What did we learn from the 2016 Ninu Festival?

Acknowledgements

The 2016 Ninu Festival was hosted by Kiwirrkurra Community on behalf of the Indigenous Desert Alliance, a network of Indigenous land management groups who operate across the deserts of Western Australia, South Australia and the Northern Territory. The idea for the Ninu Festival was conceived at a National Bilby Summit held in Queensland in March 2015, and fully supported by the National Greater Bilby Recovery Team.

The 2016 Ninu Festival received financial support from the Australian Government's National Landcare Programme, The Nature Conservancy, PEW's Country Needs People campaign, Taronga Zoo, Save the Bilby Fund, Bush Heritage Australia, the WA Department of Parks and Wildlife, Rangelands NRM, Territory NRM and Dreamworld. In-kind support was provided by University of Adelaide's Conservation Drones Australia, Arid Lands Environment Centre, CSIRO, NT Department of Land Resource Management, WWF, Environs Kimberley, Central Desert Native Title Services, Tjamu Tjamu Aboriginal Corporation and Desert Wildlife Services.

Logistical organisation of the Ninu Festival was coordinated by Rachel Paltridge, Kate Crossing and Imogen Semmler with assistance from Tom Griffiths and Jess Cuneo. Fiona Walsh was the Facilitator of the Festival and Jimmy Cocking provided technical support. Dave Nixon and Shane Mulcahy captured video footage of the event and produced a 13 minute film.

Artwork used on the poster and T-shirts was supplied by Stephanie Limbiari from Ulpinyali Community, Northern Territory with design work by Ingeous Studios.

Ninu Napurula and friends visit Kiwirrkurra community members during the Ninu Festival

This report was compiled by Rachel Paltridge, Desert Wildlife Services, October 2016

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Sally Napurula Butler visited the Alice Springs Desert Park to promote the Ninu Festival at Easter time

Why hold a Ninu Festival?

The Bilby is an iconic Australian marsupial threatened with extinction. Having already disappeared from 80% of its former range, the majority of its key wild strongholds now occur on Aboriginal owned and managed lands across central and north-western Australia.

A national Greater Bilby Summit held in Queensland in March 2015 recognised that mobilising the support and knowledge of Traditional Owners offered one of the greatest opportunities for sustained on-ground conservation action for the Bilby in the wild[1]. To support this goal a key recommendation of the Summit was to hold an inclusive knowledge sharing forum for Aboriginal ranger groups operating across the Bilby's range. This idea came to fruition in June 2016 when the inaugural Ninu[2] Festival was held over four days on Bilby country on the Kiwirrkurra Indigenous Protected Area, in the remote Gibson Desert of Western Australia. The Ninu Festival brought together Indigenous Ranger Groups, scientists, government agencies, research institutions and philanthropic conservation organisations to share knowledge and stories and discuss the future of the Bilby.

Aims

The key objective of the 2016 Ninu Festival was to harness traditional and contemporary knowledge about the Bilby and its threats to produce a framework for effective, collaborative management of wild Bilby populations across Australia. By introducing Aboriginal land managers to new technologies and methods, and researchers to Aboriginal priorities and strengths, the Ninu Festival aimed to facilitate Indigenous-led strategic management of threats (especially fire and feral predators) to reverse the decline of the Bilby across its range.

Specific Aims of the 2016 Ninu Festival were to:

- celebrate the cultural significance of Bilbies to Indigenous Australians and reinvigorate enthusiasm for monitoring and managing this species
- increase awareness of the continuing decline of Bilbies
- improve knowledge of the current distribution of Bilbies across Australia
- highlight the importance of Indigenous Rangers in Bilby Recovery efforts
- discuss monitoring methods and encourage a standardised approach to monitoring Bilbies
- discuss and demonstrate the range of predator management techniques available
- discuss appropriate fire management options for Bilbies in different habitats

[1] Bradley, K. et al. (2015) 2015 Greater Bilby Summit and Interim Conservation Plan, Save the Bilby Fund.
[2] Ninu is the name used for Bilby in Pintupi, the local language spoken at Kiwirrkurra

Scope of this Report

This report aims to distil the information presented at the 2016 Ninu Festival into a snapshot of current knowledge about where Bilbies live, what they eat and the work that Indigenous Rangers are doing to promote their recovery. It summarises the range of options available for monitoring and managing wild Bilby populations that were discussed and demonstrated at the Ninu Festival and provides recommendations for future recovery efforts.

The report was collated by Rachel Paltridge through funding from Territory Natural Resource Management but is based on information provided by the 170 participants at the Festival.

Whereas this document is written primarily as a practical manual of technical information, a second complementary report by Fiona Walsh will focus more on the cultural aspects of the Ninu Festival and explore the significance of Bilbies to Traditional Owners.

Other perspectives on the 2016 Ninu Festival have been captured

- On film

  Ninu Festival 2016 documentary by Shane Mulcahy and Dave Nixon https://youtu.be/tM3pNe9UBBQ
  Territory NRM goes to the Ninu Festival by Jen Kreusser http://www.territorynrm.org.au/single-post/2016/07/18/VIDEO-TNRM-goes-to-the-Kiwirrkurra-Ninu-Bilby-Festival
  From the Bilby Festival – why the Bilby's worth celebrating by the Threatened Species Commissioner, Gregory Andrews https://youtu.be/XOC2IP0oXwM

- In blogs by

  First Dog on the Moon
  Vanessa Westcott
  Country Needs People
  Anja Skroblin
  Stuart Dawson

- Through radio interviews

  Radio National
  ABC Alice Springs
  ABC Broome
  ABC Port Hedland

- In Facebook Posts
  Central Desert Land and Community
  Tjamu tjamu Aboriginal Corporation Kiwirrkurra

Who Came to the Ninu Festival?

Ranger Groups

Central Desert Native Title Services
- Kiwirrkurra Rangers
- Birriliburu Rangers

Kanyirninpa Jukurrpa
- Punmu Rangers
- Parnngurr Rangers

Ngaanyatjarra Council
- Blackstone Rangers
- Warburton Rangers
- Warakurna Rangers
- Tjirkarli Traditional Owners

Kimberley Land Council
- Ngurrara Rangers
- Karajarri Rangers
- Nyul Nyul Rangers
- Gooniyandi Rangers
- Paruku Kumirrki Rangers

Nyamba Buru Yawuru Ltd
- Yawuru Country Managers

Central Land Council
- Warlpiri Rangers – Nyirripi
- Warlpiri Rangers - Willowra
- Warlpiri Rangers -Yuendumu
- Lajamanu Rangers
- Muru Waranyi Ankkul Rangers
- Anmatyerr Rangers
- Kintore Traditional Owners

Yamatji Marlpa Aboriginal Corporation
- Nyangumarta Rangers

Goldfields Land and Sea Council
- GLSC Rangers – Kalgoorlie/Norseman

APY Land Management
- Warru Rangers

Narran Lakes Nature Reserve
- Ullaroi and Wiradjuri Traditional Owners

Other Institutions

Save the Bilby Fund
Adelaide University
Murdoch University
Charles Darwin University
Melbourne University
Territory NRM
NT Dept of Land Resource Management
WA Department of Parks and Wildlife
DoE – Threatened Species Commissioner
Bush Heritage
CSIRO
Arid Lands Environment Centre/Ten Deserts
Environs Kimberley
WWF
The Nature Conservancy
Envisage Environmental Services
Ecological Horizons
Desert Wildlife Services
Taronga Zoo
PEW/Country Needs People
Desert Vision Productions

Sharing Indigenous Knowledge and Practice

The Ninu Festival began with a welcome ceremony at a Bilby dreaming site – Tjitururr. Kiwirrkurra Community leader Mr Jimmy Brown welcomed visitors to the Ninu Festival and joined other Traditional Owners in sharing part of the song for the site. Visitors were invited to break off fresh leaves and place them in a cave resembling a giant Bilby burrow entrance.

Traditional Owners from Kintore and Kiwirrkurra leading visitors to a Bilby dreaming site, Tjitururr, a cave that resembles a giant Bilby burrow entrance.

Part of the story for this site was recorded in 2000, from Kumantjayi Ward, Nolia's husband. The simple version of the story is included here to demonstrate the level of ecological information that can be gleaned from a dreaming story. This Ninu Tjukurrpa story accurately describes some of the main food resources for Bilbies in the Kiwirrkurra area as well as providing some information on breeding behaviour.

> "Ninu travels through his country digging for lunkunpa[3] as he goes. After he's had enough lunkunpa he finds some puntjali[4]. Then he moves on to look for a woman. When he finds a woman they sit down together in the same hole. They dig for yudunpa (termites). They move to another area and have two daughters. The family continues travelling and searching for lunkunpa and yudunpa. They travel from Kiwirrkurra to Muruwa and Tjitururr. Then they become weak from walking so far so they have some more lunkunpa and then go inside their hole to sleep".

[3] lunkunpa = witchetty grubs in the roots of *Acacia melleodora* shrubs.
[4] puntjali = smaller witchetty grubs found in the roots of *Indigofera georgei*

Throughout the Ninu Festival participants shared language names and cultural knowledge about Ninu including tjukurrpa (dreaming) stories and information about how Bilbies were used by previous generations of Aboriginal people.

The name Bilby is derived from the Ullaroi language name for Bilby – Bilba. Other names volunteered by participants in the leadup to the Ninu Festival were printed on the Festival T-shirt. Extra names captured during the Festival include Mirtuluju, Muntalgnaku and Nyarlgoo.

Some Traditional Owners at the Bilby Festival have the Bilby as their totem. Others mentioned looking after Bilby dreaming sites on their country. The Ngaanyatjarra Rangers spoke of an expedition they undertook through the Gibson Desert following the Ninu tjukurrpa songline. Traditional Owners from the Kimberley told the Walmajarri story of the ancestral Bilby taking the pearlshell from the freshwater of Paruku (Lake Gregory) to the saltwater at Broome. A Traditional Owner from Kalka in South Australia described the importance of Ninu Tjukurrpa in his community, despite the physical loss of this species from South Australia.

It was clear that no one hunts Bilbies to kill them anymore but many people had stories of eating them in the past in the pujiman (pre-contact) days, when Bilbies were more common. People also spoke of using their tails to adorn their hair and beards, spinning fur into hairstring belts and wearing their legbones through the septum in their noses.

"We have to save the Bilby because we'll be saving ourselves and our kids. The Bilby is us" Nardi Simpson, Yuwaalaraay Traditional Owner from NSW.

"Its just a part of me. It makes my feeling so happy that he's on the country and I'm with him…its my connection with the country – me and the Bilby got one country" Rita Cutter, Birriliburu Traditional Owner.

These quotes are from the Threatened Species Commissioner's video: Why the Bilby is worth celebrating. Further details about the relationship between Indigenous people and the Bilby can be found Fiona Walsh's report on the Ninu Festival.

Where do Ninu Live?

Bilby Distribution

When assessing the conservation status of a species, the criteria used to determine whether it is threatened with extinction are based on population size and geographic range (measured in terms of area of occupancy and/or extent of occurrence). For a species as widely distributed as the Bilby monitoring its geographic range is a more achievable method of determining whether the species is declining, than trying to measure its population size.

Various maps have attempted to portray the geographic range of the Bilby across Australia but the remoteness and sparse human population across most of the Bilby's distribution coupled with the challenges of detecting this species, lack of resources for surveys and low reporting rates of data collected have thwarted efforts to produce accurate distribution maps. The Ninu Festival presented an opportunity to improve current mapping by documenting local knowledge from people living on country, and encouraging people to submit confirmed location records to state and national databases.

During the festival Rangers were asked to include distribution information in their presentations, and transfer knowledge of active Bilby locations onto regional maps.

