1.0 Year 1 Carcass Search Works Completed

1.1 Carcass Searches

King & Co Detection have completed the Year 1 carcass search program in accordance with the requirements of Section 5.4 of the BBAMP, with the use of conservation detection dogs at the locations and in the months presented below in **Table 1.1**.

Table 1.1 Rye Park Wind Farm BBAMP Year 1 Carcass Search Survey (Conservation Dog) Summary

Turbine	Jun 24	Jul 24	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24	Jan 25	Feb 25	Mar 25	Apr 25	May 25	Jun 25	Jul 25	Aug 25	Sep 25
A02	7th	19th	16th	13th	15th	9th	10th	22nd	18th	14th	19th	15th	3rd	7th	5th	9th
A04	11th	28th	23rd	13th	15th	9th	10th	22nd	18th	14th	19th	17th	14th	12th	5th	9th
A06	8th	24th	16th	25th	20th	19th	10th	22nd	21st	11th	16th	15th	3rd	13th	13th	3rd
A10	8th	24th	16th	25th	20th	19th	10th	22nd	21st	14th	16th	15th	9th	13th	13th	3rd
A12	8th	24th	16th	25th	20th	19th	10th	22nd	21st	11th	16th	15th	3rd	13th	13th	3rd
B01	16th	28th	11th	13th	15th	9th	10th	20th	18th	14th	19th	17th	14th	12th	13th	7th
B07	16th	19th	11th	25th	15th	19th	9th	20th	18th	14th	19th	17th	9th	7th	5th	7th
B08	16th	19th	11th	25th	15th	19th	9th	20th	18th	14th	19th	17th	9th	7th	5th	7th
B09	11th	19th	23rd	13th	15th	19th	9th	22nd	18th	14th	19th	8th	9th	7th	13th	7th
B13	7th	28th	23rd	25th	15th	9th	9th	20th	18th	11th	19th	15th	14th	12th	13th	9th
B15	7th	28th	23rd	25th	15th	9th	9th	20th	18th	11th	19th	15th	14th	12th	13th	9th
C04	19th	25th	10th	18th	14th	20th	11th	15th	19th	10th	17th	10th	6th	15th	12th	4th
C05	19th	25th	10th	18th	14th	20th	11th	15th	19th	10th	17th	10th	6th	15th	12th	5th
C06	12th	29th	14th	24th	14th	20th	11th	15th	19th	10th	17th	13th	10th	3rd	14th	5th
C09	12th	29th	14th	24th	14th	20th	11th	15th	19th	10th	17th	7th	10th	3rd	12th	4th
D02	20th	29th	21st	18th	14th	20th	18th	21st	19th	10th	17th	13th	10th	3rd	14th	4th
D05	19th	25th	10th	20th	19th	10th	18th	21st	19th	10th	17th	10th	6th	15th	14th	4th
D06	12th	23rd	22nd	24th	14th	10th	18th	21st	19th	10th	17th	13th	11th	9th	14th	4th
D07	15th	23rd	21st	24th	19th	20th	18th	21st	21st	11th	16th	13th	4th	4th	14th	8th
D09	20th	23rd	17th	20th	19th	10th	11th	21st	21st	11th	16th	13th	4th	4th	14th	8th
E01	15th	18th	21st	24th	14th	20th	11th	15th	19th	10th	17th	13th	11th	9th	12th	5th
E03	15th	18th	21st	24th	14th	20th	11th	15th	19th	10th	17th	13th	11th	9th	12th	5th
E06	20th	18th	14th	20th	19th	10th	11th	21st	22nd	11th	16th	6th	4th	4th	14th	8th
F01	18th	17th	22nd	19th	16th	24th	9th	24th	17th	13th	15th	14th	7th	16th	4th	12th
F02	18th	30th	12th	12th	16th	24th	9th	24th	17th	13th	15th	14th	7th	16th	4th	12th
F03	9th	30th	12th	12th	16th	24th	9th	24th	17th	13th	15th	14th	7th	16th	4th	12th
F04	9th	21st	12th	19th	28th	21st	20th	16th	22nd	13th	20th	11th	13th	5th	7th	14th
F05	9th	21st	12th	19th	28th	21st	20th	16th	22nd	13th	20th	11th	13th	5th	7th	14th
G01	14th	17th	22nd	19th	27th	17th	19th	17th	22nd	15th	20th	11th	13th	5th	7th	13th
G02	18th	17th	18th	23rd	31st	17th	19th	17th	22nd	15th	15th	14th	2nd	8th	4th	14th

Turbine	Jun 24	Jul 24	Aug 24	Sep 24	Oct 24	Nov 24	Dec 24	Jan 25	Feb 25	Mar 25	Apr 25	May 25	Jun 25	Jul 25	Aug 25	Sep 25
G03	14th	21st	18th	12th	28th	21st	20th	17th	22nd	13th	20th	14th	7th	16th	8th	13th
G04	14th	30th	22nd	23rd & 24th	27th	17th	19th	16th	21st	15th	15th	14th	2nd	8th	8th	13th
G05	9th	21st	18th	24th	31st	17th	19th	17th	17th	13th	15th	14th	2nd	8th	8th	13th

Note: Due to unforeseen site safety issues, the October 2025 carcass searches were not completed, and this was reported to CPHR at the time. Incidental carcass detections during this period were documented and have been incorporated into the annual dataset. These records have also been included in the Symbolix analytical reports to ensure comprehensive representation of observed mortality events.

Turbine G04 received two surveys in September 2024 due to only 5% of area being covered during the initial survey. As of the end of September 2025, a total of 528 carcass searches were completed by conservation dogs across 33 turbines.

2.0 Year 1 Carcass Search – Results

2.1 Carcass Searches

As of the end of October 2025, King & Co Detection have found 157 carcasses (37 birds, 117 bats, three unknowns). The Site Manager for RPWF has reported eight additional incidental finds, all being bird carcasses. The combination of these findings is presented below in **Table 2.1**.

Table 2.1 Year 1 Carcass Finds across RPWF per Survey Month

Month	*Species*	Common Name	Count of Species	Turbine (count of individuals at each turbine)	Threatened species/key species
June 2024	***Aquila audax***	**Wedge-tailed eagle**	**1**	**G05 (1)**	**Yes – reported to CPHR**
July 2024	*Anthochaera carunculata*	Red wattlebird	1	F02(1)	No
	Aquila audax	**Wedge-tailed eagle**	**1**	**F07(1)**	**Yes – reported to CPHR**
	Cacomantis flabelliformis	Fan-tailed cuckoo	1	A08(1)	No
	Platycercus elegans	Crimson rosella	1	E03(1)	No
August 2024	*Accipiter fasciatus*	Brown goshawk	1	B01(1)	No
	Aquila audax	**Wedge-tailed eagle**	**2**	**D02(1), G01(1)**	**Yes – reported to CPHR**
	Chalinolobus gouldii	Gould's wattled bat	1	E06(1)	No
	Elanus axillaris	Black shouldered kite (Featherspot)	1	B15(1)	No
September 2024	***Aquila audax***	**Wedge-tailed eagle**	**1**	**A07 (1)**	**Yes – reported to CPHR**
	Coturnix pectoralis	Stubble quail	1	A02 (1)	No
	Unknown	Unknown bat - patch of fur remaining	1	D02 (1)	No
	Vespadelus vulturnus	Little forest bat	3	A12 (1), D06 (1), G05 (1)	No
	Zosterops lateralis	Silvereye	1	D06 (1)	No
	Austronomus australis	White striped freetail bat	1	A12 (1)	No
	Chalinolobus gouldii	Gould's wattled bat	1	A12 (1)	No
	Ozimops sp.	Ozimops sp.	1	A10 (1)	No
	Unknown	Unable to be identified		A06 (1)	No
October 2024	***Aquila audax***	**Wedge-tailed eagle**	**2**	**F03 (1), D07 (1)**	**Yes – reported to CPHR**

