PREDATOR MONITORING AND CAT CONTROL TRIAL FOR THE SOUTHERN BRUSH-TAILED ROCK-WALLABY, *PETROGALE PENECILLATA*

Project Summery & Assessment

Environment Restoration Fund-Threatened Species Strategy

Action Plan-Priority Species Grant

CONSERVATION MANAGEMENT NETWORK

‘Predator Monitoring and Cat Control Trial for the Southern Brush-tailed Rock wallaby’ is the title of a project that was carried out by East Gippsland Conservation Management Network (EGCMN) for the Environment Restoration Fund-threatened Species Strategy Action Plan-Priority Species grant

This project aim was to change the trajectory of the wild population Brush-tailed Rock wallaby in Victoria by researching new information on predators directly interacting with rock-wallabies and conducting a pilot cat control program with in the colony to improve recruitment success of sBTRW juveniles and maximise long term population viability.

This report assesses the project goals and outcomes.

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Front cover images – Left to right: Feral cat, sBTRW, Red Fox: From 2020 southern brush-tailed rock wallaby camera monitoring images from Little River Gorge, Snowy River National Park, East Gippsland

Glossary

EGCMN – East Gippsland Conservation Management Network

DEECA – Department of Land Water and Planning

PV – Parks Victoria

sBTRW – Southern Brush-tailed Rock Wallaby

BTRW – Brush-tailed Rock Wallaby

ESU – Ecologically Significant Unit

LRG – Little River Gorge

SRNP – Snowy River National Park

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Introduction

This project, Predator Monitoring and Cat Control Trial for the Southern Brush-tailed Rock Wallaby (sBTRW) was designed to improve the trajectory of the only known extant population of the Brush-tailed Rock Wallaby (BTRW) *Petrogale penicillata* in Victoria.

This is the only known extant population of the southern evolutionary significant unit (ESU) and is currently listed in Victoria as Critically Endangered (FFGA, 1988). The sBTRW in Victoria has been supported by the Southern Brush-tailed Rock Wallaby Recovery Team for two decades and is also supported regionally by a field team. Both groups are made up of government agencies, NGOs, universities, and business stakeholders working in the sBTRW space.

Predation of the BTRW by the European Red Fox *Vulpes vulpes* is considered its greatest threat with predation by the feral Cat *Felis catus* considered to be a probable threat (Tagget in Woinarski *et al*., 2012). In Little River Gorge (LRG), we considered the former to be correct and the latter to be increasing in likelihood, with potentially highly significant impacts on recruitment within the isolated population.

Data from targeted sBTRW monitoring cameras opportunistically detects feral predators, particularly cats moving and living amongst the rocky habitat of the wallabies. Cats like foxes are known to prey select and cats have been attributed to the declines of both the Black-flanked Rock Wallaby/Waru *P. lateralis* and the Allied Rock Wallaby *P. assimilis* (Spencer, 1991; Read *et al*., 2018). Predation by the feral cat and the red fox are both listed as threatening processes to the BTRW in the National Recovery Plan (Menkhorst and Hynes, 2011).

Predator baiting for foxes at Little River George (LRG) and surrounding road networks has been ongoing for two decades with targeting of some ridges and spurs leading into the BTRW habitat commencing in the last five years. Cats have been highlighted by the field team as a problem but due to state legalities regulating cat control no action has yet been taken to address the threat posed on BTRW by this feral predator.

The sBTRW population at LRG has been increasing over the last decade but this has not been sustained in the two years prior to this projects commencement. With the two year period analysed during this project also showing sustained declines and potentially dire outcomes for the population (Gaborov, 2022, 2023). A drop in numbers of approximately 15% has been observed, with predation likely to be the cause or a least a major contributing factor.

