# Artemis nature fund

artemis.org.au

Parrot colour-banding on Artemis.

L-R: Sue & Tom Shephard, Patrick Webster, Susie Adamczyk, Paul Barden and Steve Murphy.

## WELCOME

Happy New Year!

Welcome to another ANF newsletter. We have a lot to cover and so we have organised the newsletter into an overview section that includes a summary of the main achievements in 2022. We then present a detailed section which

provides a deeper dive into some of the more substantial achievements. You can jump to these parts using the various links throughout the document.

But first...

# THANK YOU!!

We achieved a lot in 2022 and, in no small part, it was because of the support from people like you. So thank you!

In 2022 we were also supported by the federal and state governments, as well as several key organisations.

Notably, we also received a generous donation from the estate of the late Len Robinson, in conjunction with Healesville Sanctuary. Len was one of the first people to ever visit Artemis to photograph parrots in 1970. Of the thousands of people to visit in the intervening years, Tom and Sue Shephard (Artemis Station owners) remember him vividly. This is partly because he photographed them at the Laura Races that year! Len's generous donation allowed us to purchase an all-terrain-vehicle for field work. Thank you to Peter Menkhorst for helping organise this support.

*Sue and Tom Shephard at the Laura Races in 1970 - photographed by Len Robinson.*

*Golden-shouldered Parrot photographed by Len Robinson.*

*Len photographing a Turquoise Parrot, Warby Ranges, 1980s.*

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## 2022 summary

In 2022 we continued our practical, on-ground actions to save Golden-shouldered Parrots on Artemis. Here is a break-down of what that looked like. Click the links for more information.

1. We actively managed 2950 hectares of parrot habitat. This included the manual removal of stems to restore vegetation structure to an open state across 49 ha at 8 high priority nesting sites. We also implemented a "storm-burn" across 2900 ha of parrot habitat.
2. Through monitoring, we discovered that the breeding success of parrots in 2022 was about half of what it was 20 years ago.
3. We continued colour-banding parrots to learn about movements, monitor individual survival and population size.

4. We tracked 12 individual butcherbirds to find out how they responded to habitat restoration.
5. We took detailed measurements of 100 termite mounds (parrot nests) to monitor how they respond to restoration. We also transplanted mounds to improve habitat quality.
6. We worked with the Queensland Government to expand the Nature Refuge on Artemis. Part of this agreement is a significant investment by the state government in new conservation actions on Artemis in 2023
7. We assisted the BBC Natural History Unit on a forthcoming wildlife documentary series. We can't share many details at this stage but it is a project with global reach and will put Artemis' Golden-shouldered Parrots into the homes of literally hundreds of millions of people.

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## How to support us

ANF's mission is to do practical, on-ground work to save endangered wildlife.

The habitat restoration work on Artemis Station is evidence that we are all about taking real action to solve conservation problems.

We rely upon donations and grants to be able to do this.

If you would like to make a donation, please visit our website

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Follow us on Facebook for regular updates throughout the year

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## Habitat restoration


*ANF staff member Henry Stoetzel removing invasive stems.*

Over the past few decades, parrot habitat on Artemis has become un-naturally thick with shrubs and small trees. This has allowed predators to kill an unsustainably high number of parrots. Follow this link to see a short video that explains more about the process.

Opening up habitat is the main action we are undertaking to reverse the decline of parrots on Artemis. In 2022, we restored the vegetation structure back to an open state by the manual removal of stems across 49 ha in 8 priority areas. This will drive down predation pressure thereby increasing nesting success and adult and juvenile survival.