Month	Species	Common Name	Count of Species	Turbine (count of individuals at each turbine)	Threatened species/key species
	Austronomus australis	White striped freetail bat	2	A02 (1), A12 (1)	No
	Chalinolobus gouldii	Gould's wattled bat	1	E01 (1)	No
	Falco berigora	Brown falcon	1	A12 (1)	No
	Falco cenchroides	Nankeen kestrel	1	G04 (1)	No
	Ozimops ridei	Eastern free-tail bat	1	B08 (1)	No
	Ozimops sp.	Ozimops sp.	1	F04 (1)	No
	Pardalotus punctatus	Spotted pardalote	1	B09 (1)	No
	Rhipidura albiscapa	Grey fantail	1	C09 (1)	No
	Unable to be identified	Unable to be identified	2	B07 (1), B15 (1)	No
	Vespadelus vulturnus	Little forest bat	16	A06 (1), B01 (1), C06 (1), D06 (1), **D07 (1)**, D09 (1), E01 (1), **E03 (1),** E05 (3), E06 (1), F01 (1), F02 (1), F03 (2)	No
	Zosterops lateralis	Silvereye	1	C09 (1)	No
November 2024	***Aquila audax***	**Wedge-tailed eagle**	**1**	**F02 (1)**	**Yes – reported to CPHR**
	Austronomus australis	White striped freetail bat	3	A02 (1), A04 (1), E01 (1)	No
	Platycercus elegans	Crimson rosella	2	B01 (1), D07 (1)	No
	Vespadelus vulturnus	Little forest bat	13	**A04 (2),** B07 (1), B15 (1), C05 (1), C09 (1), D06 (2), **D07 (4)**, F05 (1)	**Yes – Reported to CPHR as Impact Trigger Reported.**
December 2024	*Austronomus australis*	White striped freetail bat	4	A12 (1), C04 (1), D05 (1), D09 (1)	No
	Chalinolobus gouldii	Gould's wattled bat	1	G05 (1)	No
	Haliastur sphenurus	Whistling kite	1	F04 (1)	No
	Vespadelus darlingtoni	Large forest bat	5	C05 (1), C06 (4)	No
	Vespadelus regulus	Southern forest bat	1	E06 (1)	No
	Vespadelus vulturnus	Little forest bat	24	**A04 (2),** A06 (1), A12 (1), B08 (3), B13 (2), C05 (1), D02 (3), **D07 (3),** **E03 (2),** E06 (1), F01 (1), F04 (1), G02 (2), G03 (1).	**Yes – Reported to CPHR as Impact Trigger Reported.**
January 2025	*Accipiter cirrocephala*	Collared sparrowhawk	1	B08 (1)	No

Month	*Species*	Common Name	Count of Species	Turbine (count of individuals at each turbine)	Threatened species/key species
	Austronomus australis	White striped freetail bat	3	D06 (2), G04 (1)	No
	Chalinolobus gouldii	Gould's wattled bat	2	G01 (1), F03 (1)	No
	Hirundapus caudacutus	**White-throated needletail**	**1**	**F04 (1)**	**Yes – Reported to CPHR**
	Ozimops sp.	Ozimops sp.	1	D09 (1)	No
	Strepera graculina	Pied currawong	1	F01 (1)	No
	Vespadelus vulturnus	Little forest bat	7	A10 (2), C06 (1), **D07 (2),** E01 (1), F05 (1)	No
February 2025	***Aquila audax***	**Wedge-tailed eagle**	**1**	**C04 (1)**	**Yes - reported to CPHR**
	Austronomus australis	White striped freetail bat	4	B08 (2), E01 (1), F05 (1)	No
	Chalinolobus gouldii	Gould's wattled bat	4	A06 (1), A12 (1), B08 (1), D02 (1)	No
	Unknown	Unknown bat – damaged carcass	1	G01 (1)	No
	Vespadelus vulturnus	Little forest bat	1	B08 (1)	No
March 2025	*Austronomus australis*	White striped freetail bat	3	B09 (1), G01 (1), G04 (1)	No
	Chalinolobus gouldii	Gould's wattled bat	1	G04 (1)	No
	Falco cenchroides	Nankeen kestrel	1	A07 (1)	No
	Ozimops planiceps	Southern freetail bat	1	F02 (1)	No
	Unknown	Unknown bat – damaged carcass	1	D07 (1)	No
	Unknown	Unknown bird – damaged carcass	1	A02 (1)	No
April 2025	*Austronomus australis*	White striped freetail bat	2	F02 (1), G01 (1)	No
	Chalinolobus gouldii	Gould's wattled bat	1	F05 (1)	No
	Gymnorhina tibicen	Australian magpie	1	G02 (1)	No
	Ozimops sp.	Ozimops sp.	1	A12 (1)	No
	Unknown	Unknown bird – damaged carcass	1	C09 (1)	No
	Vespadelus vulturnus	Little forest bat	1	F03 (1)	No
May 2025	***Aquila audax***	**Wedge-tailed eagle**	**1**	**C09 (1)**	**Yes - reported to CPHR**
	Chalinolobus gouldii	Gould's wattled bat	1	E03 (1)	No
	Gymnorhina tibicen	Australian magpie	1	C05 (1)	No
	Unknown	Unknown bat – damaged carcass	1	E06 (1)	No

Month	*Species*	Common Name	Count of Species	Turbine (count of individuals at each turbine)	Threatened species/key species
June 2025	*Cracticus torquatus*	Grey butcherbird	1	G04 (1)	No
July 2025	***Aquila audax***	**Wedge-tailed eagle**	**1**	**C09 (1)**	**Yes – reported to CPHR (featherspot)**
	Zosterops lateralis	Silvereye	1	A06 (1)	No
August 2025	*Acanthiza nana*	Yellow thornbill	1	G01 (1)	No
	Aquila audax	**Wedge-tailed eagle**	**3**	**B07 (1), B08 (2)**	**Yes – reported to CPHR, 2 Carcass and 1 Injured individual taken to WIRES (resulted in mortality).**
	Falco cenchroides	Nankeen kestrel	1	F03 (1)	No
September 2025	***Aquila audax***	**Wedge-tailed eagle**	**1**	**A04 (1)**	**Yes – reported to CPHR**
	Chalinolobus gouldii	Gould's wattled bat	1	B15 (1)	No
	Platycercus elegans	Crimson rosella	1	C09 (1)	No
October 2025	***Aquila audax***	**Wedge-tailed eagle**	**1**	**A07 (1)**	**Yes – reported to CPHR**

There were fifteen (15) wedge-tailed eagle carcasses found as part of these surveys, plus one injured and taken into care of WIRES which resulted in a mortality. The timing of these includes:

- one each in June and July 2024
- two in August 2024
- one in September 2024
- two in October 2024
- one in November 2024
- one in February 2025
- one in May 2025
- one in July 2025
- three in August 2025 (including one injured resulting in mortality)
- one in September 2025 and
- one in October 2025.