Project Goals and Key activities

This project attempted to expand predator control and monitoring to a level that historically government agencies have not achieved. By expanding the existing predator programme at LRG as well as the knowledge base and understanding arising from the current yearly BTRW camera monitoring, a partnership-based approach has been used for project delivery to maximise the collective understanding of the operating threats and where future opportunities for management intervention and improvements to the sBTRW trajectory could be made.

This project had the following field goals:

1. Establish a targeted predator camera motoring project in the habitat of the sBTRW

2. From this knowledge target fox baiting and trial cage-trapping of the feral cat

3. Repeat activity one to check for a decrease predator abundance

4. Confirm correlative success by checking increases in the sBTRW population

This section will assess these goals and key activities:

1.A targeted predator camera motoring project in the habitat of the sBTRW

Existing data, knowledge and understanding of feral predators in LRG sBTRW habitat, including home range data from scientific papers (Bengsen, et al., 2015; Buckmaster and Dickman, 2012) and information from published projects on predator monitoring (Sparkes, et al., 2021; Moseby et al., 2021; Claridge and Paul, 2014), will be used to establish a longitudinal camera grid for the gorge. This will encompass 21 cameras 14 IR cameras and 7 white flash to aid individual identification. Numbers of cameras is based on the smallest predator home range, a female cat. There will be a further 12 cameras deployed in probable exit/entry points to establish use by feral predators. Due to the terrain and difficulty of wide camera images lures will be used so that animals are more likely to pass the camera. There will be 2 camera deployments targeting feral predators. The first planned for autumn 2022. The second in spring- early summer 2022 after predator control has taken place. Information from cameras will identify predators, abundance and a minimal count of individuals. After the second camera collection changes in predator abundance can be assessed.

A targeted predator monitoring grid was established with the habitat of the sBTRW in LRG following the above number of cameras and terrain suitability for predators. Cameras were left on in-situ with bait lures placed in front of camera traps to attract predators into the cameras on three rather than two occasions. This was planned to be done before and after predator control, therefore twice. This project however managed a third round of bait lures and so monitoring was conducted 3 times across 14 months. Monitoring successfully informed predator dynamics in the gorge providing information on predator distribution, abundance and behaviour across the period. Information was shared with field staff and managers and was collated in 3 reports (EGCMN reports 1, 3 and 6). Field staff also checked cameras outside of these three periods to better understand predator presence in areas where they were working.

The 33 cameras were purchased and placed in the gorge with the hope that this monitoring grid and the information it supplies would continue beyond the initial life of this project. This has now been confirmed by Parks Victoria who have agreed for this to occur. For more in depth information on this work see EGCMN Reports 1, 3 and 6.

2. From this knowledge target fox baiting and trial cage-trapping of the feral cats

Key predator control activities planned to use information from the first targeted predator monitoring for advice on where to place baits in the gorge to assist the already established fox-baiting program. Parks Victoria were aware of this and had money and time to implement these additional baits.

A trial cat control program using cage-traps was be conducted in the sBTRW colony. Two areas within the colony with the highest cat abundance were to be trapped as well as entry /exit points that have regular feral predators. Each trapping area was to be active for 10 days.

The predator control activities took place as planned but differed slightly to allow expansion in some areas. Including increase fox control activities and delivery of cat additional trapping, which was implemented twice.

Advice was given over two successive winters for baiting activities including regular buried baits for foxes as well as where to trial canine injectors for foxes. Successfully delivering on our intention and aim to use information provided by the project to better inform predator baiting activities to reduce predation pressure on the Wallaby colony.

As our first monitoring period had confirmed cat distribution and abundance and informed our decision to confine the initial cat trapping and to also conduct ground shooting of foxes. Ground shooting was implemented as some foxes are known to be 'bait shy' therefore warranting the deployment of a different and additional control mechanism. As shooting is not as efficient as baiting, we again used the newly established predator camera array to inform and refine decisions to concentrate shooting in areas where foxes had been recently observed, providing greater levels of delivery efficiency based on camera-trap data.