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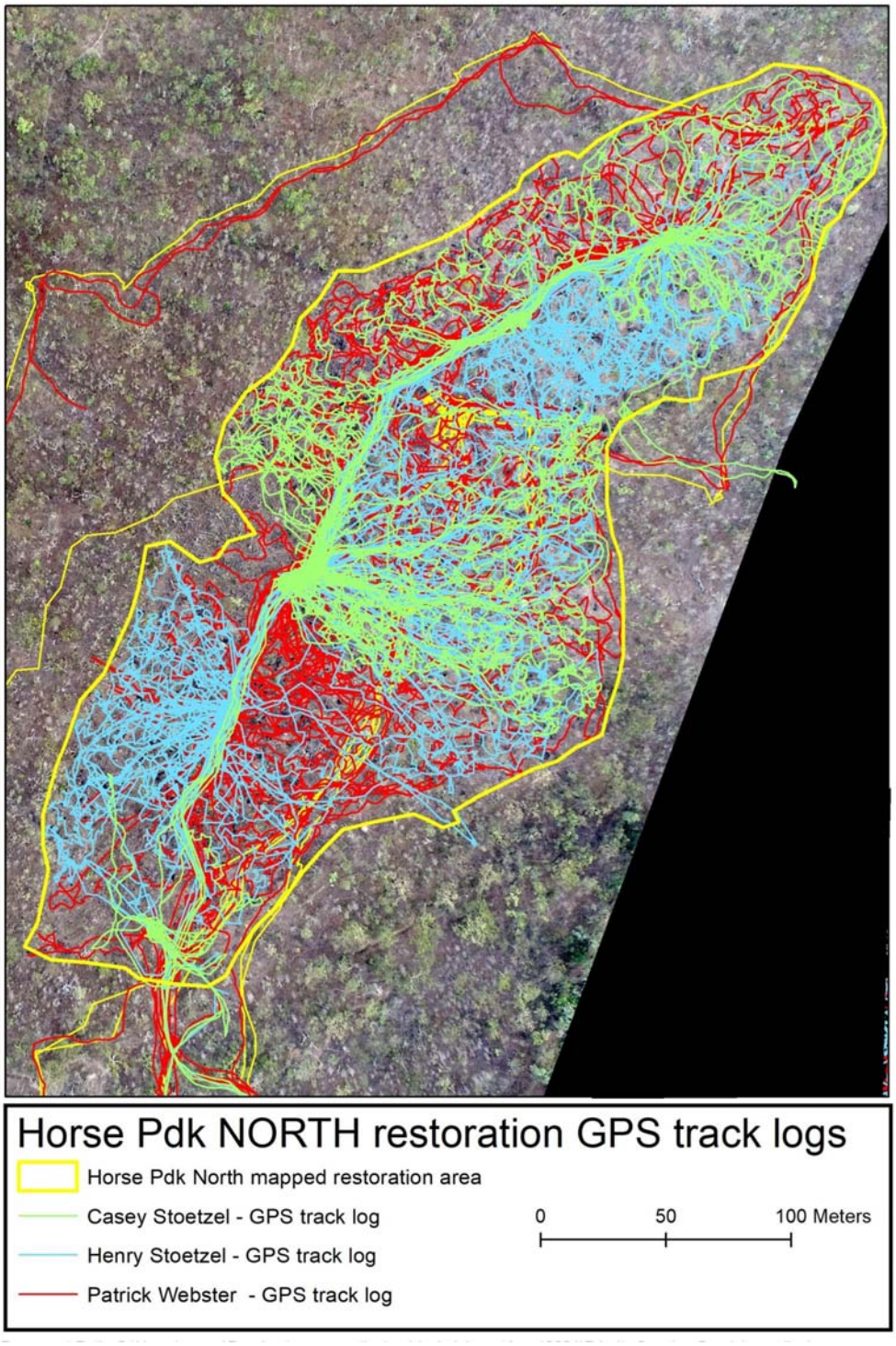


*GPS track logs at one site from Pat, Henry and Casey.*

The amount of work involved in removing stems from 49 ha was - in a word - large. Six people worked on between April and December, but it was really three ANF employees - Patrick Webster and brothers Henry & Casey Stoetzel - who did the lion's share in July. In July alone this trio clocked up ***235 km ON FOOT*** as they went about cutting tens of thousands of stems. And each stem was treated with herbicide to prevent resprouting. Vegetation management and

herbicide expert Geoff Messer made two visits to provide oversight and we are grateful for his on-going guidance.

*Before restoration.*

*Immediately after restoration.*

*Immediately after storm burn.*

*After 50mm of rain.*

A fly-through of the site shown in the above photos can be seen here.

Removing stems is the first step towards restoring parrot habitat to an open structure. Follow-up management is required to deal with fallen timber and the resprouting that will inevitably occur.

"Storm burning" is an important tool during follow-up management. This means applying fire with relatively high intensity just before rain. This helps to clean up the fallen timber from the clearing operations, which is important so that we can drive through the sites to do other follow-up management activities.

Among these activities is treating resprouting or newly germinated woody stems. In 2023 we will be refining methods to control resprouting. Among the tools we have to work with are various tree-specific herbicides applied either with a boomless nozzle system, back-pack sprayer or drone.