Of these, five were incidental finds and 11 were found during conservation dog surveys. October 2025 was not formally surveyed for carcasses due to safety concerns with the conservation dog survey team and this was reported to CPHR.

These finds have not triggered the impact threshold for this species however all were reported to CPHR within 24 hours of identification of the carcasses/injured individual.

Additionally, one threatened species carcass (being the white-throated needletail) was found in January 2025. This find was reported to the CPHR the next day after the find as required by the threatened species response and reporting requirements of the BBAMP.

Between June 2024 and September 2025 there were 65 little forest bat carcasses found during surveys. Between October 2024 and January 2025, 10 little forest bat carcasses were found within proximity to Turbine D07. Due to this, an Impact Trigger Report was issued to CPHR, following the required trigger pathway in accordance with the BBAMP.

2.2 Statistical mortality modelling

As per the BBAMP reporting requirements, a statistical analysis was undertaken to provide estimates of the annual total number of collisions for three species groups (birds, bats, and wedge-tailed eagle) in consideration of the carcass search area and effort. This work was completed by Symbolix, using the carcass search data collected by King & Co Detection. The results of the Year 1 investigation is provided in **Appendix A** and summarised below.

Overall detectability with a 95% confidence interval of bats and birds by dogs is 100% as sourced from searcher efficiency trials conducted in May and October 2025. Scavenger efficiency trails were conducted in October and November 2024, and May 2025 at randomly selected turbines. This is to refine the statistical model for Rye Park Wind Farm. This process has allowed the models to be using more local data and have a greater chance of confidence intervals.

Under the assumptions for the appropriate models the median time for carcass removal via scavenge (being the removal of a carcass to be no longer identified):

- For birds and bats is 1.2 days (with a 95% confidence interval).
- For wedge-tailed eagle is 190 days (with a 95% confidence interval).
- The carcass persistence for the large birds is due to several reasons of predation, some predators at other locations have been seen to actively avoid the wedge-tailed eagles and the size of the animal takes longer to decay to a point of being unrecognisable.

2.2.1 Mortality estimates

The mortality estimates in the Year 1 carcass search program included models for bats, birds, and wedge-tailed eagles. The estimates cover the 16 months of survey from May 2024 to September 2025. An estimate that has returned higher than what was seen may be due to the rate of scavenging. With an average of 1.2 days of time to scavenge for birds and bats on RPWF, it is therefore assumed that a large portion of birds and bats are not found during carcass searches by King & Co due to loss to other scavengers.

The models predict and Symbolix expect about 100% of bats, 97% of birds, and 91% of wedge-tailed eagles to fall within 120m of the turbine, so continuing to survey in this radius is appropriate for this assemblage of species.

Table 2.2 **Summary of Mortality model results**

Mortality Group	Found in formal survey	Model predicted mortality (median)	95% confidence upper range
Bats	116	3098	4340
Birds	25	683	1018
Wedge-tailed eagle	11	25	37

The predicted model for the wedge-tailed eagle shows that even though formal surveys found eleven individual carcasses, the incidental finds are relevant to the overall number of mortalities. The predicted median is close, and the model is appropriate for this wind farm.

3.0 Limitations

While using conservation dogs as a primary survey method, it comes with survey limitations including some encountered at RPWF. The unstable and steep terrain at some of the turbines presents an accessibility challenge which may hinder or slow the movement of dogs and also pose potential safety risks, based on the surface rock stability. To address these issues, each month the conservation dog team risk assesses each turbine survey location prior to survey to ensure that it is safe for the human and the dog to proceed.

Additionally, the varying degrees of vegetation density can obscure visibility and access, potentially leading to incomplete coverage around each turbine. Dense vegetation can also increase potential for snakes (thus safety issues), which have been noted several times during conservation dog surveys.

Despite these limitations at times, unsearchable areas have been mapped as per Section 5.4.3 of the BBAMP and this has provided a corrective function to include in the mortality estimate modelling. This modelling considers the area that can be realistically surveyed, adjusting the fall zone accordingly to provide an accurate prediction of mortalities. The survey coverage at RPWF is moderate to high coverage across most turbines and seasons.

4.0 Conclusion

The Project has commenced the Year 1 components of the BBAMP at the 33 turbines that are part of the full BBAMP monitoring component. The Year 1 program has been completed successfully at all 33 turbines once all construction activities and associated exclusion areas had been removed across that cluster of wind turbines and commissioning of the wind turbine cluster had commenced.

There was a total of 165 carcasses (45 birds, 117 bats, and 3 unknowns) recorded as part of the Year 1 carcass searches completed up to the end of September 2025 (including one reported WTE in October 2025). These comprised one threatened species carcass and fifteen wedge-tailed eagle carcasses, and 65 little forest bat carcasses. Each of these were reported according to the BBAMP timing requirements with the little forest bat impact trigger activated due to the repeated carcass finds from October 2024 to January 2025 at Turbine D07.

Modelling expects that 100% of bats, 97% of birds and 91% of wedge-tailed eagle carcasses will fall within 120m of the turbine bases. Statistical modelling has shown that coverage obtained by the dog team out to the 120m search zone for most is sufficient to cover the majority of the modelled fall zone for bats and birds. Continued improvement will be sought to ensure this coverage is optimal to support ongoing modelling. Mortality estimates result in an expected total site loss of around 3,098 bats, 683 birds and 25 wedge-tailed eagles within the 16-month period.

5.0 Further review

A minor review will be undertaken after the first year of commencement of operation, following the completion of the annual report, with the review summary and amendments to monitoring and mitigation strategies issued as an appendix to the BBAMP. The minor review will be prepared (including consideration of results) with involvement from CPHR and DCCEEW in accordance with Section 8.2 of the BBAMP.

In addition to the review requirements, Tilt will seek as part of this review amendments to the BBAMP to ensure a single version of the BBAMP is approved by both CPHR and DCCEEW as well as a review of other implementation challenges to allow for the efficient implementation of the BBAMP.

Yours sincerely

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Appendix A

Symbolix Report

Rye Park Wind Farm Mortality Estimate - Year 1

Prepared for Umwelt, 17 December 2025, Ver. 0.9

This report outlines an analysis of mortality at Rye Park Wind Farm (RPWF) from 2024-05-22 to 2025-09-14 (16 months). The analysis is broken into the three related components below:

- Searcher efficiency / detectability – estimated from trials in May 2025 and October 2025.
- Scavenger loss rates – estimated from trials in October 2024, November 2024 and May 2025.
- Mortality estimates - based on surveys at 33 turbines, from 2024-06-07 to 2025-09-14

1 Available data

Survey data was collected and provided by Umwelt. A brief summary of the data is provided below, and the ultimate focus of this report is a discussion of the potential mortality.

Turbine parameter data (rotor diameter and height) was provided by Umwelt.

Species archetype data was taken from Hull and Muir (2010).