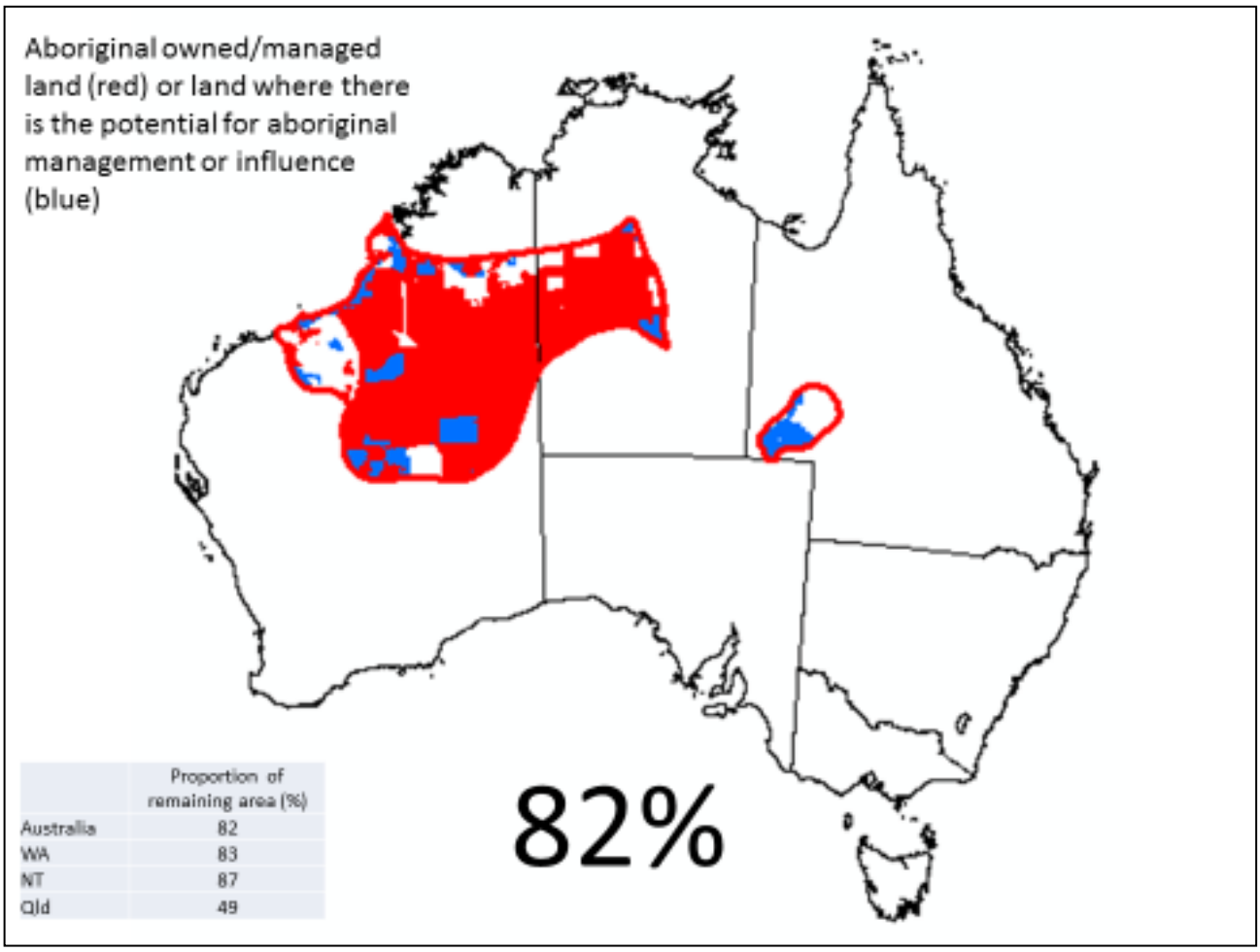
This information was used to refine the known boundary of the current distribution of the Bilby in Western Australia and the Northern Territory.

Martu Rangers from Kanyirninpa Jukurrpa and Birriliburu join forces to map the distribution of Bilbies in the Great Sandy and Little Sandy Deserts.

Saving the Bilby: Recognising the importance of Indigenous Land Management – Vanessa Wescott

Vanessa Westcott (Bush Heritage), who works with the Birriliburu Rangers, gave a presentation on the extent of current Bilby distribution that occurs on Indigenous Lands. Her analysis revealed that 70% of the current range of the Bilby is on Indigenous owned or managed land, and a further 12% of Bilby distribution overlaps tenure that is either under native title non-exclusive possession or co-managed with Parks and Wildlife.

Vanessa concluded that because Aboriginal people are responsible for managing the majority of the Bilby population in Australia, it is Indigenous Rangers that need to be recognised, funded and supported as the key players to carry out vitally important work to save the Bilby from extinction.



from Vanessa Westcott's presentation. Note the boundary of the current Bilby distribution in NT and WA has been adjusted since the Bilby Festival to reflect Traditional Owners knowledge of the 2016 geographical range.

Sharing the Data

Data Sharing and Sensitivity – Thalie Partridge

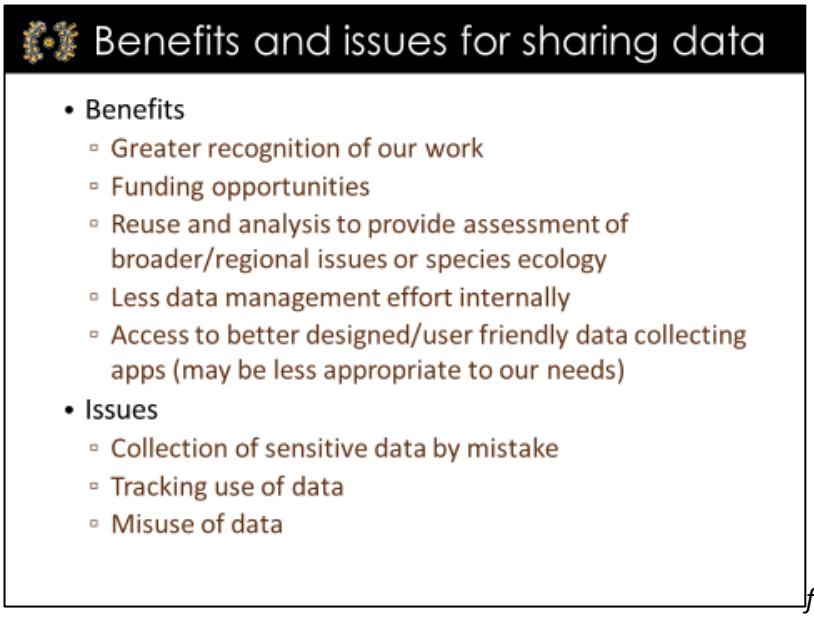
Thalie Partridge is a Land Resource Information Officer with the Central Land Council. She is responsible for collating all the Bilby (and other fauna) records from across the CLC region into a system that is useful for Traditional Owners and Rangers out on country. Thalie talked about the benefits and issues of sharing biological data that rangers collect with the government and other users.

It was suggested that there are some situations where the precise locations of threatened species may not be appropriate to share with other users, but it is possible to generalise locations of particularly sensitive records.

In most cases the benefits of sharing data with other researchers and managers are likely to outweigh any negatives. Contributing Bilby data to a national database will give Rangers an opportunity to view their data in a broader context. Submitting records to state and national databases will also give policy makers a more accurate idea of how important Indigenous lands are for threatened species, and the critical role that Indigenous Rangers play in biodiversity conservation. Improved knowledge of threatened species distributions should help Rangers attract more funding in the future, and also strengthen the chance threatened species populations can be protected from impacts of development.

Thalie is advocating for a custom built app that can be used by all Indigenous Ranger Groups across the range of the Bilby to collect consistent Bilby monitoring data using a standardised method. Ideally a portal would be set up where rangers could submit their data and retrieve it back again in a user-friendly format of maps, tables or basic statistics.

The Indigenous Desert Alliance is looking into development of a Bilby monitoring app and data portal for the benefit of all ranger groups.



from Thalie Partridge's presentation

Monitoring Ninu

Monitoring Introduction by Rachel Paltridge

Monitoring is checking how something is going. Monitoring lets us know if things are going downhill and we need to try to make some changes. We can monitor Ninu by checking where they are, and how many there are in a given area. If our monitoring suggests Ninu are declining, we might need to ramp up our management efforts.

Some reasons for monitoring Ninu are:

- To find out if they are still disappearing across Australia
- To check how well our individual management programs are working – is the burning or cat hunting we are doing making any difference or do we need to more, or less?
- To demonstrate to other ranger groups trying to manage the same issues that management its worthwhile and it is possible to make a difference
- To show our funding bodies that the money they give us is being well spent.

Monitoring can occur at three scales:

- at the continental scale. This will address questions such as is the range of the Bilby still contracting from the south, and at what rate? How does the distribution of the Bilby relate to the distribution of foxes and rabbits?
- at the level of the IPA or a group's management area. This will help individual ranger groups work out where the priority areas for Bilbies are on their IPA, and get a broadscale baseline frequency of occurrence of Bilby sign across the IPA
- at the scale of an individual management site where rangers are doing specific management of fire or feral animals, and want to know whether their management is having a positive or negative impact on the local Bilby population at that site.

Different monitoring methods are more appropriate for different scales of monitoring. Whereas we might just want to know presence or absence information at sites at the broadscale level, at the management site level we need more quantitative information on abundance of Bilbies at that site.

At the Ninu Festival we explored a variety of monitoring methods from collating Traditional Knowledge of where people have come across Bilbies, to formal tracking surveys still based on Traditional tracking skills, to the latest developments in Drone technology, genetic fingerprinting and camera traps.

Monitoring Ninu - Mapping and Recording Local knowledge

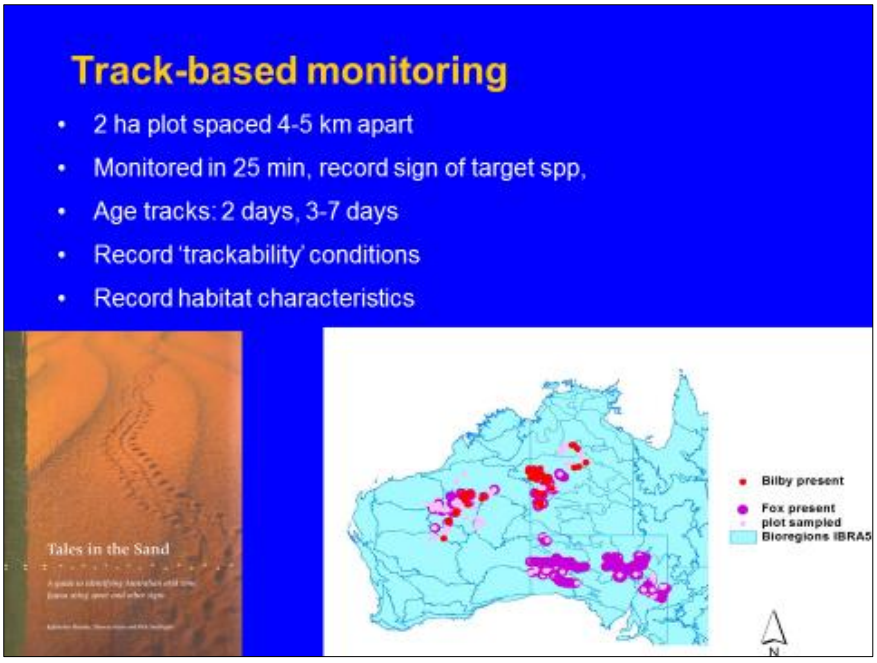
Often the most productive way of finding where Bilbies currently occur is to talk to the elders, or other active hunters in the community about where they have come across Bilby tracks, both recently and in the past. Most Ranger groups use this as a starting point for their surveys. If rangers visit the sites they have been told about and get the GPS point, this data can be accurately mapped and stored in databases. Kanyirninpa Jukurrpa (KJ) have come up with an innovative method of displaying known Bilby sites and other data: a massive "live" map in the community where new information can be immediately displayed for everyone to see and update as new information becomes available.

From the KJ presentation on Tuesday:

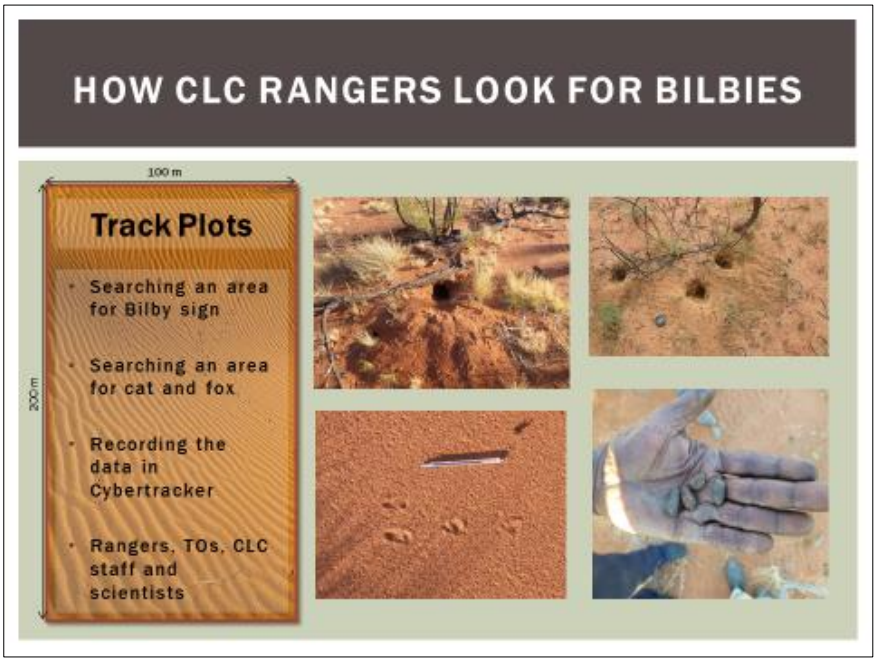
The only issue with relying solely on Traditional Knowledge of where Bilbies are is that gradually over time people may spend less time out walking around on country, and if less country is covered by hunters the number of known sites around a community may diminish, even if there is no decline in Bilbies. For this reason, we also need additional monitoring methods to complement the Traditional Knowledge, that can be consistently applied well into the future and are independent of hunting effort. Martu Rangers also use tracking plots to monitor Bilbies on the KJ Native Title determination.