Both these activities were successful in capturing target animals (predators) on camera. However, the ground shooting was limited by available funding and another round, conducted shortly after the first, would have likely resulted in further fox reductions within the sBTRW habitat. In the second year due to the high abundance and distribution of both foxes observed on monitoring cameras, ground shooting occurred again over a three-night period. Both ground shooting activities only yielded low number of foxes but were able to specifically target predators that were known to be using the gorge and spending time amongst the sBTRW, demonstrating the effectiveness of the camera array and shooting, as a management intervention, as a cost-effective way to directly reduce the threat of predation.

The cat trapping activity was also altered somewhat from our original intent, in that trapping was able to be delivered twice, rather than once over the lifetime of the project (in August, 2022 and May 2023). In first round of trapping only one area was trapped (see project report 2) and from 91 trap nights caught two cats. In the second round this was expanded to cover a broader area in three clusters. All trapping occurred around the rim of the gorge rather than amongst the sBTRW, due to animal welfare concerns that the sBTRW many enter the traps and injure themselves, become stressed when trapped and knock their heads and secondly as many of the cats in the gorge were also seen around the gorge rim, meaning that target animals could be trapped in these locations rather than within the sBTRW colony itself, increasing deployment efficiencies. This second round of cat trapping consisted of 49 traps used over 10 trap nights, not all were always active due to access time. Only 1 cat was caught.

Further detail on predator control conducts as part of this project can be seen in EGCMN Reports 2 and 4.

3. Repeat activity one to check for a decrease predator abundance

This activity was repeated as stated above. Predator abundance did not decrease for cats and stayed relatively the same for foxes. It is suspected that this is related to climate and that fox control did most likely have influence over fox numbers despite them still being too high for sBTRW survival.

4. Confirm correlative success by checking increases in the sBTRW population

This goal can be assessed in the annual sBTRW monitoring. We also added a key activity to assess juvenile's recruitment. We proposed spring camera monitoring of 20 white-flash cameras, loaned from DEECA, (to see ear-tag colours) to assess female sBTRW with their emerging joeys at already established camera sites. This additional monitoring will allow the sBTRW field team to understand which joeys were present in spring to compare to sub-adults in the regular monitoring in Autumn 2022 and 2023 and help define the importance of our predator control and how much control is necessary. Spring monitoring (because of released animals) in 2020 is what alerted the field team that the offspring were successfully pouch emerging but were not surviving to sub-adulthood.

This activity took place in spring-summer 2022. We were able to assess and compare 16 females with pouch emerging and pouch emerged young to the annual monitoring results from April 2023. This activity showed and confirmed very low recruitment (2 of 16) within the sBTRW colony. Highlighting that the current short-term population trajectory is one of decline and if predation is responsible for this that current predator control measures are inadequate. While we did not expect this projects related increase in predator control to alter the observed decline in the short term (after a single round of control) the observation made reinforce our understanding that in order to improve the colonies trajectory predator control efforts need to be increased and sustained in the mid to longer term.

For more detail on this key activity see EGCMN Report 5.

4. Reporting project activities and their outcomes

A report of all funded activities and their outcomes will be made accessible on our website it will also be given to the sBTRW Field and Recovery Teams for use. Camera data will be shared with regional DEECA and Parks Victoria to assist in their ongoing sBTRW monitoring project and included in the Victorian Biodiversity Atlas.

Rather than one report, detailing all project activities, six individual reports were written with results and recommendations for each key field activity, allowing the information to be used in a more immediate and timely fashion. This included three camera monitoring deployment reports, covering predator activity, distribution and abundance and also the use of lures, their impacts on predator behaviours/camera trap detection success relative to when lures were not used. Reports on additional predator control delivered by the EGCMN for the ground shooting and cat trapping in both 2022 and 2023, were also complied and shared with project partners. There was also a report complied on the survivorship and recruitment of pouch emerging young from 2022-2023. These reports have all been shared with local DEECA and Parks Victoria staff, the recovery team and have also been uploaded to the EGCMN website, for public access.