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## Storm burning

In addition to storm burning sites after they have received intense management attention, we also use it in areas before management to help with access, and also in areas that have not experienced woody thickening but need to be maintained in an open state.

In October, we lit a ~2900 hectare fire through parrot habitat in the central part of Artemis. Below are some photos, and here is a link to a short video.

*An intentional fire in Golden-shouldered Parrot habitat, lit just before forecast storms.*

*While it looks confronting at the time, storm burning is an important tool for managing Golden-shouldered Parrot habitat. It helps us get access and also maintains areas in an open state.*

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## 2022 nesting season

*"Windmill Creek Nest" 2022*

We need to monitor Golden-shouldered Parrot nesting success to ensure our habitat restoration efforts are having the desired effect of decreasing predation pressure. Here are the key facts from the 2022 nesting season:

- 16 nests were found during April and May 2022
- Of these, only 5 were successful giving a success rate of 33%. This is about half of what it was 20 years ago.
- All successful nests had some form of management attention (immediate area around nests cleared or all stems killed with tebuthiuron, but left standing).
- Of the 11 that failed, 4 had received management attention (immediate area cleared or entire nesting flat cleared), whereas the remaining 7 nests received no management attention. Some nests were only discovered when they had already failed.
- Adult depredation/death was attributed as the cause of failure for 3 nests.
- Predation of the nestlings by meat ants (sometimes following adult death) was the cause of failure for 3 nests. See photo below.

*Meat ant attack.*
*The 5 chicks in this nest were being raised by a single male - we assume the female was killed. One of the nestlings was much smaller than the others and we assume it died because the male couldn't provide enough food. Once dead, meat ants were attracted and they went on to kill the entire brood of chicks. We assume that the root cause of this was female predation, which we know to be more likely in thicker habitats.*

- The cause of the remaining 5 failures was unknown.
- Two nests were monitored intensively using camera traps. We limited this to two nests because we were trialling a new installation method for the cameras where they were set at ground level looking upwards. This was to limit the potential to attract predators, as would be the case if they were set higher off the ground. We plan to monitor more nests using this method in 2023.
- Of the two nests monitored with cameras, one was visited repeatedly by black-backed butcherbird/s and dingo/s. This nest was successful. The other failed for unknown reasons and no predators were recorded visiting this nest.
- We had a mystery at one nest, whereby the nest entrance was gouged out but the nestlings were unscathed. We installed metal bars to prevent further predation attempts and/or  to stop the nestlings falling out. No scratches were observed on the mound under the nest entrance, which

would be expected had the predator been a goanna. If it was a bird, we expect the nestlings would have been taken. It's a guess, but we think that a dingo is the only potential predator that could reach up and cause that damage without damaging the mound lower down, but the nest was just tall enough and the chamber deep enough to prevent the dingo from taking out the chicks. All 4 chicks went on to fledge on 30th May

*An unknown predator gouged out this nest's entrance but didn't take the chicks.*

*Metal bars installed across nest entrance to prevent predation.*

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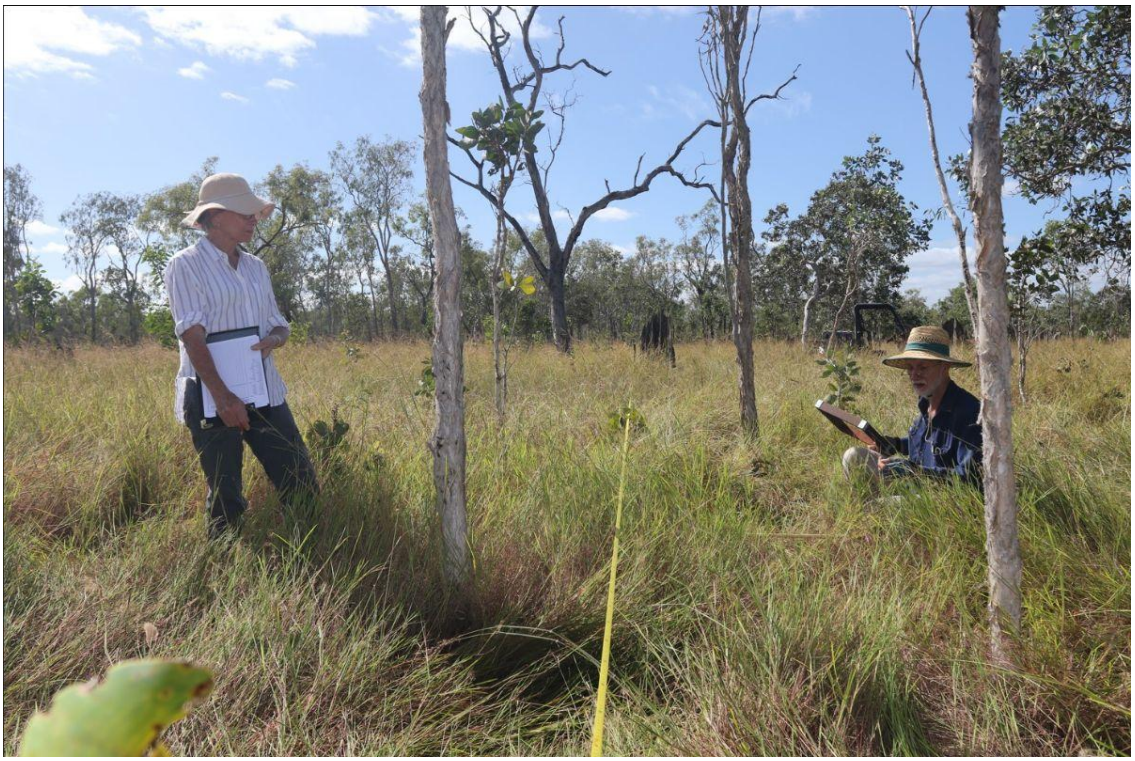
## Termite mounds

