

# Wedge-tailed Eagle Research Fund 2023 Annual Report



Photo: Dr Eric Woehler

*Prepared for Wild Cattle Hill Pty Ltd*

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## Glossary

|        |                                                                              |
|--------|------------------------------------------------------------------------------|
| ANU    | Australian National University                                               |
| DCCEEW | Commonwealth Department of Climate Change, Energy, the Environment and Water |
| EMOP   | Eagle Mortality Offset Plan                                                  |
| FPA    | Forest Practices Authority                                                   |
| NRET   | State Department of Natural Resources and Environment Tasmania               |
| TAC    | Technical Advisory Committee                                                 |
| UTas   | University of Tasmania                                                       |
| WTE    | Wedge-tailed Eagle, <i>Aquila audax fleayi</i>                               |

## Introduction

This is the fourth Annual Report for the Wedge-tailed Eagle (WTE) Research Fund ('The Fund'). It discusses the achievements since the last Annual Report in September 2022.

The Fund has been operating in accordance with requirements and is enabling the support of high-quality research on Tasmanian Wedge-tailed Eagles. It is unlikely this research would have been supported without The Fund. The projects being supported will provide valuable advances in the understanding of the WTE population in Tasmania, which will assist with achieving the conservation outcomes for the subspecies.

## Background

The Cattle Hill Wind Farm was approved by Tasmanian State Regulator in 2012 and by the Commonwealth Department of Environment and Energy (now the Department of Climate Change, Energy, the Environment and Water, DCCEEW) in December 2014. A requirement of the approval of the Cattle Hill Wind Farm (as described in the relevant permit conditions) was to develop an offset plan for wedge-tailed eagles (*Aquila audax fleayi*, WTE).

An Eagle Mortality Offset Management Plan (EMOP) was developed and subsequently approved to satisfy these requirements. The EMOP comprises two components, with the second component describing the Tasmanian WTE Research Fund. The EMOP required that The Fund needed to be established and administered by an independent organisation. NRM South was selected as the administering body for The Fund and a Services Agreement was signed between NRM South and Wild Cattle Hill Pty Ltd on 23<sup>rd</sup> August 2019.

## Objective of The Fund

The Fund is designed to offset the impact of WTE mortalities (or injured WTE that cannot be released into the wild) due to collisions with wind turbines at the Cattle Hill Wind Farm. The Fund will only support research relating to the Tasmanian sub-species of WTE and projects based in Tasmania.

The primary purpose of The Fund is to support high quality ecological or other relevant scientific research on Tasmanian WTE, the results of which will assist with the management and protection of the sub-species. The intention is that The Fund continues for the medium term (at least 10 years), hence not all funds will be expended each year. Research will be supported that is scientifically rigorous, conducted by high quality scientists, and which is in accordance with the objectives of the Threatened Tasmanian Eagles Recovery Plan 2006-2010 or any subsequent eagle Recovery Plan.

## Priorities for The Fund

Research supported by The Fund will be consistent with the published recovery objectives of the "Threatened Tasmanian Eagles Recovery Plan 2006-2010" or a subsequently approved version of the Recovery Plan. The EMOP notes that DoEE (now DCCEEW) have indicated they require The Fund to support key scientific research on the sub-species and not other activities, although the State component of The Fund may support education activities.

Suitably qualified researchers<sup>1</sup> will be eligible to apply for funds to support relevant research on WTE consistent with the below priorities. Critical research that can demonstrate a sound experimental design and statistical rigour will be viewed most favourably.

The initial priorities for funding support are:

- Demography of the WTE. This could include studies into the size of the state population (such as an evidence-based population census), fecundity, survival of different age classes, and immigration and emigration intra- and inter-state. Such ecological data could be used to update a Population Viability Analysis.
- The collection of data that will allow an evaluation of the sub-species conservation status against IUCN criteria.
- Quantification of anthropogenic impacts to WTE, such as collisions with vehicles, powerlines, shooting or poisoning, and the development of mitigation measures to reduce these impacts. ☐ Disturbance to nesting WTE. This includes studies into determining the anthropogenic factors that impact on breeding, and quantification of these such as the distance, duration and types of factors that result in impacts to breeding success.
- Strategies to monitor nesting behaviour of WTE. Nests are currently very difficult to monitor due to the need to limit disturbance to breeding birds, hence automated strategies to monitor nests without disturbing eagles will be supported.
- Studies into why WTE collide with wind turbines and strategies to reduce collision rates. Published studies indicate WTE actively respond to and avoid wind turbines, but occasionally collide. Any insights into why they occasionally collide may assist with strategies to minimise collisions.
- Other scientific studies where it can be demonstrated that the research will provide a demonstrable benefit to the sub-species.

