pacific Swift	*Apus pacificus*	MI	MI	Known
Peregrine Falcon	*Falco peregrinus*		OS	Known
Carnaby's Black-cockatoo	*Zanda latirostris*	EN	EN	Known

3.2 Bird Utilisation Surveys

3.2.1 Species Diversity

A total of 98 unique species across 34 families have been recorded within the BBUS Area across the BBUS program, including vantage point assessments and incidental observations. The most specious families recorded were Meliphagidae (Honeyeaters) – 13, Acanthizidae (Thornbills and Allies) – 8, Accipitridae (Hawks, Eagles, and Kites) – 6, Artamidae (Woodswallows, Butcherbirds, Currawongs, and Peltops) – 6 and Cacatuidae (Cockatoos) – 5.

The most frequently observed species within the BBUS Area are presented in **Table 3.2**. A complete list of all bird species recorded is presented in **Appendix E**. It should be noted that records represent each observation recorded and do not represent the number of individuals within each record.

Table 3.2 Most Frequently Observed Species Across the BBUS Program

Common Name	Scientific Name	Number of Records				
		BBUS01	BBUS02	BBUS03	BBUS04	Total
Galah	*Eolophus roseicapilla*	122	111	77	59	**369**
Australian Raven	*Corvus coronoides*	82	119	24	131	**356**
Australian Ringneck	*Barnardius zonarius*	48	54	37	49	**188**
Australian Pipit	*Anthus australis*	62	48	26	50	**186**
Brown Honeyeater	*Lichmera* indistincta	43	53	33	25	**154**
Nankeen Kestrel	*Falco cenchroides*	39	30	35	14	**118**
Australian Magpie	*Gymnorhina tibicen*	23	22	26	44	**115**
Magpie-lark	*Grallina cyanoleuca*	31	40	14	19	**104**
Tree Martin	*Petrochelidon nigricans*	18	28	10	44	**100**
Singing Honeyeater	*Gavicalis virescens*	25	18	13	33	**89**
Pied Butcherbird	*Cracticus nigrogularis*	31	22	13	20	**86**
Willie Wagtail	*Rhipidura leucophrys*	23	24	14	19	**80**

3.2.2 Species of Interest

Species of interest are species which require consideration during impact assessment and management of the Project. This includes conservation significant species (i.e. listed under the BC Act, EPBC Act, or as Priority species by DBCA), raptor species, and species recorded flying within RSA during the BBUS program thus placing them at risk of blade strike. Species of interest are discussed further in the following sections.

3.2.2.1 Conservation Significant Species

Three conservation significant species were recorded during the BBUS program; Carnaby's Black-Cockatoo (*Zanda latirostris*) (EN; EN), Pacific Swift (*Apus pacificus*) (MI; MI), and Peregrine Falcon (*Falco peregrinus*) (OS) (**Table 3.3**).

Of these, Carnaby's Black-Cockatoo was the most frequently recorded, with 53 records including 38 primary (physical sightings) and 15 secondary (calls) observations across all four BBUS. Primary observations ranged from single individuals to flocks of up to 35 birds, with a median flock size of two across all BBUS undertaken to date. Carnaby's Black-Cockatoos were most frequently recorded during spring surveys, with 22 records in BBUS01 and 16 records in BBUS02. In contrast, the summer and autumn BBUS included only six records in BBUS03 and five records in BBUS04 respectively. Flocking behaviour was observed during all BBUS events. However, maximum flock sizes varied between surveys, with larger flocks recorded in spring, including 25 individuals in BBUS01 and 35 in BBUS02. In contrast, smaller flocks were observed in summer and autumn, with maximums of 8 individuals in BBUS03 and 16 in BBUS04, respectively.

Peregrine Falcon was recorded four times across two BBUS (BBUS02 and BBUS03). One record of this species during BBUS02 included four individuals observed hunting together. These are believed to be an adult pair with two juveniles. All other records were of single individuals observed in flight.

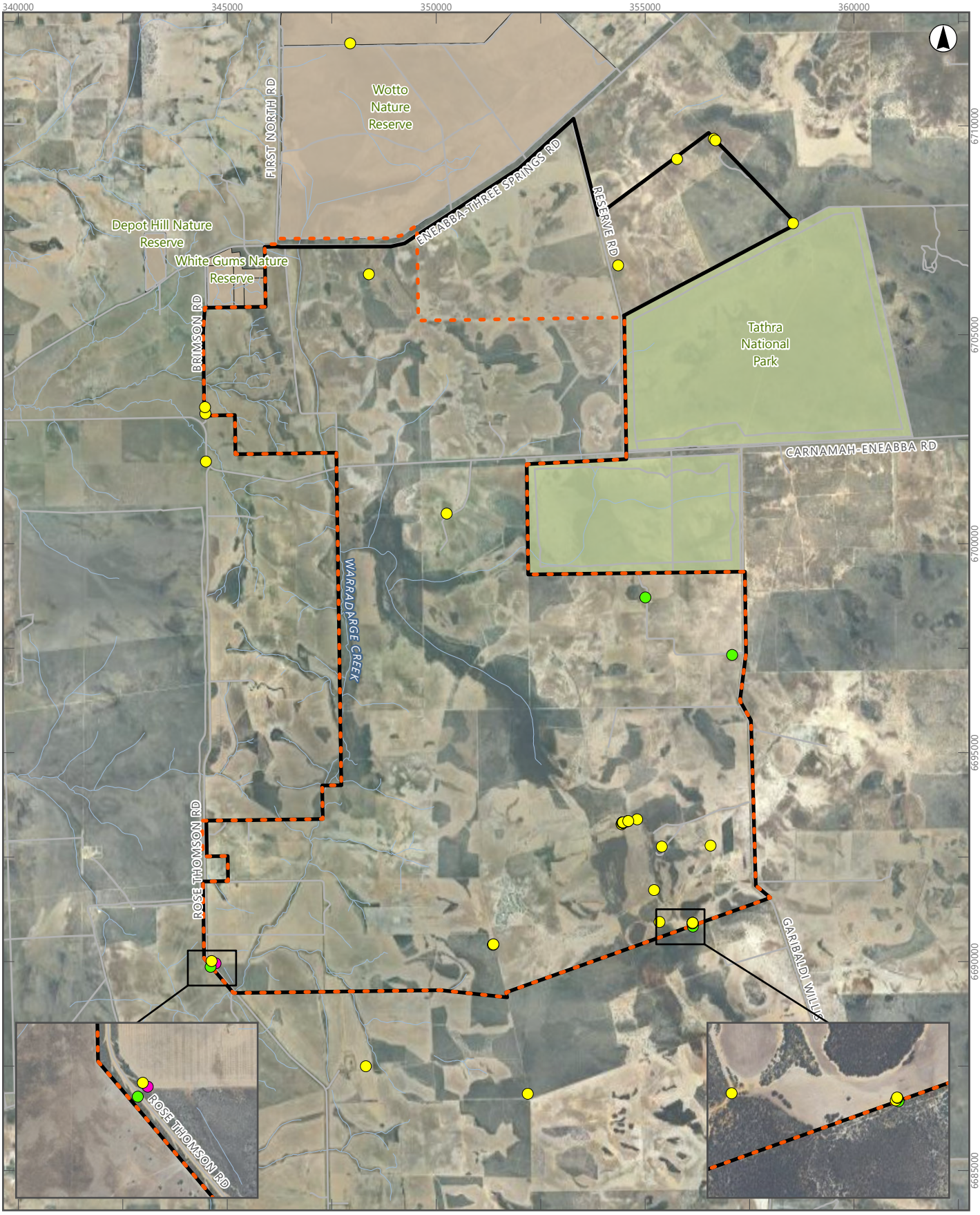
Pacific Swift was recorded only once during BBUS04. This was a primary observation of four individuals who flew directly over the surveyor.

The locations of all conservation significant species recorded during BBUS events are displayed on **Figure 3.1**. Flight height data gathered for conservation significant birds are discussed further in the following sections.

Table 3.3 All Conservation Significant Species Records within the BBUS Area

Common Name	Scientific Name	Cth Listing	WA Listing	Number of Records				Total
				BBUS01	BBUS02	BBUS03	BBUS04	
Carnaby's Black-Cockatoo	*Zanda latirostris*	EN	EN	22	20	6	5	**53**
Pacific Swift	*Apus pacificus*	MI	MI	-	-	-	1	**1**
Peregrine Falcon	*Falco peregrinus*	-	OS	-	2	2	-	**4**

Note. EN=Endangered, OS=Other Specially Protected, MI=Migratory.



Scale: 1:125,000 at A4, GDA2020 MGA Zone 50

Legend

- BBUS Area
- Tathra Wind Farm Area
- Road
- Watercourse
- National Park
- Nature Reserve

Conservation Significant Fauna

●	*Apus pacificus*	Pacific Swift
●	*Falco peregrinus*	Peregrine Falcon
●	*Zanda latirostris*	Carnaby's Black-Cockatoo

FIGURE 3.1

Conservation Significant Species Recorded during BBUS

0 2.5 5
Kilometres

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024), DBCA (2024), Umwelt (2024), SynergyRED (2024)

Carnaby's Black-Cockatoo

Carnaby's Black-Cockatoo (*Zanda latirostris*) (EN; EN) was recorded on 53 occasions during the BBUS program including 38 primary observations which allowed for the collection of flight data. Flight heights for this species ranged from ground level to 120 m AGL. Ten records (26%) of this species were flying within the RSA height range (30 m AGL to 250 m AGL). Most records (74%) were birds flying below RSA height (<30 m AGL). The maximum height this species was recorded at was 120 m AGL, for which a flock of three individuals was recorded during BBUS02 (spring) and two individuals were recorded together during BBUS04 (autumn). Flight height data for this species is presented in **Figure 3.2** and **Table 3.4** and includes both vantage point and incidental data.

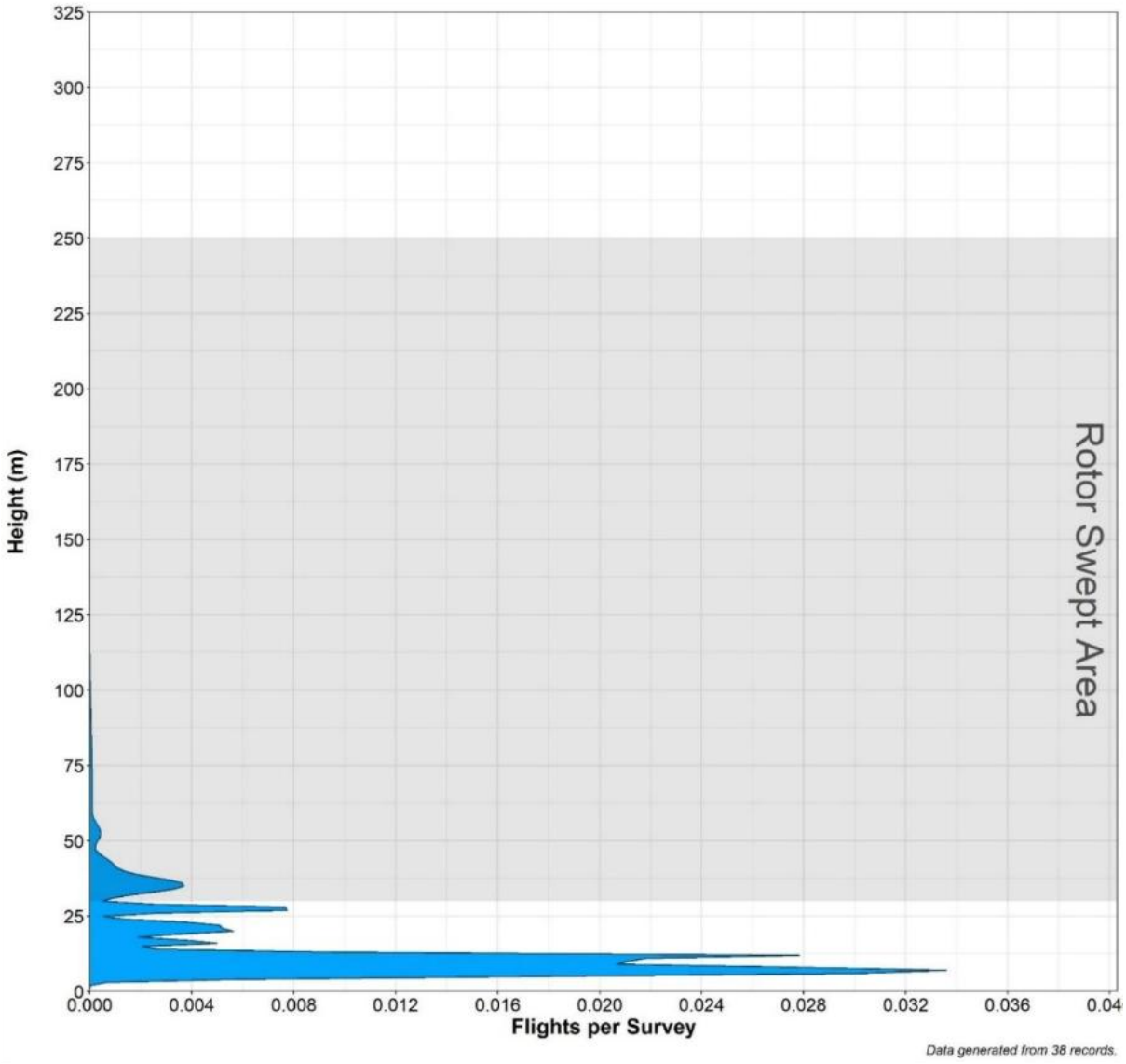


Figure 3.2 Exposure Risk Model for Carnaby's Black-cockatoo (*Zanda latirostris*)

Peregrine Falcon

Peregrine Falcon was recorded on four occasions across spring, summer, and autumn BBUS surveys (BBUS02, BBUS03, and BBUS04). While most observations involved single individuals, one sighting included a group of four birds in flight, likely comprising a breeding pair with two juveniles suggesting potential nesting activity within or near the BBUS Area. Recorded flight heights ranged from 5 m to 200 m above ground level (AGL), with 75% of observations occurring within the rotor swept area (RSA: 30–250 m AGL). Flight height data for this species are summarised in **Table 3.4**.

Although only four records were collected during the survey period, the adopted vantage point methodology is considered appropriate for detecting this species. The low number of observations is therefore attributed to the Peregrine Falcon's naturally low occurrence rate within the survey area. However, indicative exposure values are presented in **Figure 3.3** for context only and should be interpreted with caution.

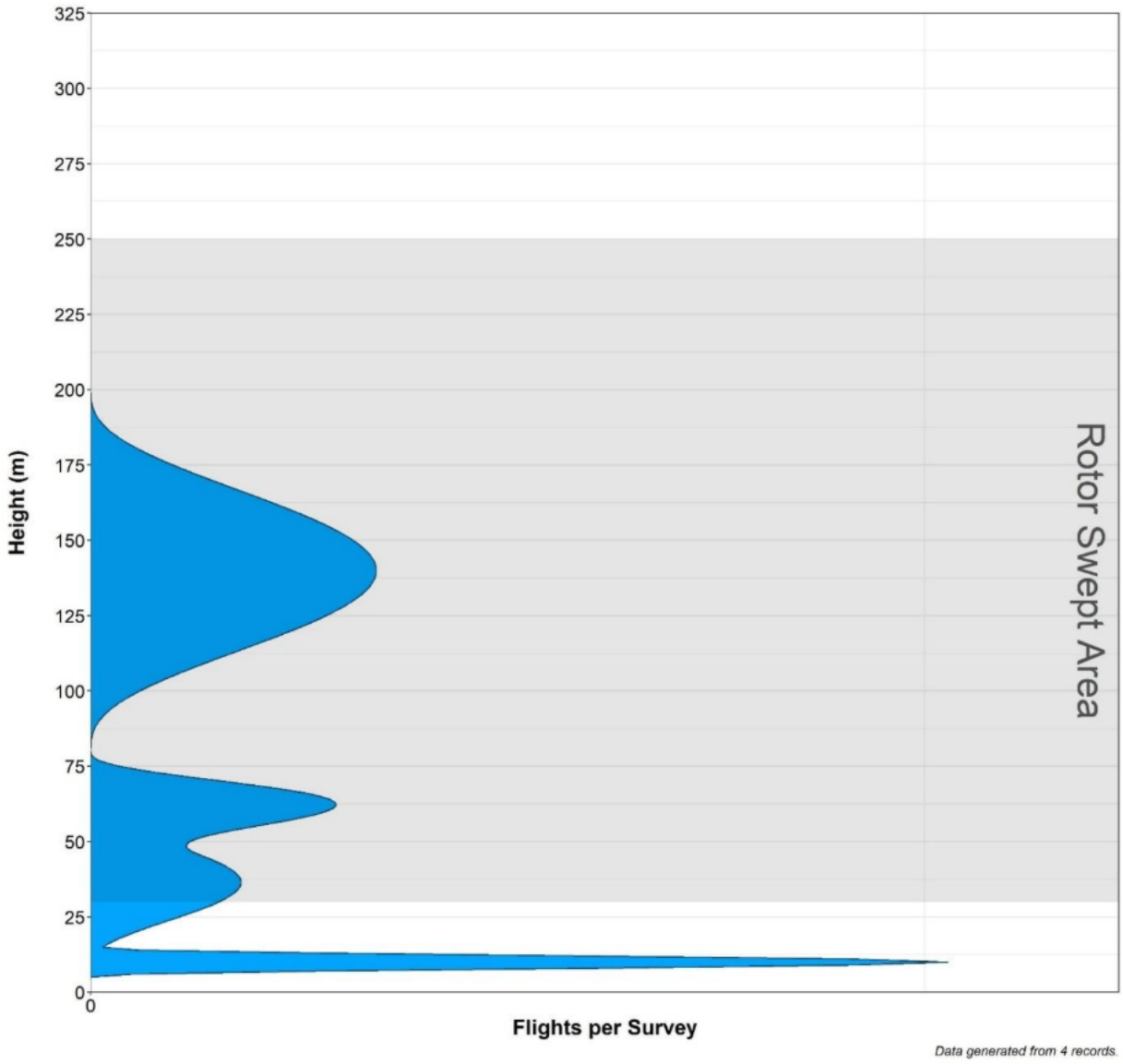


Figure 3.3 Exposure Risk Model for Peregrine Falcon (*Falco peregrinus*)

Pacific Swift

Pacific Swift (*Apus pacificus*) was recorded within the BBUS Area during the BBUS program. One group of four Pacific Swift was recorded at BUS18 flying within the RSA height range (30 m AGL to 250 m AGL) during BBUS04. Flight heights for these birds varied between 30 m AGL and 65 m AGL which is within the RSA (**Table 3.4**). The low number of observations is attributed to the species naturally low occurrence rate within the survey area. However, indicative exposure values are presented in **Figure 3.4** for context only and should be interpreted with caution.

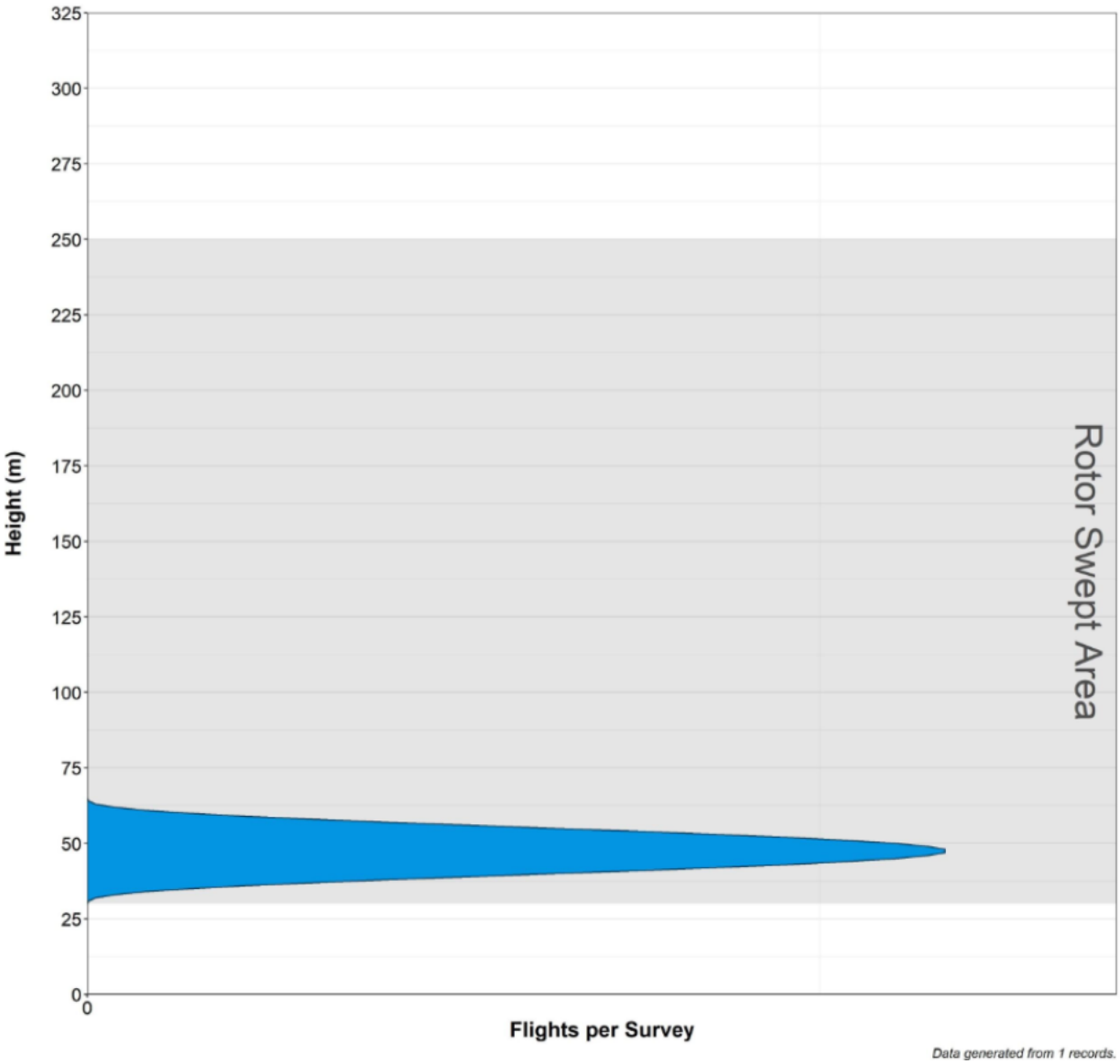


Figure 3.4 Exposure Risk Model of Pacific Swift (*Apus pacificus*)

Table 3.4 Conservation Significant Species Maximum Flight Heights

Species	Scientific Name	Flight Height (m)									Total Flight Records
		<10	10–19	20–29	30–39	40–49	50–59	>60	Min	Max	
Carnaby's Black-Cockatoo	*Zanda latirostris*	2	15	11	2	3	2	3	0	120	**38**
Pacific Swift	*Apus pacificus*	-	-	-	-	-	-	1	30	65	**1**
Peregrine Falcon	*Falco peregrinus*	-	1	-	-	-	-	3	5	200	**4**

Note. Highlighted columns indicate records within the RSA height range.