In the wild, Golden-shouldered Parrots only ever nest in termite mounds, and at Artemis, 96.7% are built inside conical (or witch's hat) mounds. The problem is that our survey work in 2021 showed that there are now significantly fewer mounds now than there was 20 years ago. And to make matters worse, we know so little about the ecology of these termites that we don't understand why they are declining.

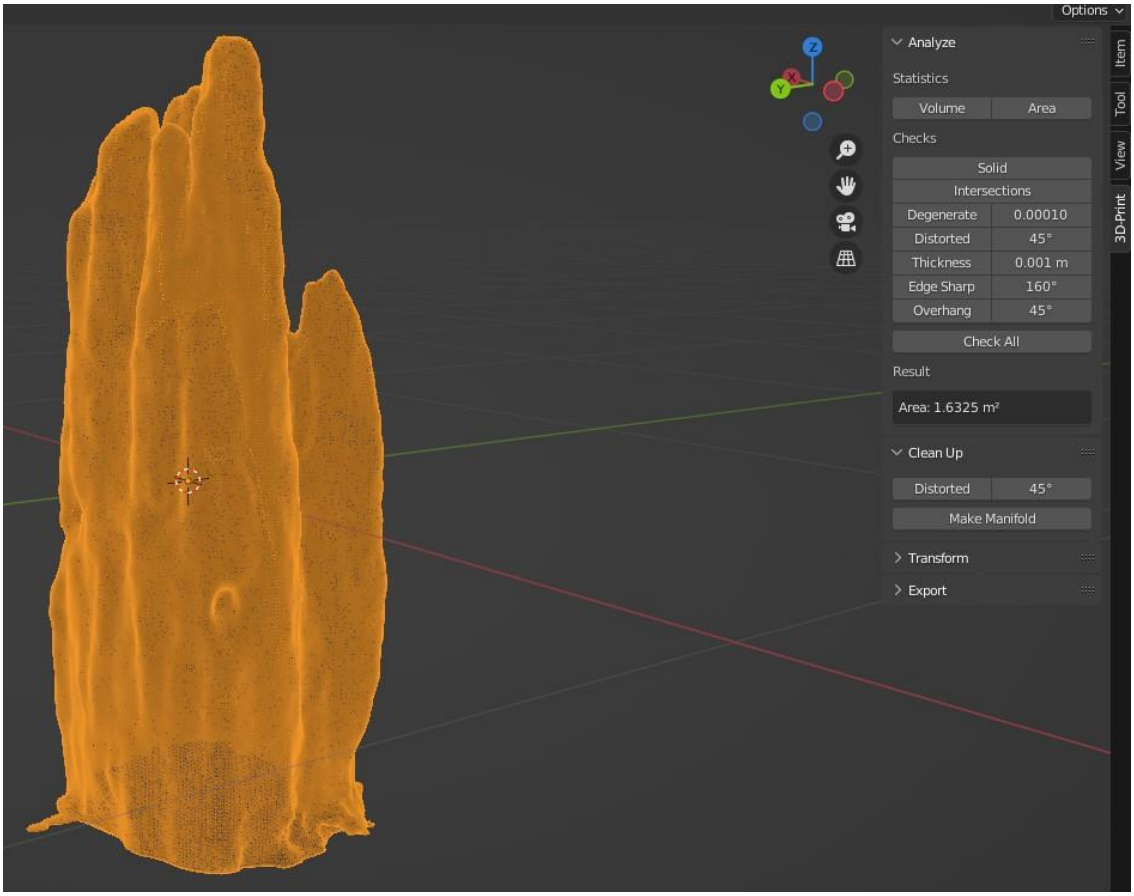


*Botanists Wendy Cooper and Rigel Jensen doing habitat surveys on Artemis in 2021. From this work, we learned that termite mounds are now significantly less common than they were 20 years ago.*

The leading theory about why termite mounds are declining is that it has something to do with the thickening process, and we have some tantalising anecdotal information that this might indeed be the cause: a year after we cleared around one nest we saw a large number of small mounds pop up.

*A rapid increase in the number of small termite mounds followed in the year after we cleared this area.*

To monitor how termite mounds respond to our habitat restoration work - and thereby test the theory that mound development and growth relates to thickening - we took detailed measurements of 100 mounds. We used LiDAR scanning to create 3-dimensional models of each mound which allows us to calculate surface area and volume accurately and precisely. About half the mounds are in areas we have restored, while the other half are from "control" areas that will not be restored for a couple of years. Following the growth rates of these mounds through time should tell us if we're able to fix the declining numbers of mounds by habitat restoration. In 2023, we will also be doing some high-tech investigations into what the termites are actually eating which will help us understand what's going on. Stay tuned for more about that later!




*3-D LiDAR scan of a Golden-shouldered Parrot nesting mound. Repeated scans over the years will allow us to track how the mounds change over time.*