Results have not yet been uploaded to the Victorian Biodiversity Atlas but are being uploaded to the Atlas of Living Australia as requested by the funding agreement.

Project Outcomes

The following project outcomes, as listed in our funding agreement are assessed below

1. *Fill a critical gap in the current predator control program in the LRG as currently there is a predator control program but no broad scale monitoring of predators. This means it is unknown whether predators are decreasing or increasing in the habitat if baiting has an effect on predators and if changes in sBTRW population are related to changes in predator abundance. It also means that areas being controlled may not be the best areas for controlling predation to the sBTRW. Despite predators in sBTRW habitat opportunistically seen on sBTRW monitoring cameras there is currently not the resources to establish a targeted survey for predators in Little River Gorge. The sBTRW population is so small (46 animals last count) it is critical that a greater knowledge of predators in the habitat is known to maximise predator control success and so that it positively affects the population of sBTRW.*

This outcome was successfully delivered/fulfilled:

- There is now broadscale predator monitoring infrastructure and a program protocol established in and around sBTRW colony in Little River gorge.
- The monitoring equipment has been established in accordance with our objectives and remains in place to facilitate future and on-going predator specific monitoring.
- The predator monitoring camera array will now allow longer term trends in predator distribution and abundance to be established, providing important additional management decision making information to improve the trajectory of the sBTRW colony in this location.

2. *Fill in a critical gap in the program by trialling lethal cat-control. Fox control has been associated with increased numbers of cats in the environment and cats also threaten sBTRW (Menkhorst and Hynes, 2011). This project will test the only current legal methods for controlling cats in Victoria and if successful can impact on the sBTRW population positively. Successful cat control will also pave the way for more access to funding for further effort in the future including new cat control methods that are currently being trialled in Victoria such as cat specific baiting and Felixer automated lethal recognisers.*

- Broadscale Cat trapping has now been trailed in the gorge, for the first time.
- Cat-trapping, as a management tool to reduce predator pressure, has been confirmed as an important management tool, albeit resource intensive, capable of reducing cat numbers. As trapping remains the only legal control option for feral cats control in Victoria, opportunities now exist, with the newly established infrastructure to alter and refine their use to improve effectiveness. Testing the use of new and novel attractants to lure cats into traps has been enabled by this project can now continue in the most efficient way possible into the future.

3. Establish a predator monitoring programme that can be used again in the future. By establishing these camera locations targeting predators, abundance can be compared anytime in the future with other funding past the life of this project.

- As noted above both the predator specific camera monitoring array and cat trap grid established by this project will remain as semi-permanent fixtures available to be used, as funding is available, into the future. Allowing for detailed long-term trends in predator

distribution and abundance to be evaluated and future predator management intervention effectiveness to be assessed.

- The sBTRW field team has also indicated predator monitoring enabled by this project should continue and be used to further inform the outcomes of increased predator control in their annual activity plan.

4. Increase and or improve current fox baiting areas to target individual foxes frequenting sBTRW habitat. This will identify possible individuals that are spending more time in the sBTRW habitat and therefore more likely to hunt sBTRW or even be selecting them preferentially.

- Information obtained by this project's predator monitoring camera array has been used to better target and guide existing fox baiting efforts.
- Increases in fox control effort were further enabled by this project via the trialling of 'canine injectors' which were installed and monitored using the newly established predator monitoring cameras where elevated fox activity had been observed.
- Camera predator monitoring results obtained by this project also influenced and were able to inform locations where ground shooting activities for foxes were undertaken and should be concentrated/continued.

5. Increase the population of sBTRW by changing recruitment levels and adult survival by increasing predator control efforts on both foxes and cats. This project hopes to positively change the trajectory of sBTRW from one of stasis and slow decline back to an increasing population.

