

Wedge-tailed Eagle Research Fund 2024 Annual Report



Photo: Dr Adam Cisterne (wedge-tailed eagle nest taken during the fieldwork for the ecotoxins project)

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 fifth Annual Report for the Wedge-tailed Eagle (WTE) Research Fund ('The Fund'). It covers the achievements since the last Annual Report in September 2023.

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 23rd 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 researchers¹ 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.

¹ 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 Saint Rooks, Manager, Threatened Species and Conservation Programs, who replaced Dr Davina Gregory-Dunsmuir, who has moved to another section in 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.

NRM South has also now established a Project Governance Steering Committee (PGSC) to oversee externally funded projects. The PGSC serves a crucial function in overseeing projects and providing guidance on best practice project management and governance processes, with recognition of the parameters and processes required by some funding entities. It is responsible for reviewing project progress and providing advice and recommendations on:

- Project performance (e.g. delivery against milestones and budget),
- Project risk (e.g. WHS and compliance) and
- Project management processes (including change, quality and stakeholders)

The Committee is an advisory committee to the NRM South Board (does not have delegated authority) and includes Board representation (through the Committee's Chair). The WTE Research Fund is included in the remit of the PGSC.

Achievements during 2024

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

Details of the achievements:

1. The fifth deposit (including the set-up contribution) to The Fund was received from Wild Cattle Hill Pty Ltd On the 11th October 2023.
2. 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. The project will be completed and the final report submitted at the end of August 2024. The final payment will then be made.
3. The project "Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-tailed Eagles (*Aquila audax fleayi*)" was completed. The TAC reviewed the report and had some questions of the grant recipients. At the request of the TAC, the grant recipients presented the findings of their study and addressed questions from the TAC. The final report was submitted in August 2024. The final payment was made. The findings are detailed below.
4. As discussed in the September 2023 annual report, it was recognised that only some of the objectives of the Fund were not being addressed by grant applicants and that a PhD project would be developed that focussed on some of the other key objectives. In addition, as there had been an additional deposit to the Fund by the Cattle Hill Wind farm due to the triggering of a mortality threshold hold exceeding a morality threshold, it was proposed that this additional payment be used for a PhD stipend. Approval was granted by the TAC (including the State and Commonwealth regulators) that it was appropriate to use the Fund's money in this manner. The project has been budgeted and a Funding Agreement negotiated with UTas. It is hoped a student will commence in September 2024.
5. Due to the negotiations over the PhD scholarship and due to the cost of the 3.5 year stipend, a top up bursary, mandatory payments and field work costs, it will be necessary to use some of the annual grant funds to support the scholarship. For this reason, a grant round was not advertised in the first part of 2024. It is intended that grants will be advertised in later 2024.

Projects supported in 2024

The following projects were completed or due to be completed in 2024:

Midlands GPS tracking

“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).

Summary of findings

As mentioned above, the final report is due at the end of August 2024. The findings below represent the results to date.

Project aims:

The aim of this research is to GPS-track five adult eagles in the Tasmanian Midlands to investigate how they use this region of Tasmania. We will consider the spatial ecology of the birds at two scales. First, we will investigate habitat use at the home-range scale, considering the size and characteristics of areas used. Second, we will model how Tasmanian wedge-tailed eagles select for different habitats depending on the behaviour they are exhibiting.

Field work:

We captured adult Tasmanian wedge-tailed eagles using established techniques (e.g. bow net, net launcher; Bloom et al., 2007) and attached GPS-GSM solar-powered telemetry units (CTT ES-400 transmitters; Cellular Tracking Technologies, Rio Grande, NJ, USA) to each eagle using a Teflon ribbon harness.

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.

Data summary:

The summaries presented here are based on data collected from the date the GPS-transmitters were attached until August 12th, 2024. During this period, we have collected 900,698 location fixes from the five GPS-tracked eagles.