3.2.2.2 Raptors

At least ten raptor species were recorded across the BBUS program, with Nankeen Kestrel (*Falco cenchroides*) and Wedge-tailed Eagle (*Aquila audax*) being the most commonly recorded. One of these species, Peregrine Falcon (*Falco peregrinus*), has conservation significance as discussed in **Section 3.3.2.1**. One of these species, Peregrine Falcon (*Falco peregrinus)* has conservation significance as discussed in **Section 3.3.2.1**. The total number of records from the BBUS program are presented in **Table 3.5**.The total number of records from the BBUS program are presented in **Table 3.5** and the locations of raptor species recorded during BBUS events are displayed on **Figure 3.5.**

Table 3.5 Raptor Records within the BBUS Area

Common Name	Scientific Name	Cth Listing	WA Listing	Number of Records
Australian Hobby	*Falco longipennis*	-	-	1
Black-shouldered Kite	*Elanus axillaris*	-	-	2
Brown Falcon	*Falco berigora*	-	-	11
Brown Goshawk	*Accipiter fasciatus*	-	-	9
Collared Sparrowhawk	*Accipiter cirrocephalus*	-	-	3
Little Eagle	*Hieraaetus morphnoides*	-	-	4
Nankeen Kestrel	*Falco cenchroides*	-	-	118
Peregrine Falcon*	*Falco peregrinus*	-	OS	4
Raptor sp.	-	-	-	4
Wedge-tailed Eagle	*Aquila audax*	-	-	76
Whistling Kite	*Haliastur sphenurus*	-	-	4
	Total			**236**

Note. *Species also presented in **Table 3.3.**

Raptor Exposure Risk

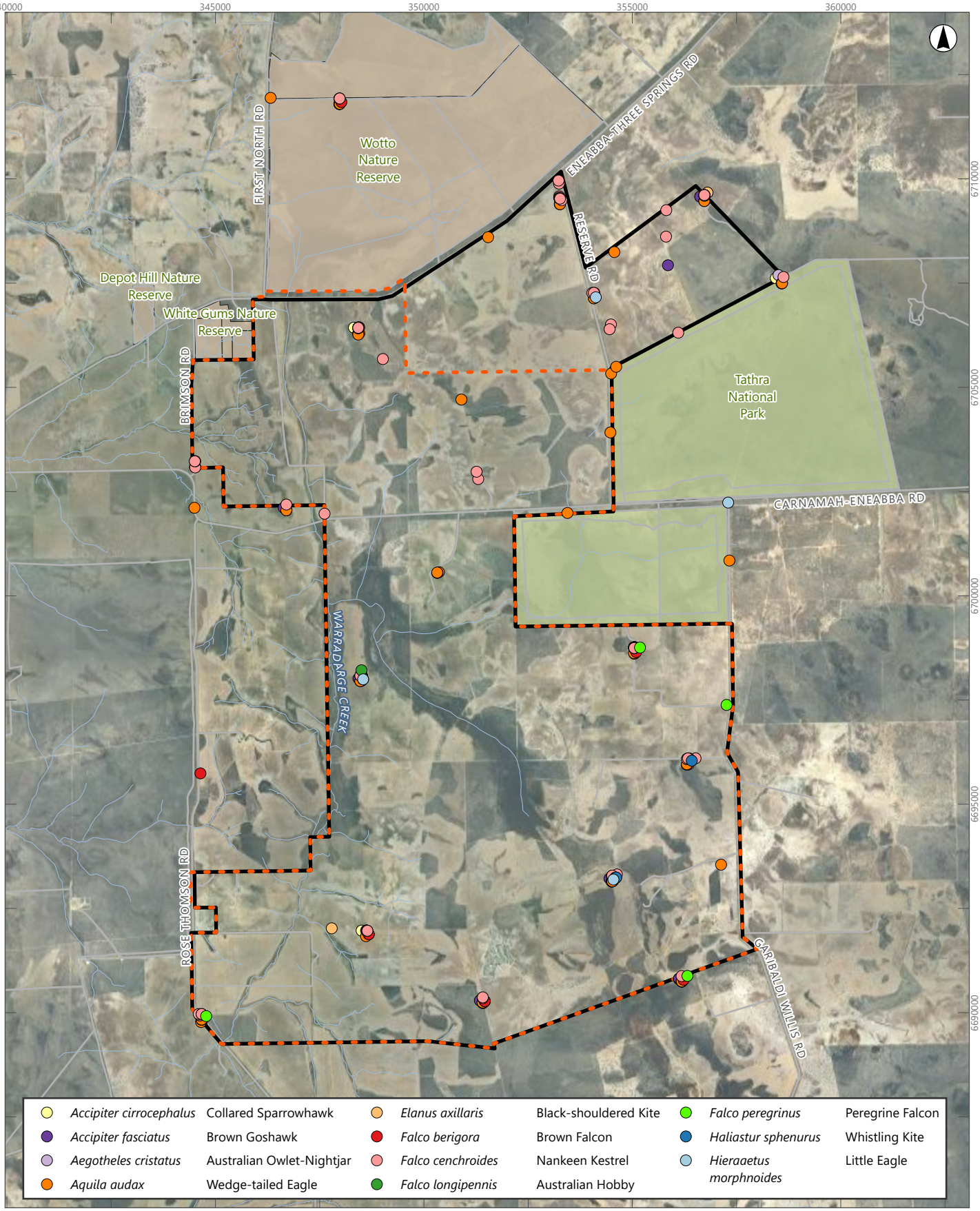
Flight height data gathered for raptors during the BBUS program recorded at least nine raptor species (141 records) flying within the RSA height range (30 m AGL to 250 m AGL). Three unidentified records of raptors were also recorded flying within the RSA height range. The Wedge-tailed Eagle was the most frequently recorded raptor species within the RSA (67 records) followed by the Nankeen Kestrel (46 records). Flight height data for these species is presented in **Table 3.6** and includes incidental data collected outside of the BBUS Area.

Table 3.6 Raptor Species Maximum Flight Heights

Common Name	Scientific Name	Flight Height (m)														Total Flight Records
		<10	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–149	150–199	200–249	250–299	>300	
Australian Hobby	*Falco longipennis*		1														**1**
Black-shouldered Kite	*Elanus axillaris*					1								1			**2**
Brown Falcon	*Falco* berigora	2		2	1		4	1									**10**
Brown Goshawk	*Accipiter fasciatus*	1		1	1	1		1		2		1	1				**9**
Collared Sparrowhawk	*Accipiter cirrocephalus*		2			1											**3**
Little Eagle	*Hieraaetus morphnoides*		2	1								1					**4**
Nankeen Kestrel	*Falco cenchroides*	11	28	12	17	7	7	3	2	3	1	3	3				**97**
Peregrine Falcon*	*Falco peregrinus*		1					1		1				1			**4**
Raptor sp.	-			1			1		1			1					**4**
Wedge-tailed Eagle	*Aquila audax*	1	1		5	4	11	9	3	4	6	7	10	8	4**	1	**74**
Whistling Kite	*Haliastur sphenurus*					2			1								**3**

Note. Highlighted columns indicate the RSA height range. *Species listed as Other Specially Protected under the BC Act are also presented in **Table 3.4**.

**Two of the four Wedge-tailed Eagle records were observed at exactly 250 m AGL. These two records are therefore included in the records identified as overlapping with the RSA height range.



Scale: 1:125,000 at A4, GDA2020 MGA Zone 50

Legend

- BBUS Area
- Tathra Wind Farm Area
- Road
- Watercourse
- National Park
- Nature Reserve

FIGURE 3.5

Raptors Recorded During BBUS

0 2.5 5
Kilometres

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024), DBCA (2024), Umwelt (2024), SynergyRED (2024)

3.2.2.3 At-risk Species

At least 41 unique species were observed flying within the RSA height range (30 m AGL to 250 m AGL) placing them at risk of blade strike. Three of these species are of conservation significance, Pacific Swift (MI; MI), Peregrine Falcon (OS) and Carnaby's Black-Cockatoo (EN; EN) as discussed in **Section 3.2.2.1**. A further eight species of raptor were recorded flying at RSA (**Section 3.2.2.2**).

Of all species recorded, Australian Raven (*Corvus coronoides*) was recorded most frequently within the RSA, with 80 records (38.7% of primary observations) within the RSA. This was followed by Wedge-tailed Eagle (*Aquila audax*) with 67 records (90.5% of primary observations), Tree Martin (*Petrochelidon nigricans*) with 61 records (62.9% of primary observations), and Galah (*Eolophus roseicapilla*) with 60 records (19.9% of primary observations) within the RSA.

Of all family groups recorded, Cacatuidae (Cockatoos) (represented by five species) had the highest number of records within the RSA, with 99 records (24.3% of primary observations). This was followed by Corvidae (Crows, Jays, and Magpies) (represented by three species) with 93 records (38.4% of primary observations) and Accipitridae (Hawks, Eagles, and Kites) (represented by six species) with 83 records (87.4% of primary observations) within the RSA.

All at-risk species recorded during the BBUS program and their maximum flight heights are provided in **Appendix H** which includes data collected outside of the BBUS Area. Exposure Risk Models are also presented in **Appendix H** for all species with more than 15 records over the BBUS program.

Table 3.7 Exposure Risk of Birds Species Recorded within Rotor Swept Area

Species Name	Scientific Name	Cth Listing	WA Listing	Total # of Primary Records
Conservation Significant				
Pacific Swift	*Apus pacificus*	MI	MI	1
Peregrine Falcon	*Falco peregrinus*		OS	4
Carnaby's Black-cockatoo	*Zanda latirostris*	EN	EN	38
Raptors				
Black-shouldered Kite	*Elanus axillaris*			2
Little Eagle	*Hieraaetus morphnoides*			4
Wedge-tailed Eagle	*Aquila audax*			74
Brown Goshawk	*Accipiter fasciatus*			9
Collared Sparrowhawk	Accipiter *cirrocephalus*			3
Whistling Kite	*Haliastur sphenurus*			3
Nankeen Kestrel	*Falco cenchroides*			97
Brown Falcon	*Falco berigora*			10
Other At-Risk Species				
Australian Shelduck	*Tadorna tadornoides*			4
Straw-necked Ibis	*Threskiornis spinicollis*			3
Western Red-tailed Black-cockatoo	*Calyptorhynchus banksii escondidus*			11
White-faced Heron	*Egretta novaehollandiae*			3
Galah	*Eolophus roseicapilla*			301
Western Corella	*Cacatua pastinator*			34
Little Corella	*Cacatua sanguinea*			19
Regent Parrot	*Polytelis anthopeplus*			3
Australian Ringneck	*Barnardius zonarius*			91

Species Name	Scientific Name	Cth Listing	WA Listing	Total # of Primary Records
Crimson Chat	*Epthianura tricolor*			41
Tawny-crowned Honeyeater	*Gliciphila melanops*			17
Brown Honeyeater	*Lichmera indistincta*			46
Masked Woodswallow	*Artamus personatus*			4
Black-faced Woodswallow	*Artamus cinereus*			46
Australian Magpie	*Gymnorhina tibicen*			33
Black-faced Cuckooshrike	*Coracina novaehollandiae*			18
Magpie-lark	*Grallina cyanoleuca*			31
Torresian Crow	*Corvus orru*			14
Little Crow	*Corvus bennetti*			19
Australian Raven	*Corvus coronoides*			207
White-backed Swallow	*Cheramoeca leucosterna*			10
Welcome Swallow	*Hirundo neoxena*			36
Fairy Martin	*Petrochelidon ariel*			2
Tree Martin	*Petrochelidon nigricans*			97
Brown Songlark	*Cincloramphus cruralis*			11
Silvereye	*Zosterops lateralis*			3
Mistletoebird	*Dicaeum hirundinaceum*			1
Australian Pipit	*Anthus australis*			86

3.3 Bat Surveys

The analysis of the ultrasonic bat call recordings collected during the BBUS program identified a total of six unique microbat species across two families (SZ, 2025). None of these species are listed as threatened under the EP Act and/or EPBC Act.

3.3.1 Species Diversity

At least six unique microbat species were recorded across the BBUS program. The total number of passes from the BBUS program are presented in **Table 3.8.**

Table 3.8 Microbat Species Recorded During the BBUS Program

Common Name	Species	Cth listing	WA Listing	Number of passes
White-striped Free-tailed Bat	*Austronomus australis*	-	-	223
Gould's Wattled Bat	*Chalinolobus gouldii*	-	-	6,664*
South-western Free-tailed Bat	*Ozimops kitcheneri*	-	-	
Chocolate Wattled Bat	*Chalinolobus morio*	-	-	24
Lesser Long-eared Bat	*Nyctophilus geoffroyi*	-	-	127
Southern Forest Bat	*Vespadelus regulus*	-	-	2,765

*Combined number of passes as call type associated with both species (SZ, 2025)

3.3.2 Species of Interest

Microbat species of interest include conservation significant species recorded and those recorded from ultrasonic recorders mounted to the Met Mast (30 m and 100 m). These are discussed further in the following sections.

3.3.2.1 Conservation Significant Species

No conservation significant microbats have been recorded within the BBUS Area to date.

3.3.2.2 At Risk Species

Three species of microbat have been recorded within RSA. These were:

- White-striped Free-tailed Bat (*Austronomus australis)*.
- South-western Free-tailed Bat (*Ozimops kitcheneri)*.
- Gould's Wattled Bat (*Chalinolobus gouldii)*.

4.0 Conclusions and Discussion

The results of the first four Bird and Bat Utilisation Surveys (BBUS01–BBUS04) provide a strong foundation for understanding the bird and bat activity within the proposed Tathra Wind Farm Area. These interim findings contribute insights to inform ecological impact assessment, turbine micrositing, and mitigation planning as the project moves through feasibility assessment.

Key Conclusions

During the first year of the BBUS program, a total of 98 bird species from 34 families were recorded within the BBUS Area. At least 41 bird species were observed flying within the rotor swept area (RSA: 30–250 m AGL), placing them at potential risk of blade strike. These include three conservation significant species listed under either the BC Act or EPBC Act:

- Carnaby's Black-Cockatoo (Endangered under the EPBC Act and BC Act).
- Peregrine Falcon (Other Specially Protected under the BC Act).
- Pacific Swift (Migratory under the EPBC Act and BC Act).

A majority of Carnaby's Black-Cockatoo flight records were below the RSA height (74%) however 26% of records included this species flying within RSA. Flight height for this species ranged from below the RSA to around the middle of RSA heights (max 120 m AGL). The lower occurrence of flight heights exceeding 30 m AGL are further supported by R. Johnstone's advice where Carnaby's Black-Cockatoo are reported to generally fly between 5–15 m AGL, with occasional occurrences at 15–100 m AGL (Johnstone, 2025). Furthermore, mortality assessment at Warradage Wind Farm, located adjacent to the BBUS Area, has not identified Carnaby's Black-Cockatoo amongst strike mortality as part of three-year operational bird strike surveys (Bright Energy Investments, 2025). Within the BBUS Area, the species has been observed as single individuals to flocks of up to 35 birds, with the median flock size of two birds.

Peregrine Falcons were detected on four occasions across three seasonal BBUS events, with flight activity spanning from 5 m to 200 m AGL. Although infrequently recorded, observations included a potential breeding group suggesting localised nesting activity. Seventy-five percent of maximum flight heights occurred within the RSA, indicating a measurable collision risk.

Pacific Swifts were recorded once during the BBUS program, with a group of four individuals observed flying between 30 and 65 m AGL – well within the rotor swept area. The flight height suggests potential exposure, warranting ongoing consideration in subsequent surveys.

At least ten raptor species were recorded during the BBUS program, with Wedge-tailed Eagle and Nankeen Kestrel observed most frequently. Flight height data confirmed that at least nine identified raptor species (plus three unidentified records) were flying within the RSA, indicating a broad potential for blade strike exposure. Wedge-tailed Eagle accounted for the highest number of RSA height records (67), followed by Nankeen Kestrel (46). These findings highlight the importance of raptor activity in turbine risk assessments across the survey area.

At the time of the writing this report, turbine specifications had not been decided upon and so the RSA was conservatively set to encompass a wide height range of 30–250 m AGL. It is likely that refinement of the RSA range will result in differing risk assessment outcomes.

A total of six microbat species were recorded during the BBUS Program. None of these species are currently listed under the EP Act and/or EPBC Act. Three species of microbat have been recorded within RSA. These were:

- White-striped Free-tailed Bat (*Austronomus australis)*.
- South-western Free-tailed Bat (*Ozimops kitcheneri)*.
- Gould's Wattled Bat *(Chalinolobus gouldii)*.

References

Benshemesh, J. (2007). *National Recovery Plan for Malleefowl* Leipoa ocellata. Department for Environment and Heritage, South Australia.

BirdLife Australia. (2024). *Birdata Explore Search Tool*. Interrogation of Birdata Database Using Explore Search Tool. BirdLife Australia. https://birdata.birdlife.org.au/explore#map=-22.5083100_136.0786120_4

Bureau of Meteorology (BOM). (2025). *Climate Data Online* [Database interrogation]. http://www.bom.gov.au/climate/dwo/IDCJDW6028.latest.shtml

DCCEEW. (2023). *Conservation Advice for* Aphelocephala leucopsis *(southern whiteface)* (p. 21). Department of Climate Change, Energy, the Environment and Water (DCCEEW). Canberra, Australian Capital Territory. https://environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=529

Geering, A., Agnew, L., & Harding, S. (2007). *Shorebirds of Australia*. CSIRO Publishing. Melbourne, Victoria.

Higgins, P. J. (Ed.). (1999). *Handbook of Australian, New Zealand and Antarctic Birds. Volume 4: Parrots to Dollarbird*. Oxford University Press. Melbourne, Victoria.

Higgins, P. J., Davies, S. J. J. F., & Marchant, S. (Eds.). (1996). *Handbook of Australian, New Zealand and Antarctic Birds. Volume 3: Snipe to Pigeons.* Oxford University Press. Melbourne, Victoria.

Marchant, S., & Higgins, P. (Eds.). (1993). *Handbook of Australian, New Zealand and Antarctic Birds. Volume 2: Raptors to Lapwings.* Oxford University Press, Melbourne.

Morcombe, M. (2004). *Field guide to Australian Birds*. Steve Parish Publishing.

Nichols, O. G., & Nichols, F. M. (1984). The reptilian, avian and mammalian fauna of the Mount Saddleback State Forest, Western Australia. *Western Australian Naturalist*, *15*, 179–189.

Pizzey, G., & Knight, F. (2012). *The Field Guide to the Birds of Australia* (9th ed.). HarperCollins Publishers.

Saunders, D. A. (1974). Subspeciation in the White-tailed Black Cockatoo, *Calyptorhynchus baudinii*, in Western Australia. *Australian Wildlife Research*, *1*, 55–69.

Saunders, D. A. (1980). Food and movements of the short-billed form of the White-tailed Black Cockatoo. *Australian Wildlife Research*, *7*, 257–269.

Saunders, D. A. (1986). Breeding season, nesting success and nestling growth in Carnaby's Cockatoo, *Calyptorhynchus funereus latirostris*, over 16 years at Coomallo Creek, and a methods for assessing the viability of populations in other areas. *Australian Wildlife Research*, *13*, 261–273.

Sedgwick, E. H. (1968). A Collie bird list. *Western Australian Naturalist*, *10*, 189–194.

Sedgwick, E. H. (1973). Birds of the Harvey district. *Birds of the Harvey District*, *12*, 131–139.

Specialised Zoological. (2025). *Acoustic analysis and bat call identification from Tathra, Western Australia*. [Unpublished report prepared for Umwelt].

Umwelt. (2024). *Bird and Bat Utilisation Desktop Risk Assessment – Tathra and Eneabba Springs Wind Farm* [Unpublished Report prepared for SynergyRED].

Umwelt. (2025). *Tathra Wind Farm Basic and Targeted Fauna Assessment (Unpublished report prepared for SynergyRED)*.

Appendix A

Detailed Likelihood of Occurrence

Appendix Table A.1 Detailed likelihood of Occurrence

TAXON	Common Name	EPBC Listing	WA Listing	Source			Habitat Description	Number of records within Desktop Study Area	Likelihood of Occurrence
				PMST	NatureMap	DBCA			
Actitis hypoleucos	Common Sandpiper	MI	MI	X	X		The Common Sandpiper is a non-breeding visitor to Australia and can be found along all Australian coastlines and many inland areas. Habitats frequented by the Common Sandpiper include coastal and inland wetlands, estuaries and deltas of streams, mangroves, around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties (Geering et al., 2007; Higgins et al., 1996).	There is one record of this species within the Desktop Study Area. The location of this record is unknown (NatureMap).	**Low** When surface water is present, this species may opportunistically utilise the following habitat types during the non-breeding season; Tall Shrubland Associated with Dampland, Eucalyptus along Drainage Line, and Cleared Agricultural Land.
Aphelocephala leucopsis	Southern Whiteface	VU	P4	X			The Southern Whiteface occurs over most of mainland Australia south of the tropics. Habitat critical to the survival of this species includes areas of relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs (or both); habitat with low tree densities and an herbaceous understorey litter cover which provides essential foraging habitat; and living and dead trees with hollows and crevices which are essential roosting habitat (DCCEEW, 2023).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Low** This species is unlikely to utilise the habitats within the BBUS Area.
Apus pacificus	Pacific Swift	MI	MI	X			The Pacific Swift is a non-breeding visitor to all states and territories of Australia, with scattered records along the coast of the Pilbara. This species is almost exclusively aerial and has been observed over inland plains, above foothills and in coastal areas in Australia. They have seldom been observed roosting on trees or the ground, and are thought to roost aerially. They often occur in areas of updraughts, such as along cliffs and have been overserved from less than 1 m to at least 300 m above the ground (Higgins, 1999, p. 199).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Known** This species was recorded in the airspace above the BBUS Area during BBUS04.
Calidris acuminata	Sharp-tailed Sandpiper	VU, MI	MI	X			The Sharp-tailed Sandpiper is a non-breeding migrant to Australia. In Australia, they prefer muddy edges of shallow fresh or brackish wetlands with sedges, grass, saltmarsh, or low vegetation. They can be found in lagoons, swamps, lakes, pools, dams, waterholes, saltpans, hypersaline saltlakes, flooded paddocks, sedgelands, and ephemeral wetlands and are also recorded in intertidal mudflats, estuaries, mangrove-lined creeks, and occasionally rocky shores or reefs. Moves between coastal and inland habitats based on seasonal wetland availability (Higgins et al., 1996).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Low** When surface water is present, this species may opportunistically utilise the following habitat types during the non-breeding season; Tall Shrubland Associated with Dampland, Eucalyptus along Drainage Line, and Cleared Agricultural Land.
Calidris alba	Sanderling	MI	MI		X		The Sanderling is a non-breeding migrant to Australia where it is almost always found on the coast. It has been recorded on open sandy beaches, exposed sandbars, spits, and shingle banks and forages in the wave-wash zone and among rotting seaweed. Also occurs on rocky outcrop beaches, sheltered sandy shorelines of estuaries, inlets, and harbors. Rarely recorded in near-coastal wetlands, including lagoons, hypersaline lakes, saltponds, and samphire flats. Occasional inland records from ephemeral brackish lakes and river-pools. Roosting sites include bare sand high on beaches, washed-up kelp, coastal dunes, rocky reefs, and ledges (Higgins et al., 1996).	This species has been recorded from one location approx. 17 km southwest of the BBUS Area.	**Very Low** Species is a saltwater and coastal habitat specialist. The BBUS Area does not contain habitat suitable to support this species.