Track-based Monitoring – Rick Southgate

Rick Southgate gave a history of Bilby monitoring, from his early days in the 1980s of mapping the historical distribution of Bilbies by interviewing Aboriginal informants and collating locations of museum records, to the development of the more systematic track plot method in the 1990s. Initially a 6ha plot, the plot size was refined to 2ha in 2006. Each randomly selected 2ha plot is sampled for 30 person-minutes, thus one person searches for 30 minutes, 2 people for 15 minutes and 3 or more people for 10 minutes. Further details on how to survey a plot, and other habitat variables to monitor are given in Moseby et al. (2008)[5].



From Rick Southgate's presentation



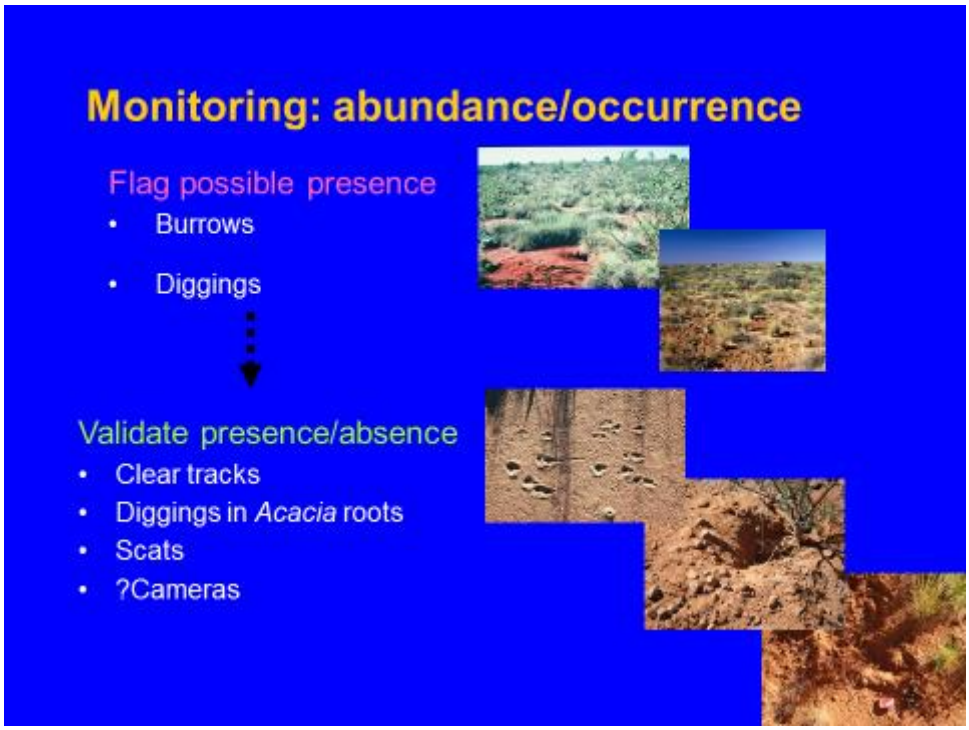
From the CLC presentation

[5] Moseby, K., Nano, T., and Southgate (2008). Tales in the Sand. A guide to identifying Australian arid zone fauna using spoor and other signs.

Advantages of the track plot method are that other threatened species (mulgara, great desert skink) and threats such as feral animals are simultaneously monitored and it is a repeatable, systematic method of surveying a broad area in a relatively short period of time. Combined with local knowledge of the whereabouts of Bilbies, this is an ideal method of broadscale distribution monitoring, to get a snapshot of current distribution of not only Bilbies but also rabbits, foxes, camels and a range of other threatened species and large game species (kangaroos, emus, bustards) across the country.

Many Indigenous Rangers possess superb tracking skills, and even people with limited experience in the identification of tracks often have excellent observational skills. Thus the track plot method of Bilby monitoring builds on people's strengths, and ensures the younger generation of rangers are not losing the art of tracking.

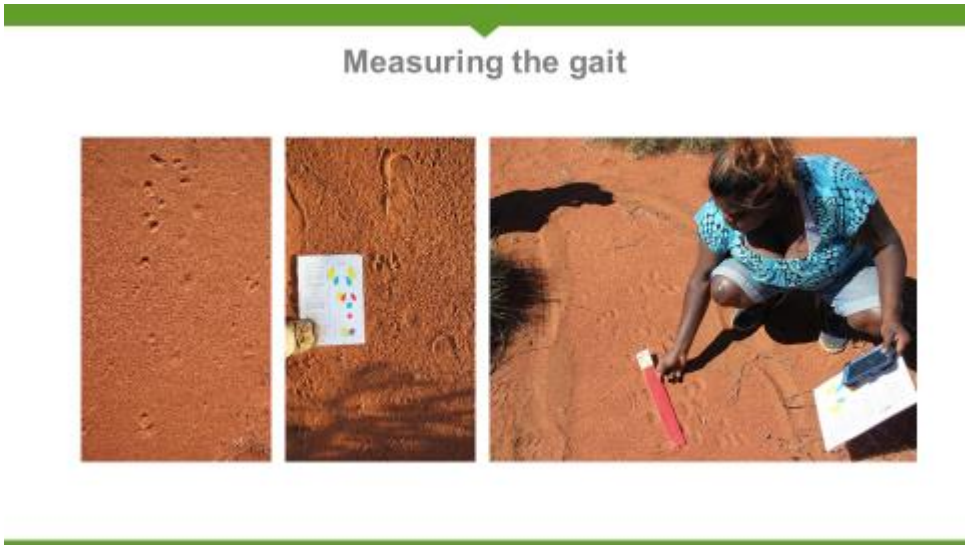
Although Bilbies leave quite conspicuous sign of their presence, Bilby tracks can be confused with rabbit tracks, and diggings and burrows made by rabbits and goannas can sometimes resemble Bilby diggings and burrows. Rick stressed the importance of confirming possible Bilby burrows and diggings by searching for Bilby scats, diggings for witchetty grubs in the roots of known host plants, or clear tracks that show the individual claws. Motion-detector cameras can also be used to validate potential Bilby sign.



from Rick Southgate's presentation

Some Ranger Groups are recording more than just presence or absence of Bilby sign at a site, but using track gait measurements to work out the number of different size classes of animals at the site. Scat size can also be used to identify presence of juveniles at sites. The range of sizes of tracks and scats at a location can distinguish between 'an old man wandering through country' (population sink) or the conditions are good and breeding is happening (population source).

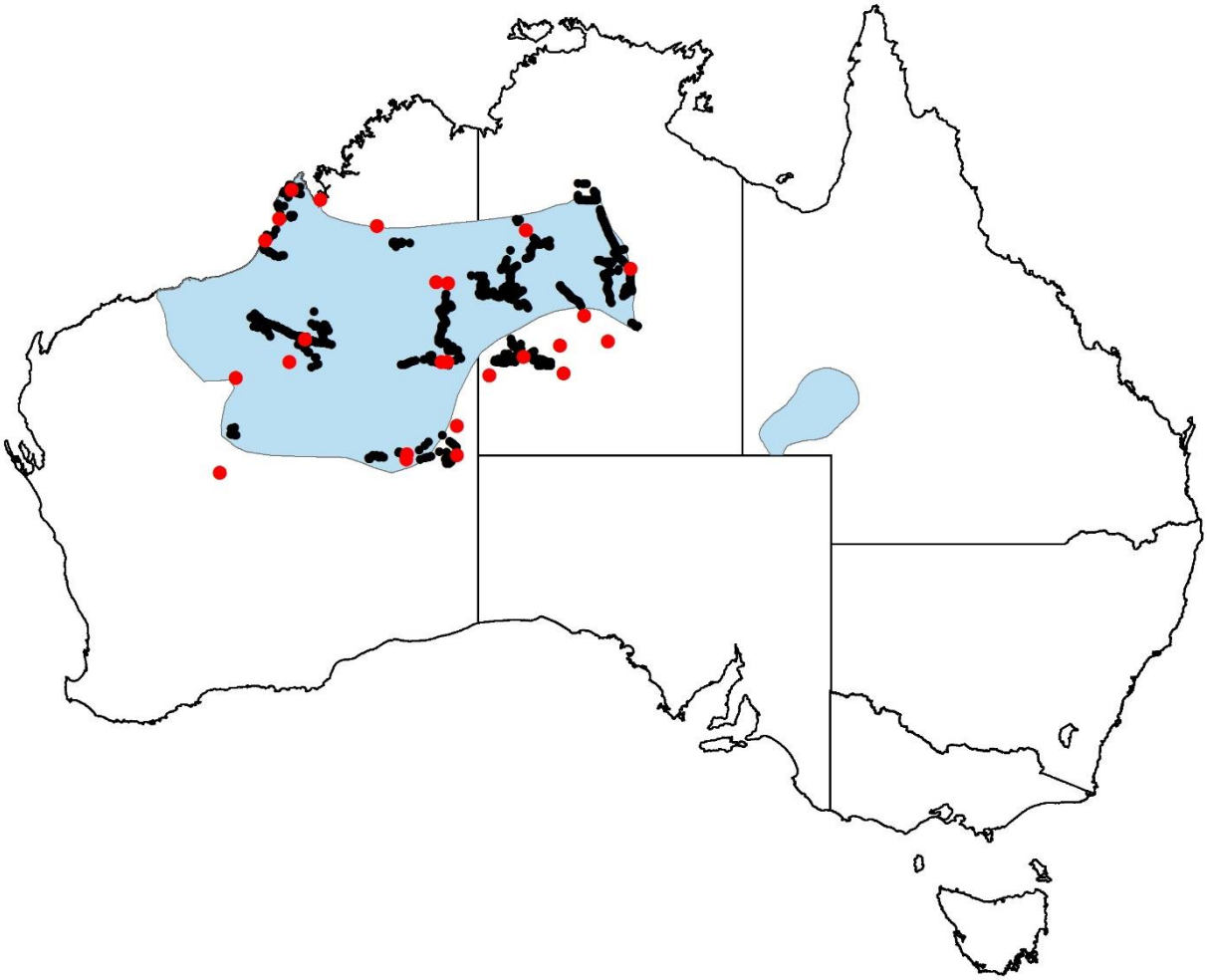
A range of different sized Bilby scats, of varying degrees of freshness (from the Kiwirrkurra presentation)



Punmu Rangers measure the length and width of a series of sets of Bilby tracks to work out if it's an adult male, adult female/young male, or a juvenile. (from the KJ presentation).

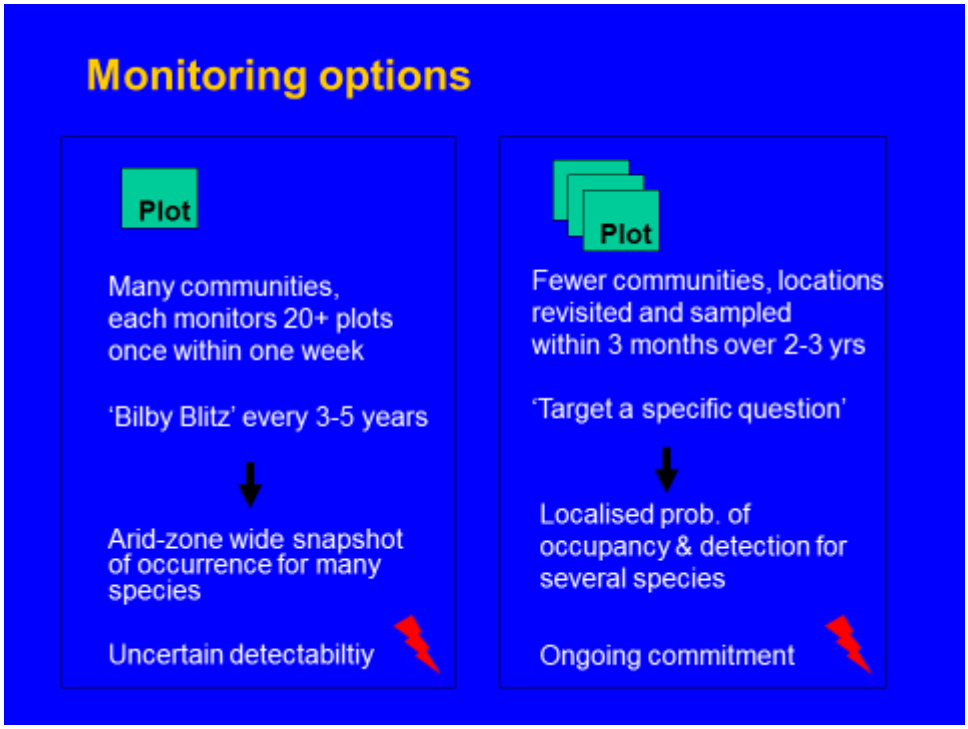
Who's using the track Plot Method?