Two of the GPS-tracked eagles have not transmitted any recent data. This lack of communication could be attributed to one of four potential scenarios:

1. **Signal disruption:** The eagle may have ventured into a region where 3G/4G network coverage is unavailable, preventing data transmission.

2. **Mortality in a no-signal zone:** The eagle may have perished in an area devoid of 3G/4G connectivity, resulting in a cessation of data updates.
3. **Transmitter failure:** There could be a technical issue with the transmitter, leading to a malfunction that stops data relay.
4. **Insufficient power:** The transmitter's battery may not be receiving adequate solar energy to maintain its charge, thus hindering its operation.

Utilisation distributions:

Analysis of the utilisation distributions (UDs) showed some variation in the size of the overall areas used by the eagles. Under the UD model, we consider that the animal's use of space can be described by a bivariate probability density function, which gives the probability to relocate the animal in specific areas (Benhamou, 2011). We can then use this information to infer the home-range size of each bird. For example, the 95% UD corresponds to the smallest area in which the probability to relocate the animal is equal to 0.95 (i.e., there is a 95% chance that the bird is within this area at any given time). We can also use tighter UD thresholds to identify areas of concentrated use within the 95% UD (i.e., the 50% UD can be interpreted as the core home range of the eagle).

The 50% UD (core home range) size was similar across all the eagles (3.05 – 6.29 km²), except for Winton who had the smallest core area (1.61 km²). The mean 50% UD was 3.94 km², which is smaller than the 5.1 km² mean for resident birds we are tracking in other areas of Tasmania. The mean 30% UD was also smaller than the mean recorded for the five birds we are tracking on conservation land (6.7 km²). There was greater variation in the 95% UD. Emily recorded a small 90% UD of 13.18 km², which is smaller than the areas used by most of the other eagles being tracked across Tasmania. Winton and Julian recorded 95% UD similar to the mean we have recorded for resident birds we are tracking across the state (21.8 km²). Daisy recorded a very large 95% UD (92.32 km²), which was driven by the large area she explored during spring 2023. The mean 95% UD for the four eagles in this project that were resident in a territory for the entire tracking period was 21.19 km², which is very close to the 21.8 km² mean for resident birds we are tracking in other areas of Tasmania.

Habitat selection:

We are currently working on combining the data from all the adult eagles we are GPS-tracking into an analysis that will investigate fine-scale behaviour-specific habitat selection using state-space modelling and incorporating a number of habitat variables in a multivariate framework. For this report we have explored how the birds have used different land cover categories 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 15 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).

The eagles used habitats non-randomly ($p < 0.001$) in relation to land cover categories. There was a lot of variation in how the eagles selected for different land cover categories, particularly non-native vegetation (Julian and Daisy selected strongly for this habitat type, whereas Bow strongly avoided it). Native grassland, cleared land, and dry eucalypt and non-eucalypt forests were generally used by the eagles proportional to their availability.

Extra-urban areas, including residential and commercial buildings, were strongly avoided by all eagles. There was also a slight avoidance of agricultural areas, although Daisy was an exception, using agricultural land more than would be expected based on its availability. Notably, plantations were the only land cover category with a significantly positive selection ratio, as both the upper and lower confidence intervals were above zero. However, this positive selection result is likely due to the scarcity of plantation habitats in the available areas, with data from only two eagles (Daisy and Emily) used to calculate this odds ratio.

There are some differences in how Tasmanian wedge-tailed eagles tracked in the Midlands selected habitats compared to those tracked on conservation land. All conservation eagles avoided non-native vegetation, whereas the Midlands eagles exhibited more variability in their use of this land cover type. Additionally, the conservation eagles demonstrated a stronger preference for non-eucalypt forests.