- The sBTRW population and specifically recruitment was not observed to increase during the delivery of this project. With the monitoring observations and results instead confirming a continued population decline (see other comments regarding timeframes).
- Predator control efforts were increased as a result of this project, however we believe that further control efforts are warranted. It is also suspected that current predator abundances may be influenced by food availability related to the recent La Nina event.

6. Data sharing; Reporting of this project will be shared with stakeholders and used for the established predator control program and sBTRW annual monitoring programme. A final report and summary reports will be distributed to the field team and Recovery Team. Reports of the project will be available on the EGCMN website.

- Reports have been shared with various stakeholders including DEECA and Parks Victotia staff, Recovery and Field Team members.
- Reports have been made available on the EGCMN website
- Reports will be sent to the sBTRW Recovery Team

An off chute of the targeted predator monitoring is the monitoring of another endangered species, the spot-tail quoll Dasyurus maculatus, also in LRG. LRG is one of the few areas in East Gippsland that has regular detections of spot-tail quoll however as these detections are opportunistic the status of the spot-tail quoll in the gorge is not well understood. The targeted predator monitoring will also target spot-tail quoll and can give an assessment of the population's status that can be used in current East Gippsland DELWP spot-tail quoll fire recovery programme and in future projects.

- Spot-tail quolls (STQ) were not well represented in the camera monitoring results, with detections lower than expected. STQs were detected only 4 times at 4 separate locations, with only one of these detections in front of a lure.
- The results of spot-tail quoll detections made during this project, in an area understood to be a stronghold for the species, are of particular concern and are suspected to represent/be a part of a wider overall decline of in the species and subsequent detections across the Upper Snowy area.

Measuring Success of Project Activities

The following criteria were used to measurement project success.

1. An increase in the number of sBTRWs recruited the following year and surviving after the pilot cat control and targeted fox control. This will be evaluated from the annual autumn sBTRW targeted camera monitoring and the additional spring sBTRW camera monitoring of females and joeys. This data can be compared with 2023 and previous years assess recruitment and mortality.

2. A difference in predator abundance and individuals from the two targeted predator monitoring cameras before and after targeted control. This is important as bait takes and trapped cats do not necessarily equate to success if they are quickly replaced by other individuals.

3. The number of cats caught in cage traps and fox takes on bait stations as a form of partial success.

4. It assists with the objective to 'To prevent the extinction of the last remaining extant population by increasing population size to a minimum of 50 mature individuals, with positive or neutral rate of increase without supplementation.'

5. Project activities will in essence 'monitor the effectiveness of predator control'

Using the above criteria, established at project inception, it is unfortunate that this project has not been able to deliver against criteria 1 and 2; being unable to show an improvement in the sBTRW population trajectory or conclusively establish a decline in predator abundance from 2022 to 2023 as a result of our predator control interventions.

Criteria 3 has been somewhat successful and criteria 4 and 5 has been wholly successful. With consistent and further increased predator control we believe criteria 1 and 2 will be possible in the future but unable to be demonstrated within existing project timeframes. The cat control in this project was a trial for broader area and considerable lessons have been learnt. Further opportunities for predator control improvement and refinements have also been identified for subsequent works into the future. It is hoped that more reliable, efficient and ultimately successful management tools for controlling cats will be introduced in the near future to assist predator control interventions and the sBTRW population trajectory.

Intensive ground shooting of foxes to control the bait shay animals inhabiting the gorge needs to be increased, to a point where abundance is further reduced and the risk of the predation threat ameliorated. After which time the need for intensive ground shooting may only need to occur when monitoring indicates a need.

Against Criteria 3 the project has achieved partial success as indicated by the removal of several cat and fox individuals via trapping and shooting in 2022. It also had success in shooting foxes inhabiting

the gorge in 2022 and 2023. Bait takes were low in 2022 and bating has not yet been assessed in 2023, however foxes have shown a decline in winter 2023 compared to the previous summer. These fox numbers however are similar to the previous winter, so it is not clear whether this decrease in detection on cameras is related to predator control or also influenced by seasonal variations.