Many Ranger groups have already been using the track plot method to establish baseline data on Bilbies. Extensive track plot surveys have been carried out by Central Land Council's Ranger groups and KJ's Martu Ranger Groups. Ngaanyatjarra Rangers, Kiwirrkurra Rangers and Birriliburu have also surveyed numerous tracking plots and the Kimberley groups are also starting to use this technique, although tracking is often more difficult on their country. The track plot method is also used for monitoring programs in W.A. and S.A. outside the range of the Bilby. Information from areas of their former range is important to provide comparisons of threat levels with areas where Bilbies have persisted.



This map shows the distribution of Ranger Groups across the range of the Bilby (red dots) and some of the track plot sites (black dots) that have already been sampled at some time during the past ten years. There are actually more survey sites in the KJ region and also the Kimberley, but the map indicates the broad coverage of country that can be monitored by Indigenous Rangers. The map can also be used to identify knowledge gaps for future surveys – e.g. the southern edge of the range between Warburton and Wiluna, the northern edge of the range across the Kimberleys and the western edge of the range through the Pilbara.

Interpreting and Analysing the data collected from track plots



From Rick Southgate's presentation

Rick suggested that plots can be done in two ways –

- one off sampling of many plots every 3-5 years to get a snapshot of distribution
- repeated sampling of a smaller number of plots to get more accurate information on how detectable Bilbies are, and the probability that they are actually absent from the vicinity of a plot where an absence is recorded.

Dr Anya Skroblin from the University of Melbourne is working with KJ to analyse the track plot data that they have already collected and help refine the monitoring to be conducted by Martu. Her work may provide some recommendations for groups to incorporate when designing a monitoring program, and help with analysing data.

Potential to use drones for Bilby Surveys - Adam Kilpatrick

Unmanned aerial vehicles (UAVs) also known as drones, are increasingly being used for wildlife surveillance and biodiversity monitoring. Drones present an opportunity to conduct broadscale Bilby monitoring in remote and inaccessible areas.

Adam Kilpatrick from the University of Adelaide's Unmanned Research Aircraft Facility gave a presentation and field demonstration on the potential use of drones to survey Bilby sign. In the photograph below a cluster of Bilby diggings is clearly visible from a height of 20m. Adam captured images of this Bilby site at Kiwirrkurra from 10, 20, 60 and 120m. Although the diggings were still visible from 120m (when the image was zoomed in on the computer), he considers 60m to be the optimum height to balance image quality with field of view and air safety requirements.

Image of Bilby diggings captured by Adam Kilpatrick during Tuesday's field activities at the Ninu Festival

Under current Air Safety regulations drone use is primarily limited to operating within the range of Visual Line of Sight (VLOS) due to the potential risk of collisions with aircraft. Depending on the size and lighting on the drone, VLOS can be from 500m to several kilometres. Small drones, which can only operate within 500m, and have a maximum battery life of 25 minutes therefore currently offer limited benefits for Bilby surveys, which by the time you include the time taken to review the imagery on the screen, would be quicker to survey by walking on foot.

However, there is enormous potential to use drones to search for Bilby sign over much greater distances, with flights of up to 100 km out and back a real possibility when permission can be obtained to fly Beyond Visual Line of Sight (BVLOS). The technology is already available and the

University of Adelaide is currently working towards building a suitable drone and obtaining CASA approval to conduct long-range flights to survey Bilbies.

Drone surveys will not replace the on-ground tracking surveys being conducted by Indigenous ranger groups. The information obtained from aerial surveillance of diggings and burrows will never match the level of detail that can be gleaned from interpretation of tracks and scats of not only Bilbies, but also their predators and competitors. However drone technology has the potential to fill in gaps between accessible survey areas, or find new populations that could be targeted with future tracking surveys.

Ground-truthing is always an important component of any aerial surveillance work, to determine the incidence of false positives (classifying sign as Bilby when there is in fact no Bilby sign) and false negatives (failing to detect Bilby sign that is actually there).

The drone in action during the Tuesday afternoon field activities (photo by Ted Fields)

Camera Trapping – Stuart Dawson

During the Tuesday afternoon field activities Stuart Dawson demonstrated the use of Camera Traps to validate Bilby presence at a site. Although most ranger groups are already using cameras, Stuart provided some useful tips on how to set them up to maximise the chance of capturing good Bilby images.

Stuart recommended the use of Reconyx cameras because they have the fastest trigger time (0.2 of a second compared to 1.3 seconds for Bushnell and Scoutguard cameras, which are a bit cheaper). He sets them up at a height of about 40cm from the ground, angled slightly down.

Stuart made the really important point that cameras can confirm presence of Bilbies but do not confirm absence. It's always best to use multiple methods of detection when you are relying on indirect observations to assess whether Bilbies are present at a site. Just because no Bilby photos are captured on camera, doesn't mean they do not occur in the area. They may be avoiding the cameras, or just using other burrows in the area at that time. However, in habitats where the ground is too hard to register tracks, or there is too much leaf litter on the ground to see tracks and scats, cameras can be a useful way of confirming potential Bilby diggings and burrows.

An advantage of cameras is that they can also record the presence of predators and rabbits at Bilby burrows. The Kiwirrkurra rangers have been using cameras to monitor the predation pressure at Bilby burrows in their cat hunting area.

It is sometimes possible to distinguish different individual Bilbies using burrows, which provides more information than just presence at a site. For example Bilbies sometimes have damage to their ears which can be used to identify particular animals, juvenile Bilbies can be distinguished by their size relative to fixed features in the photo, and sometimes the gender of Bilbies is apparent.

Bilby photo captured at Kiwirrkurra by Stuart Dawson during the Ninu Festival

From Stuart Dawson's field demonstration handout:

Setting a camera trap on a burrow

1. Set stake

2. Attach camera with zip tie

3. Use stick to angle down

4. Trigger the camera

5. Remove SD card

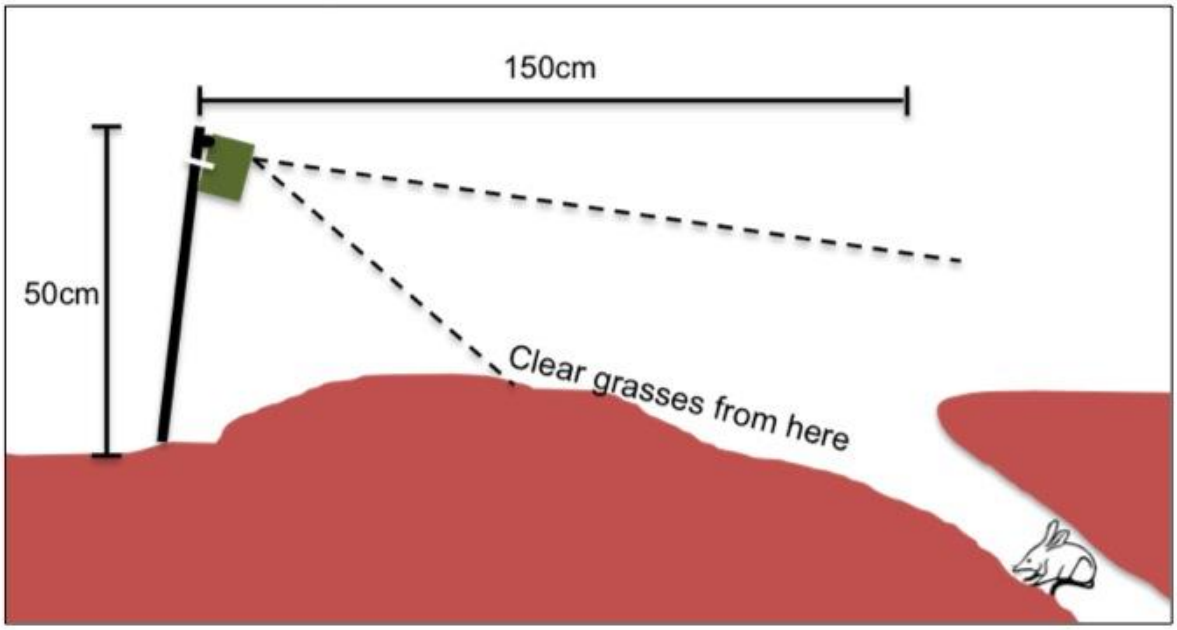
6. SD in digital camera

7. Check aim

8. Check camera by triggering

Remember

- Always watch the first trigger to check camera is working
- Remove loose grass and leaves
- Attach tightly, in case cattle play with them



Aiming the camera

✗ - Too high

✓ - Perfect, center of screen

Success

Examples

Setting the camera

1. Label camera
2. Label SD card
3. Turn on
4. Erase SD card
5. Set camera as in photo

General camera trap hints:

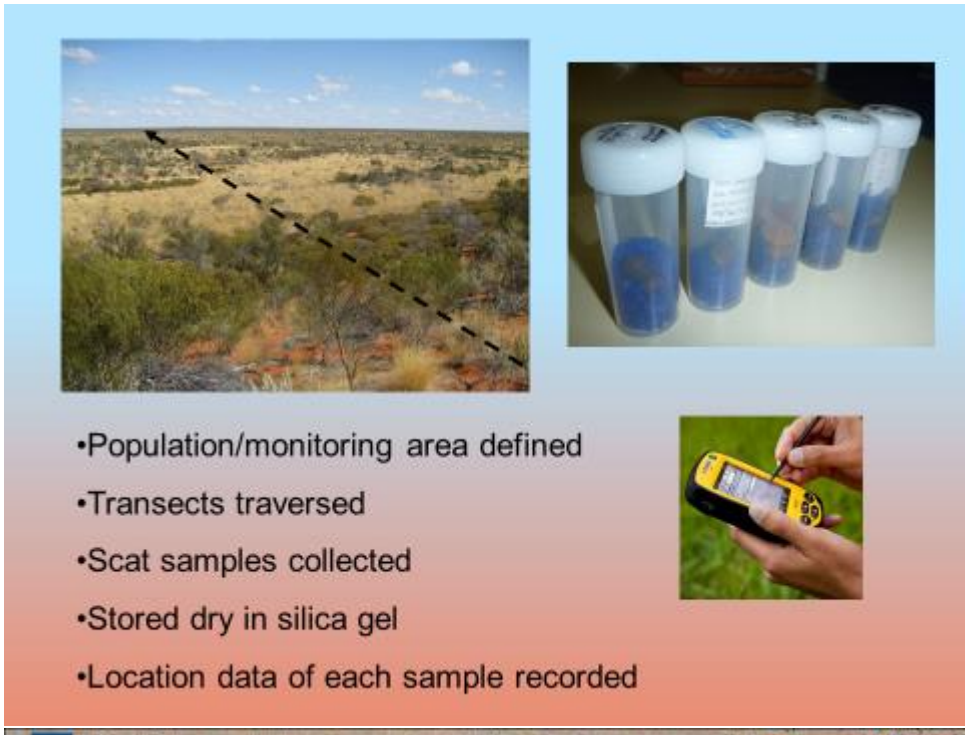
- Cameras only show presence, not absence – could be a shy animal
- Good to use WITH other methods such as tracking
- Can tell animals apart with good photos
- Cattle like to play with cameras, so attach them well
- Still photos are generally faster than videos
- Hot weather can reduce cameras effectiveness
- Always clear vegetation to avoid setting camera off
- Keep batteries above 60%

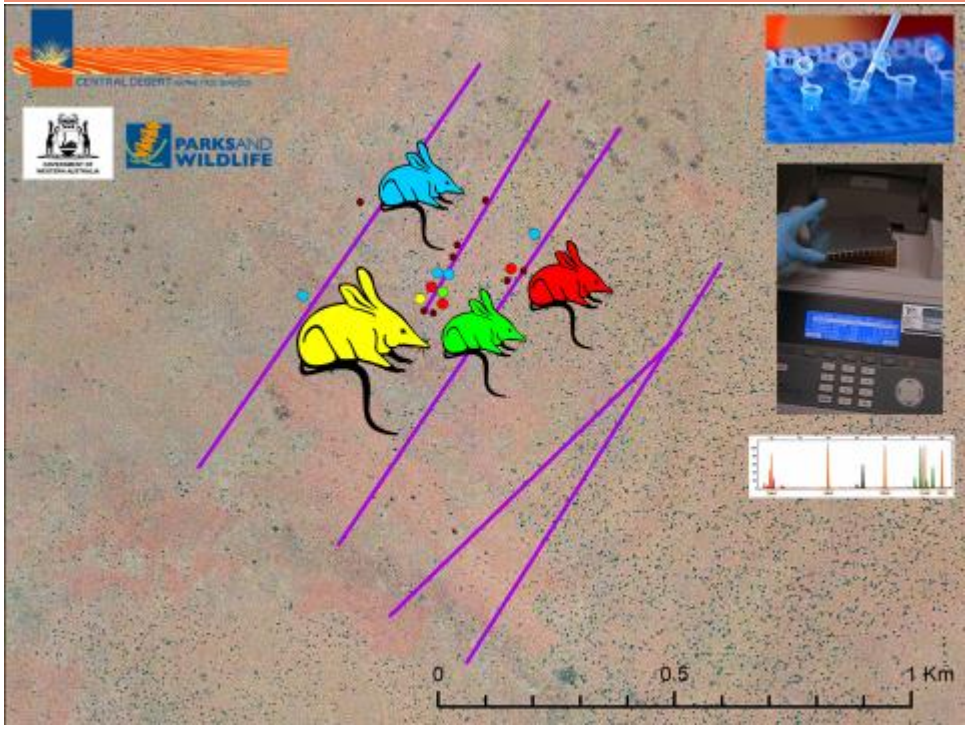
For help or more information, email **s.dawson@murdoch.edu.au**

Using DNA analysis to monitor Bilby Abundance - Martin Dziminski

Martin Dziminski from the WA Department of Parks and Wildlife gave a presentation and field demonstration on how to conduct fine-scale Bilby population abundance monitoring through scat analysis. Scientists can conduct "DNA fingerprinting" of the scats to distinguish individual Bilbies from each other. Fresh scats are collected along transects in the field and sent to the laboratory in Perth for analysis. As long as you can work out where the edge of your Bilby colony is, and position your transects throughout the area of known Bilby occupation, the results can tell you exactly how many different Bilbies are using the site.