The priorities for funding support may be revised by the panel following any reviews of the EMOP.

Studies on WTEs required for commercial developments (i.e. conditions of a permit, outside offsets) or studies that are the responsibility of Local, State (including Government Business Enterprises) or Commonwealth Government will not be supported.

### Administration of The Fund

NRM South's role is ensure that The Fund is established and administered as described in the Eagle Mortality Offset Plan (EMOP).

Specifically, NRM South's role is to:

- Be responsible for receipt, management and audit of WTE Research Fund.

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<sup>1</sup> Must hold a postgraduate degree in science and evidence of the successful publication of relevant, high quality research in peer-reviewed scientific journals or experience and qualifications deemed by the panel to be evidence of equivalent merit. However, proposals to support high quality Honours research will also be considered.

- Assist with the identification and selection of panel members. The Panel members selected will be agreed by the Tasmanian EPA and delegate of the Commonwealth DCCEEW.
- Host, recruit and administer/support a panel, as prescribed by the EMOP, to prioritise, assess and distribute research funds – approximately two meetings per year.
- Administer reimbursement of panel members reasonable travel costs and hourly payment for attendance at annual meetings.
- Advertise, administer and coordinate research applications, and in conjunction with the panel develop and maintain the assessment process.
- Contract and administer the research funds on behalf of the research panel, including coordination of progress and final reports.
- Provide panel advice and reports to Wild Cattle Hill Pty Ltd and any other contributors to The Fund for preparation and submission to the Regulator (if required).

### Governance of The Fund

The Fund is overseen by an independent Technical Advisory Committee (TAC, referred to in the EMOP as a “Panel”).

As described in the EMOP, the TAC comprises:

- A representative of the Department of NRET (currently Dr Davina Gregory-Dunsmuir, Threatened Species and Conservation Programs Environment. She replaced Dr Rachel Alderman, who left her role at NRET).
- a representative from the administering body, NRM South (Dr Cindy Hull).
- a representative of the DCCEEW (as an observer, Dr Ivan Lawler), and
- at least two scientists experienced in wildlife ecology, with a strong background in research and publishing (Dr Phil Bell and Dr Sarah Munks, both independent consultants with extensive experience working on eagles). These roles were filled following advertising and a competitive selection process. Both of these independent scientists had completed their first term on the TAC and were offered a second term, which they both accepted.

The role of the Technical Advisory Committee (TAC) is to:

- Review funding applications and select those to be supported.
- Monitor the progress of grant recipients, and
- Determine whether to accept research reports (i.e. whether they fulfill the requirements of support).

Individual members of the Technical Advisory Committee are expected to:

- Actively participate in the review, monitoring and reporting of the Research Fund.
- Attend, either in person or by teleconference, twice annual meetings, and additional meetings, if required.
- Provide reliable, relevant, technical and contemporary advice.
- Comply with relevant NRM South Policies and Procedures, including the Code of Conduct, and any specific requirements of The Fund including Confidentiality; and
- Be an advocate for the research Fund’s outcomes.

## Achievements during 2023

The fourth year of The Fund built on the achievements of previous years.