TAXON	Common Name	EPBC Listing	WA Listing	Source			Habitat Description	Number of records within Desktop Study Area	Likelihood of Occurrence
				PMST	NatureMap	DBCA			
Calidris ferruginea	Curlew Sandpiper	CR, MI	CR	X			The Curlew Sandpiper is a non-breeding migrant to Australia. It primarily inhabits intertidal mudflats, estuaries, bays, lagoons, and saltworks, but is occasionally found inland around ephemeral lakes, dams, and waterholes. It occurs in fresh and brackish waters, foraging along shallow pools and mudflat edges. Roosting sites include sandspits, shingle beaches, islets, and coastal wetlands, sometimes using dunes and saltmarsh during high tides (Higgins et al., 1996).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Low** When surface water is present, this species may opportunistically utilise the following habitat types during the non-breeding season; Tall Shrubland Associated with Dampland, Eucalyptus along Drainage Line, and Cleared Agricultural Land.
Calidris melanotos	Pectoral Sandpiper	MI	MI	X			The Pectoral Sandpiper is a non-breeding visitor to Australia. In Australasia, it prefers shallow fresh to saline wetlands and has been recorded at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. They forage in shallow water or soft mud at the edge of wetlands (Higgins et al., 1996).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Low** When surface water is present, this species may opportunistically utilise the following habitat types during the non-breeding season; Tall Shrubland Associated with Dampland, Eucalyptus along Drainage Line, and Cleared Agricultural Land.
Calidris ruficollis	Red-necked Stint	MI	MI			X	The Red-necked Stint is a non-breeding migrant to Australia. It primarily inhabits coastal areas, including sheltered inlets, bays, lagoons, estuaries, and intertidal mudflats, often near spits, islets, and banks, with occasional records on sandy or coralline shores, ocean beaches, rocky shores, reefs, and shoals. Inland, it has been observed in saltworks, sewage farms, saltmarsh, ephemeral and permanent wetlands, such as lagoons, lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks, and saltflats, as well as flooded paddocks, damp grasslands, and rarely on dry gibber plains with little vegetation (Higgins et al., 1996).	This species has been recorded from one location approx. 15 km west of the BBUS Area.	**Low** When surface water is present, this species may opportunistically utilise the following habitat types during the non-breeding season; Tall Shrubland Associated with Dampland, Eucalyptus along Drainage Line, and Cleared Agricultural Land.
Falco hypoleucos	Grey Falcon	VU	VU	X			The Grey Falcon inhabits lightly timbered inland plains, especially stony plains and lightly timbered acacia scrubland, and along inland drainage systems (Morcombe, 2004; Pizzey & Knight, 2012). They also occur in gibber deserts, sandridges, pastoral lands, timbered watercourses and seldom in the driest deserts (Pizzey & Knight, 2012). This species is considered scarce to rare and is usually found singularly or sometimes in pairs (Morcombe, 2004).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Very Low** The BBUS Area does not contain primary habitat to support this species, and the species has not been recorded within 20 km of the BBUS Area.
Falco peregrinus	Peregrine Falcon		OS		X	X	The Peregrine Falcon is uncommon but wide-ranging across Australia. Habitat is extremely diverse, from rainforest to arid scrub, from coastal heath to alpine. Habitat consists of cliffs, gorges, timbered watercourses, riverine, wetland plains, open woodlands, pylons, spires and buildings (Morcombe, 2004; Pizzey & Knight, 2012).	Three records of this species occur within the Desktop Study Area. The closest record is located 20 km south and north of the BBUS Area.	**Known** This species was recorded during BBUS02, BBUS03 and BBUS04.
Leipoa ocellata	Malleefowl	VU	VU	X		X	The Malleefowl occurs in semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and/or acacias. They require a sandy substrate and abundance of leaf litter for breeding. Densities of the birds are generally greatest in areas of higher rainfall and on more fertile soils where habitats tend to be thicker and there is an abundance of food plants (Benshemesh, 2007).	Two records of this species occur within the Desktop Study Area. The closest record lies approx. 12 km northwest of the BBUS Area	**Very Low** Limited habitat is available within the BBUS Area to support this species.

TAXON	Common Name	EPBC Listing	WA Listing	Source			Habitat Description	Number of records within Desktop Study Area	Likelihood of Occurrence
				PMST	NatureMap	DBCA			
Motacilla cinerea	Grey Wagtail	MI	MI	X			The Grey Wagtail is a non-breeding summer visitor to Australia, mostly in the north (Pizzey & Knight 2012). It is associated with running water, sandy, rocky streams in escarpments and rainforests, sewerage ponds, ploughfields and airfields (Pizzey & Knight 2012).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Excluded** Likely a historic recorded misidentified Eastern Yellow Wagtail (Motacilla tschutschensis) which would have a very low probability of occurring in the BBUS Area.
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	CR, MI	CR	X			The Eastern Curlew is a large non-breeding migrant to Australia, found commonly along the north coast of Western Australia, but rarely south of Shark Bay. It is found on intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons (BirdLife Australia, 2024).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Very Low** The BBUS Area does not contain suitable habitat to support this species.
Pezoporus flaviventris	Western Ground Parrot	CR	CR		X	X	The Western Ground Parrot is only known from two locations in far south-west Western Australia; Fitzgerand River National Park and Cape Arid National Park / Nuytsland Nature Reserve. It inhabits low, dry or swampy near-coastal heathland. It usually inhabits vegetation that has remained unburnt for long periods of time (DotE, 2024).	One record of this species has been recorded within the Desktop Study Area. This record lies within the BBUS Area.	**Excluded** BBUS Area falls outside the species contemporary distribution.
Rostratula australis	Australian Painted Snipe	EN	EN	X			The Australian Painted Snipe has been recorded at wetlands in all states of Australia. It generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. It also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes tea-tree (Melaleuca). The Australian Painted Snipe sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber (Marchant & Higgins, 1993).	This species was only detected from the PMST search. There are no records of this species within 20 km of the BBUS Area.	**Very Low** When surface water is present, this species may opportunistically utilise the following habitat; Tall Shrubland Associated with Dampland, Eucalyptus along Drainage Line, and Cleared Agricultural Land.
Zanda latirostris	Carnaby's Black-Cockatoo	EN	EN	X	X	X	Carnaby's Black-Cockatoo is endemic to, and widespread in, the south-west of Western Australia. Breeding mainly occurs in the wheatbelt, from the Stirling Ranges north-west to near Three Springs, but has also been recorded on the coastal plain to the south-west, around Bunbury (Higgins, 1999; Saunders, 1974). Carnaby's Black-Cockatoo occurs in uncleared or remnant native eucalypt woodlands, especially those that contain salmon gum and wandoo, and in shrubland or kwongan heathland dominated by hakea, dryandra, banksia and grevillea species. It also occurs in remnant patches of native vegetation on land otherwise cleared for agriculture (Saunders, 1974, 1986). The species forages seasonally in pine plantations in areas that receive high rainfall, e.g. the Swan Coastal Plain (Saunders, 1974; Sedgwick, 1968, 1973) and around the Perth metropolitan area on both native and non-native plants, such as liquid amber. It also forages in forests containing marri, jarrah or karri (Nichols & Nichols, 1984; Saunders, 1980).	Over 544 records of this species have been recorded within the Desktop Study Area. At least seven of these have been recorded from within the BBUS Area.	**Known** This species was recorded during the Basic & Targeted Fauna Assessment. Breeding and foraging habitat exists within the BBUS Area.

TAXON	Common Name	EPBC Listing	WA Listing	Source			Habitat Description	Number of records within Desktop Study Area	Likelihood of Occurrence
				PMST	NatureMap	DBCA			
Pluvialis squatarola	Grey Plover	VU, MI	MI			X	The Grey Plover is a non-breeding migrant to Australia where it has been recorded in all states along the coasts and is especially abundant on the western and southern coastlines. In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayment's, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes (Marchant & Higgins, 1993).	One record of this species has been recorded within the Desktop Study Area. This record lies 38 southwest of the BBUS Area.	**Very Low** When surface water is present, this species may opportunistically utilise the following habitat; Tall Shrubland Associated with Dampland, Eucalyptus along Drainage Line, and Cleared Agricultural Land.

Appendix B

Vantage Point Photos

Table B.1 Vantage Point Photos

Vantage Point	
VP01	
VP02	
VP03	
VP04	

Vantage Point

VP05

VP06

VP07

VP08

Vantage Point

VP09

VP10

VP11

VP12

Vantage Point

VP13

VP14

VP15

VP16

Vantage Point

VP17

VP18

Appendix C

Vantage Point Survey Effort

umwelt

Table C.1 Bird Utilisation Surveys Completed During Each Time Period for BBUS01

Site Name	Morning (6 am–10 am)	Midday (10 am–2 pm)	Afternoon (2 pm–6 pm)	Total
BUS01	2	2	2	6
BUS02	2	2	2	6
BUS03	2	2	2	6
BUS04	2	2	2	6
BUS05	2	2	2	6
BUS06	2	2	2	6
BUS07	2	2	2	6
BUS08	2	2	2	6
BUS09	2	2	2	6
BUS10	2	2	2	6
BUS11	2	2	2	6
BUS12	2	2	2	6
BUS13	2	2	2	6
BUS14	2	2	2	6
BUS15	2	2	2	6
BUS16	2	2	2	6
BUS17	2	2	2	6
BUS18	2	2	2	6
Total	**36**	**36**	**36**	**108**

Table C.2 Bird Utilisation Surveys Completed During Each Time Period for BBUS02

Site Name	Morning (6 am–10 am)	Midday (10 am–2 pm)	Afternoon (2 pm–6 pm)	Total
BUS01	2	2	2	6
BUS02	2	2	2	6
BUS03	2	2	2	6
BUS04	2	2	2	6
BUS05	2	2	2	6
BUS06	2	2	2	6
BUS07	2	2	2	6
BUS08	2	2	2	6
BUS09	2	2	2	6
BUS10	2	2	2	6
BUS11	2	2	2	6
BUS12	2	2	2	6
BUS13	2	2	2	6

Site Name	Morning (6 am–10 am)	Midday (10 am–2 pm)	Afternoon (2 pm–6 pm)	Total
BUS14	2	2	2	6
BUS15	2	2	2	6
BUS16	2	2	2	6
BUS17	2	2	2	6
BUS18	2	2	2	6
Total	**36**	**36**	**36**	**108**

Table C.3 Bird Utilisation Surveys Completed During Each Time Period for BBUS03

Site Name	Morning (6 am–10 am)	Midday (10 am–2 pm)	Afternoon (2 pm–6 pm)	Total
BUS01	2	2	2	6
BUS02	2	2	2	6
BUS03	2	2	2	6
BUS04	2	2	2	6
BUS05	2	2	2	6
BUS06	2	2	2	6
BUS07	2	2	2	6
BUS08	2	2	2	6
BUS09	2	2	2	6
BUS10	2	2	2	6
BUS11	2	2	2	6
BUS12	2	2	2	6
BUS13	2	2	2	6
BUS14	2	2	2	6
BUS15	2	2	2	6
BUS16	2	2	2	6
BUS17	2	2	2	6
BUS18	2	2	2	6
Total	**36**	**36**	**36**	**108**

Table C.4 Bird Utilisation Surveys Completed During Each Time Period for BBUS04

Site Name	Morning (6 am–10 am)	Midday (10 am–2 pm)	Afternoon (2 pm–6 pm)	Total
BUS01	2	2	2	6
BUS02	2	2	2	6
BUS03	2	2	2	6
BUS04	2	2	2	6
BUS05	2	2	2	6
BUS06	-	-	-	-
BUS07	2	2	2	6
BUS08	2	2	2	6
BUS09	2	2	2	6
BUS10	2	2	2	6
BUS11	2	2	2	6
BUS12	2	2	2	6
BUS13	2	2	2	6
BUS14	2	2	2	6
BUS15	2	2	2	6
BUS16	2	2	2	6
BUS17	2	2	2	6
BUS18	2	2	2	6
Total	**34**	**34**	**34**	**102**

Table C.5 Bird Utilisation Surveys Completed During Each Time Period for All BBUS to Date

Site Name	Morning (6 am–10 am)	Midday (10 am–2 pm)	Afternoon (2 pm–6 pm)	Total
BUS01	8	8	8	24
BUS02	8	8	8	24
BUS03	8	8	8	24
BUS04	8	8	8	24
BUS05	8	8	8	24
BUS06	6	6	6	18
BUS07	8	8	8	24
BUS08	8	8	8	24
BUS09	8	8	8	24
BUS10	8	8	8	24
BUS11	8	8	8	24
BUS12	8	8	8	24
BUS13	8	8	8	24

Site Name	Morning (6 am–10 am)	Midday (10 am–2 pm)	Afternoon (2 pm–6 pm)	Total
BUS14	8	8	8	24
BUS15	8	8	8	24
BUS16	8	8	8	24
BUS17	8	8	8	24
BUS18	8	8	8	24
Total	**142**	**142**	**142**	**426**

Appendix D

Ultrasonic Detector Survey Effort

umwelt

Table D.1 Ultrasonic Detector Survey Effort at each Bat Utilisation Survey Point for BBUS01

BaUS ID	Date Deployed	Date Collected	Detector Nights
BaUS01	4/10/2024	8/10/2024	3
BaUS02	6/10/2024	9/10/2024	3
BaUS03	5/10/2024	7/10/2024	3
BaUS04	5/10/2024	8/10/2024	3
BaUS05	6/10/2024	11/10/2024	5
BaUS06	5/10/2024	8/10/2024	3
BaUS07	5/10/2024	8/10/2024	3
BaUS08	4/10/2024	7/10/2024	3
BaUS09	5/10/2024	8/10/2024	3
BaUS10	4/10/2024	9/10/2024	4
BaUS11	5/10/2024	8/10/2024	3
BaUS12	5/10/2024	9/10/2024	4
BaUS13	7/10/2024	9/10/2024	3
BaUS14	5/10/2024	8/10/2024	3
BaUS15	7/10/2024	10/10/2024	3
BaUS16	4/10/2024	6/10/2024	3
BaUS17	5/10/2024	8/10/2024	3
BaUS18	5/10/2024	8/10/2024	3
Total			**57**

Table D.2 Ultrasonic Detector Survey Effort at each Bat Utilisation Survey Point for BBUS02

BaUS ID	Date Deployed	Date Collected	Detector Nights
BaUS01	18/11/2024	22/11/2024	3
BaUS02	19/11/2024	22/11/2024	3
BaUS03	20/11/2024	23/11/2024	3
BaUS04	21/11/2024	24/11/2024	3
BaUS05	18/11/2024	21/11/2024	3
BaUS06	18/11/2024	21/11/2024	3
BaUS07	18/11/2024	21/11/2024	3
BaUS08	18/11/2024	21/11/2024	3
BaUS09	21/11/2024	24/11/2024	3
BaUS10	20/11/2024	23/11/2024	3
BaUS11	21/11/2024	24/11/2024	3
BaUS12	21/11/2024	24/11/2024	3
BaUS13	18/11/2024	20/11/2024	3
BaUS14	18/11/2024	21/11/2024	3
BaUS15	18/11/2024	21/11/2024	3

BaUS ID	Date Deployed	Date Collected	Detector Nights
BaUS16	18/11/2024	21/11/2024	3
BaUS17	18/11/2024	21/11/2024	3
BaUS18	18/11/2024	21/11/2024	3
Total			**53**

Table D.3 Ultrasonic Detector Survey Effort at each Bat Utilisation Survey Point for BBUS03

BaUS ID	Date Deployed	Date Collected	Detector Nights
BaUS01	10/01/2025	13/01/2025	3
BaUS02	10/01/2025	13/01/2025	3
BaUS03	10/01/2025	13/01/2025	3
BaUS04	11/01/2025	14/01/2025	3
BaUS05	11/01/2025	14/01/2025	3
BaUS06	11/01/2025	14/01/2025	3
BaUS07	14/01/2025	17/01/2025	3
BaUS08	11/01/2025	14/01/2025	3
BaUS09	11/01/2025	14/01/2025	3
BaUS10	10/01/2025	13/01/2025	2
BaUS11	11/01/2025	14/01/2025	3
BaUS12	10/01/2025	13/01/2025	3
BaUS13	10/01/2025	14/01/2025	4
BaUS14	10/01/2025	13/01/2025	3
BaUS15	10/01/2025	13/01/2025	3
BaUS16	14/01/2025	17/01/2025	3
BaUS17	11/01/2025	14/01/2025	3
BaUS18	11/01/2025	14/01/2025	3
Total			**54**

Table D.4 Ultrasonic Detector Survey Effort at each Bat Utilisation Survey Point for BBUS04

BaUS ID	Date Deployed	Date Collected	Detector Nights
BaUS01	10/03/2025	13/03/2025	3
BaUS02	10/03/2025	13/03/2025	3
BaUS03	10/03/2025	13/03/2025	3
BaUS04	10/03/2025	13/03/2025	3
BaUS05	10/03/2025	13/03/2025	3
BaUS06	10/03/2025	12/03/2025	3
BaUS07	10/03/2025	12/03/2025	3
BaUS08	10/03/2025	13/03/2025	3

BaUS ID	Date Deployed	Date Collected	Detector Nights
BaUS09	10/03/2025	13/03/2025	3
BaUS10	10/03/2025	13/03/2025	3
BaUS11	10/03/2025	13/03/2025	3
BaUS12	10/03/2025	13/03/2025	3
BaUS13	10/03/2025	13/03/2025	3
BaUS14	10/03/2025	13/03/2025	3
BaUS15	11/03/2025	13/03/2025	3
BaUS16	10/03/2025	13/03/2025	3
BaUS17	10/03/2025	13/03/2025	3
BaUS18	10/03/2025	13/03/2025	3
Total			**48**

Table D.5 Met Mast Ultrasonic Detector Survey Effort to Date

BBUS	BaUS ID	Date Deployed	Date Collected	Detector Nights
BBUS2	Met Mast – 100 m west	19/11/2024	24/11/2024	5
BBUS2	Met Mast – 30 m west	19/11/2024	24/11/2024	5
BBUS2	Met Mast – 30 m east	19/11/2024	24/11/2024	5
BBUS2	Met Mast – 100 m east	19/11/2024	24/11/2024	5
BBUS2	Met Mast – ground	19/11/2024	24/11/2024	5
BBUS3	Met Mast – 30 m west	10/01/2025	19/02/2025	Awaiting
BBUS3	Met Mast – 100 m west	10/01/2025	19/02/2025	Awaiting
BBUS3	Met Mast – 30 m east	10/01/2025	19/02/2025	Awaiting
BBUS3	Met Mast – ground	10/01/2025	19/02/2025	Awaiting
BBUS3	Met Mast – 100 m east	10/01/2025	19/02/2025	Awaiting
BBUS4	Met Mast – 30 m East	10/03/2025	13/03/2025	3
BBUS4	Met Mast – 30 m east	10/03/2025	13/03/2025	3
BBUS4	Met Mast – 100 m West	10/03/2025	13/03/2025	3
BBUS4	Met Mast – 100 m east	10/03/2025	13/03/2025	3
BBUS4	Met Mast – ground	10/03/2025	13/03/2025	3
Total				**43**

Appendix E

Complete BBUS Species List

Table E.1 Complete Bird List Recorded During all BBUS to Date

Family	Common Name	Scientific Name	Number of Records				
			BBUS01	BBUS02	BBUS03	BBUS04	Total
Acanthizidae (Thornbills and Allies)	Inland Thornbill	*Acanthiza apicalis*		4	3	1	**8**
	Redthroat	*Pyrrholaemus brunneus*			1	6	**7**
	Spotted Scrubwren	*Sericornis maculatus*	10	4	3		**17**
	Weebill	*Smicrornis brevirostris*	3	7	25	16	**51**
	Western Gerygone	*Gerygone fusca*	7	1	1	5	**14**
	Western Thornbill	*Acanthiza inornata*		1		1	**2**
	White-browed Scrubwren	*Sericornis frontalis*	1				**1**
	Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	11	8	8	13	**40**
Accipitridae (Hawks, Eagles, and Kites)	Black-shouldered Kite	*Elanus axillaris*			1	1	**2**
	Brown Goshawk	*Accipiter fasciatus*	6	2	1		**9**
	Collared Sparrowhawk	*Accipiter cirrocephalus*	1		2		**3**
	Little Eagle	*Hieraaetus morphnoides*		3	1		**4**
	Wedge-tailed Eagle	*Aquila audax*	13	8	23	32	**76**
	Whistling Kite	*Haliastur sphenurus*	1	1	2		**4**
Aegothelidae (Owlet-nightjars)	Australian Owlet-Nightjar	*Aegotheles cristatus*			1		**1**
Alcedinidae (Kingfishers)	Sacred Kingfisher	*Todiramphus sanctus*		1			**1**
Anatidae (Ducks, Geese, and Waterfowl)	Australian Shelduck	*Tadorna tadornoides*	4			2	**6**
	Australian Wood Duck	*Chenonetta jubata*	7				**7**
	Grey Teal	*Anas gracilis*		1			**1**
	Pacific Black Duck	*Anas superciliosa*		1			**1**
Apodidae (Swiftlets, Needletails, and Swifts)	Pacific Swift	*Apus pacificus*				1	**1**