From Martin Dziminski's presentation:



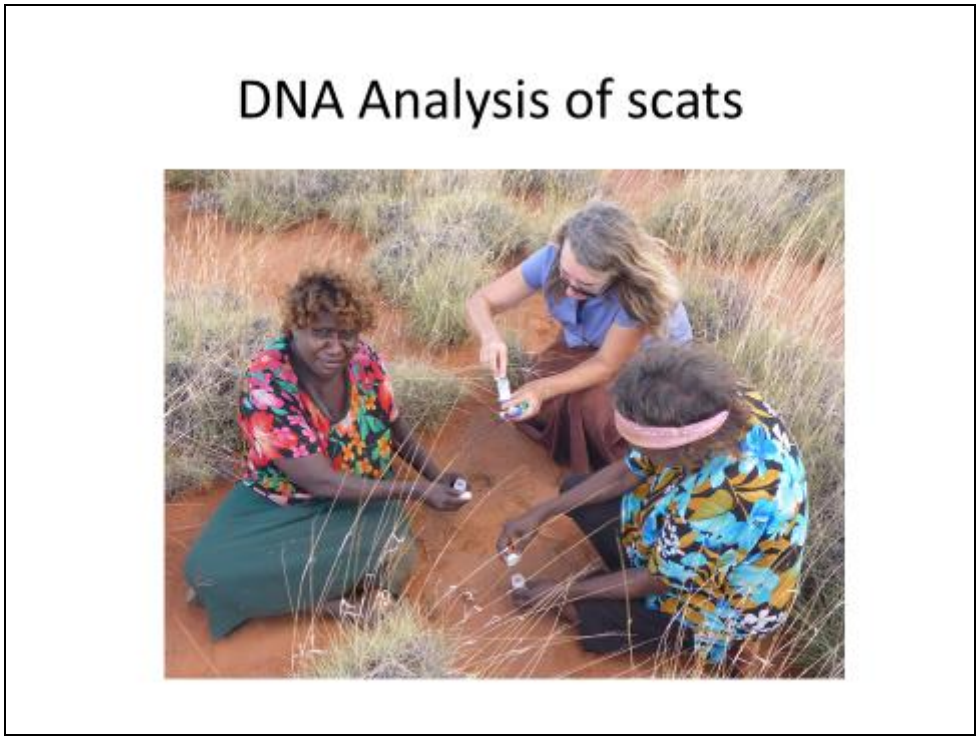


This level of information could be very useful for monitoring the effect of management at a localised site. For example you might want to measure whether your predator management program is producing an increase in the number of Bilbies at the site.

The disadvantages of the technique are: it can be difficult to work out where the edge of the population is (and this may move over time), it is time-consuming to walk the transects and record all the location data for each scat sample, rain will destroy the DNA in the scats, and it's relatively expensive to get the DNA analysis done.

In most cases Rangers working in sandy spinifex country should be able to get enough information for their monitoring programs by looking at the extent of fresh Bilby sign and measuring track and scat sizes to determine the size-classes of individuals present (juveniles, females/young males, adult males). But this only gives a maximum of 3 animals present at a site. If your management program successfully increased the colony from one breeding female to multiple adult females of the same size, the DNA analysis would be the best way of confirming this.

DPaW are collaborating with a number of ranger groups to set up DNA monitoring sites in Bilby areas of WA. The Kiwirrkurra Rangers are participating in the program and established three sites in March 2016. At the main predator control site the Rangers had already estimated that there were five animals present from their assessment of the size of the tracks, a healthy adult male, a "crippled" male with a limp, a female and two different sized juveniles. Results from the DNA analysis identified 4 individuals, but no DNA was retrievable from the smallest juvenile scat sample. This was a useful exercise that confirmed the accuracy with which Expert Trackers can distinguish individual animals from their tracks.



From the Kiwirrkurra presentation

Summary: Which Monitoring Methods should we use?

Method	Efficient over large areas?	Provides information on abundance?	Provides information on threats?	Repeatable and systematic?	Cost?	Expertise available in community?
Traditional Knowledge	Yes potentially	Yes - good trackers can estimate number of individuals	Yes potentially	No, depends how much time spent hunting	low	Yes
Track plot surveys	Yes	No – frequency of occurrence	Yes	Yes	low	Yes – after basic training
Drone surveys	Potentially but not yet	No – frequency of occurrence	No	Yes	high	No – requires trained pilot
Camera Trapping	No	No – unless individual animals can be distinguished	Yes	Yes	high	Yes – after basic training
DNA analysis	No	Yes – most accurate method of determining abundance	No	Yes	high	No – requires scientist to analyse

Weighing up the different options that were presented at the Ninu Festival – **to monitor broadscale distribution of Bilbies across Australia a combination of Traditional Knowledge and track plot surveys will give us the best information, at the best price, and will make best use of the expertise available in the community**. While visiting Bilby sites that have been found by Traditional Owners travelling through the country often turns up the most Bilby records, it is difficult to compare the results through time and space, when there has been variable levels of search effort. The track plot method is a more independent, repeatable and systematic method that can complement Traditional Knowledge.

Within large management units such as the scale of an IPA, track plot surveys are also the recommended monitoring method to determine the frequency of occurrence of Bilby sign across the IPA, and where the priority areas are. When drone technology becomes more accessible, drones will enable better surveillance of country at the scale of an IPA, which often have a very limited network of tracks, and hence available tracking plots.

If we need to know the precise number of Bilbies at a particular site, DNA fingerprinting of Bilby scats is the only reliable method to determine actual abundance at high densities. If this is prohibitively expensive, the size and gait of Bilby tracks can be used to estimate the number of size classes present, which is at least more quantitative than just presence/absence.

To get meaningful monitoring data from camera trapping would require a large number of cameras deployed across an area. However cameras are a good means of community engagement and even a small number of cameras set for extended periods can provide useful information on the persistence of Bilbies at a site and visitation rates of predators and rabbits, as evidenced by the Wanjarr Mankarr film produced by Kanyinirpa Jukurrpa.

Bilby Blitz – A collaborative Bilby Monitoring Project to commence in 2017

An exciting outcome of the Ninu Festival was an agreement for as many Ranger groups as possible to work towards conducting a collaborative nation-wide survey for Bilbies within a 1 month period, in 2017. It is hoped that all ranger groups will survey as many plots as they can within the month, including known Bilby areas, but also new areas that have not previously been surveyed.

The results of the "Bilby Blitz" will provide a snapshot of the current distribution of Bilbies, as well as a range of other species across the Northern Territory and Western Australian deserts. Repeating the Blitz every 5 years or so will help to answer important questions such as:

- Is the range of the Bilby continuing to contract, and at what rate?
- Are foxes continuing to expand their distribution through the deserts?
- Are there any positive or negative relationships between particular predator or competitor species and Bilby presence?
- What are the key habitats for Bilbies in each region, and what are the preferred fire-ages within each habitat?

It is suggested that the Bilby Blitz could be organised as a collaboration between the Indigenous Desert Alliance, the Greater Bilby Recovery Team and the Threatened Species Hub. This should ensure we get valuable input from both Ranger groups and scientists to develop a program that is both achievable to conduct, and scientifically robust.

There will be lots of details to work out for the Bilby Blitz, such as:

- How many sites can each group do, and how should sites be selected?
- What habitat information needs recording?
- How do we account for imperfect detection (repeat sampling or duplicate plots)?
- Who's going to collate and analyse the data, and how should it be reported back to groups?
- Should there be a training component where Senior TO's train younger rangers in track identification, and/or groups can get help from scientists in how to survey track plots if they haven't done it before?
- Do we need a new app developed to ensure everyone is capturing data in the same way?
- How much additional funding is needed and where can we source it?
- How often should a Bilby Blitz be carried out?

Feral Animal Control to Protect Bilbies

Feral animals can threaten the survival of Bilbies in many ways:

- Predators eat them
- Rabbits attract more predators, eat their food and take over their burrows
- Cattle, donkeys and camels might trample their food plants and burrows and generally degrade the habitat

Managing feral animals at priority sites will be essential to prevent the extinction of the Bilby.

At the Ninu Festival participants explored available methods of feral animal control through presentations, field activities and a mapping activity.

Mapping the distribution of foxes and Bilbies on Martu Country

Presenting the mapping data

Managing Cats – what we know and what we need to know

From the Introductory Feral Animal Presentation, by Rachel Paltridge

We know:

- Cats eat Bilbies
- Cats occur everywhere
- Cats and Bilbies can coexist

We assume:

- Cats are a significant predator of Bilbies
- Killing cats will allow Bilby populations to increase

What we need to know:

- How many cats are too many cats for Bilbies?
- Are Bilbies more vulnerable to predation after fire?
- When is cat control most crucial?
- Importance of dingoes in regulating cat densities and impacts
- What control methods can reduce impacts of predation?
- Can we manage impacts of cats without fences?
- Can good fire management increase resilience of Bilbies to feral cats?

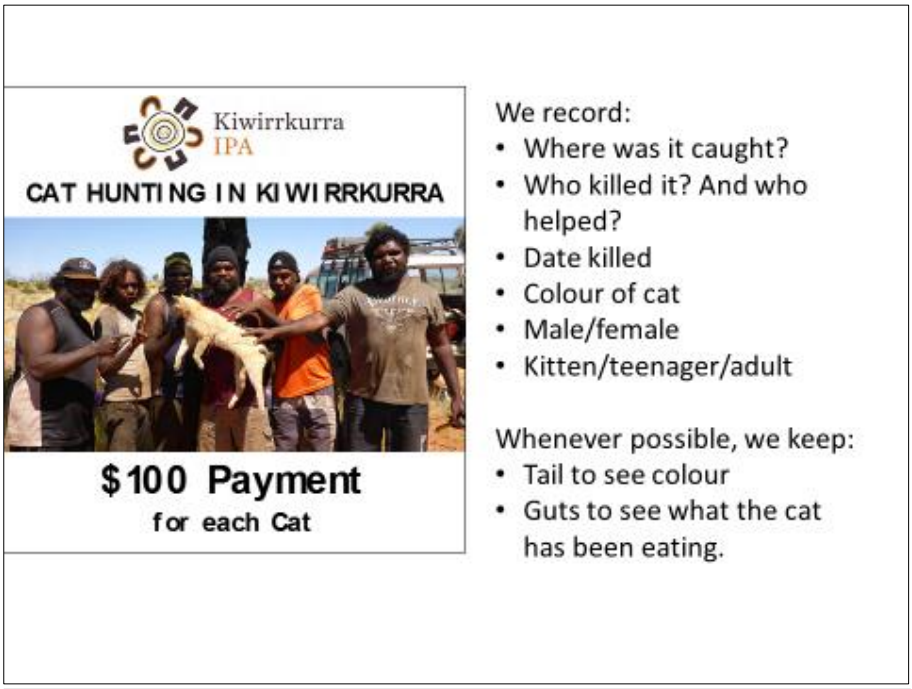
Cat prowling around Bilby burrow after a fire

Managing Cats with Traditional Hunting – Kate Crossing and Kiwirrkurra Rangers

The Kiwirrkurra Rangers gave a presentation about using Traditional Hunting to kill cats around Kiwirrkurra. Kiwirrkura people have a long tradition of hunting feral cats for food, which continues to this day. This tradition used to be widespread across the desert but is fast declining.