Details of the achievements:

1. The fourth deposit (including the set-up contribution) to The Fund was received from Wild Cattle Hill Pty Ltd On the 8<sup>th</sup> October 2022.
2. NRM South once again reviewed and updated the application process and guidelines for The Fund, which were sent to the TAC for their comment. Although a grant round was not advertised in 2023, as funds had been allocated based on applications from 2022, the application process and guidelines were made ready for implementation in 2024.
3. The final payment for the project “Estimating the population size of the Tasmanian wedge-tailed eagle (*Aquila audax fleayi*) using modern genetic techniques” (ANU and UTas) was made following completion of the project and receipt of the final report.
4. The project “Monitoring wedge-tailed eagle population trends” was completed and the final report received (note that an extension had been sought and approved to complete the work, necessary due to unanticipated delays). The final payment was made in December 2022.
5. The project “Investigating the spatial ecology and habitat use of Tasmanian wedge-tailed eagles in the Tasmanian Midlands using high-frequency GPS telemetry (Pay, Koch, Cameron, Wiersma, Katzner)” continued, with the mid-term payment made in June 2023 following receipt of the interim report.
6. The project “Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-tailed Eagles (*Aquila audax fleayi*)” also continued, with the mid-term made in July 2023 following receipt of the interim report. A one-month extension was sought for the mid-term report, and the TAC agreed to this.
7. Additional funds were received in June 2023 from Wild Cattle Hill (as a result of exceeding the wedge-tailed eagle mortality threshold). The TAC met to discuss the best use of these funds given that the number of applications to the Fund is declining each year. It was agreed the money would be rolled over to 2024, with a more proactive approach to addressing key priorities through the development of a PhD project. Discussions have commenced with UTas about this potential PhD project.

An analysis by NRM South found that to date the five projects supported by the Fund have focussed either on demography or to a small extent, anthropogenic impacts. The priorities that have received little or no attention, but remain a priority are:

- Quantifying other anthropogenic impacts
- Factors causing disturbance to breeding eagles
- Factors causing wind farm collisions.

A key priority is to understand what sort of disturbance impacts breeding eagles, including the proximity, intensity, duration and type of noise that impacts breeding birds. It would also be of value to determine the consequences of this impact, to breeding success.

It is planned that the details of a potential PhD project will be developed with key researchers, the TAC and academics at UTas as soon as possible. NRM South is also awaiting feedback from NRET about this approach.

## Projects supported in 2023

The following projects were underway in 2023:

*“Investigation the spatial ecology and habitat use of Tasmania wedge-tail eagles in the Tasmanian Midlands using high-frequency GPS telemetry”* for full funding from:

- Dr James Pay (UTas) Project Lead.
- Dr Amelia Koch (FPA)
- Prof Elissa Cameron (University of Canterbury)
- Jason Wiersma (FPA) and
- Dr Todd Katzner (USGS).

This project will provide information on the spatial ecology and resource use of adult Tasmanian wedge-tailed eagles in the agricultural area of the Tasmanian Midlands. Furthermore, the data from this project will be combined with data from other GPS-tracked eagles across Tasmania to provide a state-wide understanding of how the species uses different landscapes. The insight into the importance of different habitats and the spatial modelling of this information will address two research priorities identified in the Tasmanian wedge-tailed eagle recovery plan (Threatened Species Section, 2006) and by the Technical Advisory Committee.

*“Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-Tail Eagles”* from:

- Dr De Stojanovic (ANU)
- Dr James Pay (UTas)
- Dr Catherine Young (ANU), and
- Adam Cistern (ANU).

The aims of this research are to estimate the prevalence of ecotoxin exposure across the Tasmanian wedge-tailed eagle population, the magnitude of potential demographic impacts of ecotoxins and the source of the ecotoxins. This research builds on the work of Dr James Pay (Pay, Katzner, Hawkins, Barmuta, et al., 2021; Pay, Katzner, Hawkins, Koch, et al., 2021) that observed a high frequency of ecotoxin exposure in wedge-tailed eagle carcasses from around Tasmania.

## Findings of recently completed projects

### 2021

Two projects supported in 2021 have now been completed. Below is a summary of their key findings.

*“Estimating the population size of the Tasmanian wedge-tailed eagle (Aquila audax fleayi) using modern genetic techniques”* was fully funded.