Although the aims of criteria 4 has not occurred during the existing project timeframes, for the sBTRW population we believe this work has assisted the aim and will continue to do so in the future if and once the sBTRW trajectory improves. This project has set up additional predator control and monitoring that will continue past the projects end and continue to assist this aim in the medium to longer term.

Against criteria 5 our project has been successful. Albeit that we are unable to demonstrate an overall reduction in predator abundance or distribution resulting from our predator control activities. The monitoring array demonstrated that our control efforts, in this inbstance, has not been able to influence predator distribution or abundance during the project timeframe. Suggesting that future efforts need to be more intensive and/or sustained and strongly indicating that current levels of investment to reduce the predation threat from foxes and cats appear to be inadiquate.

The establishment of dedicated predator monitoring is a major achievement in such a complex, rugged and remote environment and cannot be understated. This new camera array and the installation of a new cat trap network has enabled, for the first time, for long-term predator pressure to be evaluated and the identification population trends in a key threat to the survivorship of the sBTRW population. The new predator monitoring and trap network will also enable a more detailed evaluation of future management interventions and inform both land management agency and stakeholder priorities and opportunities for investment to be objectively evaluated.

This project has allowed for the first time, via the installation of a new a dedicated camera array, monitoring of the effectiveness of predator control and will be an extremely valuable tool as we collectively seek to improve the trajectory of the only extant sBTRW population in Victoria.

Key Recommendations

1. Continue using the predator camera grid, now set up in LRG, to understand predator dynamics to inform and assist local predator control to improve the sBTRW population trajectory. This can be done with or without bait lures, at any time of year but preferentially to assist with predator control evaluations pre and post control activities. Camera monitoring, now established, could also be done via fixed price contracts, as the times and effort required are well established, potentially reducing future project costs. Batteries and SD cards will need maintenance, as will camera sites during warmer months to control grass growth and reduce false triggers, so to avoid undue financial burden during image processing. Costs which should be built into further project budgets.

2. Conduct more cat trapping so to Investigate the effectiveness of different lures in cat traps (cat urine, faeces) using cameras on wired open traps to evaluate and improved trapping success rates. Traps are now set up around the gorge and in front of cameras, so resources required are limited to field time and data processing.

3. Considering the decline of sBTRW has not yet improved and increased predator control logically needs to continue, consideration should be given to employing a part-time predator control officer that can assist with this field work and may also assist with other sBTRW and predator projects in the Upper Snowy. The officer could assist with baiting, camera monitoring, cat trapping and ground shooting and investigate canine injectors in the gorge. These activities often need a 2nd field officer but currently most of this work is being conducted by contractors and employing an officer may reduce the overall cost of such activities.

4. Write a small trial plan for canine injectors so they can be tested as currently testing has not been conducted in a systematic or coordinated fashion.