1.1 Data cleaning

For all data containing species names (carcass finds (formal and incidental), detectability and scavenger):

- Species names made consistent.
- Unidentifiable/unknown birds were recoded to "Unidentified Bird"
- Unidentifiable/unknown bats were recoded to "Unidentified Bat"

Survey data:

- Turbine G04 was surveyed twice in September 2024 due to constraints encountered on the first day preventing a full search. The rest of the area was therefore surveyed on the subsequent day[1]. Since only 5% of the area was surveyed in the initial search, survey "G04K-09-23-24" was removed, with the subsequent survey "G04M-09-24-24" representing the full survey area in the analysis.

Scavenger data:

- The last seen date for carcass "Surrogate14" was updated to "2025-05-06" as advised by Umwelt[1]
- The date and time last seen for carcass "RPK22" was updated to "2024-11-14 11:08:00" as advised by Umwelt[1]

[1] L. Shea *pers. comms*

2 Statistical methodology overview

Mortality through collision is an ongoing environmental management issue for wind facilities. Different sites present different risk levels; consequently different sites have different monitoring requirements. In order to estimate the mortality loss at a given site (in a way that is comparable with other facilities) we must account for differences in survey effort, searcher and scavenger efficiency. We used a Monte Carlo method to achieve this.

Best practice estimators project the number of found carcasses (C) up to the number of actual mortalities (M), by accounting for:

- The probability a carcass will be detected by the searcher (p)
- The probability a carcass is not lost to scavenging or decay prior to the search (r)
- The probability a carcass falls within the searched area (a) - also known as the "coverage factor"
- The fraction of turbines searched (f)

Most mortality estimators, e.g. (M. M. Huso 2011), can be conceptualised as a ratio estimator:

$$\hat{M} = \frac{C}{\hat{p} \cdot \hat{r} \cdot \hat{a} \cdot f} \tag{1}$$

The terms in the denominator provide a "boost factor" to the number of carcasses found, C.

However, a limitation of analytical methods, is estimating r, when the time between surveys is not constant. In Australia, it is common for the time between searches to vary due to seasonal changes in effort, designs targeting specific species, logistical reasons, or the use of a pulsed design in which the turbine is searched monthly with a return visit a few days later. Additionally, ratio estimators cannot handle the cases when zero carcasses are found, as zero multiplied by any number still gives zero. This limits their ability to provide an estimate for very rare species that may collide infrequently.

To address this, Symbolix have developed a Monte Carlo algorithm. We have used this method for mortality estimates at over forty wind farms in Australia to date.

Monte Carlo methods (Sawilowsky (2003), Ripley (1987)) simulate a large set of possible survey results, by simulating the actual survey protocol, and sampling from empirical distributions for scavenge loss and searcher efficiency. This method allows us to directly sample the probability a carcass was lost before each survey, negating the need to calculate r analytically for each survey round.

We then estimate how many carcasses were truly generated, given the range of searcher and scavenger efficiencies, the survey frequency and coverage, and the true "found" details. After many simulations, we can estimate the likely range of mortalities that could have resulted in the recorded survey outcome (number of carcasses found).

This method has been benchmarked against analytical approaches (M. M. Huso (2011), Korner-Nievergelt et al. (2011))]. Its outputs are equivalent but it is able to robustly model more complex survey designs (e.g. pulsed surveys, rotating survey list).

Figure 1 provides an overview of the methodology. A detailed explanation can be found in Stark and Muir (2020).

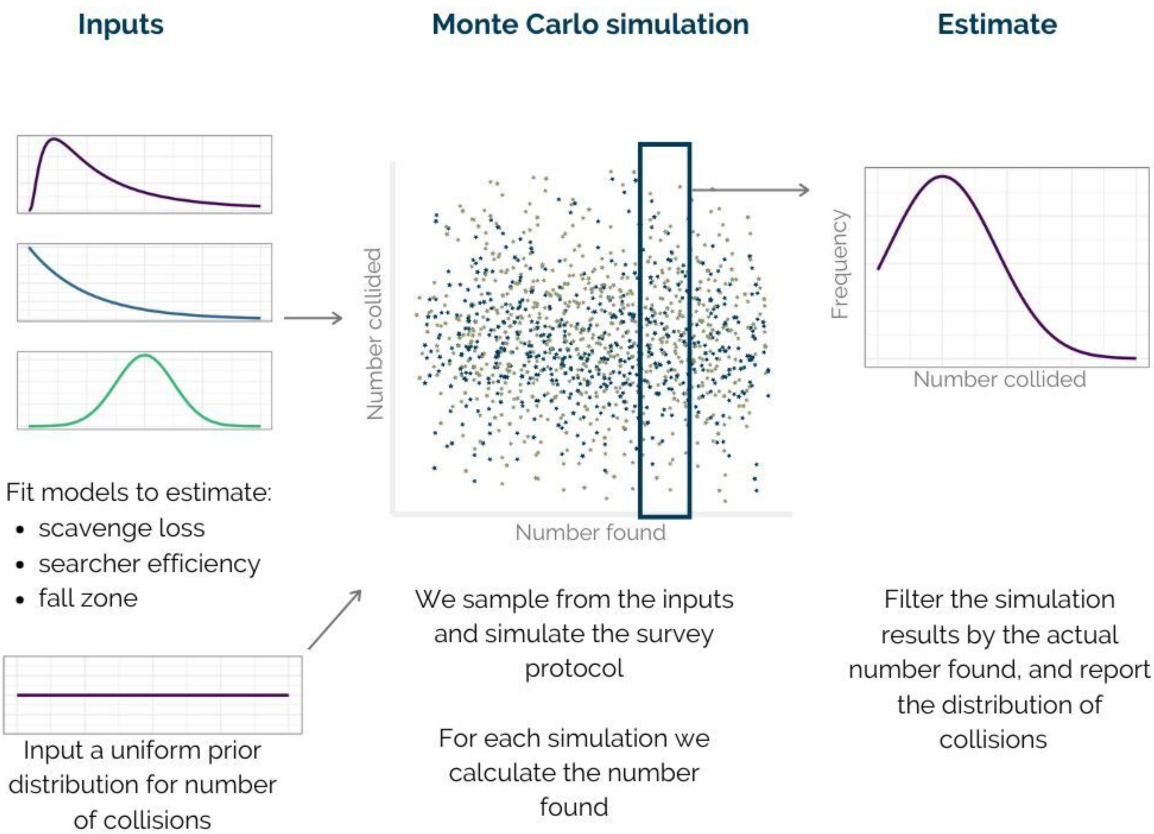

Figure 1: Overview of how the mortality estimation works.

The following sections outline how we estimate p, r and a. C is given by the field observation data for this site, and f is defined by the survey design.

3 Analysis and modelling

The survey program consisted of carcass searches, and adjunct scavenger and detection trials. We summarise the methods, field data and analysis results for each below.

3.1 Carcass search data

The carcass searches provide the C and f terms in Section 2.

3.1.1 Survey effort

Carcass searches were undertaken by trained conservation dogs in accordance with the Bird and Bat Management Plan (BBMP)[2].

The mortality estimate was based on a dated list of turbine surveys. The survey frequency is summarised in Table 1.

In total, 50% of turbines were searched monthly to 120m. In the cases where a full 120m radius search was not possible the actual area of coverage recorded through GPS tracks was used. In the Monte Carlo algorithm, we explicitly simulate the survey design. The proportion of turbines sampled (f) is therefore accounted for in the simulation.