The aim of the feral cat control project at Kiwirrkurra is to encourage the continuation of this unique skill at the same time as investigating its effectiveness in reducing predation pressure on threatened species in targeted areas.

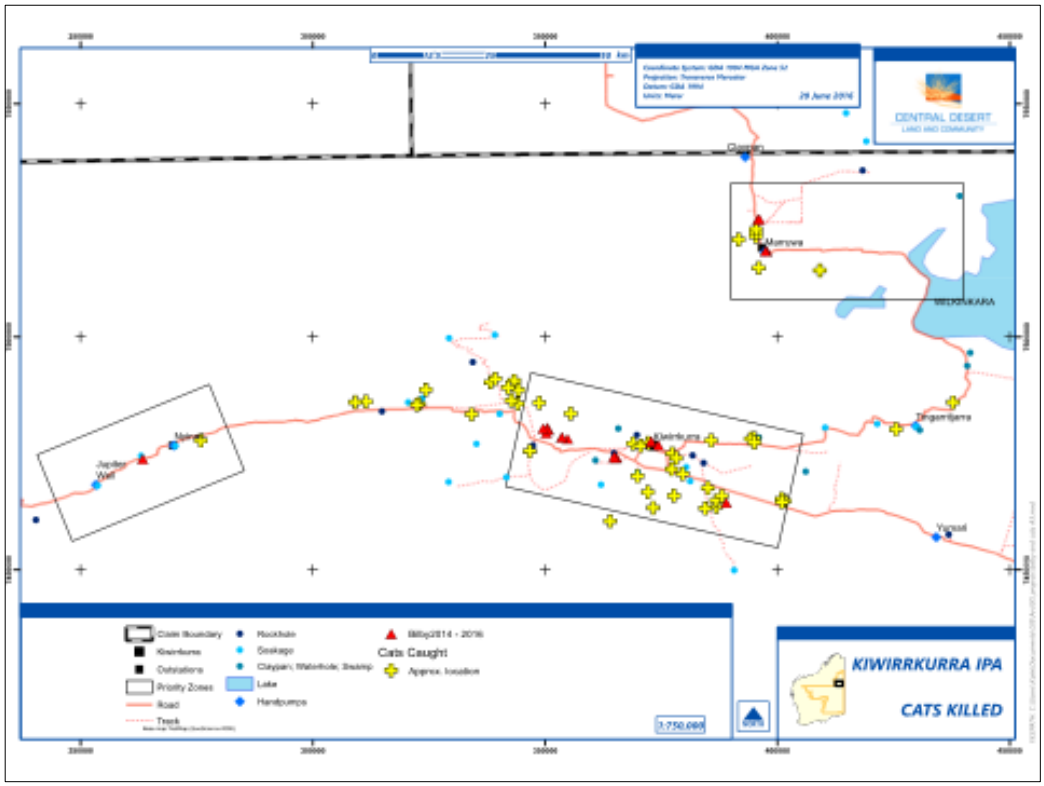
Two key strategies are used: dedicated cat hunting trips focused on 10km zones around priority Bilby and great desert skink locations; and incentive payments to Kiwirrkurra people for feral cats caught anywhere within the IPA in their own time. Hunters keep the cat stomachs in the IPA freezer to study what the cats eat.



Slides from the Kiwirrkurra cat hunting presentation

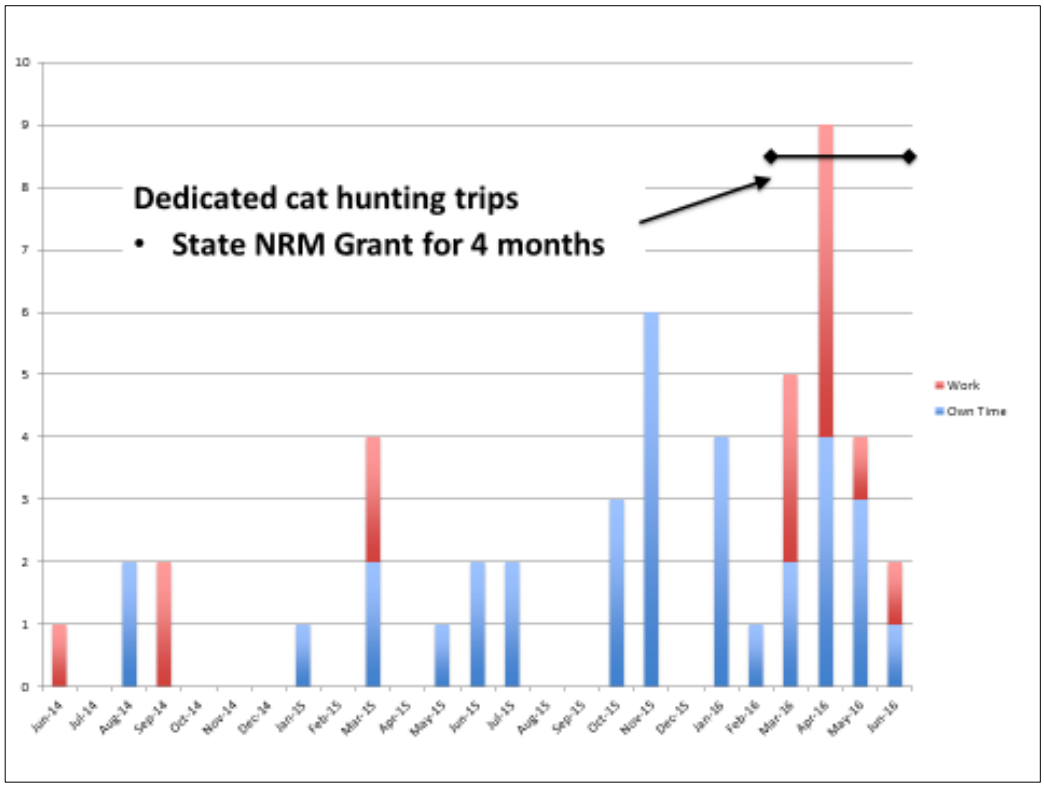
Through this project, 50 cats have so far been killed in just over two years. The project has significantly increased the recognition of and pride in cat hunting within the community, with more individuals learning the skills needed.

Map of cats killed on the Kiwirrkurra IPA over a 2 year period to June 2016



Slides from the Kiwirrkurra cat hunting presentation

Number of cats killed per month on the Kiwirrkurra IPA.



During the Kiwirrkurra presentation, Kate mentioned the importance of maintaining strict animal welfare protocols during any form of cat control.

Nolia emphasised that it only takes an experienced hunter "one hit" to kill a cat when it is hit on the back of the head with a crowbar.

In March 2016 the Australian Wildlife Conservancy hosted a Humane Cat Camp at Newhaven Sanctuary where CLC's Warlpiri Rangers and the Kiwirrkurra Rangers participated in training in leghold trapping and humane euthanasia techniques. A vet from Murdoch University assessed the rangers in their competency to use blunt trauma to dispatch cats, and their ability to immediately follow up a kill by checking for 4 signs of life.

Which other Ranger Groups still use Traditional hunting to catch cats?

Although the number of communities actively engaged in cat hunting is rapidly diminishing, highly skilled cat hunters can also be found in several other Ranger groups.

Martu Rangers from Punmu still hunt feral cats for meat. In 2015 a joint threatened species and cat hunting camp was held at Punmu for Kiwirrkurra and KJ rangers to try to reinvigorate the art of cat hunting. This resulted in the removal of five feral cats from a 10km^2 Bilby site over a 3 day period.

Central Land Council's Warlpiri Rangers from Nyirripi Community also regularly hunt cats for food and protection of threatened species. In 2015 Ranger Christine Ellis won three awards for her cat control efforts in the Northern Territory including the Minister's award for Outstanding Frontline Achievement, Regional Ranger of the Year and Indigenous NRM Champion for the Northern Territory.

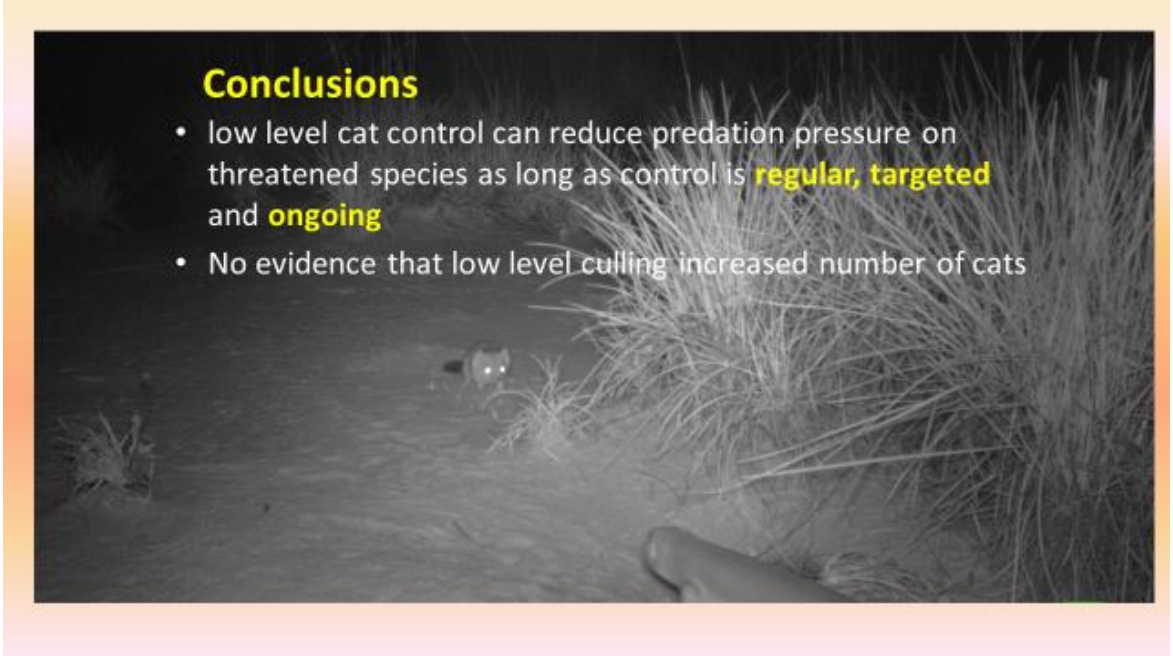
Managing Cats with Leghold Traps

For highly skilled cat trackers working in areas with a good tracking substrate, Traditional hunting is the most efficient method of cat control in localised areas. However, not everyone has the tracking skills, understanding of cat behaviour, fitness and stamina required to pursue a cat to capture, and not all country is suitable for tracking. In some cases cat trapping can be a useful method of removing cats.

Use of soft-jaw leghold traps was described in presentation by Christine Ellis and Rachel Paltridge, and demonstrated in the field by Warlpiri Rangers Peter Wilson and Benedict Mosquito with Andrew Schubert.

The Warlpiri Rangers initially used the leghold traps to control cats at a site supporting Great Desert Skinks at AWC's Newhaven Reserve. However, the experience and expertise gained from that project enabled them to win a 12 month contract to control cats around a Bilby colony on a mine site in the Tanami Desert.

The cat control project at Newhaven demonstrated that monthly cat control patrols constrained predation pressure within a 4km^2 core area for Great Desert Skinks over a two year period. Unlike a study in Tasmania that found cat densities increased under low level cat control, there was minimal recolonization of the Newhaven site, possibly because healthy dingo packs in the area were assisting in the suppression of cat densities.



Used carefully leghold traps can be a successful control technique for cats, however there are numerous risks associated with using them, and it is important that Rangers undergo thorough training before embarking on a trapping program.

Soft-jaw leghold trapping can be conducted for the purpose of cat control without a permit in the Northern Territory. However, in Western Australia permits are required from the WA Government.

The main risks associated with the use of leghold traps are:

- capturing non-target species (such as dingo, Birds of Prey, turkey, Bilby, goanna)
- Trapped animals can get stressed/injured (from heat, thirst, predation, capture myopathy, dislocation, swelling)

In the field demonstration, Andrew, Benedict and Peter demonstrated how to minimise the chance of capturing non-target species, maximise the chance of capturing a cat, and reduce distress to any captured animals.