Summary from the final report (note that analysis of the broader dataset is continuing):

We were aiming to study eagles that had most or all of their 95% UD over land managed under the Nature Conservation Act 2002. Even though we targeted larger areas of reserved land (>30 km<sup>2</sup>)

with eagle nests within the reserved area, it is difficult to predict the size and shape of the areas used by the birds after the transmitter is attached. So far, the 95% UD for four of the eagles tracked for this project are mostly over reserved land (72 – 95% of the 95% UD over reserved land). William's 95% UD had the lowest overlap with reserved land (52%), which may be due to his UD being calculated from only six days of data (the size and shape of his 95% UD is likely to change substantially with more data). However, William was also caught closer to the edge of reserved land than the other eagles, as the trapping stations we had further within Mount William National Park were not visited by any wedge-tailed eagles during the field work. We therefore plan to target an additional bird within reserved land (a reattempt at trapping the pair at Strathgordon) using funds from the wider project aiming to track 50 birds across the state. Interestingly all five of the eagles being GPS-tracked had a lower proportion of their 50% UD over reserved land compared to their 95% UD. Although we have limited data, which is also biased to periods outside of the breeding season, this suggests the eagles are focusing the core areas of their home range to the edge of the reserved land.

#### Habitat selection

When we have the full dataset we will be able to investigate fine-scale behaviour-specific habitat selection using state-space modelling incorporating a number of habitat variables in a multivariate framework. For this report we have explored two habitat variables using a habitat selection ratio (Manly et al., 2002). This approach compares the proportion of available habitat types to the proportion of time spent in each habitat. We identified the available habitat area for each eagle using the 95% UD described previously and buffering that area by an additional band that added 5% to the total area. The proportion of time spent in each habitat type was measured as the proportion of GPS fixes that fell within each habitat (to reduce spatial autocorrelation, the six second flight mode data was subsampled to 10 minutes). The resulting selection ratios identify which habitats are being selected. As such, selection ratio values  $< 1$  indicate a habitat used proportionally less than its availability, and ratio values  $> 1$  indicate a habitat used proportionally more than its availability (i.e., a selection ratio of 2 indicates a habitat type used twice as much as expected). The habitat features we considered in this analysis were landcover categories derived from TasVeg (DPIPWE, 2020) and the distance to the reserve edge (DPIPWE, 2015). The eagles used habitats non-randomly ( $p < 0.001$ ), both in relation to land cover categories and distance to the reserve edge. The eagles showed a strong avoidance for landcover classifications of non-native vegetation, residential, and other natural, which were also habitat types that contributed very small areas within the available habitat areas of the eagles. Eagles with any plantation forest within their available habitat area (Blodwyn, Giolla, and Floki) also avoided this landcover type. Dry eucalypt and wet eucalypt forests were generally used by the eagles proportional to their availability, whereas Blodwyn and Giolla selected for areas of non-eucalypt forest. There was a lot of individual variation in how the eagles used other landcover categories. Selection ratios for agricultural areas were particularly varied between individuals, with the selection ratio values strongly driven by the availability of agricultural areas within the available habitat area. For example, William showed a strong avoidance of agriculture because his available habitat area was ~50% agricultural land and he spent ~20% of his time in these areas. In contrast, Blodwyn and Bruny showed a strong selection for agricultural areas even though they spent less time in this habitat type (~5 – 10%), because there was much less agricultural land in their available habitat area (~8 – 15%). The selection ratio confidence intervals

for different distances from the reserve edge all overlapped 0, suggesting no significant overall avoidance or selection for any specific distance from the edge. However, there are some trends in the data. In general eagles exhibited a slight avoidance of areas > 1 km within the reserved area, and a slight avoidance of areas > 1 km outside of the reserved areas. The avoidance of areas > 1 km outside of the reserved areas is driven by data from the two eagles that had areas > 1 km outside of a reserved area within their available habitat area (William, who was caught close to the edge of Mount William National Park, and Giolla, whose large home range incorporates areas of Mountain River south of Kunanyi National Park). Four of the eagles either selected positively for areas within 300 m of the reserve edge or used it as much as would be expected from the availability. This may be due to the edges of the reserves being associated with the intersection of open areas and forest edges, which provide good foraging habitat. Blodwyn was the only eagle that avoided any areas outside or close to the edge of the reserved area. This is potentially due to Narawntapu National Park having lots of open areas within the national park that are suitable for hunting.