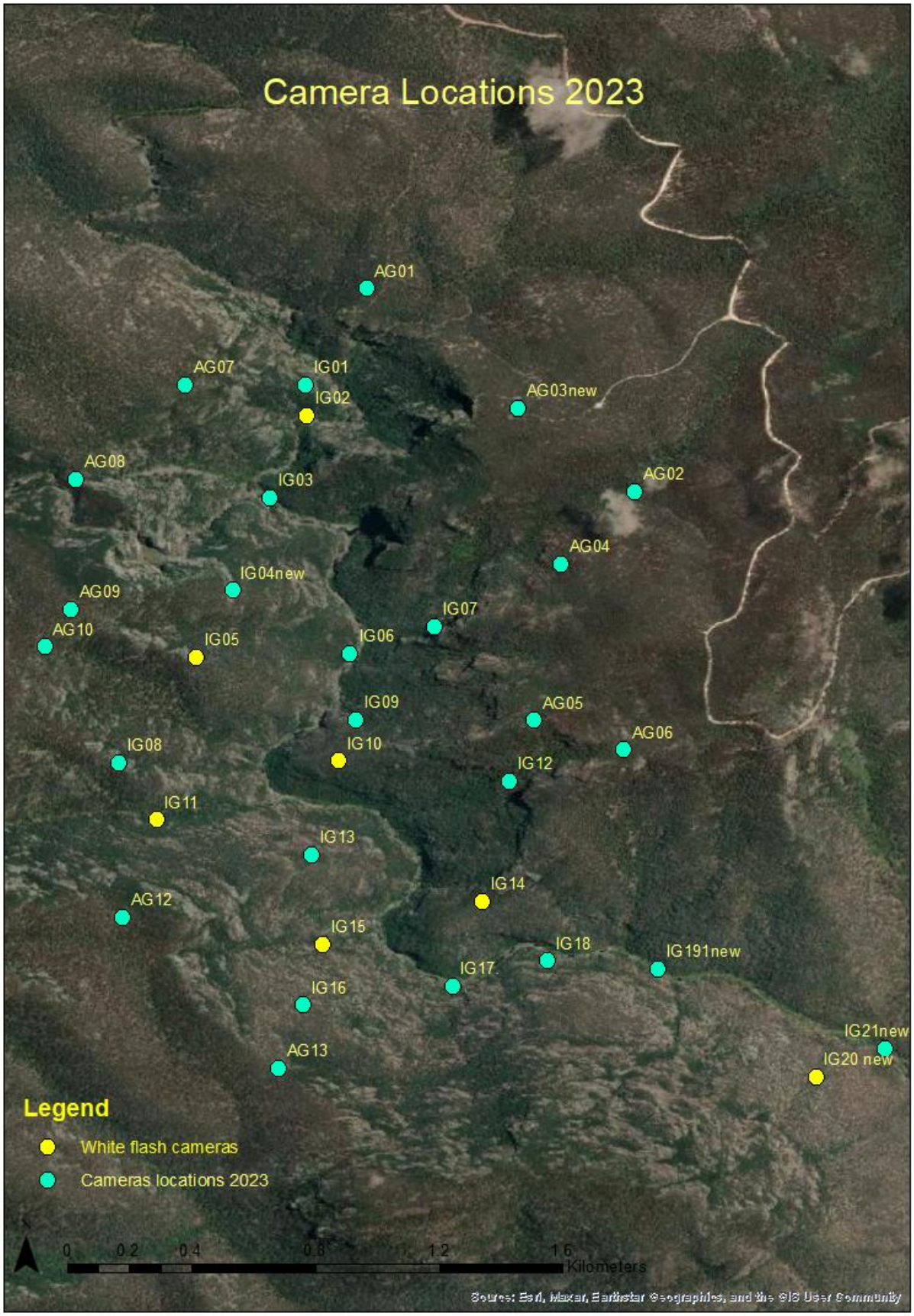
5. As part of predator control intensification, conduct ground shooting 4 times a year using call play back twice in fox mating season (winter) and twice in denning season (late spring/early summer).

6. Investigate and trail the use of thermal imaging remote piloted aircraft (drones) to assist in finding fox den sites, predator abundance and aide in gathering overall population demographics of various other invasive species in the gorge on species know to modify and degrade overall habitat quality (pigs, deer).