From the Leghold Trapping field demonstration handout:

Choosing Trapping Areas

- Drive roads looking for cat sign
- Walk around burrows to look for tracks
- Follow tracks to find dens where cats are sheltering in burrows or under vegetation

Choosing Trap Sites to increase chance of catching cats but reduce risk of catching non-targets

- Look for areas where multiple aged cat tracks indicate regularly used pathways
- Setting traps away from the edge of the road will minimise dingo captures
- Don't set leghold traps within 500m of Bilby burrows
- Meat baits increase the chance of capturing non-targets
- If you do use meat place under vegetation so it can't be seen by birds flying overhead
- Pongo (cat urine and faeces) is the most target specific lure for cats (but may also attract dingoes)
- Adjust tension on the pan to reduce chance of small animals triggering trap

Setting Traps

- Set in pairs or threes
- Make sure stake is secure
- Dig a depression for the trap
- Cover treadle with toilet paper
- Cover all with thin layer of sand
- Bait or lure behind
- Arrange sticks to make cat step onto trap
- Use other sticks/spinifex to channel movement

Trap Sets

- Baited Cubby Set
- Walk through Set
- Den entrance

Peter and Benedict from the Warlpiri Ranger Group demonstrating how to set a leghold trap

Reducing stress/injury to trapped animals

- Regular checking is essential– early morning and late afternoon every day, to minimise time in trap
- Ensure good record keeping (see below) to make sure no traps are missed
- Set near cover to provide shade and shelter
- Approach trapped animal quietly
- Use catchpole/blanket to release non-targets
- Check for injury before release

Information to Record about traps

- Date set
- GPS location
- How many traps
- Bait/lure

If you catch a cat:

- Shooting at close range is the best way to kill cat
- Blunt Trauma euthanasia with a crowbar if you are experienced in this method
- Check signs of life to confirm death (eye reflex, breathing, heartbeat, toe reflex)
- Record weight, gender, colour, breeding
- Photo of each side of cat (to compare with camera images)
- Look at gut contents
- Collect ear sample for genetic study
- Collect urine to catch the next cat
- Cook the cat if you like eating them
- If lactating female, go back to search for kittens

Monitoring effectiveness of your Trapping Program

Monitoring should measure

- number of cats removed
- Impact of control on pest animal
  - e.g. tracking surveys before and after
  - number of cats visiting burrows
- Impact on the asset you are trying to protect
  - e.g. number of Bilbies at the site
  - number of mulgara tracks crossing the transect

Cat captured in a leghold trap at a Bilby site in the Tanami Desert by the Warlpiri Rangers

New Technology to control cats in localised areas – Feral Cat Grooming Trap

John Read from Ecological Horizons demonstrated a new tool he has developed for cat control – the Feral Cat Grooming Trap - which targets the fastidious grooming behaviour of cats to poison them. The beauty of the Grooming Traps is that they are species specific, containing a series of sensors that can recognise a cat from a dingo, wallaby or Bilby. When the sensors detect a cat walking past a lethal dose of toxic gel is sprayed onto the cat's fur from up to 4m away. The cat instinctively grooms the gel and in doing so ingests the lethal dose of the poison and dies.

A major advantage of the Grooming Trap is that it is does not rely on a cat's hunger to work. Cats are sprayed as they walk along tracks, dune crests, creeks or fencelines without needing to change their behaviour or even slow down. In addition, feral cats may also be attracted by a variety of programmable intermittent audio-lures. Another benefit is that the traps can be left in the field for months unattended. The trap automatically resets a total of 20 times before the sealed individual cartridges need to be replaced.

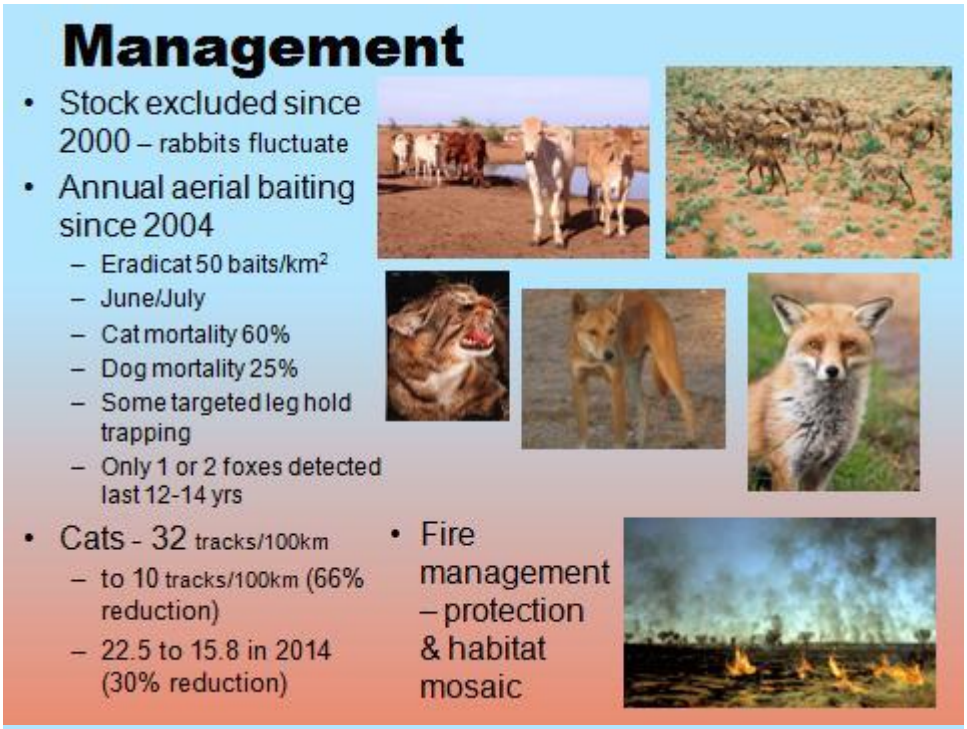
Disadvantages of the Grooming Trap are that they are still being individually custom made, and are thus very expensive. It is anticipated the price will come down in the next few years when they go to mass production.

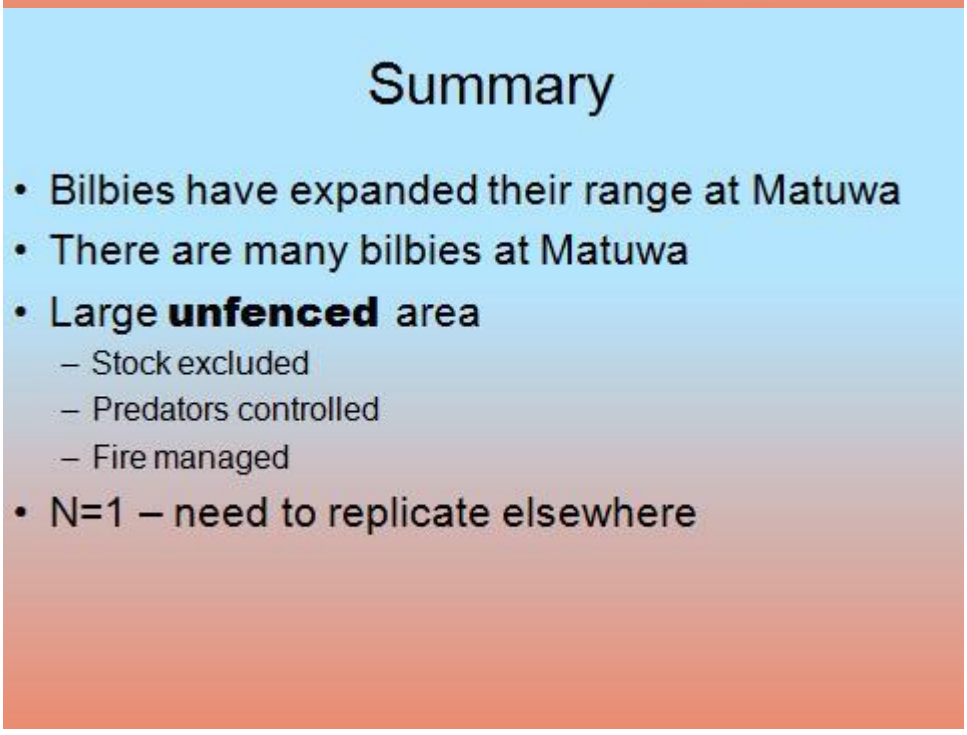
Nolia demonstrating what happens when a cat walks past the Grooming Trap during the Tuesday afternoon field activities.

Managing Predators with Poison Baits

Another method of predator control discussed at the Ninu Festival was poison baiting. The Western Australian Government has developed a bait called Eradicat® which has been registered for cat control in WA. This bait comprises a small kangaroo and chicken sausage injected with a synthetic toxin known as 1080 (sodium monofluoroacetate) which replicates a naturally-occurring poison found in some plant species in WA. Many native animals in the region have developed resistance to this toxin but dingoes will die from eating baits, so not everyone wants to use baits.

Martin Dziminski from DPaW gave a presentation on the success of predator baiting in a Bilby reintroduction project at Matuwa, a large unfenced area that is co-managed by DPaW and Martu.





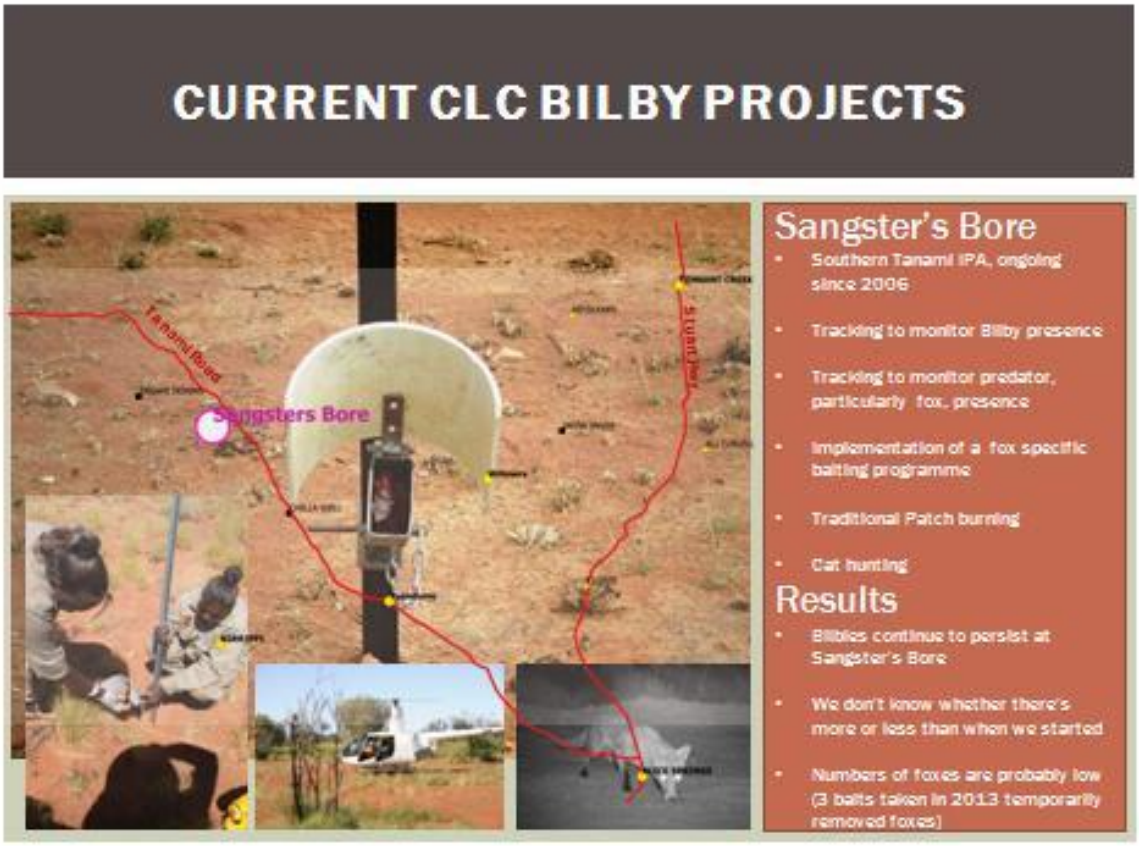
from Martin Dziminski's presentation

Aerial baiting is currently the only method of controlling cats over a broadscale area. At Matuwa, ten years of annual Eradicat baiting has reduced the number of cat tracks across the property by more than 60% but only resulted in a 25% reduction in dingo tracks. Foxes are very rare on the property. **Combined with the removal of cattle and camels, and a regular fire management program, the baiting program has assisted the persistence and expansion of a reintroduced (unfenced) population of Bilbies on Matuwa**. It is believed that the number of Bilbies at the site has doubled in the past three years, from the 128 animals reintroduced to at least 250 present in 2016.

The Matuwa Bilby Reintroduction project is an example of how Bilbies can be reintroduced and managed in large open landscapes (outside fences) with good habitat management and sustained predator control. As Bilby densities build up inside Matuwa, they can potentially disperse out into the surrounding area.

Although Matuwa is the only Bilby site where cat baiting has been used as a management tool, **the Central Land Council Rangers have used poison baits for foxes in the Tanami Desert.** With the knowledge that dingoes regularly eat cats in this region, the Rangers did not want to conduct aerial or ground baiting for foxes, in case it caused an increase in cat numbers. Instead they trialled fox-specific bait stations which are too narrow to allow dingoes access to the baits.

The trials confirmed that although foxes didn't visit the bait stations very often, they were able to access the baits whereas dingoes could not remove baits. Bilbies persisted at the site where the fox baiting was conducted between 2006 and 2013.