Flight behaviour:

To carry out some preliminary exploration of the flying behaviour of the birds, we subset all the GPS-fixes recorded whilst the birds were flying. We then segmented this data by individual flight. In total the birds have completed 9,759 flights, flying for a total duration of 105,678 minutes. The mean duration of a flight was 12.04 minutes, which is almost twice the mean flight duration (6.86 minutes) recorded for five birds GPS tracked on reserved land. The mean flight duration was also longer than the mean (9.94 minutes) recorded for birds in other areas of Tasmania, suggesting that wedge-tailed eagles in the Midlands spend longer in flight when compared to other areas of the state. Most GPS fixes recorded during flights were <250 m altitude over ground level.

Ecotoxins

“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).

Findings

Project aims:

1. Determine how prevalent eco-toxin exposure is across the Tasmanian Wedge-tailed Eagle population.

2. Estimate how severe eco-toxin accumulation is relative to background levels in areas frequented by eagles.
3. Investigate whether eco-toxin exposure is attributable to environmental features (e.g. proximity to anthropogenic disturbance).
4. Investigate the demographic impact of ecotoxins.

Ecotoxin results:

- None of the eight anticoagulant rodenticides tested were detected within the material collected below wedge-tailed eagle nests.
- Lead concentrations were low overall but were highest in soil below wedge-tailed eagle nests.
- Zinc concentrations were lower in soil collected directly under wedge-tailed eagle nests compared to background concentrations.
- The results suggest that the method described within may be useful for detecting high lead exposure in wedge-tailed eagles.
- Given the very small differences between nest and background concentrations of lead, a larger sample size should be analysed to validate the current results.

Demographic results:

- Sensitivity analyses demonstrated that final population sizes were driven by reproductive output (brood size), juvenile and adult survival rates. Population growth, however, was driven by the survival of adults and older pre-adult birds.
- In simulations of ecotoxin exposure scenarios, Tasmanian wedge-tailed eagle population sizes were significantly decreased when both mortality of adults and sub-adults was impacted.

Conclusions and recommendations

1. Our preliminary results that lead levels under Tasmanian wedge-tailed eagle nests are higher than background levels – these indicative results supported our expectations, but the small sample size of accessible nests necessitates cautious interpretation.
2. Confirmatory research to support our findings should be implemented, with an aim to increasing spatial coverage and the overall sample size of eagle nests.
3. Our sensitivity analysis shows that mortality rates are highly influential on population viability of Tasmanian wedge-tailed eagles, but the relationship between ecotoxin exposure and mortality remains unclear and should be a priority for further research.
4. We found no evidence of elevated zinc levels under eagle nests.
5. The source of lead under eagle nests remains unknown and should be a priority for further research.

6. Quantifying the extent to which hunting with lead bullets occurs in the vicinity of nest sites may help explain variation in lead levels among nests, but there remain serious logistical challenges of quantifying hunting rates within eagle territories.

PhD project

“How is TWTE habitat selection affected by human activities and land-use intensity?”

The project will be housed in the School of Natural Sciences at Utas, and supervised by:

- Dr James Pay, University of Tasmania (Supervisor)
- Professor Chris Johnson, University of Tasmania (Supervisor)
- Associate Professor Chris Burrige, University of Tasmania (Supervisor)
- Dr Catherine Young, NRM South (Advisor) – to ensure the project remains focussed on the WTE Research Fund objectives.

The funding covers a 3.5 year stipend, plus top up bursary, mandatory paid leave, relocation allowance and fieldwork costs.

This project has not yet commenced. A student had been offered the scholarship and support but decided not to take up the offer. A new student will be identified by advertising the position and selecting from the pool of applicants. The funding agreement with Utas will be signed once a student is identified. The scholarship will be paid in 4 stages, commencing upon the enrolment of the student.

Brief project outline

This PhD project will investigate how TWTEs respond to a range of human activities. The project will have a particular focus on using existing datasets (including GPS-tracking data from 41 adult and 25 pre-adult TWTEs) as well as carrying out field experiments to assess effects of disturbance on behaviour and breeding success of eagles.