Table 1: Number of surveys per month.

Date	Surveys
2024 Jun	33
2024 Jul	33
2024 Aug	33
2024 Sep	33
2024 Oct	33
2024 Nov	33
2024 Dec	33
2025 Jan	33
2025 Feb	33
2025 Mar	33
2025 Apr	33
2025 May	33
2025 Jun	33
2025 Jul	33
2025 Aug	33
2025 Sep	33

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3.1.2 Carcass finds

The breakdown of found carcasses per species are summarised in Table 2.

Table 2: Carcasses found during formal surveys. Wedge-tailed Eagles in bold.

Species	Number found
Australian Magpie	1
Bird sp.	3
Black-shouldered Kite	1
Brown Falcon	1
Collared Sparrowhawk	2
Crimson Rosella	4
Grey Butcherbird	1
Grey Fantail	1
Nankeen Kestrel	2
Pied Currawong	1
Red Wattlebird	1
Silvereye	3
Stubble Quail	1
Wedge-tailed Eagle	**11**
Whistling Kite	1
White-throated Needletail	1
Yellow Thornbill	1
Bat sp.	5
Gould's Wattled Bat	14
Large Forest Bat	5
Little Forest Bat	64
Ozimops sp.	4
South-eastern Freetail Bat	1
Southern Forest Bat	1
White-striped Freetail Bat	22

A number of carcasses were also found incidentally. These carcasses are not included in the data that produces the mortality estimate; however we report them here for completeness (Table 3).

Table 3: Incidental carcass finds.

Species	Number found
Australian Magpie	1
Fan-tailed Cuckoo	1
Nankeen Kestrel	1
Wedge-tailed Eagle	4

3.2 Searcher efficiency

The aim of searcher efficiency trials is the quantify the effectiveness of observers, at finding carcasses. They provide the p term in Equation 2.

3.2.1 Field methods

The searcher efficiency data was collected in accordance to the specification in 5.6 of the BBMP. This included trials conducted at randomly selected turbines in Autumn and Spring to account for variability in ground cover.

The searcher efficiency data is sourced from trials conducted in May 2025 and October 2025. Carcasses were laid out, searches for the carcasses undertaken using the same protocol as the main mortality survey (i.e. using a trained detection dog with a human handler). If the carcass was found, “success” was recorded, else “failure” was the dog missing the carcass.

The carcasses deployed for searcher efficiency trials included birds (20 replicates), and bats (19 replicates)

The number of carcasses are summarised in Table 4.

Table 4: Count by species used during the detection trials.

Species	Replicates
Australian Magpie	3
Bird sp.	1
Collared Sparrowhawk	1
Common Quail	1
Duck sp.	1
Falcon sp.	1
Grey Fantail	1
Nankeen Kestrel	1
Noisy Miner	1
Pardalote sp.	1
Rosella sp.	2
Silvereye	3
Wedge-tailed Eagle	2
White-throated Needletail	1
Bat sp.	1
Broad-nosed Bat sp.	2
Eastern Freetail Bat	1
Gould’s Wattled Bat	4
Little Forest Bat	6
White-striped Freetail Bat	5

3.2.2 Results

The dogs found 100% of carcasses laid out, and therefore we assume all carcasses have the same searcher efficiency, see Table 5.

Table 5: Detection efficiencies for bats and birds (including wedge-tailed eagles).

Variable	Birds and Bats
Number found	39
Number placed	39
Mean detectability proportion	1
Detectability lower bound (95% CI)	0.91
Detectability upper bound (95% CI)	1

Overall detectability of bats and birds (including wedge-tailed eagles) is 100%, with a 95% confidence interval of [91%, 100%].

3.3 Scavenger efficiency

In order to accurately estimate mortality, we must account for carcass loss to scavengers. Scavenger trials are performed to quantify the time until a carcass is completely lost as a result of scavenger activity.

This section estimates the r term in Section 2.

3.3.1 Field methods

Scavenger efficiency trials were conducted in October 2024, November 2024 and May 2025 at randomly selected turbines. Trials conducted in Autumn and Spring to account for seasonal variability in scavenger behaviour.

The carcasses were deployed for a maximum of 22 days and unscavenged carcasses were removed within 6 to 22 days. In total, 93 carcasses were used, this included birds (50 replicates, including four wedge-tailed eagles), and bats (43 replicates)). Trials used motion sensor cameras with human checks on approximately days 5 and 15 in order to record exact times of scavenge events.

We note that the BBMP states “If a carcass has been removed within the first fortnight it may be replaced by another.” We would recommend against this in the future as it increases the likelihood of scavenger returning to that location which may bias the results.

Table 6 summarises the species used in the trials.

Table 6: Count by species used during the carcass persistence trials.

Species	Replicates
Anthochaera sp.	1
Australian Magpie	9
Australian Raven	1
Brown Goshawk	1
Collared Sparrowhawk	1
Common Quail	10
Corella sp.	1
Crested Pigeon	1
Duck sp.	2
Falcon sp.	1
Grey Fantail	1
Magpie-lark	1
Nankeen Kestrel	1
Noisy Miner	1
Pardalote sp.	1
Rosella sp.	6
Satin Bowerbird	2
Silvereye	3
Wedge-tailed Eagle	4
White-throated Needletail	1
White-winged Chough	1
Broad-nosed Bat sp.	2
Chocolate Wattled Bat	1
Eastern Freetail Bat	1
Gould's Wattled Bat	6
Little Forest Bat	13
Ozimops sp.	1
White-striped Freetail Bat	19

3.3.2 Statistical methods

Survival analysis (Kaplan and Meier (1958), Kalbfleisch and Prentice (2011)) was used to determine the distribution of time until complete loss from scavenge (or decay). Survival analysis was required to account for the fact that we do not necessarily know the exact time of scavenge loss, only an interval in which the scavenge event happened. For example, any carcass which is unscavenged at the end of the trial, has its scavenge event in the interval $[x, \infty]$ (where x is the length of the trial).

By performing survival analysis we can estimate the time until carcass loss after a given length of time, despite these unknowns.

We fit parameterised models to analyse significant factors influencing time to scavenge (carcass species type etc.), and to find the most appropriate distribution to fit the time-to-loss curve (e.g. log-normal, exponential).

Time to carcass loss is influenced by the parameters discussed above and the distribution of the loss curve we fit to the data (M. M. P. Huso, Dalthorp, and Korner-Nievergelt 2015). The choice of loss function is important because it should capture the behaviours and relative time dependence of the various scavengers. Generally, the best distribution is the log-normal distribution (Stark and Muir 2020).

3.3.3 Results

The best model for scavenger efficiency was the "intercept-only" model (i.e. all carcass have the same expected scavenging rate). The four Wedge-tailed Eagle (WTE) carcasses were analysed separately and combined with the Wedge-tailed Eagle carcass persistence data from Stark and Muir (2020).

Figure 2 shows the survival curve fitted to the carcasses. The survival curve (smooth solid line for fitted regression curve, jagged step function for empirical removal rate) shows the estimated proportion of the set remaining at any given time. The shaded portions are the 95% confidence intervals on the estimate.

Under these assumptions, the median time to carcass removal via scavenge is 1.2 days, with a 95% confidence interval of [0.8, 1.8] days.