Family	Common Name	Scientific Name	Number of Records				
			BBUS01	BBUS02	BBUS03	BBUS04	Total
Ardeidae (Herons, Egrets, and Bitterns)	White-faced Heron	*Egretta novaehollandiae*	1	1	1		**3**
Artamidae (Woodswallows, Bellmagpies, and Allies)	Australian Magpie	*Gymnorhina tibicen*	23	22	26	44	**115**
	Black-faced Woodswallow	*Artamus cinereus*	11	18	6	21	**56**
	Dusky Woodswallow	*Artamus cyanopterus*	2		1		**3**
	Grey Butcherbird	*Cracticus torquatus*	2	3	9	2	**16**
	Masked Woodswallow	*Artamus personatus*	1	3	2		**6**
	Pied Butcherbird	*Cracticus nigrogularis*	31	22	13	20	**86**
	Woodswallow sp.	*N/A*		1			**1**
Cacatuidae (Cockatoos)	Carnaby's Black-Cockatoo	*Zanda latirostris*	22	20	6	5	**53**
	Corella sp.	*N/A*	20	13	1	4	**38**
	Galah	*Eolophus roseicapilla*	122	111	77	59	**369**
	Inland Red-Tailed Black-Cockatoo	*Calyptorhynchus banksii escondidus*	1			13	**14**
	Little Corella	*Cacatua sanguinea*	4	4	1	18	**27**
	Western Corella	*Cacatua pastinator*	18	16	4	1	**39**
Campephagidae (Cuckooshrikes)	Black-faced Cuckooshrike	*Coracina novaehollandiae*	12	6	5	5	**28**
	Ground Cuckooshrike	*Coracina maxima*		1	1		**2**
	White-winged Triller	*Lalage tricolor*	5	3		1	**9**
Casuariidae (Cassowaries and Emu)	Emu	*Dromaius novaehollandiae*	4	9	2	4	**19**
Charadriidae (Plovers, Dotterels, and Lapwings)	Banded Lapwing	*Vanellus tricolor*		1			**1**
	Black-fronted Dotterel	*Elseyornis melanops*		1			**1**
	Common Bronzewing	*Phaps chalcoptera*	4	1		2	**7**

Family	Common Name	Scientific Name	Number of Records				
			BBUS01	BBUS02	BBUS03	BBUS04	Total
Columbidae (Pigeons and Doves)	Crested Pigeon	*Ocyphaps lophotes*	11	16	13	16	**56**
Corvidae (Crows, Jays, and Magpies)	Australian Raven	*Corvus coronoides*	82	119	24	131	**356**
	Corvus sp.	*N/A*	15		23	9	**47**
	Little Crow	*Corvus bennetti*	7	6	14	4	**31**
	Torresian Crow	*Corvus orru*			29	3	**32**
Cuculidae (Cuckoos)	Black-eared Cuckoo	*Chalcites osculans*	1			2	**3**
	Fan-tailed Cuckoo	*Cacomantis flabelliformis*	5				**5**
	Horsfield's Bronze Cuckoo	*Chalcites basalis*	9	7	1		**17**
	Pallid Cuckoo	*Heteroscenes pallidus*	1				**1**
	Shining Bronze Cuckoo	*Chalcites lucidus*	1				**1**
Dicaeidae (Mistletoebird and Sunbirds)	Mistletoebird	*Dicaeum hirundinaceum*		3			**3**
Estrildidae (Finches, Firetails, and Mannikins)	Australian Zebra Finch	*Taeniopygia castanotis*	2				**2**
Falconidae (Falcons and Caracaras)	Australian Hobby	*Falco longipennis*	1				**1**
	Brown Falcon	*Falco berigora*	2	4		5	**11**
	Nankeen Kestrel	*Falco cenchroides*	39	30	35	14	**118**
	Peregrine Falcon	*Falco peregrinus*		2	2		**4**
Hirundinidae (Swallows)	Fairy Martin	*Petrochelidon ariel*		2			**2**
	Martin sp.	*N/A*		1		8	**9**
	Tree Martin	*Petrochelidon nigricans*	18	28	10	44	**100**
	Welcome Swallow	*Hirundo neoxena*	7	16	3	10	**36**
	White-backed Swallow	*Cheramoeca leucosterna*	1	1	4	4	**10**

Family	Common Name	Scientific Name	Number of Records				
			BBUS01	BBUS02	BBUS03	BBUS04	Total
Locustellidae (Grassbirds and Allies)	Brown Songlark	*Cincloramphus cruralis*	42	19	4		**65**
	Rufous Songlark	*Cincloramphus mathewsi*	2	1		2	**5**
Maluridae (Fairywrens)	Blue-breasted Fairywren	*Malurus pulcherrimus*	2	1			**3**
	Fairywren sp.	*N/A*			1	1	**2**
	Purple-backed Fairywren	*Malurus assimilis*	1	5		1	**7**
	Splendid Fairywren	*Malurus splendens*	4	2	1	5	**12**
	White-winged Fairywren	*Malurus leucopterus*	9	2	10	10	**31**
	Wren sp.	*N/A*	1	2	2		**5**
Meliphagidae (Honeyeaters)	Brown Honeyeater	*Lichmera indistincta*	43	53	33	25	**154**
	Brown-headed Honeyeater	*Melithreptus brevirostris*		1		4	**5**
	Crimson Chat	*Epthianura tricolor*	31	25	1		**57**
	Honeyeater sp.	N/A	4	4	3		**11**
	New Holland Honeyeater	*Phylidonyris novaehollandiae*	3	2		1	**6**
	Red Wattlebird	*Anthochaera carunculata*	4	5	1	5	**15**
	Singing Honeyeater	*Gavicalis virescens*	25	18	13	33	**89**
	Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	1	9		4	**14**
	Tawny-crowned Honeyeater	*Gliciphila melanops*	21	20	8	14	**63**
	Western Wattlebird	*Anthochaera lunulata*				2	**2**
	White-cheeked Honeyeater	*Phylidonyris niger*		1	4	11	**16**
	White-fronted Chat	*Epthianura albifrons*	16	15		1	**32**
	White-fronted Honeyeater	*Purnella albifrons*				1	**1**
	Yellow-throated Miner	*Manorina flavigula*	14	6	10	17	**47**
Meropidae (Bee-eaters)	Rainbow Bee-eater	*Merops ornatus*	5	10	6	2	**23**

Family	Common Name	Scientific Name	Number of Records				
			BBUS01	BBUS02	BBUS03	BBUS04	Total
Monarchidae (Monarch Flycatchers)	Magpie-lark	*Grallina cyanoleuca*	31	40	14	19	**104**
	Restless Flycatcher	*Myiagra inquieta*	1				**1**
Motacillidae (Wagtails and Pipits)	Australian Pipit	*Anthus australis*	62	48	26	50	**186**
Pachycephalidae (Whistlers and Allies)	Grey Shrikethrush	*Colluricincla harmonica*	10	11	2	6	**29**
	Rufous Whistler	*Pachycephala rufiventris*	18	25	15	10	**68**
	Western Whistler	*Pachycephala fuliginosa*	3	3	1		**7**
Pardalotidae (Pardalotes)	Spotted Pardalote	*Pardalotus punctatus*		3	2		**5**
	Striated Pardalote	*Pardalotus striatus*	7	8	20	4	**39**
Petroicidae (Australasian Robins)	Hooded Robin	*Melanodryas cucullata*		2		1	**3**
	Jacky Winter	*Microeca fascinans*		4			**4**
	Red-capped Robin	*Petroica goodenovii*	5	4	5	4	**18**
Phasianidae (Pheasants, Grouse, and Allies)	Stubble Quail	*Coturnix pectoralis*		2			**2**
Psittaculidae (Old World Parrots)	Australian Ringneck	*Barnardius zonarius*	48	54	37	49	**188**
	Regent Parrot	*Polytelis anthopeplus*	1	2		1	**4**
Rhipiduridae (Fantails)	Grey Fantail	*Rhipidura albiscapa*		4		2	**6**
	Willie Wagtail	*Rhipidura leucophrys*	23	24	14	19	**80**
Threskiornithidae (Ibis and Spoonbills)	Straw-necked Ibis	*Threskiornis spinicollis*	1		2		**3**
Turnicidae (Buttonquails)	Painted Buttonquail	*Turnix varius*		1	1		**2**
Zosteropidae (White-eyes, Yuhinas, and Allies)	Silvereye	*Zosterops lateralis*		5	4	2	**11**
N/A	Raptor sp.	N/A			4		**4**

Appendix F

Vantage Point Bird Records

Table F.1 Number of Bird Records at Each Bird Utilisation Survey Point

Common Name	Scientific Name	BUS01	BUS02	BUS03	BUS04	BUS05	BUS06	BUS07	BUS08	BUS09	BUS10	BUS11	BUS12	BUS13	BUS14	BUS15	BUS16	BUS17	BUS18	Incidental	Total
Australian Hobby	*Falco longipennis*													1							1
Australian Magpie	*Gymnorhina tibicen*	10	5	3	1	3	3	8	3	2	25	13	3	5	11	8	8	1	3		115
Australian Owlet-Nightjar	*Aegotheles cristatus*									1											1
Australian Pipit	*Anthus australis*	8	20	9	11	1	2	17	32	1	3	3	11	14	3	2	13	11	16	5	186
Australian Raven	*Corvus coronoides*	36	27	14	9	5	17	21	16	12	33	39	19	29	24	11	14	6	16	3	356
Australian Ringneck	*Barnardius zonarius*	10	4	1	5	2	3	12	11	9	28	25	3	15	21	19	3	6	3	6	188
Australian Shelduck	*Tadorna tadornoides*										1			1			1	2		1	6
Australian Wood Duck	*Chenonetta jubata*										1	3		2				1			7
Australian Zebra Finch	*Taeniopygia castanotis*												2								2
Banded Lapwing	*Vanellus tricolor*																			1	1
Black-eared Cuckoo	*Chalcites osculans*															1			1	1	3
Black-faced Cuckooshrike	*Coracina novaehollandiae*	2		2	3		1	3	1			1	1	1	2	1	2	3	1	4	28
Black-faced Woodswallow	*Artamus cinereus*		4	3	3	2		4	4	5							5	1	17	4	56
Black-fronted Dotterel	*Elseyornis melanops*																			1	1
Black-shouldered Kite	*Elanus axillaris*								1											1	2
Blue-breasted Fairywren	*Malurus pulcherrimus*									1						2					3
Brown Falcon	*Falco berigora*					1						1		2		1	3	2		1	11
Brown Goshawk	*Accipiter fasciatus*		1						1					1	1	3	1			1	9
Brown Honeyeater	*Lichmera indistincta*	2	12	11	10	23	5	10	5	33			1	1	4	13	14	2	8		154

Common Name	Scientific Name	BUS01	BUS02	BUS03	BUS04	BUS05	BUS06	BUS07	BUS08	BUS09	BUS10	BUS11	BUS12	BUS13	BUS14	BUS15	BUS16	BUS17	BUS18	Incidental	Total
Brown Songlark	*Cincloramphus cruralis*	12	2		6			7	2	1	6	1	3	10	1		6	4	4		65
Brown-headed Honeyeater	*Melithreptus brevirostris*					1				1						2	1				5
Carnaby's Black-Cockatoo	*Zanda latirostris*	2			1	1			2	1	1				23	8	2		1	11	53
Collared Sparrowhawk	*Accipiter cirrocephalus*				1					1								1			3
Common Bronzewing	*Phaps chalcoptera*										1		2	1			2	1			7
Corella sp.						1	1		12	1	1	1		1	17	1			2		38
Corvus sp.		3	2	4	4		5	1	4		3		3		6	2	3	1	1	5	47
Crested Pigeon	*Ocyphaps lophotes*			1	1	2	1	1		3		20	7	6	1		1		9	1	56
Crimson Chat	*Epthianura tricolor*	3	2	3	1	2		5	1	1			5				3		26	4	57
Dusky Woodswallow	*Artamus cyanopterus*					1		1		1											3
Emu	*Dromaius novaehollandiae*	2	2	3	1			2	1	1		1	1			1	1	3			19
Fairy Martin	*Petrochelidon ariel*											2									2
Fairywren sp.		2																			2
Fan-tailed Cuckoo	*Cacomantis flabelliformis*										3			1			1				5
Galah	*Eolophus roseicapilla*	28	4	17	11	2	9	11	21	27	24	56	22	7	54	32	18	8	6	6	369
Grey Butcherbird	*Cracticus torquatus*		1									1	2	5	3	1		1	2		16
Grey Fantail	*Rhipidura albiscapa*		1					2		1						1					6
Grey Shrikethrush	*Colluricincla harmonica*	1	3			1		1	2	5				4	3	6	2	1			29

Common Name	Scientific Name	BUS01	BUS02	BUS03	BUS04	BUS05	BUS06	BUS07	BUS08	BUS09	BUS10	BUS11	BUS12	BUS13	BUS14	BUS15	BUS16	BUS17	BUS18	Incidental	Total
Grey Teal	*Anas gracilis*																			1	1
Ground Cuckooshrike	*Coracina maxima*							1												1	2
Honeyeater sp.		1	2	2					1	1			1		1	2					11
Hooded Robin	*Melanodryas cucullata*									3											3
Horsfield's Bronze Cuckoo	*Chalcites basalis*		1		1	5		1		6							3				17
Western Red-Tailed Black-Cockatoo	*Calyptorhynchus banksii escondidus*	1							5						3		1	1		2	14
Inland Thornbill	*Acanthiza apicalis*					1				7											8
Jacky Winter	*Microeca fascinans*			1				1		2											4
Little Corella	*Cacatua sanguinea*								1	1	18	1		1	4					1	27
Little Crow	*Corvus bennetti*	2	2				3	1	1	1	4	2	1	2	6	2	1	1	1	1	31
Little Eagle	*Hieraaetus morphnoides*							1						1	1					1	4
Magpie-lark	*Grallina cyanoleuca*	3	1		1	1	7		1	1	16	19	21	3	12	3	6	3	1	2	104
Martin sp.		1										1		2	2					2	9
Masked Woodswallow	*Artamus personatus*	1			1					2									1	1	6
Mistletoebird	*Dicaeum hirundinaceum*			1	1					1											3
Nankeen Kestrel	*Falco cenchroides*	4	1		5	4	15	3	9	2		17	14	9	4	1	3	9	6	10	118
New Holland Honeyeater	*Phylidonyris novaehollandiae*		1			1				1			1						2		6
Pacific Black Duck	*Anas superciliosa*																			1	1
Pacific Swift	*Apus pacificus*																		1		1

Common Name	Scientific Name	BUS01	BUS02	BUS03	BUS04	BUS05	BUS06	BUS07	BUS08	BUS09	BUS10	BUS11	BUS12	BUS13	BUS14	BUS15	BUS16	BUS17	BUS18	Incidental	Total
Painted Buttonquail	*Turnix varius*					1										1					2
Pallid Cuckoo	*Heteroscenes pallidus*										1										1
Peregrine Falcon	*Falco peregrinus*											1				1			1	1	4
Pied Butcherbird	*Cracticus nigrogularis*	4	3		6	4	5	5	2	1	9	11	6	4	13	3	4	3	1	1	86
Purple-backed Fairywren	*Malurus assimilis*	1			2	1		1											1		7
Rainbow Bee-eater	*Merops ornatus*				2			3		2	2		1		2	5	2		1	3	23
Raptor sp.											1		2			1					4
Red Wattlebird	*Anthochaera carunculata*	1					3				2	3		3	1	1			1		15
Red-capped Robin	*Petroica goodenovii*								1			1	1			14			1		18
Redthroat	*Pyrrholaemus brunneus*									2						1	3		1		7
Regent Parrot	*Polytelis anthopeplus*														2	1				1	4
Restless Flycatcher	*Myiagra inquieta*		1																		1
Rufous Songlark	*Cincloramphus mathewsi*											1				1	1		2		5
Rufous Whistler	*Pachycephala rufiventris*	3	5	4	1	2		5	6	7		1		8	6	14	4	2			68
Sacred Kingfisher	*Todiramphus sanctus*	1																			1
Shining Bronze Cuckoo	*Chalcites lucidus*										1										1
Silvereye	*Zosterops lateralis*		1			1			1	1					1	5	1				11
Singing Honeyeater	*Gavicalis virescens*		4	16	4	7	1	8		3	1	3		6		4	10	1	19		89

Common Name	Scientific Name	BUS01	BUS02	BUS03	BUS04	BUS05	BUS06	BUS07	BUS08	BUS09	BUS10	BUS11	BUS12	BUS13	BUS14	BUS15	BUS16	BUS17	BUS18	Incidental	Total
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*				1	4	1	1		4							2		1		14
Splendid Fairywren	*Malurus splendens*	1														6	1		4		12
Spotted Pardalote	*Pardalotus punctatus*						1	1	1										2		5
Spotted Scrubwren	*Sericornis maculatus*	1			2	7		1		2			2			1			1		17
Straw-necked Ibis	*Threskiornis spinicollis*													1					1	1	3
Striated Pardalote	*Pardalotus striatus*	2			1				5	1		2		3	8	12	1	4			39
Stubble Quail	*Coturnix pectoralis*		1															1			2
Tawny-crowned Honeyeater	*Gliciphila melanops*		1	9	8	17	5	2		10						1	6		4		63
Torresian Crow	*Corvus orru*	1	2	2	4		5	1			2		2	1	5	5	1		1		32
Tree Martin	*Petrochelidon nigricans*	4	4				1	2	3	19	2	17	2	10	7	16	4	2	5	1	100
Wedge-tailed Eagle	*Aquila audax*	1	3	1	4	5	6		3	4	4	2	4	3	6	6	3	1	9	10	76
Weebill	*Smicrornis brevirostris*		7	4	1	1		3	2	3		5		1	3	18		2	1		51
Welcome Swallow	*Hirundo neoxena*	2									11	18		1		1	2				36
Western Corella	*Cacatua pastinator*	3						1	2	1	8			3	13	5	2	1			39
Western Gerygone	*Gerygone fusca*				2	2				1	1	1	1	1	1	4					14
Western Thornbill	*Acanthiza inornata*									1						1					2
Western Wattlebird	*Anthochaera lunulata*									1						1					2
Western Whistler	*Pachycephala fuliginosa*	1	2							3						1					7
Whistling Kite	*Haliastur sphenurus*												1		3						4

Common Name	Scientific Name	BUS01	BUS02	BUS03	BUS04	BUS05	BUS06	BUS07	BUS08	BUS09	BUS10	BUS11	BUS12	BUS13	BUS14	BUS15	BUS16	BUS17	BUS18	Incidental	Total
White-backed Swallow	*Cheramoeca leucosterna*					6			1			2		1							10
Spotted Scrubwren	*Sericornis maculatus*			1																	1
White-cheeked Honeyeater	*Phylidonyris niger*					1		1		8			1	1			3				15
White-faced Heron	*Egretta novaehollandiae*	1	2																		3
White-fronted Chat	*Epthianura albifrons*	2	11	2		2		1		1			4		1		4		2	2	32
White-fronted Honeyeater	*Purnella albifrons*																				1
White-winged Fairywren	*Malurus leucopterus*	6	7	2		3		2					5			1	2		3		31
White-winged Triller	*Lalage tricolor*		1																6		9
Willie Wagtail	*Rhipidura leucophrys*		1	1	3	1	3	23	3	1	2	13	5	3	1	3	3	2	11	1	80
Woodswallow sp.				1																	1
Wren sp.		1	1		1					1			1								5
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*		1	7	1	1	1	5		1		3			1	11	3		5		40
Yellow-throated Miner	*Manorina flavigula*		1								26	6	1	2	5	2		1	1	2	47

Appendix G

Flight Height Records

umwelt

Table G.1 Maximum Flight Heights of All Bird Species Recorded to Date

Common Name	Scientific Name	<10	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–149	150–199	200–249	250–300	>300	Total Records with Flight Data
Australian Hobby	*Falco longipennis*		1														**1**
Australian Magpie	*Gymnorhina tibicen*	22	8	4		1											**35**
Australian Pipit	*Anthus australis*	56	17	7	7	1	3										**91**
Australian Raven	*Corvus coronoides*	53	48	28	25	25	11	8	4	2	1	1	2	1			**209**
Australian Ringneck	*Barnardius zonarius*	68	17	5	1	1											**92**
Australian Shelduck	*Tadorna tadornoides*		1	1		1			1								**4**
Australian Wood Duck	*Chenonetta jubata*	2	2														**4**
Black-eared Cuckoo	*Chalcites osculans*	3															**3**
Black-faced Cuckooshrike	*Coracina novaehollandiae*	10	4	1	2	1											**18**
Black-faced Woodswallow	*Artamus cinereus*	22	8	6	1	2	1		1	2			1		2(2)		**46**
Black-shouldered Kite	*Elanus axillaris*					1								1			**2**
Blue-breasted Fairywren	*Malurus pulcherrimus*	2															**2**
Brown Falcon	*Falco berigora*	2		2	1		4	1									**10**
Brown Goshawk	*Accipiter fasciatus*	1		1	1	1		1		2		1	1				**9**

Common Name	Scientific Name	<10	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–149	150–199	200–249	250–300	>300	Total Records with Flight Data
Brown Honeyeater	*Lichmera indistincta*	35	6			2	2	1									**46**
Brown Songlark	*Cincloramphus cruralis*	2	1	3	2	2	1										**11**
Brown-headed Honeyeater	*Melithreptus brevirostris*	1															**1**
Carnaby's Black-Cockatoo	*Zanda latirostris*	2	15	11	2	3	2	1				2					**38**
Collared Sparrowhawk	*Accipiter cirrocephalus*		2			1											**3**
Common Bronzewing	*Phaps chalcoptera*	2	1														**3**
Corella sp.	*N/A*	2	6	5	8	8		4		1							**34**
Corvus sp.	*N/A*	9	10	1	2	4	2	4			1	1	1				**35**
Crested Pigeon	*Ocyphaps lophotes*	25	2														**27**
Crimson Chat	*Epthianura tricolor*	29	5	2	1	3		1									**41**
Dusky Woodswallow	*Artamus cyanopterus*		1	1													**2**
Fairy Martin	*Petrochelidon ariel*	1					1										**2**
Fairywren sp.	*N/A*	1															**1**
Galah	*Eolophus roseicapilla*	94	104	43	35	15	3	6				1					**301**
Grey Shrikethrush	*Colluricincla harmonica*	1															**1**

Common Name	Scientific Name	<10	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–149	150–199	200–249	250–300	>300	Total Records with Flight Data
Ground Cuckooshrike	*Coracina maxima*	2															**2**
Honeyeater sp.	*N/A*	2	3	1	2	1	2										**11**
Hooded Robin	*Melanodryas cucullata*	2															**2**
Western Red-Tailed Black-Cockatoo	*Calyptorhynchus banksii escondidus*	2	3	2	1	1	2	1									**12**
Inland Thornbill	*Acanthiza apicalis*	1															**1**
Little Corella	*Cacatua sanguinea*	7	3	3	1	6	2	1									**23**
Little Crow	*Corvus bennetti*	4	4	2	2	4		1				1		1			**19**
Little Eagle	*Hieraaetus morphnoides*		2	1								1					**4**
Magpie-lark	*Grallina cyanoleuca*	14	9	5	1	1		1									**31**
Martin sp.	*N/A*		2	1	2	1		1		1					1(1)		**9**
Masked Woodswallow	*Artamus personatus*		1	1												1	**3**
Mistletoebird	*Dicaeum hirundinaceum*						1			1							**2**
Nankeen Kestrel	*Falco cenchroides*	11	28	12	17	7	7	3	2	3	1	2	4				**97**
New Holland Honeyeater	*Phylidonyris novaehollandiae*		1														**1**
Pacific Swift	*Apus pacificus*							1									**1**
Peregrine Falcon	*Falco peregrinus*		1					1		1				1			**4**

Common Name	Scientific Name	<10	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–149	150–199	200–249	250–300	>300	Total Records with Flight Data
Pied Butcherbird	*Cracticus nigrogularis*	12	3														**15**
Rainbow Bee-eater	*Merops ornatus*	5			1												**6**
Raptor sp.	*N/A*			1			1		1			1					**4**
Red Wattlebird	*Anthochaera carunculata*		2		2												**4**
Red-capped Robin	*Petroica goodenovii*	7															**7**
Redthroat	*Pyrrholaemus brunneus*	1															**1**
Regent Parrot	*Polytelis anthopeplus*		2		1												**3**
Rufous Whistler	*Pachycephala rufiventris*	2															**2**
Silvereye	*Zosterops lateralis*	2				1											**3**
Singing Honeyeater	*Gavicalis virescens*	16	5														**21**
Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*	3	1	1													**5**
Splendid Fairywren	*Malurus splendens*	8															**8**
Spotted Scrubwren	*Sericornis maculatus*	3															**3**
Straw-necked Ibis	*Threskiornis spinicollis*													1	2 (2)		**3**
Striated Pardalote	*Pardalotus striatus*	2															**2**

Common Name	Scientific Name	<10	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–149	150–199	200–249	250–300	>300	Total Records with Flight Data
Tawny-crowned Honeyeater	*Gliciphila melanops*	9	2	3	1	3											**18**
Torresian Crow	*Corvus orru*	3	1	6	3			1									**14**
Tree Martin	*Petrochelidon nigricans*	5	13	18	19	8	12	7	2	4	2	3	2	2			**97**
Wedge-tailed Eagle	*Aquila audax*	1	1		5	4	11	9	3	4	6	7	10	8	4 (2)	1	**74**
Weebill	*Smicrornis brevirostris*	2															**2**
Welcome Swallow	*Hirundo neoxena*	12	12	5	2	2	1	1		1							**36**
Western Corella	*Cacatua pastinator*	2	10	8	6	3	2	2		1							**34**
Western Gerygone	*Gerygone fusca*	1															**1**
Western Thornbill	*Acanthiza inornata*	1															**1**
Whistling Kite	*Haliastur sphenurus*					2			1								**3**
White-backed Swallow	*Cheramoeca leucosterna*	2	1	2	2		2		1								**10**
White-browed Scrubwren	*N/A*	1															**1**
White-cheeked Honeyeater	*Phylidonyris niger*	4	2														**6**
White-faced Heron	*Egretta novaehollandiae*				1			1	1								**3**
White-fronted Chat	*Epthianura albifrons*	18	2														**20**
White-winged Fairywren	*Malurus leucopterus*	4															**4**

Common Name	Scientific Name	<10	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–149	150–199	200–249	250–300	>300	Total Records with Flight Data
White-winged Triller	*Lalage tricolor*	4	1														**5**
Willie Wagtail	*Rhipidura leucophrys*	31															**31**
Woodswallow sp.	*N/A*															1	**1**
Wren sp.	*N/A*	1															**1**
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	8															**8**
Yellow-throated Miner	*Manorina flavigula*	15	10														**25**

Note. The number in parentheses (No.) indicates the number of records within the 250–299 m AGL flight height interval, where the maximum flight height is exactly 250 m. These records overlap with the RSA height range and are therefore included when calculating the number of species records within the RSA height range.