#### Flight behaviour

For the first few days after the transmitters are deployed, we program them to collect one location fix every 15 minutes. This is to verify the performance of the transmitters before we change the duty cycle to collecting one fix every six seconds when the birds are flying. Floki's transmitter started recording six second flight data July 24th 2021, Giolla's started February 23rd 2022, and both Bruny's and Blodwyn's started March 10th 2022. We have no detailed flight information for William as his transmitter malfunctioned before it was switched to six second data. To carry out some preliminary exploration of the flying behaviour of the birds, we subset all of the GPSfixes recorded whilst the birds were flying. We then segmented this data by individual flight. In total the birds have completed 4228 flights, flying for a total duration of 28,346 minutes (Table 3). The mean duration of a flight was 6.9 minutes. Most GPS fixes recorded during flights were <250 m altitude over ground level (AGL; Figure 13).

*"Monitoring wedge-tailed eagle population trends")* was partially supported.

Summary from the final report:

This report describes work supported by the Wedge-tailed Eagle Research Fund, carried out for a short-term project using data collected by volunteers, following standardised methods, for the annual statewide raptor survey Where? Where? Wedgie! in May 2021. This long-term monitoring effort is designed to maintain a current picture of the conservation status of Tasmanian raptors, and engage the public in effective research and conservation of these species. For the funded project, data recorded during standardised surveys from 90 separate 4 km x 4 km squares across Tasmania were analysed to obtain an index of abundance for the Tasmanian wedgetailed eagle in 2021, relative to the two previous' years data. An occupancy modelling approach was used, estimating a detection probability of 0.15 (95% confidence intervals 0.13-0.18) and a probability of occupancy of 0.77 (95% confidence intervals 0.64-0.86). There is no evidence of any large change in population size between 2019 and 2021, but the surveys and analyses need to be repeated for several more years to obtain an accurate picture of overall population trend.

## Interim results of projects underway

1. *Investigation the spatial ecology and habitat use of Tasmania wedge-tail eagles in the Tasmanian Midlands using high-frequency GPS telemetry.*

Extract from the mid-project report:

We identified potential study areas during Q4 2022 and carried out field work to capture the eagles during April and May 2023. We caught an adult female, “Daisy”, from a site near Conara at 12pm on April 18th. We next caught an adult male, “Winton”, from a site just northwest of Brighton on April 25th. We caught another adult male, “Bow”, from a site at Jericho on April 27th. On May 10th we caught a third adult male, “Julian”, at a site south of Ross, and on May 11th we caught a final adult female, “Emily”, at a site along the western edge of the Midlands study area.

Due to the short period we have been tracking the five Midlands birds, we do not have enough data to complete quantitative analyses. Here we provide a summary of the data collected from the birds so far. The summaries presented here are based on data collected from the date the GPS-transmitters were attached until June 12th, 2023. During this period, we have collected 77,163 location fixes from the five GPS-tracked eagles. Most of these fixes ( $n = 57,356$ ) are from Winton and Bow, which is a result of an increased level of spatial activity for these two birds compared to the others (as the more flights a bird performs the more time the GPS unit will be recording data at six second intervals). The other three birds have recorded 5,016 – 7,597 location fixes each.

The data collected from the birds indicates that four of the birds are holding territories. Daisy appears to be a bird that has not yet settled in a territory (her plumage at capture suggested she was either an old sub-adult or a young adult). Six days after she was captured, Daisy left the site where she was captured and travelled north. She spent a couple of weeks travelling around Lilydale, and has since headed back down to Epping Forest, around 8 kms from the site where she was captured. The data collected over the coming months will identify when she settles in a territory. We have performed a quick exploratory analysis on the utilisation distribution (UD) for each eagle (following the approach outlined in the methods). The data collected so far indicates a large amount of variation in both the overall (95% UD) and core areas (50% UD) used by the eagles. Winton and Bow have recorded very large 95% UD, with both being around double the mean 95% UD (22 km<sup>2</sup>) we have recorded for other tracked Tasmanian wedge-tailed eagles. Emily has recorded an exceptionally small 95% UD, at only 6.7 km<sup>2</sup>. The 50% UD recorded for the eagles tracked as part of this project are more consistent with the data we have collected from other eagles. As Daisy is not settled in a territory, her UD cannot be compared to the resident birds. Although interesting, these findings are likely to change, as UD are sensitive to the number of fixes and time period used to calculate them (Girard et al., 2002). A full year of GPS data for each individual will allow us to make defensible conclusions on the UD of the birds tracked for this project.