Based on the combined dataset, the median time to Wedge-tailed Eagle carcass removal via scavenge is 190 days, with a 95% confidence interval of [94, 383] days.

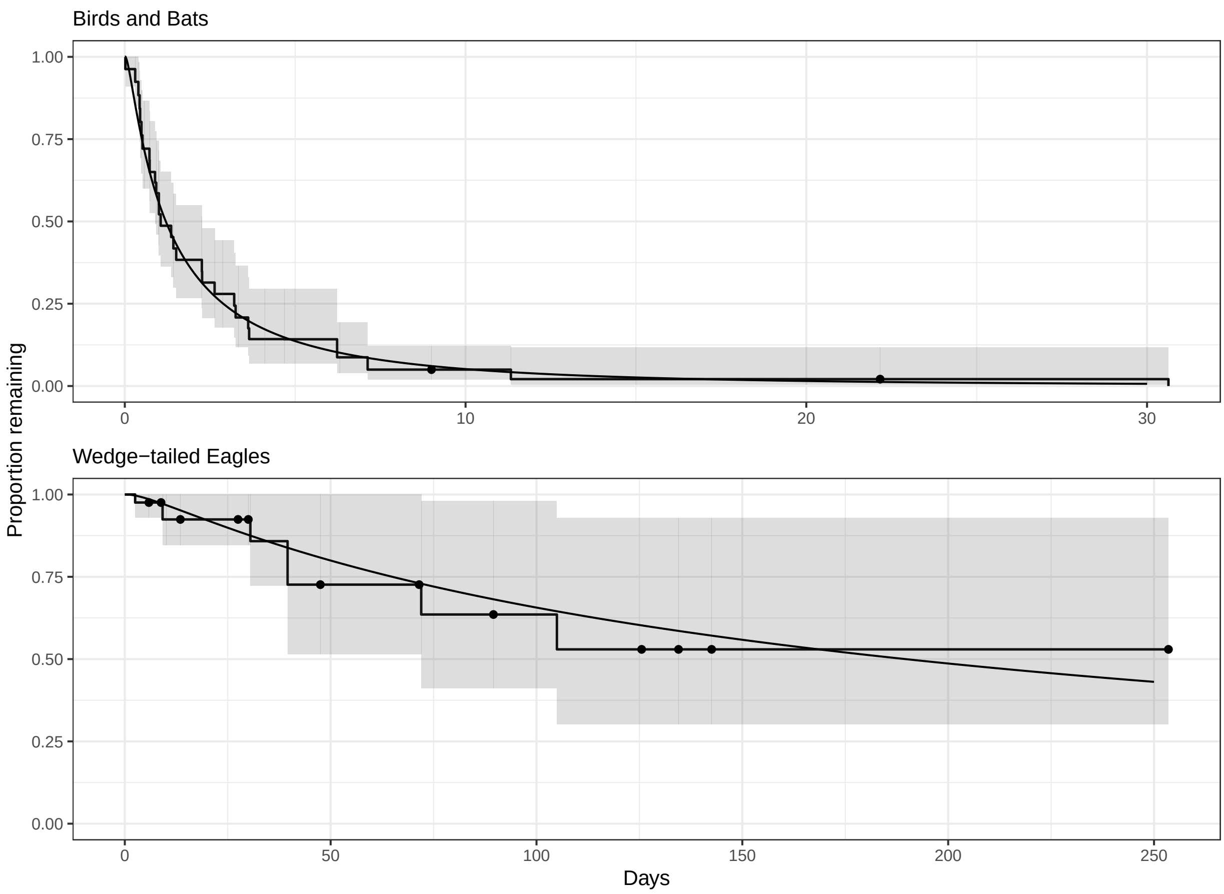

Figure 2: Empirical survival curve (the step function), with 95% confidence intervals shaded. The smooth curve presents the fitted model.

3.4 Coverage factor

The probability a carcass falls within the searched area (i.e. the "coverage factor") is calculated to provide the a term (Section 2).

3.4.1 Statistical methods

3.4.1.1 Fall zone simulation We generated a carcass fall-zone distribution for for each species class given the turbine size at the wind farm.

The fall-zone distribution is the end result of the simulation method detailed in Hull and Muir (2010). The simulation method is a ballistics model describing bird and bat strikes by turbine blades.

3.4.1.2 Coverage factor calculation The percentage of the fall zone not covered by the survey area, provides a correction factor in the mortality estimate. Because carcasses that fall outside the searched area have a zero probability of being detected by a survey, the likelihood of landing in this region is essential to understanding the relationship between detections and actual losses.

At RPWF custom search areas were used to account for reduced search areas. To account for the unique shapes being searched, a technique similar to that in Box 3.4 of International Finance Corporation (2023) is used.

A two-dimensional fall zone distribution is generated from the rotating the one-dimensional output of Hull and Muir (2010). This 2-D distribution is a series of concentric annuli, with the probability density in each annulus, being equal to the density of the corresponding histogram bin in the one-dimensional Hull and Muir (2010) output. The annuli are then spatially intersected with the searched area, and hence the proportion of carcasses falling in searched area (the "coverage factor") is found.

3.4.2 Simulation inputs

The fall zone simulation requires a set of turbine and bird specifications.

Table 7 displays the dimensions and RPM of the turbines at RPWF Wind Farm. Table 8 shows the bird and bat physical parameters used. These archetypes were used as they represent a medium sized species for each species type and produce an estimate of the average fall zone.

Table 7: Turbine specifications for Rye Park Wind Farm

Rotor Diameter (m)	Tower Height (m)	RPM
162	119	11

Table 8: Species parameters used per group.

Species type	Archetype	Mass (kg)	Min. area (sq m)	Max. area (sq m)
Bat	Gould's Wattled Bat	0.014	0.0028	0.014
Bird	Forest Raven	0.680	0.0450	0.100
WTE	Wedge-tailed Eagle	4.200	0.0700	0.800

3.4.3 Results

Figure 3 displays the simulation results, given the factors specified above. We display the cumulative density function (CDF) on the y axis versus the distance from turbine on the x axis for each species type. The CDF describes the expected proportion of carcass which fall less than or equal to a certain distance from the turbine.

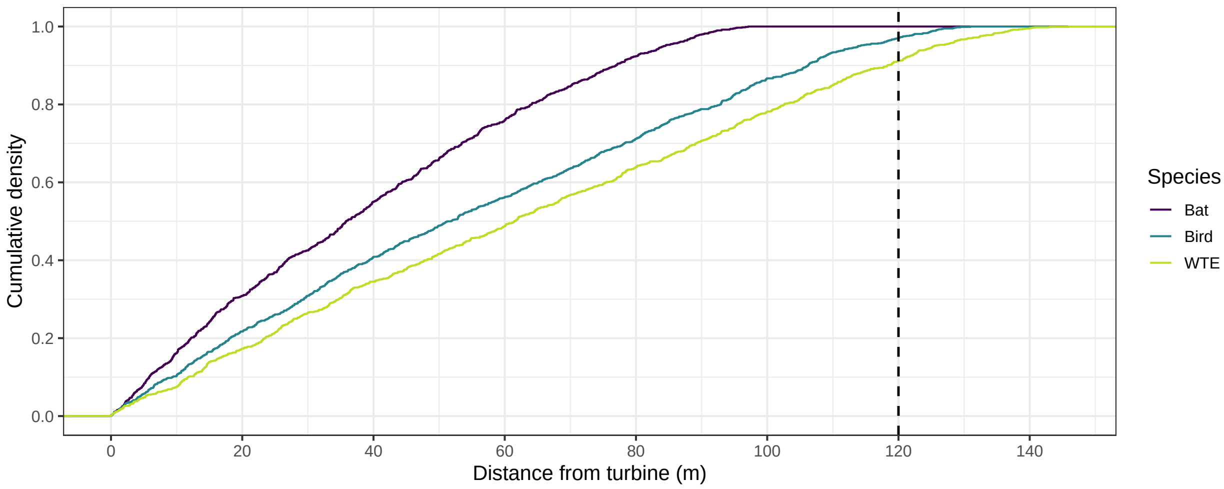

Figure 3: Cumulative distribution function of the fall zone simulation output for birds, bats and Wedge-tailed Eagles (WTEs). Vertical line indicates the survey radius.