So we know we have a problem and our habitat restoration work should provide a long-term solution. But to address the shortage of termite mounds in the short term, in December we trialled transplanting mounds. We took 14 mounds from areas where there are no parrots and moved them very carefully to places where there are currently parrots. We selected locations where we have restored habitat to an open structure to minimise predation risk if the mounds get used. This is an interim, emergency action designed to bolster the quality of breeding habitat. We can't wait to see how the mounds survive and if any of them get used by parrots in the 2023 breeding season. You can watch a short video of the transplanting process here.

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## The response of predators: Butcherbirds as a case study

The encroachment of trees and shrubs into open habitats has been good news for some predatory species, especially those that use ambush tactics to capture their prey. Think Pied and Black-backed Butcherbirds, Brown Goshawks and Collared Sparrowhawks.

*Collared Sparrowhawks are one ambush predator that has probably done well from the habitat thickening on Artemis.*

There are times in the lives of Golden-shouldered Parrots which make them vulnerable to predation - females with their heads up tunnels in termite mounds, chicks as the emerge from the nest for the first time and parrots of all ages as they feed, head down, in the grass layer. To be able to survive these risky times, the parrots need to be able to see predators coming. The problem with thickening is that the time they have to take evasive actions has been drastically reduced; so much so that ambush predators are taking an unsustainably large number of parrots.

*Female Golden-shouldered Parrots are especially vulnerable to predation when they are excavating nests.*