The project will aim for a broad understanding of the ways in which eagles respond to human activities and a variety of land uses. In doing so it will answer several questions relating to specific disturbances that are most likely to be influential. The list of questions the project could address includes:

1. **How is TWTE habitat selection affected by human activities and land-use intensity?**
Including:
 - **How does operation of helicopters affect the behaviour of TWTEs?**
 - **How is the behaviour of TWTEs, including time spent at the nest during breeding, affected by vehicle traffic?**
2. **What is the relationship between nest attendance, revealed by GPS tracking, and nest success?**

A summary of the context for each question, along with potential strategies for addressing them, is included below. Outputs from each of these project components can be synthesised using a vulnerability analysis to discover what levels of disturbance could be sufficient to cause population-level effects.

Summary of proposed project components

LITERATURE REVIEW: What are the current methods available for monitoring wildlife disturbance?

During the first year of the PhD program, the candidate will conduct a comprehensive review of the contemporary literature on monitoring wildlife disturbance. This review will encompass an exploration of the latest technologies currently at our disposal and update information provided in previous reviews on the topic (e.g., Cox et al., 2012; Cutler and Swann, 1999; Preisler et al., 2006). Conclusions from this review may offer innovative ideas and strategies for subsequent inclusion in the data chapters of the PhD thesis.

1. How is TWTE habitat selection affected by human activities?

Human activities can change the way animals use the landscape. For example, at a fine-scale animals can avoid anthropogenic activities (Barker et al., 2023; Suraci et al., 2019), or at a broadscale anthropogenic activities could increase or reduce the size of the area used by individuals (Perona et al., 2019). Understanding these dynamics has relevance to conservation management. The increasing temporal resolution of modern GPS-tracking technologies, together with advances in statistical techniques, are facilitating a more detailed understanding of animal behaviour alongside habitat use. By incorporating spatial information on human activities, modern habitat selection modelling methods can provide insight into how human activities affect wildlife movement. The project can incorporate the GPS data collected from TWTEs into models that assess how particular sources of human disturbance (for which spatial data are available, e.g., roads, land use change, fuel reduction burns) affect the spatial ecology of TWTEs.

○ How does operation of helicopters affect the behaviour of TWTEs?

Aerial nest surveys are carried out by a number of industries in Tasmania, both to search areas for TWTE nests and to check if TWTE nests are being used in any given breeding season. Furthermore, helicopter traffic associated with various other purposes is also commonplace across the state (e.g., fire management, tourism, construction work, infrastructure surveys). There is little information on how the behaviour of TWTEs is affected by these aircraft. Helicopter flight path data are recorded by industries, which includes information on the time, location, altitude, and speed of the aircraft. These data include flights that have been carried out across territories where adult eagles were being GPS-tracked over the last four years. By combining these existing datasets, the project can investigate this question by assessing if and how eagle flight behaviour and nest attendance is affected by helicopter flights, and how any effects are linked to the flight path characteristics of the aircraft (e.g., speed, altitude, direction).

○ How is the behaviour of TWTEs, including time spent at the nest during breeding, affected by vehicle traffic?

A large number of TWTE nests are situated within 1 km of roads or vehicle tracks. Current guidelines, adapted from forestry practices (limiting activities within 500 m - 1 km line-of-sight), are employed to mitigate potential impacts from road-based vehicle use during the breeding season. However, there is a lack of information regarding how TWTEs respond to vehicle traffic at the distances of current recommendations. Consequently, it is uncertain whether these guidelines need adjustment, either to enhance conservation or to reduce industry costs. The project can use traffic counters to

assess how the frequency and type of vehicle movements affects the behaviour of breeding GPS-tracked TWTEs (e.g., time spent at the nest). This could also include an experimental component, whereby vehicle movements are introduced at sites where breeding TWTEs are being monitored.