Once the fall zone distribution is calculated, we generate a "coverage factor". The coverage factor represents the expected proportion of carcasses which fall within the searched area, given the search protocol.

On average, we expect about 100% of bats, 97% of birds and 91% of wedge-tailed eagles to fall within 120m of the turbine.

4 Mortality estimate

With estimates for scavenge loss, searcher efficiency, and survey coverage for RPWF, we then converted the number of bat and bird carcasses detected into an estimate of overall mortality from 2024-05-22 to 2025-09-14.

The mortality estimation is done via a Monte Carlo algorithm. We used 15000 simulations, with the survey design simulated each time. Random numbers of virtual mortalities were simulated, along with the scavenge time and searcher efficiency (based on the measured confidence intervals). The proportion of virtual carcasses that were "found" was recorded for each simulation. Finally, those trials that had the same outcome as the reported survey detections were collated, and the initial conditions (i.e. how many true losses there were) reported on.

The model assumptions are listed below:

- There were 66 turbines on site available to strike bats and birds.
- Of these, 33 were searched monthly out to 120m.
- Search frequency for each turbine was taken from a list of actual survey dates (see Table 1 for a summary).
- Mortalities were allowed to occur from 2024-05-22, until the final surveyed date (2025-09-14).
- Bats and birds are on-site at all times during this period.
- Bats and birds that are struck are immediately replaced (i.e. strikes one day do not affect the chance of strikes the next).
- We assume that all carcasses and all feather spots (regardless of size or composition) are attributable to the wind turbines.
- Finds are random and independent, and not clustered with other finds.
- There was equal chance of any turbine being involved in a collision / mortality.
- Scavenger loss and searcher efficiency rates are calculated as outlined above.
- We assumed a log-normal scavenge shape.
- We assumed coverage factors as outlined above.

4.1 Bats

During the 16 months of surveys, 116 bats were found during formal surveys. The resulting (median) estimate of total mortality is 3098 bats lost on site in Year 1.

Table 9 and Figure 4 display the percentiles of the distributions, to show the confidence on the mortality estimate.

Based on the detected carcasses, measured detectability, scavenge rate, and survey effort, we expect that there was a total site loss of around 3098 bats, and are 95% confident that fewer than 4340 individuals were lost, in the 16 month period.

Table 9: Percentiles of estimated total bat losses in Year 1.

Estimate	0%	50% (median)	90%	95%	99%
Year 1	2089	3098	3974	4340	4887

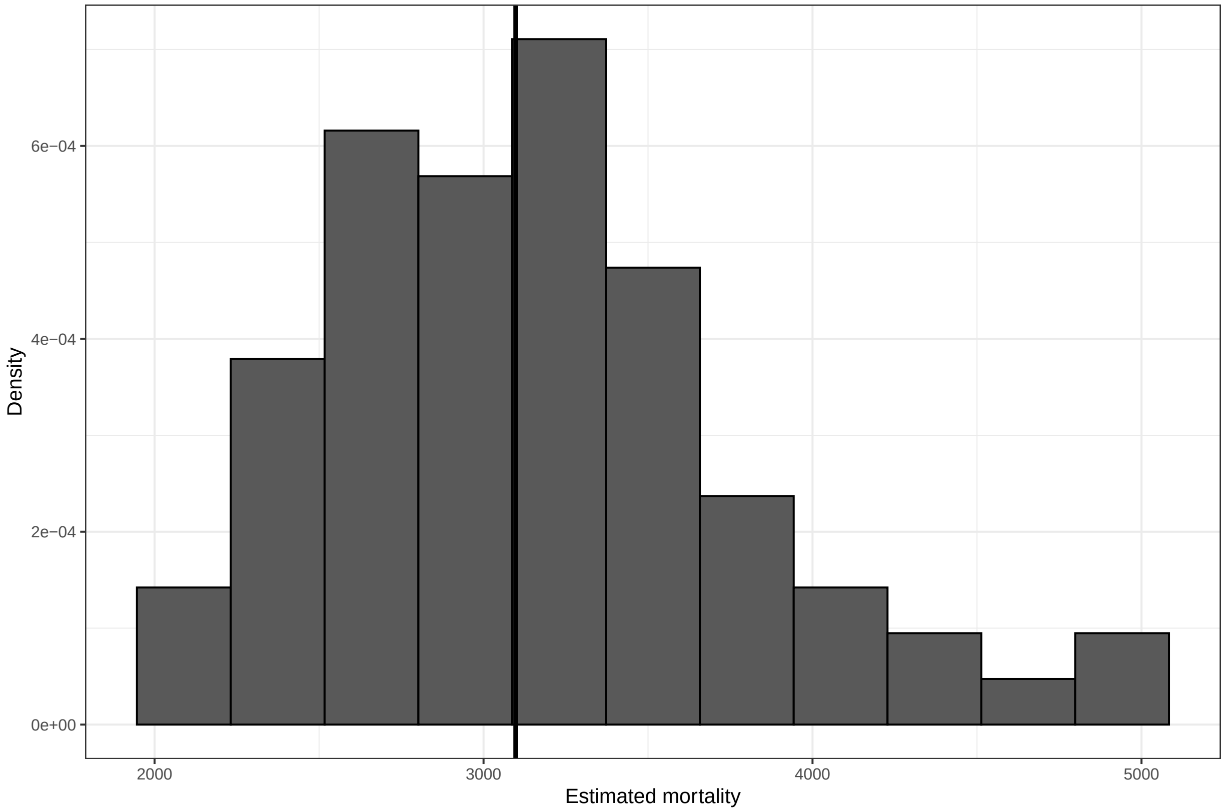

Figure 4: Histogram of the total losses distribution (bats). The black solid line shows the median.

4.2 Birds

During the 16 months of surveys, 25 birds (excluding Wedge-tailed Eagles) were found during formal surveys. The resulting (median) estimate of total mortality is 683 birds (excluding WTEs) lost on site in Year 1.

Table 10 and Figure 5 display the percentiles of the distributions, to show the confidence on the mortality estimate.

Based on the detected carcasses, measured detectability, scavenge rate, and survey effort, we expect that there was a total site loss of around 683 birds, and are 95% confident that fewer than 1018 individuals were lost, in the 16 month period.

Table 10: Percentiles of estimated total bird (excluding WTE) losses in Year 1.