Appendix H

Species Flying within Rotor Swept Area and Exposure Models

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Table H.1 Bird Species Recorded Within RSA

Species	Taxa	Records within RSA	Records outside RSA	Total Records
Australian Magpie	*Gymnorhina tibicen*	1	34	35
Australian Pipit	*Anthus australis*	11	80	91
Australian Raven	*Corvus coronoides*	80	129	209
Australian Ringneck	*Barnardius zonarius*	2	90	92
Australian Shelduck	*Tadorna tadornoides*	2	2	4
Black-faced Cuckooshrike	*Coracina novaehollandiae*	3	15	18
Black-faced Woodswallow	*Artamus cinereus*	10	36	44
Black-shouldered Kite	*Elanus axillaris*	2	0	2
Brown Falcon	*Falco berigora*	6	4	10
Brown Goshawk	*Accipiter fasciatus*	7	2	9
Brown Honeyeater	*Lichmera indistincta*	5	41	46
Brown Songlark	*Cincloramphus cruralis*	5	6	11
Carnaby's Black-Cockatoo	*Zanda latirostris*	10	28	38
Collared Sparrowhawk	*Accipiter cirrocephalus*	1	2	3
Crimson Chat	*Epthianura tricolor*	5	36	41
Fairy Martin	*Petrochelidon ariel*	1	1	2
Galah	*Eolophus roseicapilla*	60	241	301
Western Red-Tailed Black-Cockatoo	*Calyptorhynchus banksii escondidus*	5	7	12
Little Corella	*Cacatua sanguinea*	10	13	23
Little Crow	*Corvus bennetti*	9	10	19
Little Eagle	*Hieraaetus morphnoides*	1	3	4
Magpie-lark	*Grallina cyanoleuca*	3	28	31
Masked Woodswallow	*Artamus personatus*	1	3	4
Mistletoebird	*Dicaeum hirundinaceum*	2	0	2
Nankeen Kestrel	*Falco cenchroides*	46	51	97
Pacific Swift	*Apus pacificus*	1	0	1
Peregrine Falcon	*Falco peregrinus*	3	1	4
Rainbow Bee-eater	*Merops ornatus*	1	5	6
Red Wattlebird	*Anthochaera carunculata*	2	2	4
Regent Parrot	*Polytelis anthopeplus*	1	2	3
Silvereye	*Zosterops lateralis*	1	2	3
Straw-necked Ibis	*Threskiornis spinicollis*	3	0	3
Tawny-crowned Honeyeater	*Gliciphila melanops*	4	14	18
Torresian Crow	*Corvus orru*	4	10	14
Tree Martin	*Petrochelidon nigricans*	61	36	97
Wedge-tailed Eagle	*Aquila audax*	69	5	74

Species	Taxa	Records within RSA	Records outside RSA	Total Records
Welcome Swallow	*Hirundo neoxena*	7	29	36
Western Corella	*Cacatua pastinator*	14	20	34
Whistling Kite	*Haliastur sphenurus*	3	0	3
White-backed Swallow	*Cheramoeca leucosterna*	5	5	10
White-faced Heron	*Egretta novaehollandiae*	3	0	3

* ERM – Exposure Risk Model – only completed if more than 15 flight recorded

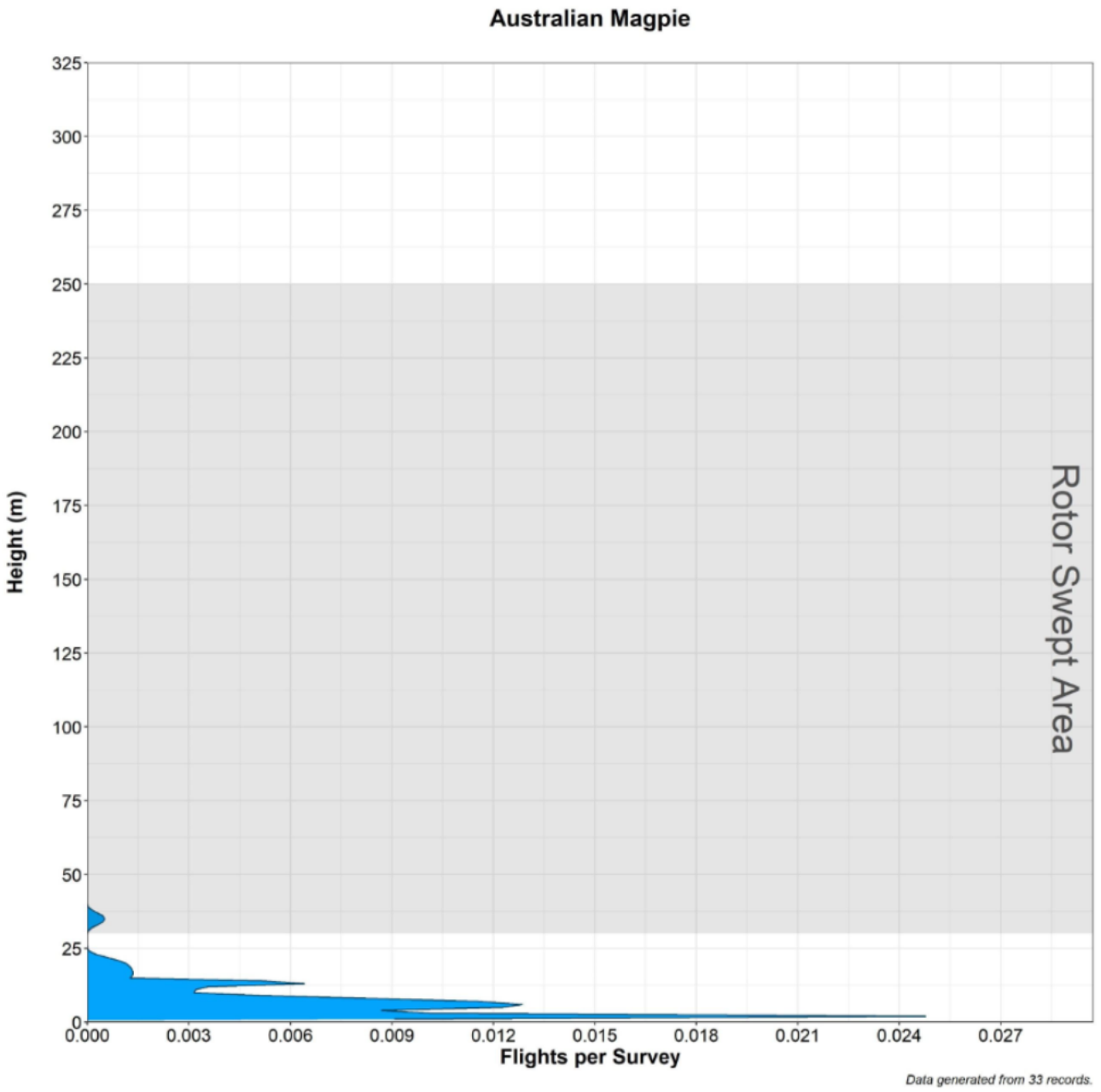

Figure H.1 Exposure Risk Model for Australian Magpie (*Gymnorhina tibicen*)

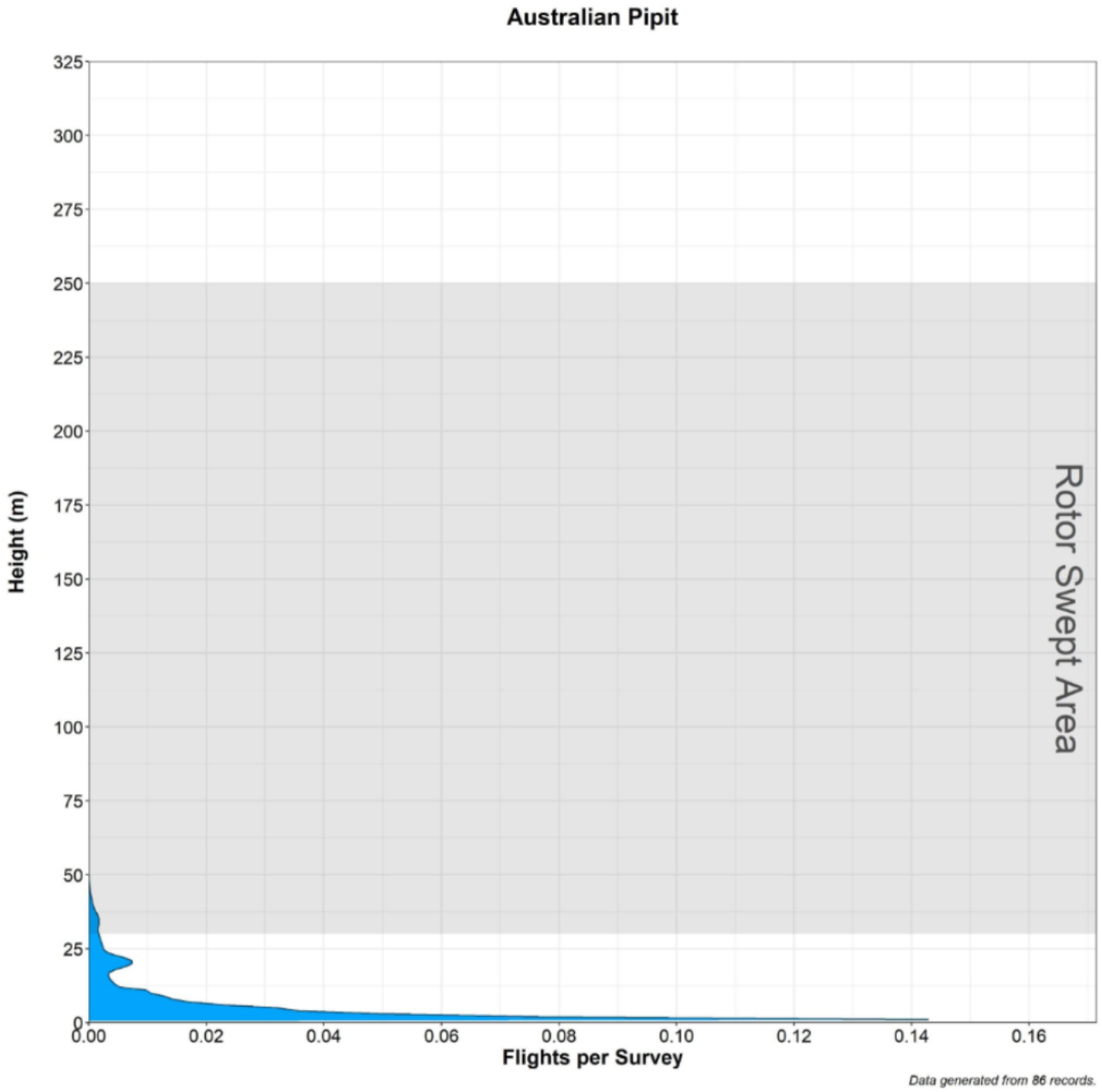

Figure H.2 Exposure Risk Model for Australian Pipit (*Anthus australis*)

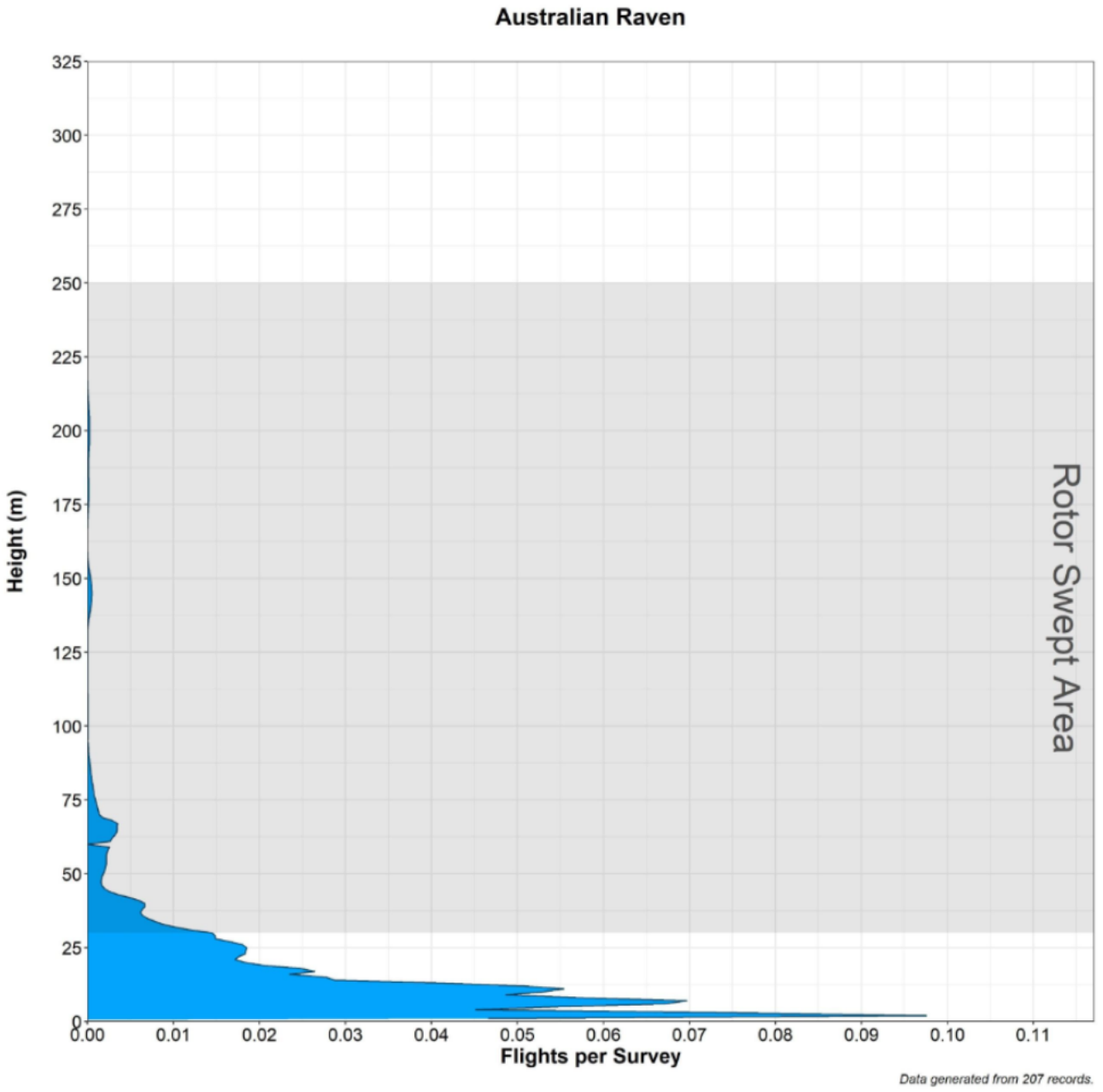

Figure H.3 Exposure Risk Model for Australian Raven

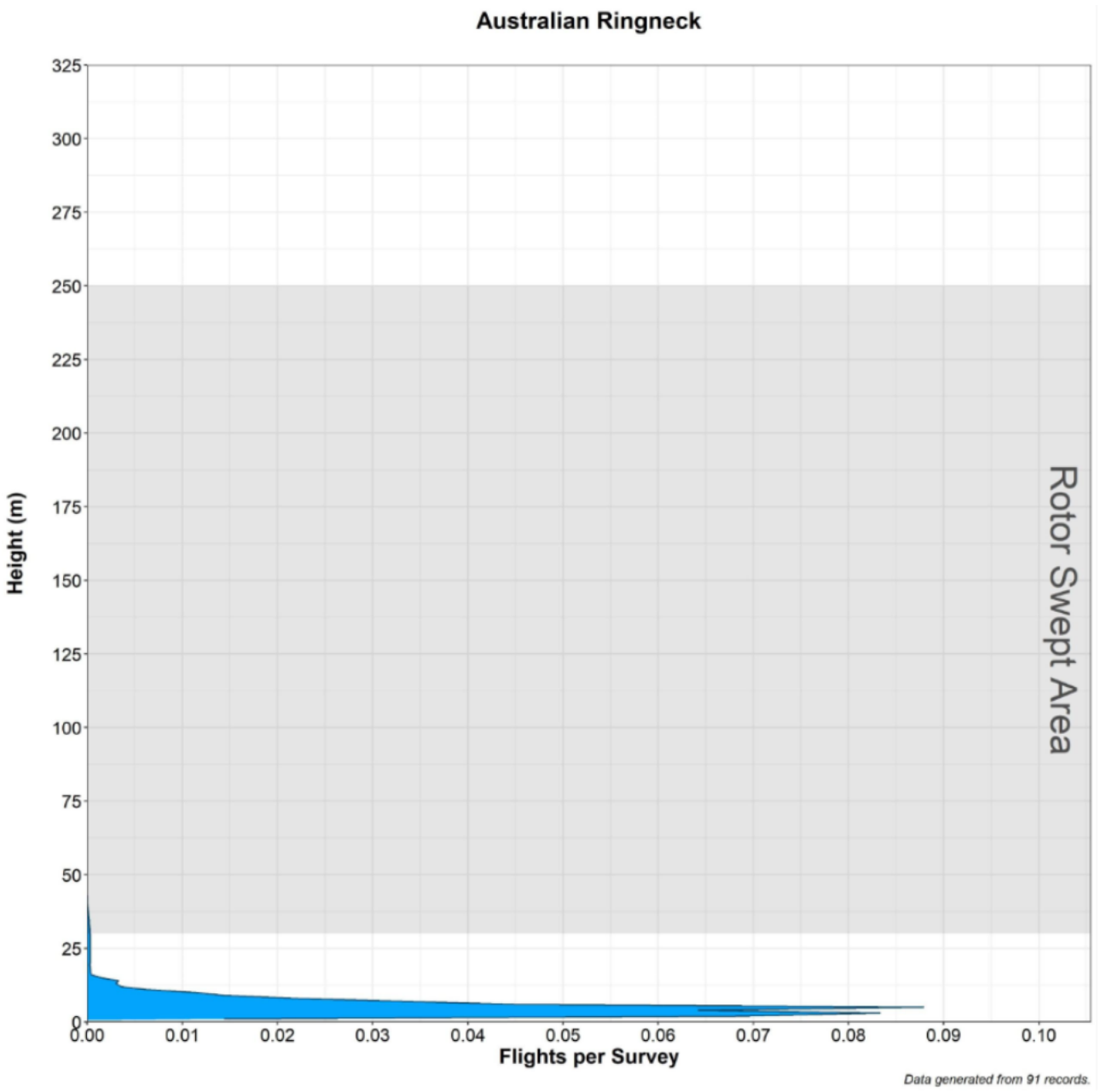

Figure H.4 Exposure Risk Model for Australian Ringneck (*Barnardius zonarius*)