2. What is the relationship between nest attendance, revealed by GPS tracking, and nest success?

GPS-tracking can be used to provide valuable information on the breeding behaviour of birds (Murgatroyd et al., 2023; Schreven et al., 2021). However, it is essential to align GPS-derived movement data, such as nest visit durations, with on-site nest surveys for validation. This validation ensures that conclusions drawn from GPS data regarding breeding season timing and nest outcomes are substantiated. By comparing survey data with GPS data from breeding TWTEs, the project can obtain information on how movement characteristics relate to observed breeding events. This will provide an assessment of the utility and limitations of movement data for monitoring TWTE breeding behaviour. Results will contribute to existing work on the TWTE aiming to use GPS-data to inform population models and assess the impacts of disturbance during breeding.

References

- Barker, K.J., Cole, E., Courtemanch, A., Dewey, S., Gustine, D., Mills, K., Stephenson, J., Wise, B., Middleton, A.D., 2023. Large carnivores avoid humans while prioritizing prey acquisition in anthropogenic areas. *J. Anim. Ecol.* 1–12. <https://doi.org/10.1111/1365-2656.13900>
- Cox, W.A., Pruett, M.S., Benson, T.J., Chiavacci, S.J., Thompson III, F.R., 2012. Development of Camera Technology for Monitoring Nests, Digital Commons University of Nebraska. Lincoln.
- Cutler, L., Swann, E., 1999. Using Remote Photography in Wildlife Ecology: A Review. *Wildl. Soc. Bull.* 27, 571–581. <https://doi.org/3784076>
- DPIPWE, 2011. Final report - Alternatives to 1080 program. Department of Primary Industries, Parks, Water and Environment, Hobart.
- Murgatroyd, M., Tate, G., Amar, A., 2023. Using GPS tracking to monitor the breeding performance of a low-density raptor improves accuracy, and reduces long-term financial and carbon costs. *R. Soc. Open Sci.* 10. <https://doi.org/10.1098/rsos.221447>
- Perona, A.M., Urios, V., López-López, P., 2019. Holidays? Not for all. Eagles have larger home ranges on holidays as a consequence of human disturbance. *Biol. Conserv.* 231, 59–66. <https://doi.org/10.1016/j.biocon.2019.01.010>
- Preisler, H.K., Ager, A. a., Wisdom, M.J., 2006. Statistical methods for analysing responses of wildlife to human disturbance. *J. Appl. Ecol.* 43, 164–172. <https://doi.org/10.1111/j.1365-2664.2005.01123.x>
- Schreven, K.H.T., Stolz, C., Madsen, J., Nolet, B.A., 2021. Nesting attempts and success of Arctic-breeding geese can be derived with high precision from accelerometry and GPS-tracking. *Anim. Biotelemetry* 9, 1–13. <https://doi.org/10.1186/s40317-021-00249-9>
- Suraci, J., Clinchy, M., Zanette, L., Wilmers, C.C., 2019. Fear of humans as apex predators has landscape-scale impacts from mountain lions to mice. *Ecol. Lett.* 22, 1578–1586.

Next stage in The Fund

The next round of grants is expected to be advertised in later 2024, and new projects will be identified.

Financial statement

A summary of the financial statement is provided below:

Details	September 2023 - August 2024	
	Contribution	Costs
Funds received (incl. GST)	\$106,260	-
Bank interest	\$1,484.71	-
Ongoing administration (8%)	-	\$7,728
Advertising	-	-
Contractor costs (TAC)	-	\$550
Carried forward	\$181,737.49	-
Final Milestone payment - Ecotoxins	-	\$17,990.60
Funds retained for final Milestone payment – Midlands GPS tracking	-	\$16,372.40
Funds retained for PhD stipend	-	\$176,166.00
Total	\$289,482	\$218,807

Any residual funds will be allocated to future grant rounds.

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).
- 2023: Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-Tail Eagles (Stojanovic, Pay, Cistern).

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).

Projects awarded support by the Fund – to commence

PhD project