2. *Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-Tail Eagles*

Extract from the mid-project report:

Applications were made and acquired for the following authorisations, across the months of April and May.

- 1) animal ethics permit from the Australian National University (A2023\_17)
- 2) permit to take threatened fauna for scientific purposes from the Tasmanian Department of Natural Resources and Environment (TFA 23086) with permit authority extensions issued separately from;
  - a) Authority – Crown Lands Act 1976
  - b) Authority – Conservation Covenant C975689 under the Nature Conservation Act 2002
- 3) Forest Activity Permit from Sustainable Timber Tasmania (FAA 2458)

B) During the initial months of April and May we have collated, from the Natural Values Atlas and with in-kind advice from the Forest Practices Authority, the location of greater than 400 nests with a monitoring history in the past 10 years. A sample of nests was sub-selected with the following criteria; 1) position accuracy  $\leq 20\text{m}$ , 2)  $\leq 300\text{m}$  from road, 3)  $\geq$  one occupancy year in past 5 years and 4)  $>$  one monitoring year in past five years. The nests in the final sample (24 nests) were shaped by site access, permissions and the presence of adult eagles at the nest.

C) 24 nests from across Tasmania were sampled. The locations of the 24 sampled nests are presented in Figure 1.

D) Sample preparation has commenced, and sample analysis has been organised with the ICP-MS research facility at the Australian National University.

There was a delay to the commencement of the project, however, the time has been made up and completion is expected as set out in the initial project schedule with a final report by the 29th of February 2024.

### Next stage in The Fund

The next round of grants is expected to be advertised in early 2024. The use of the additional funds will be resolved and implemented during 2024.

## Financial statement

A summary of the financial statement is provided below:

| <b>Details</b>                                                | <b>2023</b>          |                                                                                                                                                                                                                                  |
|---------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                               | <b>Contribution</b>  | <b>Costs</b>                                                                                                                                                                                                                     |
| Funds received (incl. GST)                                    | \$94,578.94          | -                                                                                                                                                                                                                                |
| Bank interest                                                 | \$383.98             | -                                                                                                                                                                                                                                |
| Additional funds                                              | \$137,280.00         | -                                                                                                                                                                                                                                |
| Ongoing administration (8%)                                   | -                    | \$6,878.47                                                                                                                                                                                                                       |
| Advertising                                                   | -                    | \$0                                                                                                                                                                                                                              |
| Contractor costs (TAC)                                        | -                    | \$550                                                                                                                                                                                                                            |
| Milestone payments to grant recipients (since September 2022) | -                    | Final payment Genetics \$10,263<br>Final payment Where Where Wedgie \$3,234<br>GPS Midands (1 <sup>st</sup> and 2 <sup>nd</sup> payments)<br>\$65,489.60<br>Ecotoxins (1 <sup>st</sup> and 2 <sup>nd</sup> payments) \$71,962.40 |
| GST paid                                                      | -                    | \$5,263.14                                                                                                                                                                                                                       |
| <b>Total</b>                                                  | <b>\$232,242.92*</b> | <b>\$158,377.47</b>                                                                                                                                                                                                              |

\* Residual funds will be allocated to future grant rounds and the PhD project

## Appendix 1

### Projects awarded support by the Fund - completed

- 2020: Investigating the spatial ecology and habitat use of the Tasmanian wedge-tailed eagle in unmodified landscapes using high-frequency GPS telemetry (Cameron, Pay, Katzner, Koch, Wiersma).
- 2021: Estimating the population size of the Tasmanian wedge-tailed eagle (*Aquila audax fleayi*) using modern genetic techniques (Stojanovic, Cistern, Pay, Burridge, Young, Clarke and Butler).
- 2021: Monitoring wedge-tailed eagle population trends (Hawkins and Potts).

### Projects awarded support by the Fund – underway

- 2022: Investigation the spatial ecology and habitat use of Tasmania wedge-tail eagles in the Tasmanian Midlands using high-frequency GPS telemetry (Pay, Koch, Cameron, Wiersma, Katzner).
- 2023: Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-Tail Eagles (Stojanovic, Pay, Cistern).