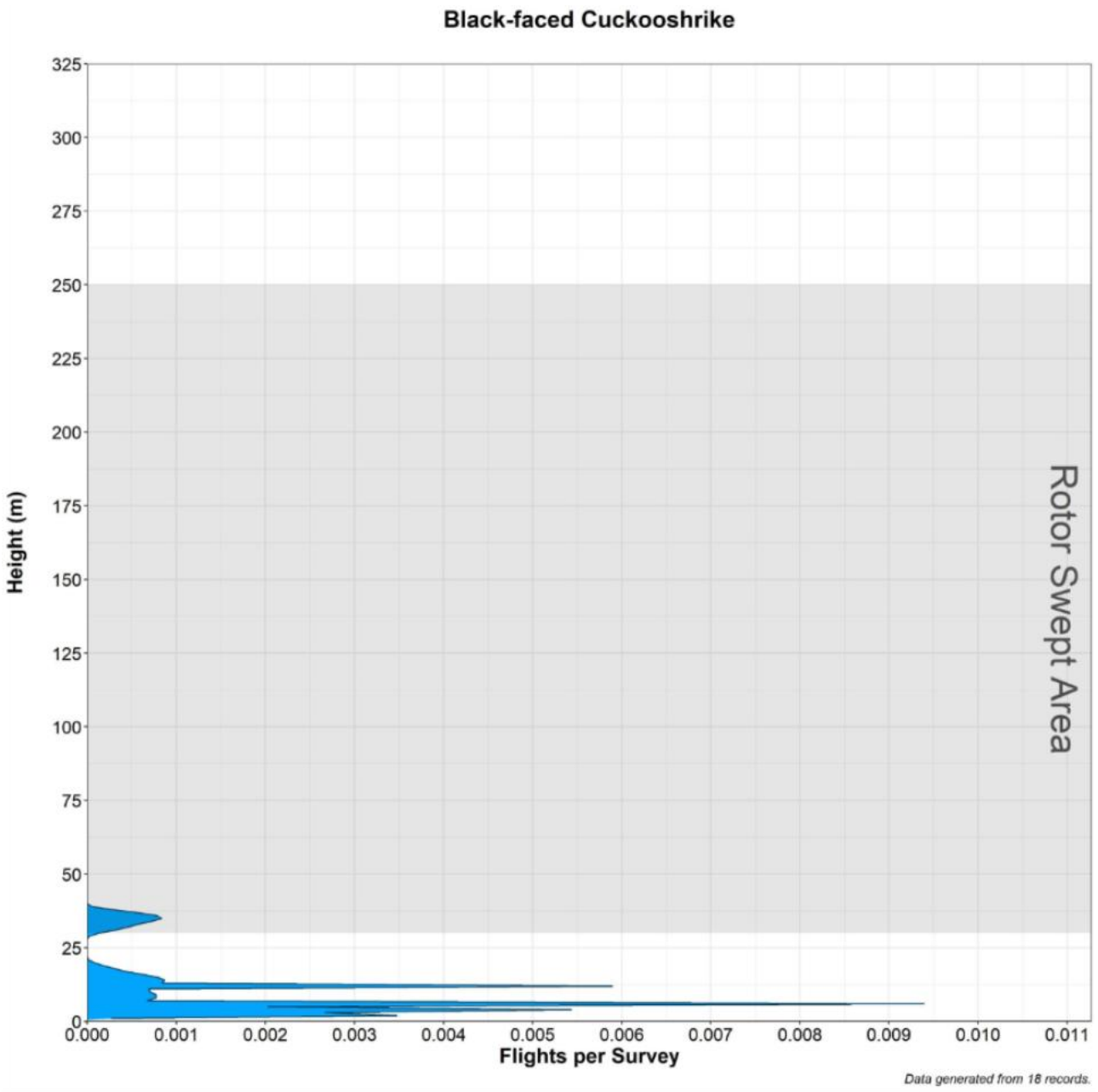

Figure H.5 Exposure Rick Model for Black-Faced Cuckooshrike (*Coracina novaehollandiae*)

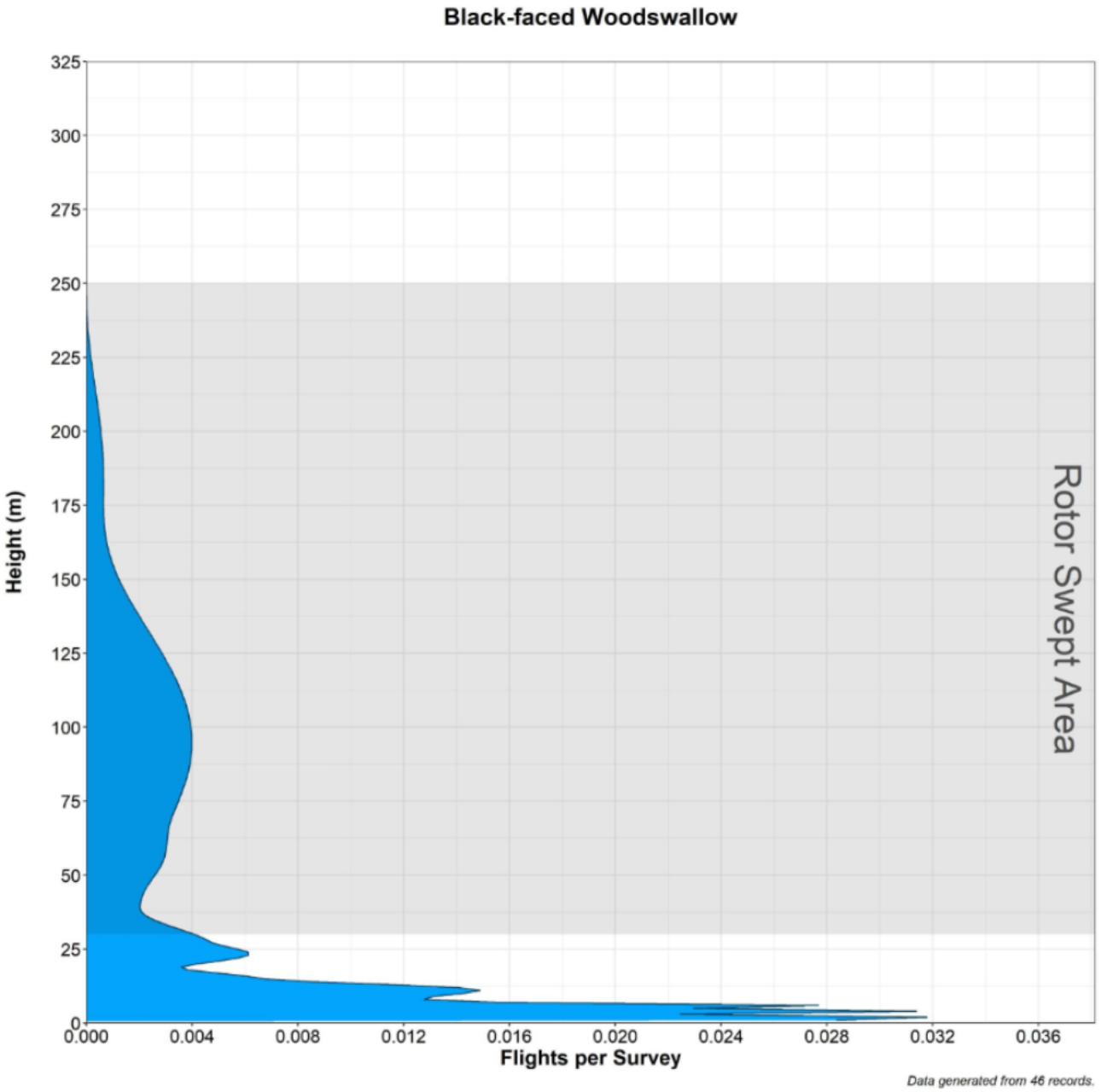

Figure H.6 Exposure Risk Model for Black-Faced Woodswallow (*Artamus cinereus*)

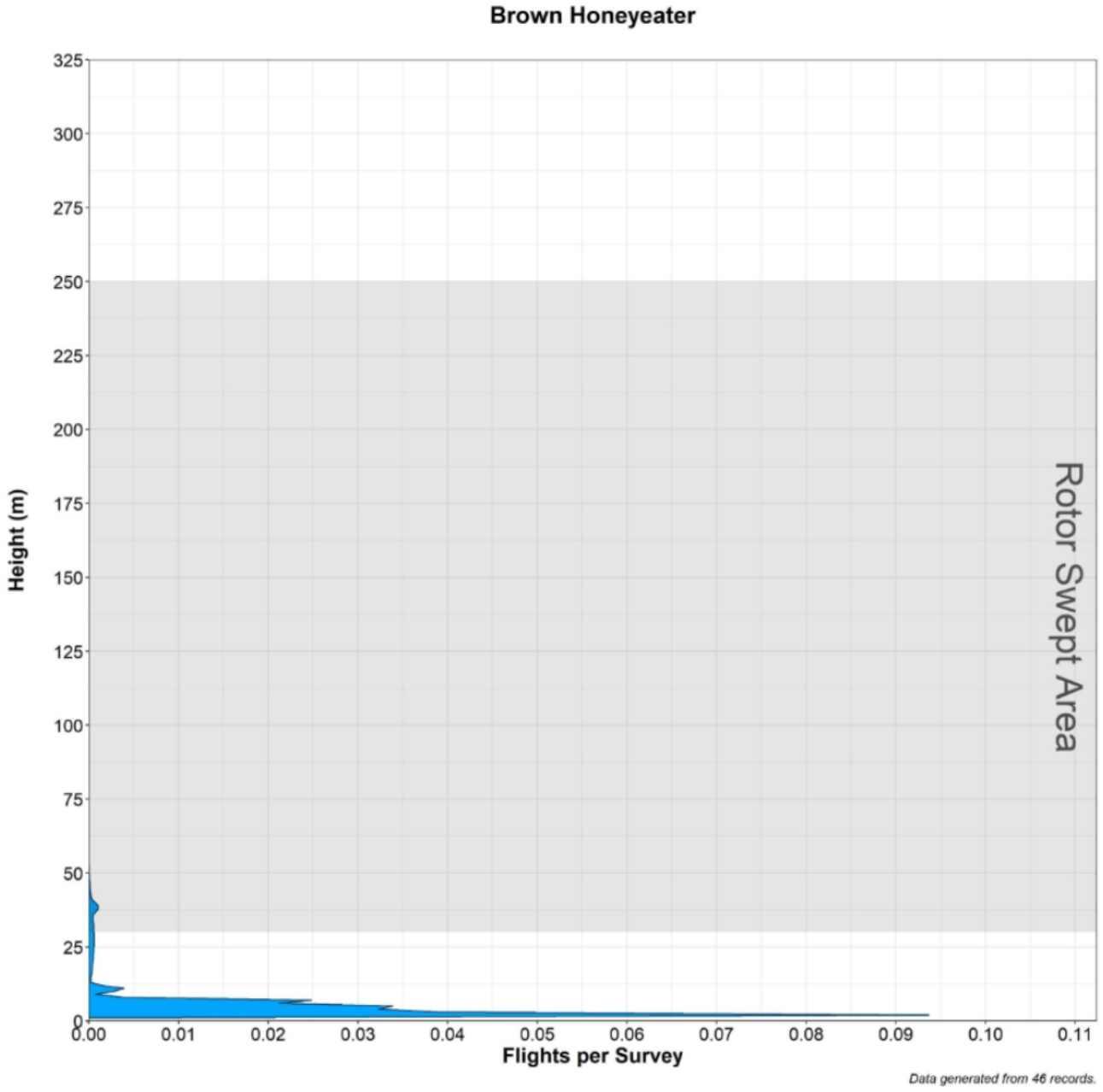

Figure H.7 Exposure Risk Model for Brown Honeyeater (*Lichmera indistincta*)

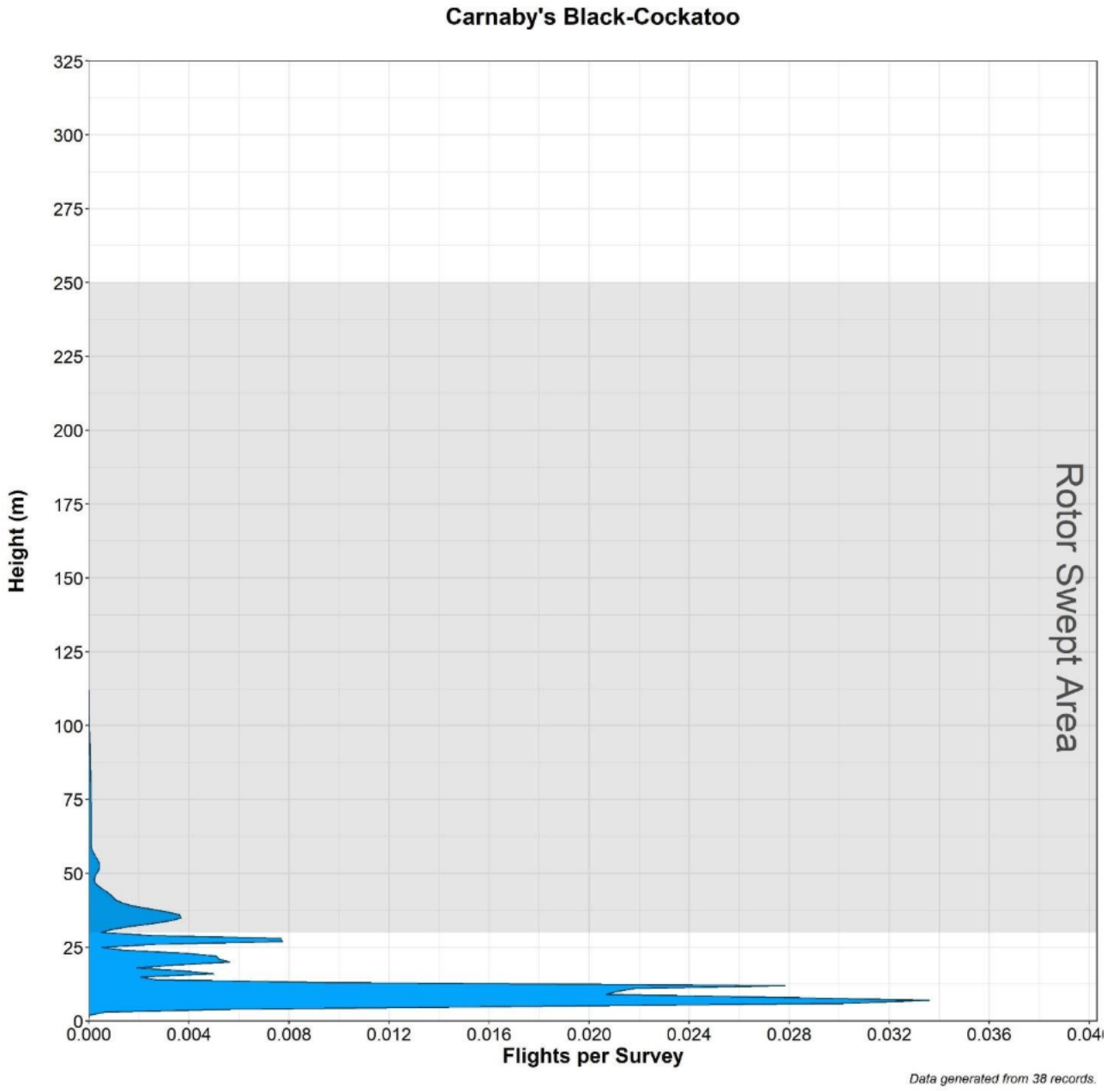

Figure H.8 Exposure Risk Model for Carnaby's Black-Cockatoo (*Zanda latirostris*)

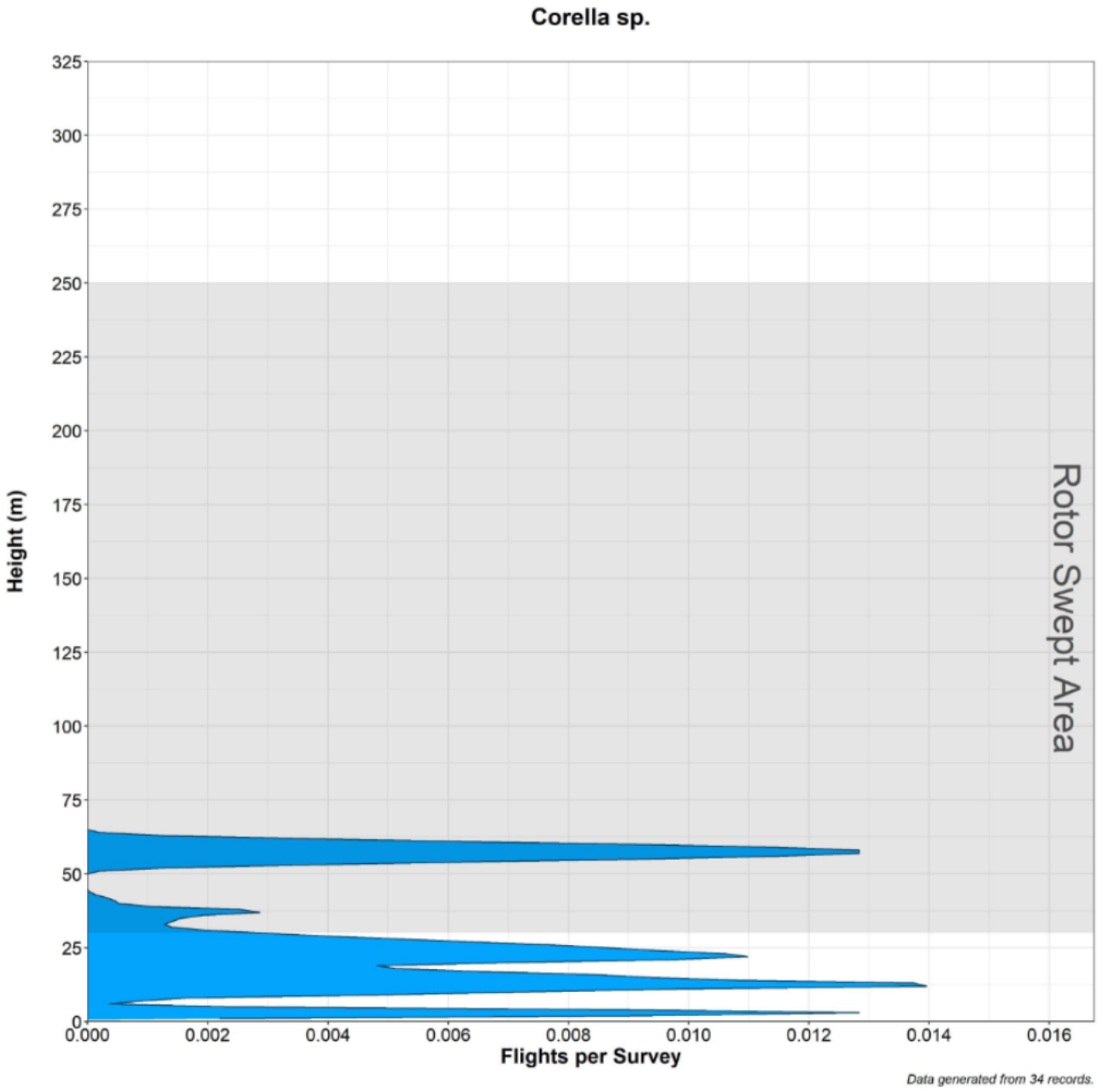

Figure H.9 Exposure Risk Model for Corella Species (*Cacatua* sp.)

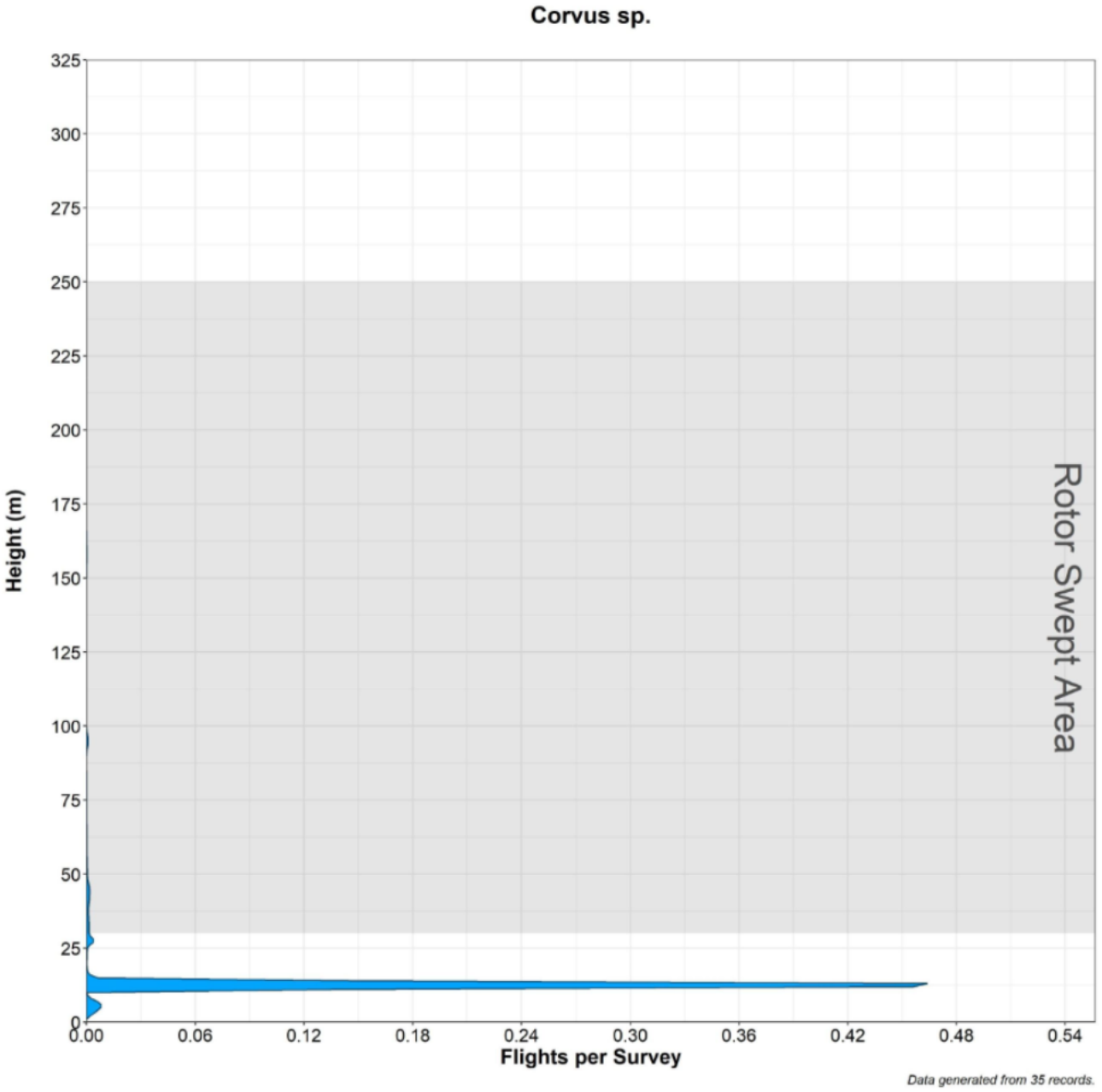

Figure H.10 Exposure Risk Model for *Corvus* sp.