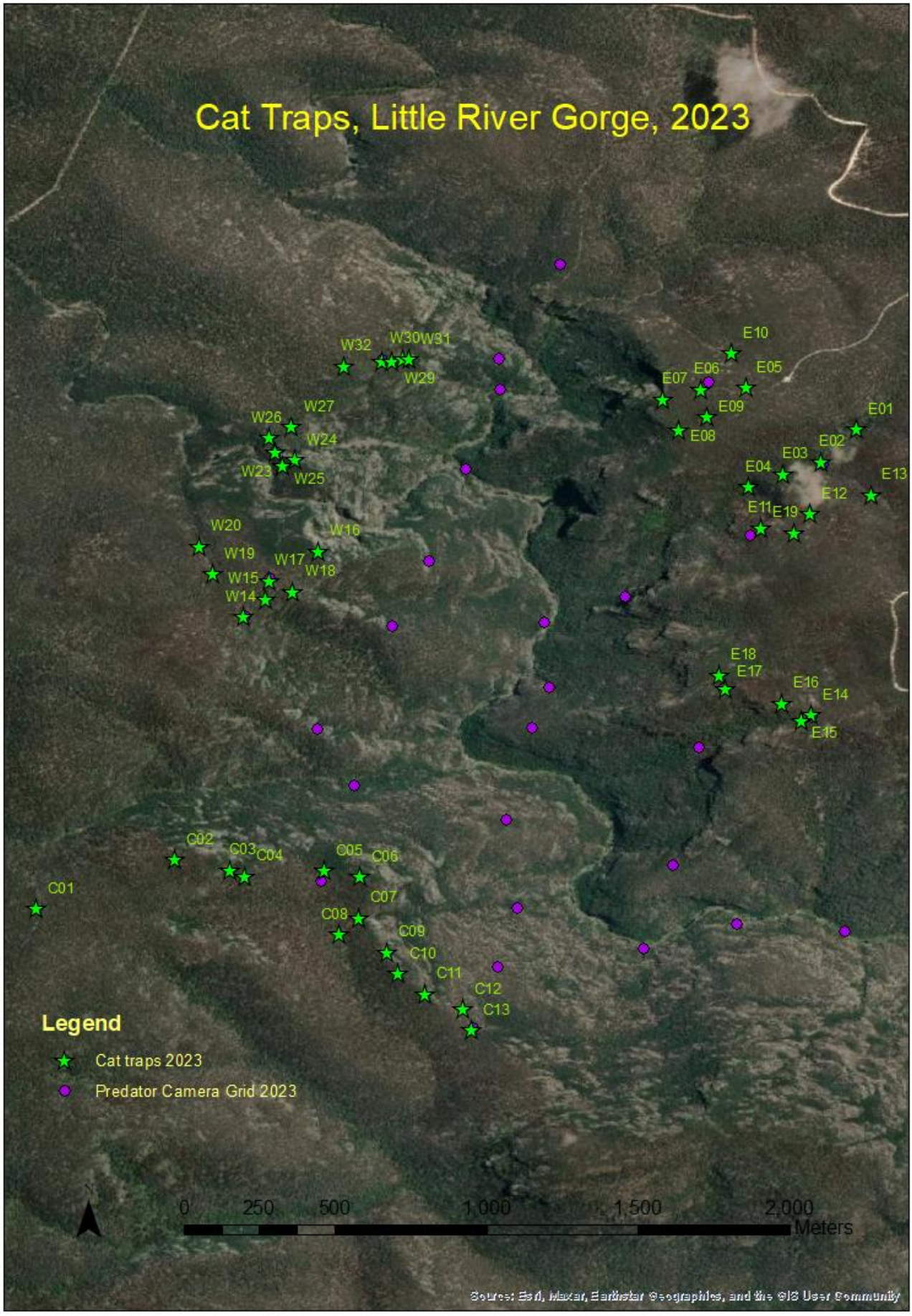
7. Continue intensified fox control and attempt cat-control until SBTRW begin to increase in number through natural recruitment. At his time check predator abundance levels and intensify control if predator numbers continue to occur above tolerable levels.

8. Continue to utilise a cross-tenure partnership based approach to project development and implementation to maximise the potential for management intervention success.

Appendix 1 Predator Monitoring Grid



Appendix 2 Cat trap locations 2023



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