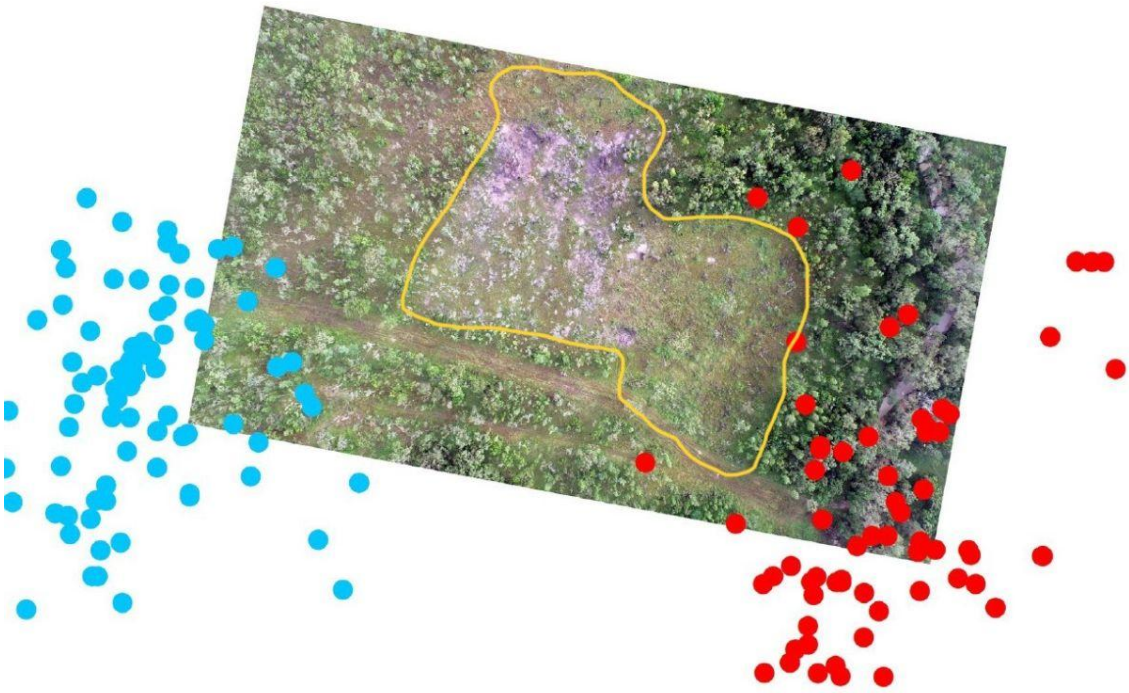
Hence why the restoration of parrot habitats to an open structure is our number one priority on Artemis. But there are differences in the way we go about restoring habitats and each of these may have different impacts on predation risk. For example, there are differences in the degree to which areas are opened up (e.g. complete stem removal versus thinning). There are also differences in the techniques used to kill invading stems (e.g. instant stem removal with saws versus using herbicides that kill trees but leaves them standing). There is also the question of scale: we sometimes clear relatively small areas around active nests and at other times we remove stems over much larger areas.

*Different habitat management techniques have different results. The blue outline shows areas where stems have been cut down and the red outline shows an area where the trees have been killed but left standing. We are doing research into how predators respond to these different outcomes.*

We are measuring the response of two key parrot predators (Black-backed and Pied Butcherbirds) to habitat restoration. We want to know if we can change where the butcherbirds spend their time through restoring habitat to an open structure. If birds remain in an area after restoration, we want to know if we have forced them to change their behaviour (e.g. do they need to hunt more, over a larger area?). Both of these responses have implications for the predation risk butcherbirds pose to parrots.

*Steve Murphy and Pat Webster fitting a GPS tracked to a Pied Butcherbird in September.*

In 2022 we tracked 4 Black-backed Butcherbirds using standard, store-on-board GPS tags which generated 342 GPS points. All of the birds were captured immediately adjacent to areas that had already been restored. The key finding was that none of the tagged black-backed butcherbirds entered into the areas that we had previously restored.



*Tracking data from two Black-backed Butcherbirds (red and blue dots). Despite being caught immediately adjacent to the restored areas (yellow outline), neither bird used the areas.*

While the results from the Black-backed tracking were very encouraging, the limitation is that we don't know where the birds were spending their time before habitat restoration. We haven't actually demonstrated a change in home range, just that none of the birds used the restored areas (maybe they never did!).

A better experimental design would be to collect data from birds before and after restoration, which is exactly what we did with Pied Butcherbirds. Being larger, Pieds can carry larger and more sophisticated tracking tags. These tags have the amazing ability to send data directly to our computers (using a short range radio signal) and even collect information about the birds' behaviour! In 2022 we collected the pre-restoration data for 8 Pied Butcherbirds, which included 2,532 GPS points and 281,004 behavioural (triaxial) data points. The

triaxial data points are the X, Y & Z movements every second of a sampling period that is tied to a known GPS location. From these data, we will be able to estimate the behaviour of each butcherbird and relate that to where it was at the time.

After the initial pre-management tracking periods we went on to modify the home ranges of half of the birds using our habitat restoration tools. The other birds were left un-altered so we have a "control" group to help us interpret any observed changes in the "treatment" group. We can't tell you how this story ends yet, because we have to repeat the tracking later in 2023 using the same birds at the same time of year (Sept-Oct). So stay tuned!!

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## In 2022, ANF received valuable support from the following institutions:

Australian Government

Department of Climate Change, Energy, the Environment and Water

RARES

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