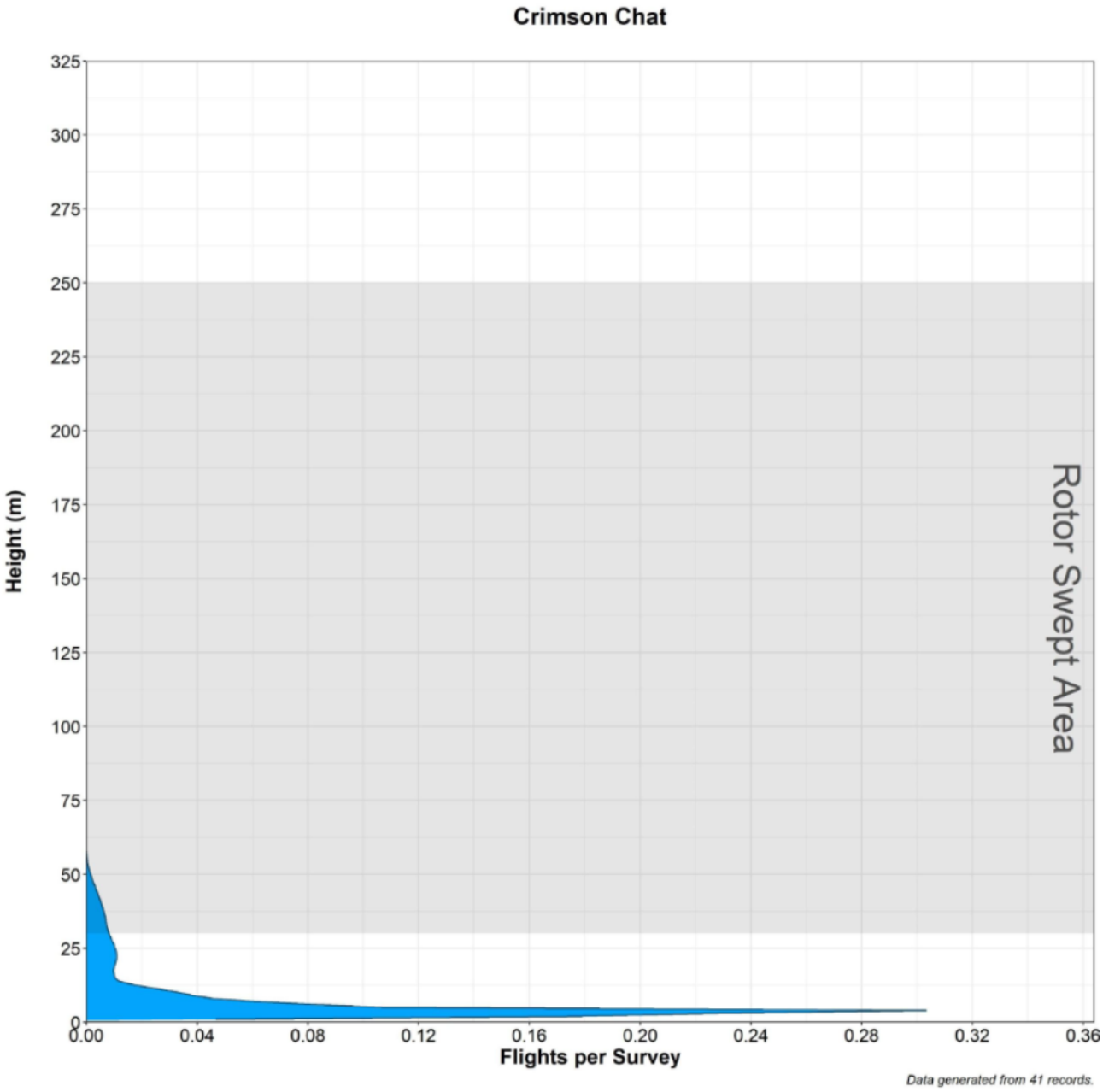

Figure H.11 Exposure Rick Model for Crimson Chat (*Epthianura tricolor*)

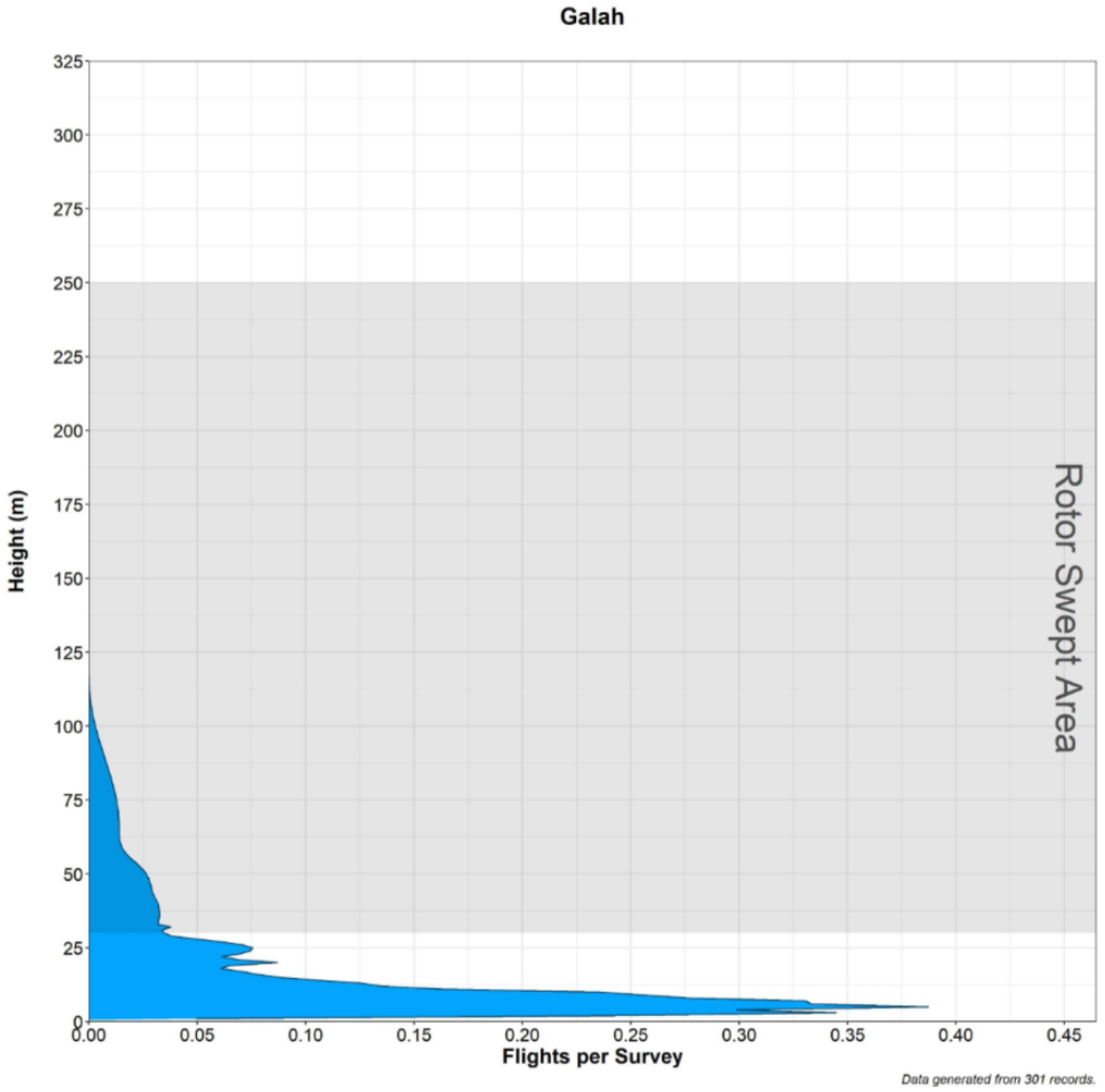

Figure H.12 Exposure Risk Model for Galah (*Eolophus roseicapilla*)

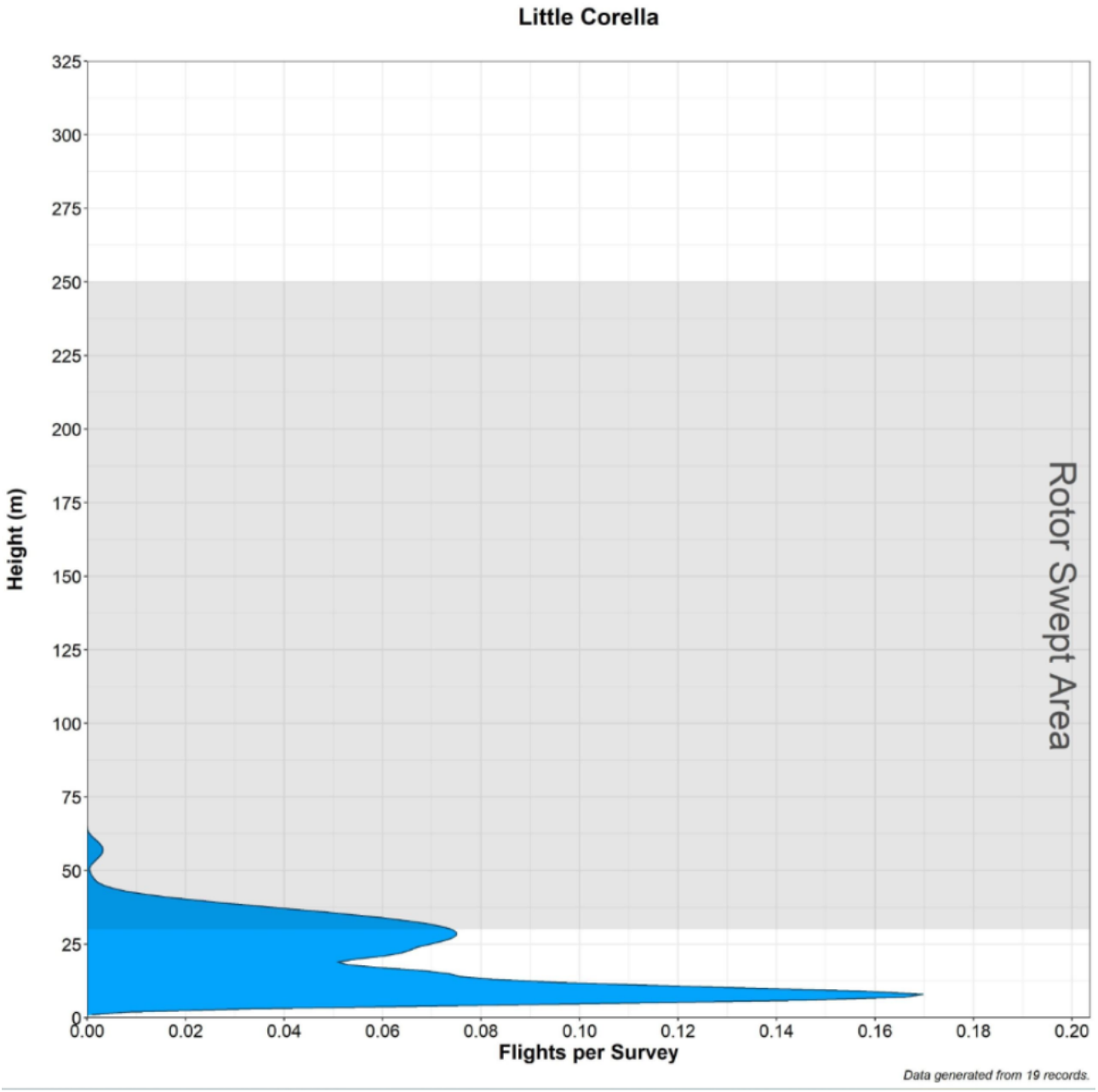

Figure H.13 Exposure Rick Model for Little Corella (*Cacatua sanguinea*)

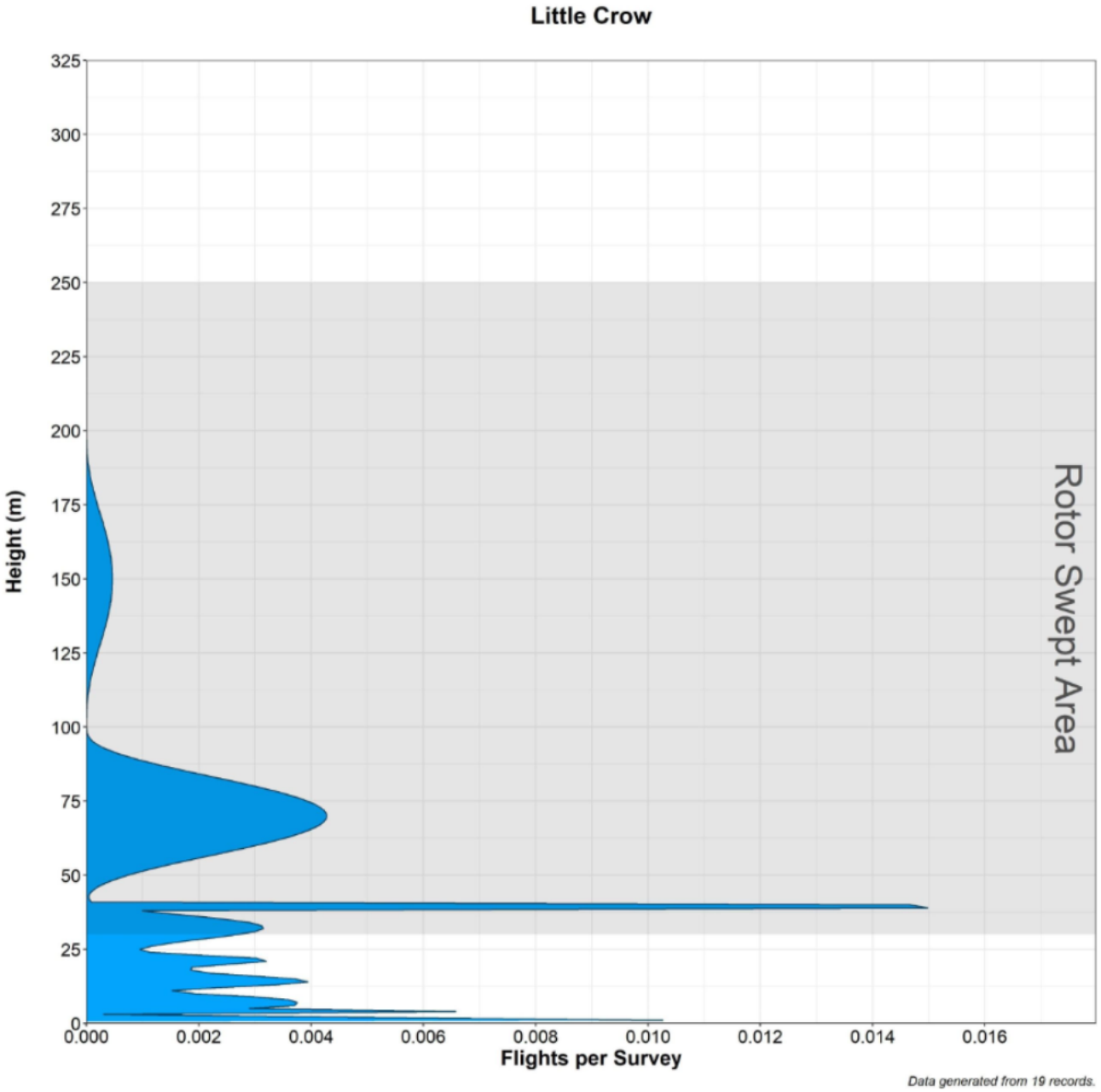

Figure H.14 Exposure Risk Model for Little Crow (*Corvus bennetti*)

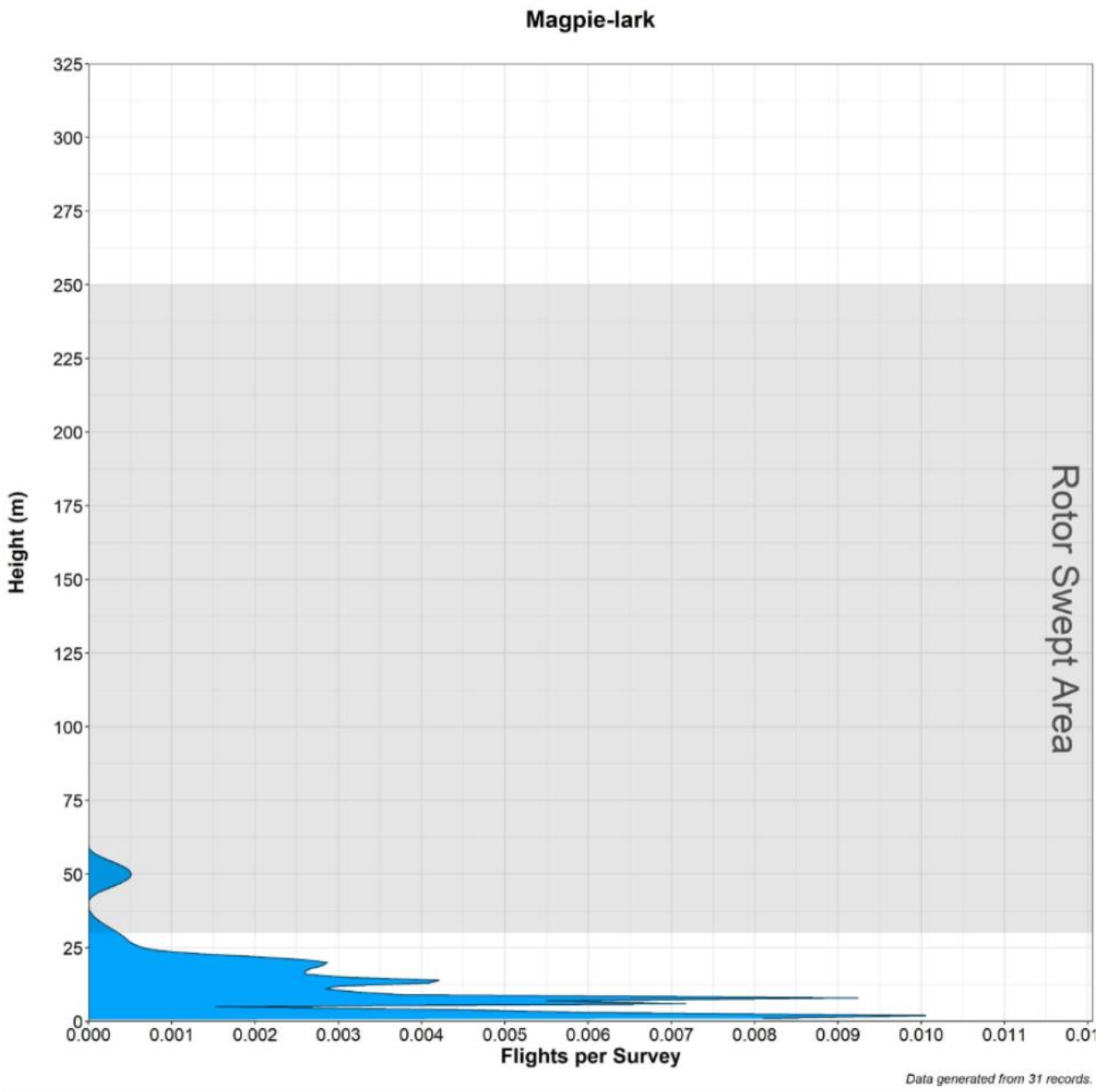

Figure H.15 Exposure Risk Model for Magpie-lark (*Grallina cyanoleuca*)

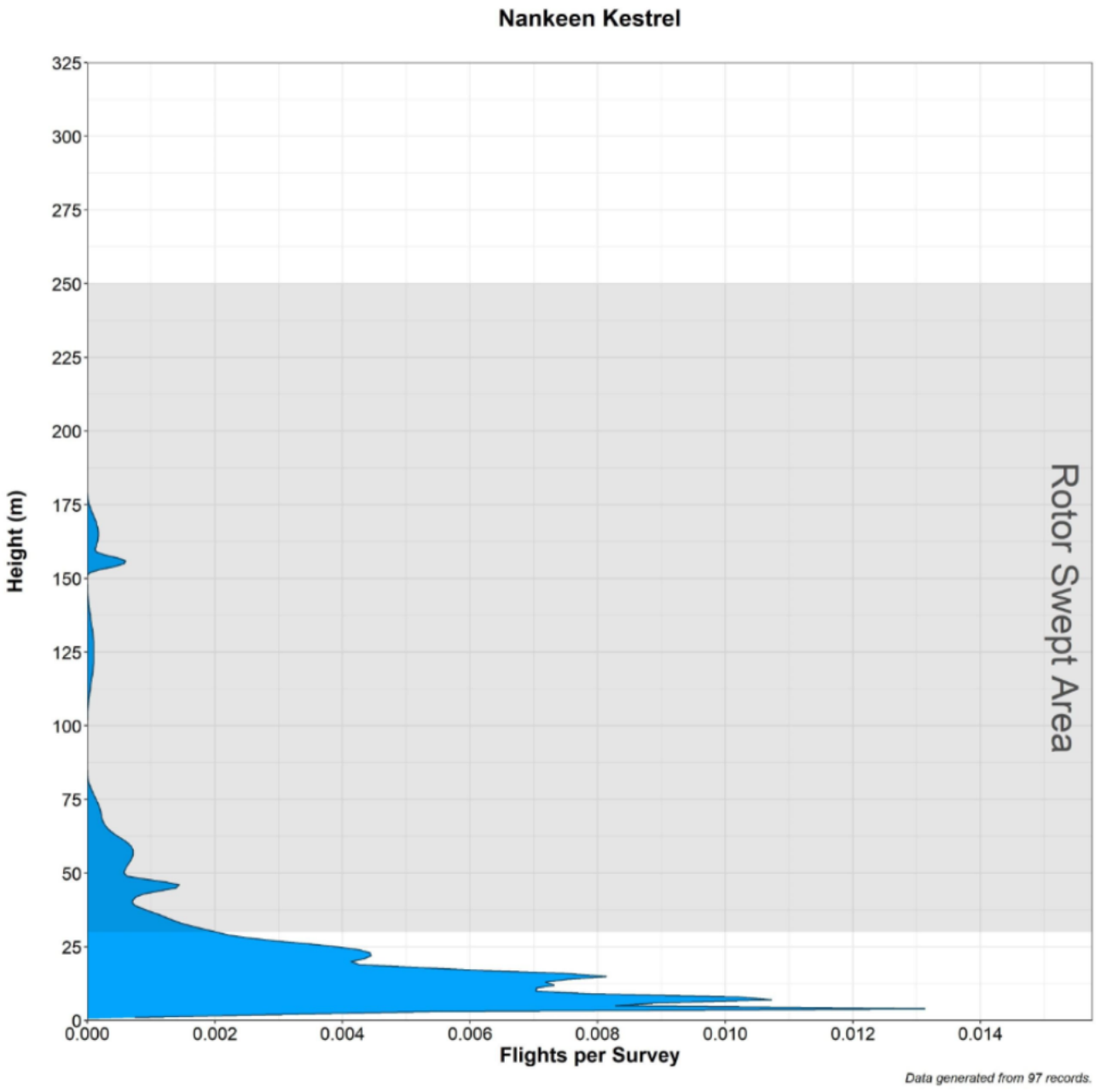

Figure H.16 Exposure Risk Model for Nankeen Kestrel (*Falco cenchroides*)