Estimate	0%	50% (median)	90%	95%	99%
Year 1	312	683	964	1018	1231

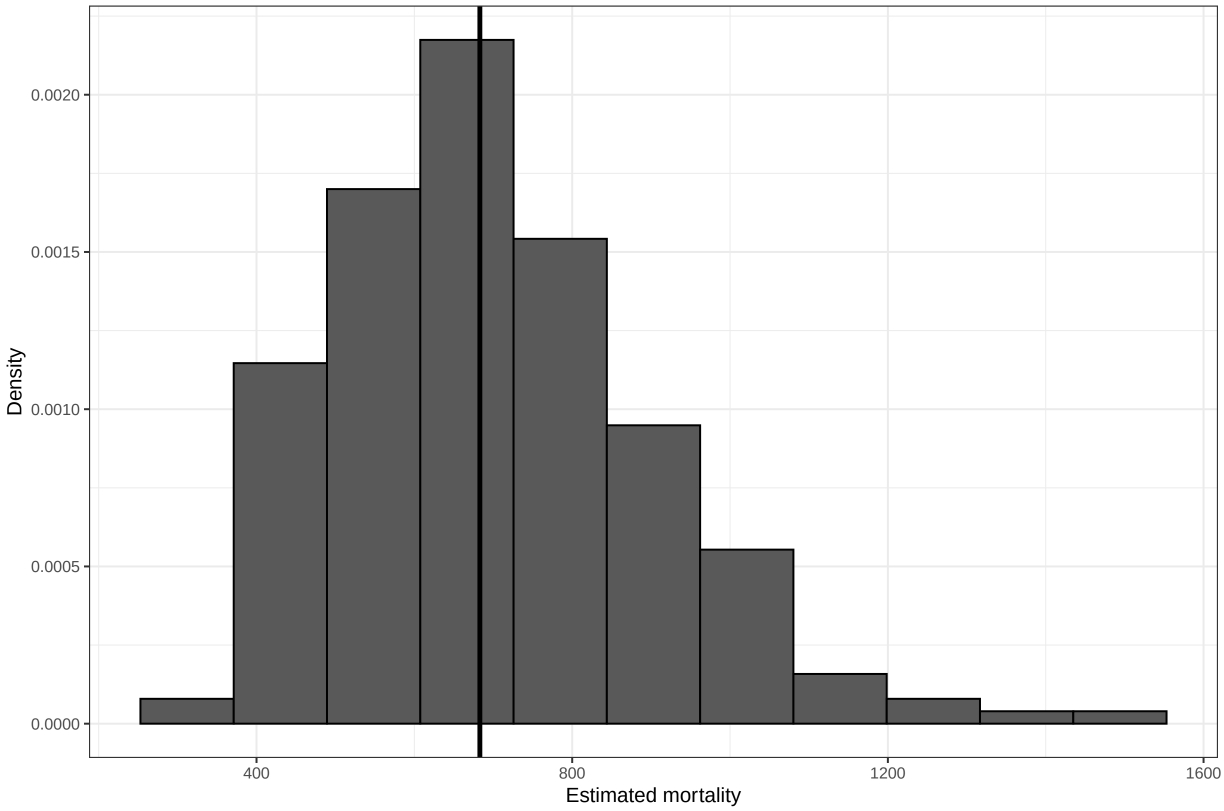

Figure 5: Histogram of the total losses distribution (birds excluding WTEs). The black solid line shows the median.

4.3 Wedge-tailed Eagles

During the 16 months of surveys, 11 Wedge-tailed Eagles were found during formal surveys. The resulting (median) estimate of total mortality is 25 WTEs lost on site in Year 1.

Table 11 and Figure 6 display the percentiles of the distributions, to show the confidence on the mortality estimate.

Based on the detected carcasses, measured detectability, scavenge rate, and survey effort, we expect that there was a total site loss of around 25 Wedge-tailed Eagles, and are 95% confident that fewer than 37 individuals were lost, in the 16 month period.

Table 11: Percentiles of estimated total Wedge-tailed Eagle losses in Year 1.

Estimate	0%	50% (median)	90%	95%	99%
Year 1	13	25	34	37	43

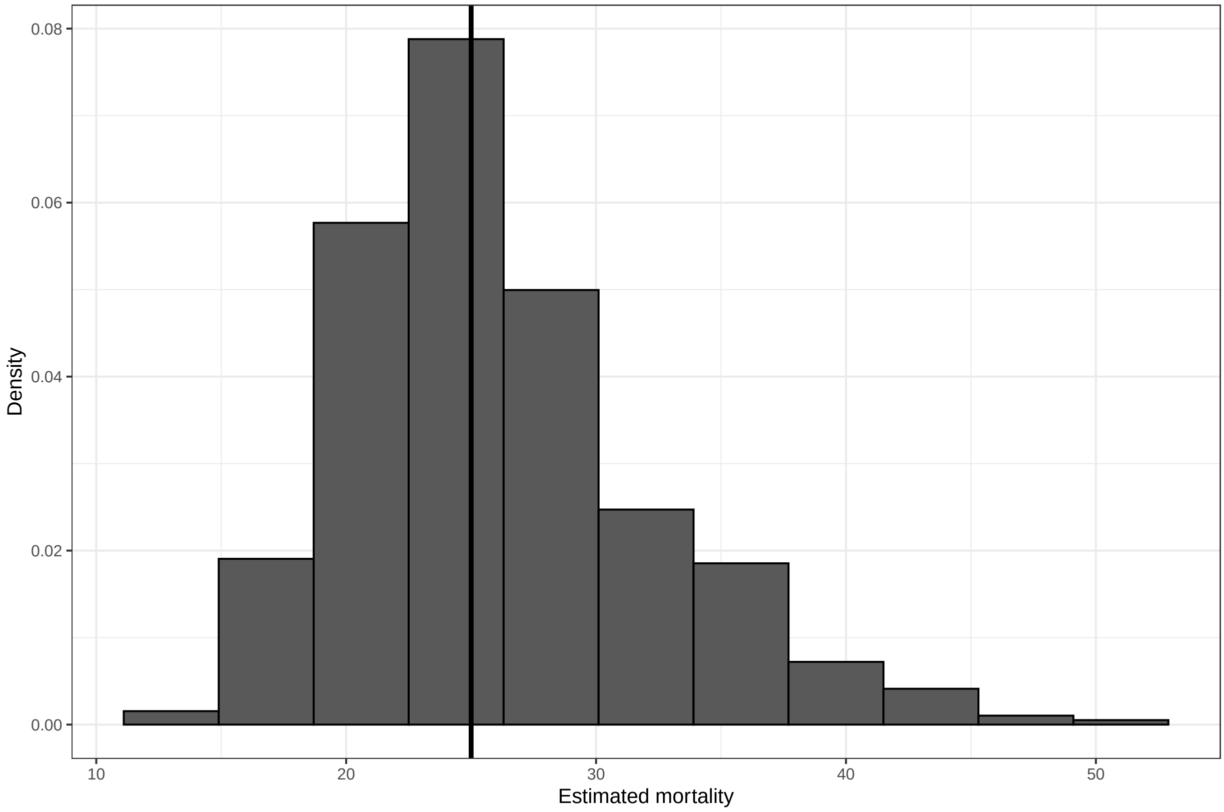

Figure 6: Histogram of the total losses distribution (WTEs). The black solid line shows the median.

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