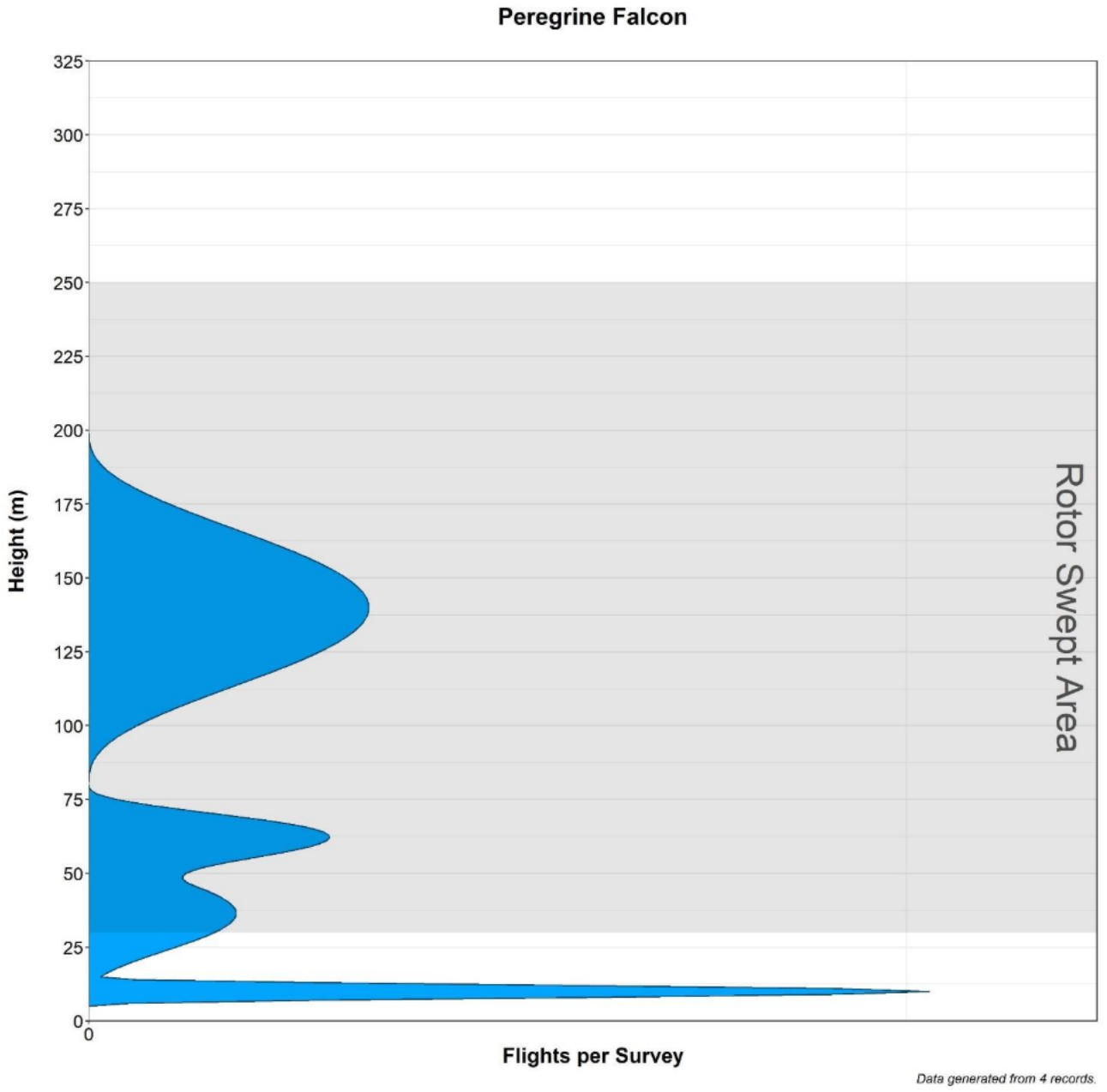

Figure H.17 Exposure Risk Model for Peregrine Falcon (*Falco peregrinus*)

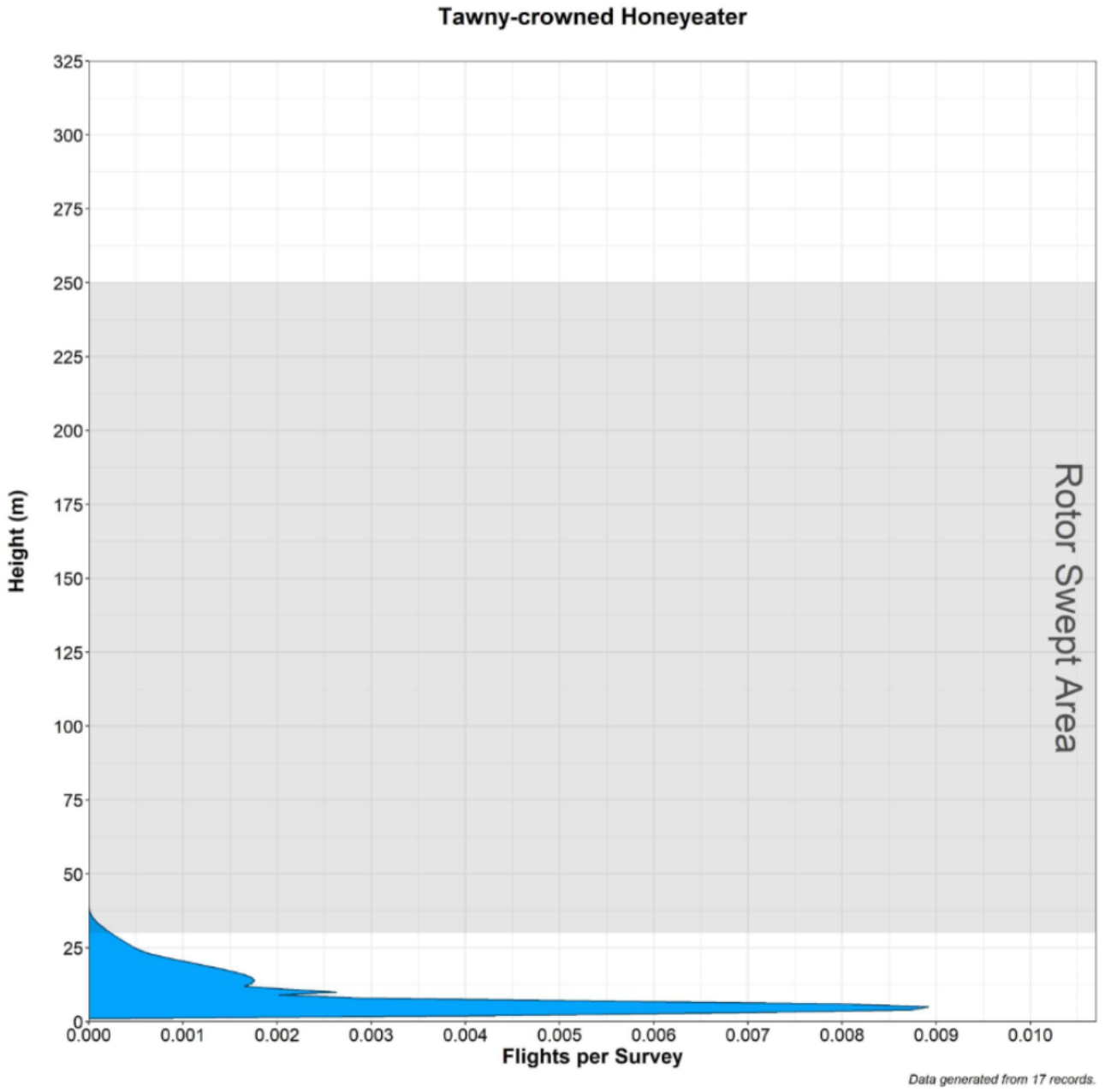

Figure H.18 Exposure Risk Model of Tawney-crowned Honeyeater (*Gliciphila melanops*)

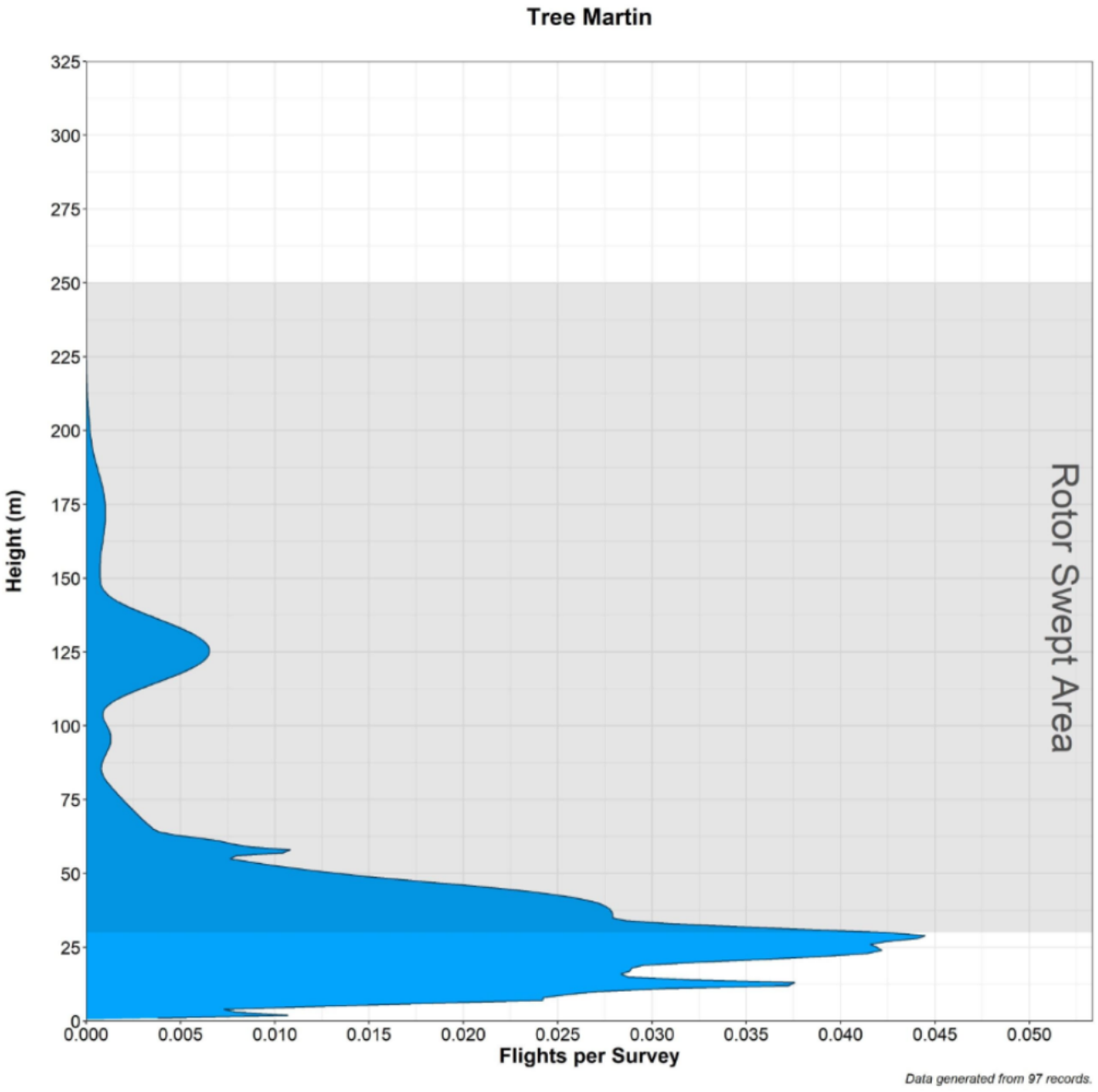

Figure H.19 Exposure Risk Model for Tree Martin (*Petrochelidon nigricans*)

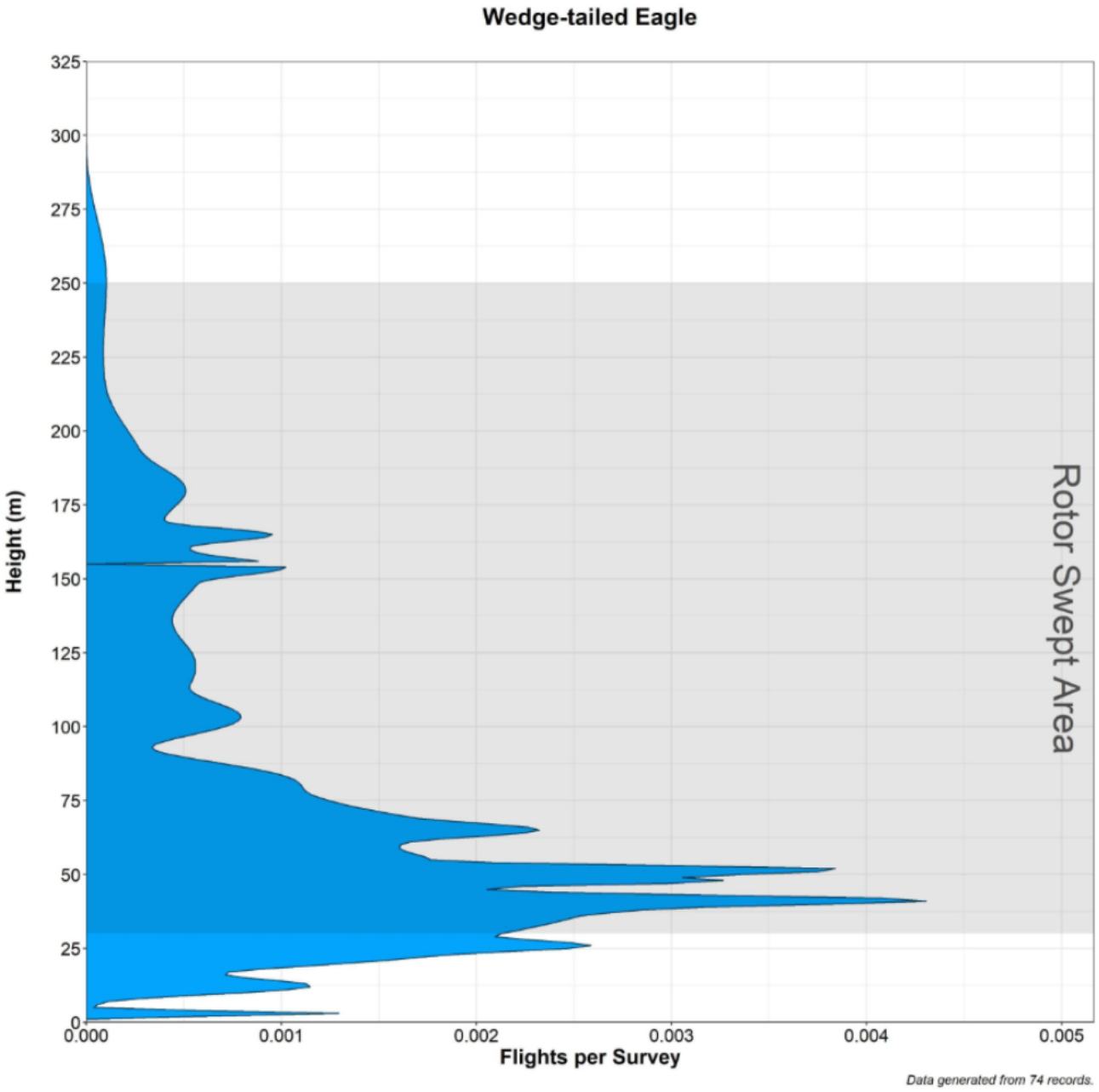

Figure H.20 Exposure Risk Model for Wedge-tailed Eagle (*Aquila audax*)

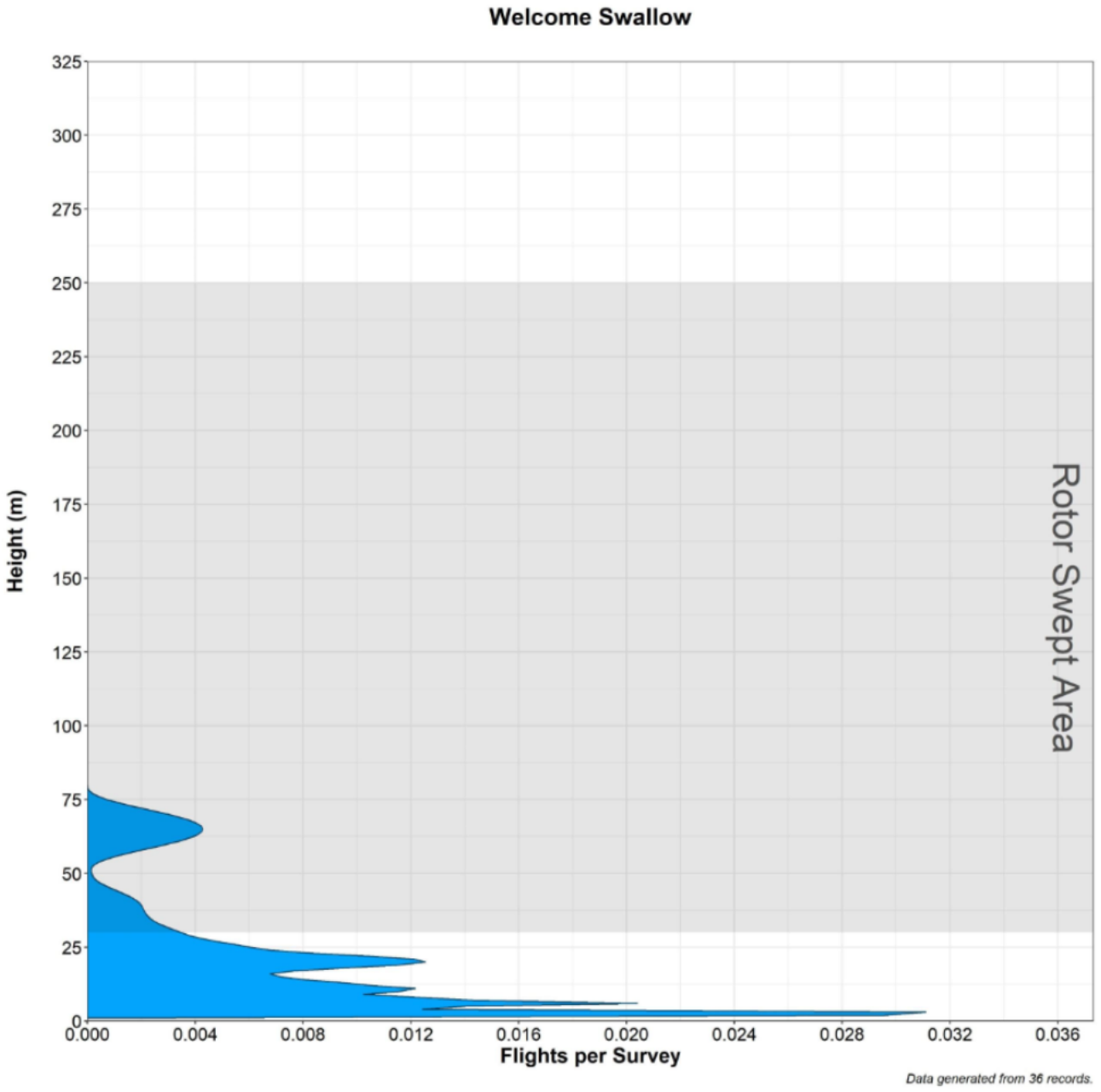

Figure H.21 Exposure Risk Model for Welcome Swallow (*Hirundo neoxena*)

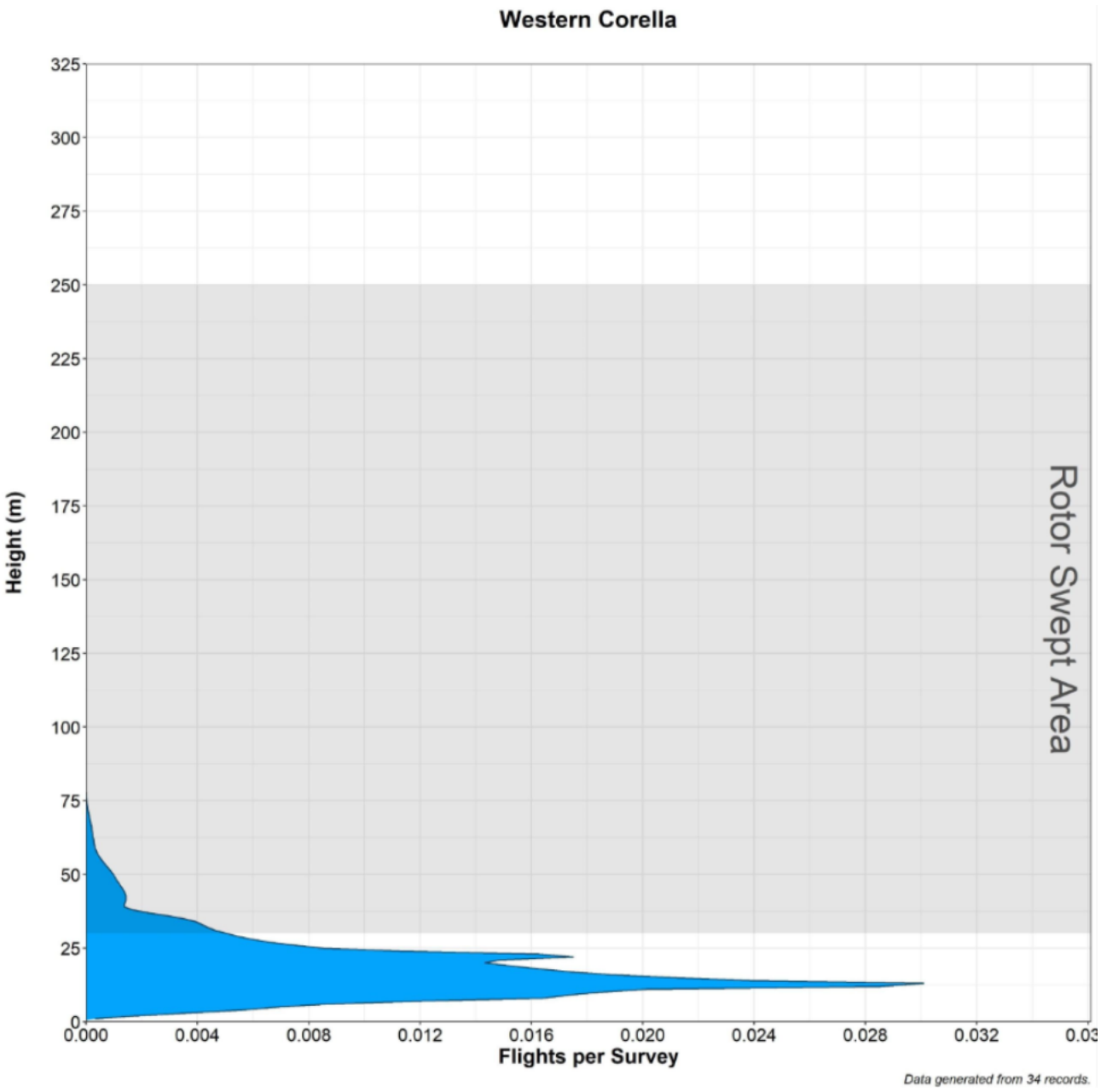

Figure H.22 Exposure Risk Model for Western Corella (*Cacatua pastinator*)

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