Any research that helps us manage foxes in Bilby habitat is very important because foxes are probably the most significant threat to the survival of the Bilby.

Managing Foxes – what we know and what we need to know

From the Introductory Feral Animal Presentation, by Rachel Paltridge

We know:

- Foxes kill Bilbies
- There's little overlap between fox and Bilby distribution

We assume:

- Foxes are the primary threat to Bilbies
- Controlling foxes will allow Bilby populations to increase

We need to know:

- How far north foxes go in the desert?
- Are they still spreading north?
- At what fox densities can Bilbies persist with?
- Do dingoes have any effect on fox abundance or behaviour?
- When is fox control most crucial/effective?
- What control methods can reduce impacts of predation?
- Can we manage impacts of foxes without fences?
- Can good fire management increase resilience of Bilbies to foxes?

Foxes can be controlled with baits, but baits laid on the ground will also kill dingoes. Central Land Council's Warlpiri Rangers captured this young fox in a leghold trap at Australian Wildlife Conservancy's Newhaven Sanctuary.

Managing Rabbits – what we know and what we need to know

From the Introductory Feral Animal Presentation, by Rachel Paltridge

We know:

- Rabbits use Bilby Habitat
- Rabbits eat Bilby Food
- Rabbits use Bilby Burrows
- Rabbits attract Predators

We assume:

- Rabbits take over Bilby burrows and kick them out
- Rabbits increase predation levels on Bilbies

We need to know:

- Where rabbits live in the desert
- If calicivirus gets to isolated pockets of rabbits at northern edge of range
- Can Bilbies and rabbits coexist?
- Which control methods can be successful in Bilby habitat

Twelve months of camera monitoring revealed that the last sign of Bilbies at this burrow in the north-western Tanami Desert was 15 hours before the first rabbit turned up. Rabbits persisted at the burrow for the rest of the year.

John Read spoke about the impacts of Calicivirus (Rabbit Haemorraghic Disease Virus) on rabbit populations and native animals in South Australia over the past 20 years. Long-term monitoring has shown that at least four species of small mammals have significantly increased their distribution and abundance in northern South Australia following the introduction of this disease in 1995. This is believed to be due to the combination of decreased competition for food resources and fewer predators since rabbit populations declined.

However, there can also be short-term negative impacts when a disease results in the sudden crash in a staple prey species such as the rabbit, and predators are forced to switch to other prey types. Fox predation is thought to have eliminated the last few black-flanked rock wallabies in a colony in northern South Australia shortly after Calicivirus spread through the area.

There are currently new strains of Calicivirus being released in Australia, but we don't know how far out into the range of the Bilby that the disease is spreading. While the benefits of reduced rabbit populations far outweigh the risks, it is important that Rangers are vigilant in looking out for signs of dead rabbits that might indicate the arrival of a new strain of Calicivirus. It is in the early months of an outbreak of a disease that prey-switching to threatened species could be an issue, so predator control could be important. If any dead rabbits are found that people suspect may be due to disease, rabbit researchers would be very interested to test carcasses. Ideally carcasses should be frozen. Contact CSIRO in Canberra to arrange testing Tanja.Strive@csiro.au.

Managing Other Introduced Animals

Rangers from Western Australia also mentioned the impacts of other introduced herbivores on Bilby populations in the Kimberley area.

Chantelle Murray from the Ngurrara Rangers described how the rangers have been working in conjunction with local pastoral properties to fence off an area of Cherabun Station to protect Bilby burrows from being trampled by cattle. The rangers monitor Bilbies at this site by looking for tracks, scats and burrows and installing cameras at burrows.

from Chantelle Murray's presentation – cattle can damage Bilby burrows

Albert Wiggan from Beagle Bay spoke about the impacts of feral donkeys on Bilbies in the Kimberley, and the reluctance of the older generation of Traditional Owners to agree to donkey culling because of the influences of Christianity.

Creating Feral-free Safe Havens

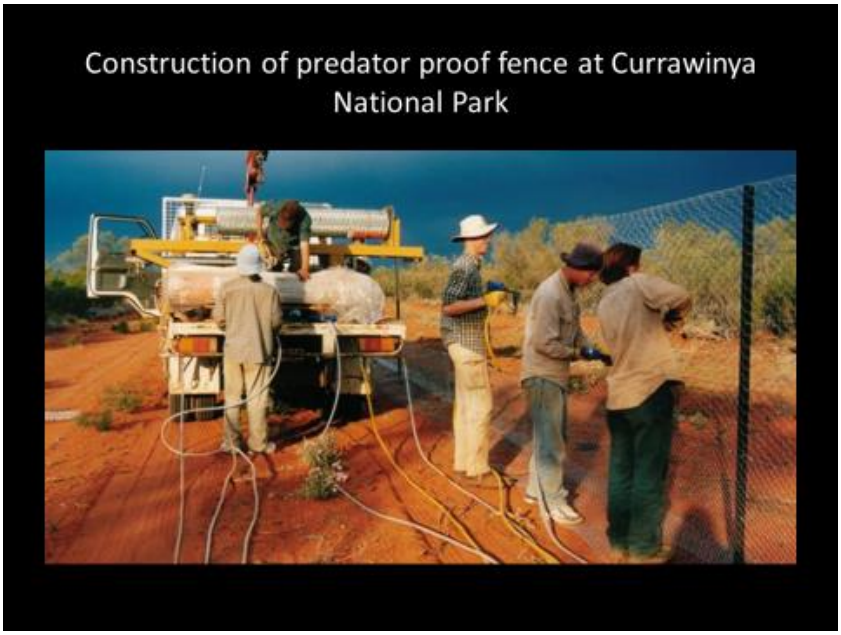
Although the focus of the Ninu Festival was on protecting wild populations of Bilbies, the role of fences to protect reintroduced populations of Bilbies from the impacts of introduced predators and herbivores was also acknowledged.

Alice Henwood showed photographs of locally extinct mammals (including Bilbies) that will be reintroduced to the largest feral free exclosure in the world, at Newhaven Sanctuary, which is managed by the Australian Wildlife Conservancy.

Stage 1 of the Newhaven Reintroduction project is 150,000 ha, but when Stage 2 is completed an area of 650,000 ha will be fenced and free of cats, foxes, camels and rabbits. The cat hunting expertise of the Nyirripi Rangers will be integral to the success of this project.

Alice Henwood telling the Ninu Festival participants about the Newhaven Restoration Project

Kevin Bradley from the Save the Bilby Fund also spoke about the Currawinya Fenced Bilby Reintroduction site in Queensland. Bilbies were released here in 2005, but the reintroduction programme has been affected by cat incursions. The fence has now been repaired and Bilbies will soon be released here again.



from Kevin Bradley's presentation

Fire Management to benefit Ninu

Burning for Bilbies

Fire Management is the single most important thing that Rangers can do to reverse the decline of the Bilby. Burning is important to increase food availability for Bilbies and maintain sufficient areas of cover for protection from predators. Many Traditional Owners are already burning during hunting activities around communities, and Ranger Programs are extending the area that is being managed for fire by supporting people to travel further afield to conduct ground burning, and in some cases doing aerial incendiary burning from a helicopter or fixed wing aeroplane.

Aboriginal people have used fire to promote their own food resources on country for thousands of years, and many foods that people eat are also consumed by Bilbies. For example the seed of the short-lived, fire promoted grass *Yakirra australiensis* was a staple food item for both western desert Aboriginal people and the Bilby. Root-dwelling larvae (witchetty grubs) are also key food items for both people and Bilbies, as were bush onions (*Cyperus bulbosus*). Of all the medium-sized mammals that once roamed the deserts, the Bilby is the species that would have had the highest dietary overlap with humans. So, when people managed country to promote their own foods they were also increasing food supplies for Bilbies, providing a direct ecological link between this iconic bandicoot and Aboriginal people.

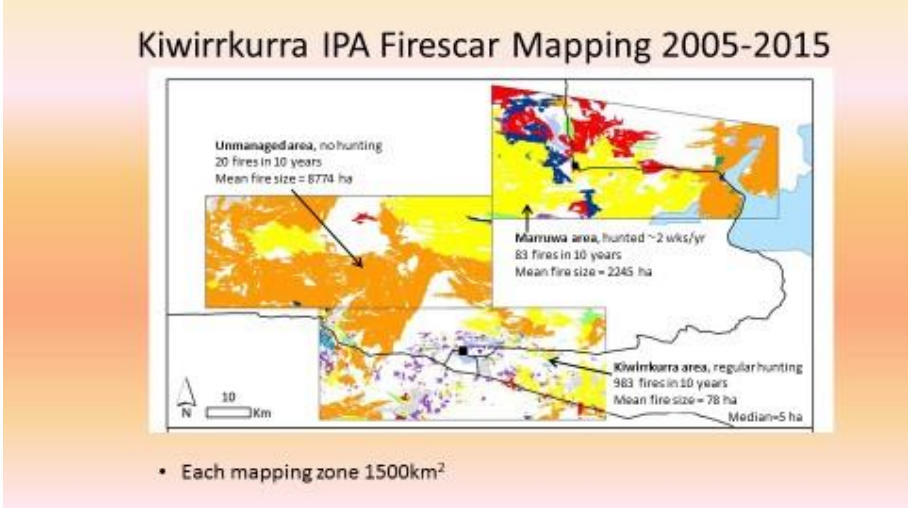
from the presentation by Rachel Paltridge: How Traditional Hunting and Burning can help Bilbies

Although fire promotes growth of many short-lived seeds and fruiting plants such as Bush Tomatoes and fan flowers, it also kills the plants that host witchetty grubs resulting in the temporary removal of this food resource for Bilbies until shrubs have regained sufficient size to again support grubs. Nerida Liddle presented a talk on her honours project which is addressing the relationship between fire, witchetty grub host plants, witchetty grubs and Bilbies. Nerida also provided a lab demonstration on how to find out what Bilbies have been eating through scat analysis.

How are Rangers managing fire to look after Bilbies?

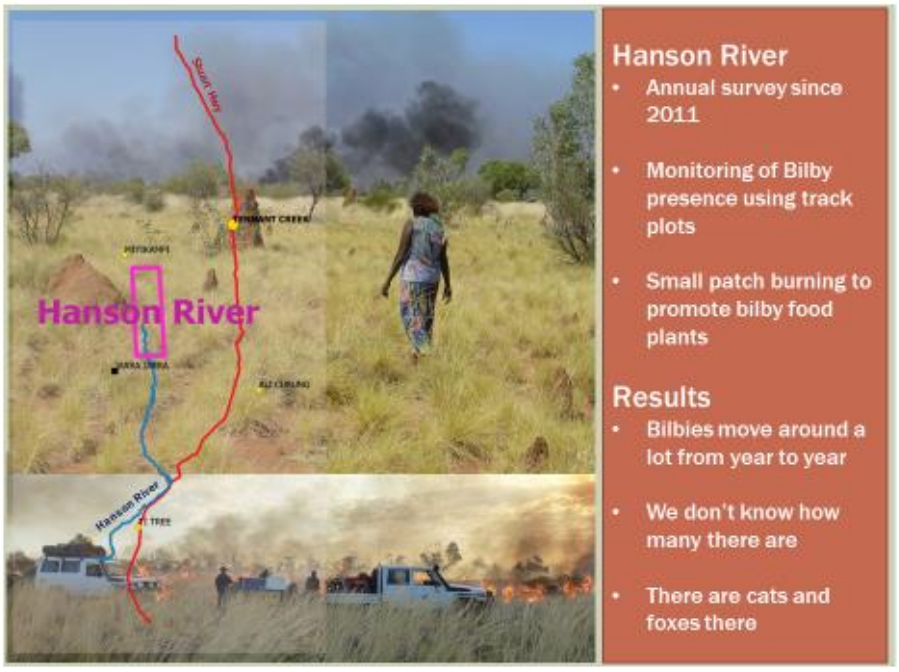
Nearly all the Ranger Group presentations mentioned that they were doing some level of fire management to protect Bilby populations on their country. This ranged from fine-scale patch-burning conducted during hunting activities in Bilby areas, through prescribed burning to create fire breaks around Bilby populations to landscape scale burning in the broader area.

The **Kiwirrkurra Rangers** have maintained a fine-scale fire mosaic through recreational hunting activities within a 20km radius of Kiwirrkurra. This ensures a continuous supply of ephemeral grass seed is available in the area and feeding areas are always within close proximity to areas with good spinifex cover. Ranger Work is supporting more trips to the more remote Bilby population at Murruwa to try to reduce the size of the firescars at this site.



Fire scar mapping on the Kiwirrkurra IPA

Central Land Council Rangers have conducted aerial incendiary burning and ground burning in Bilby habitat in both the North Tanami and South Tanami Indigenous Protected Areas to prevent landscape scale fires. They also conduct small scale patch-burning to promote food plants during their annual Hanson River Bilby survey in the eastern Tanami Desert.

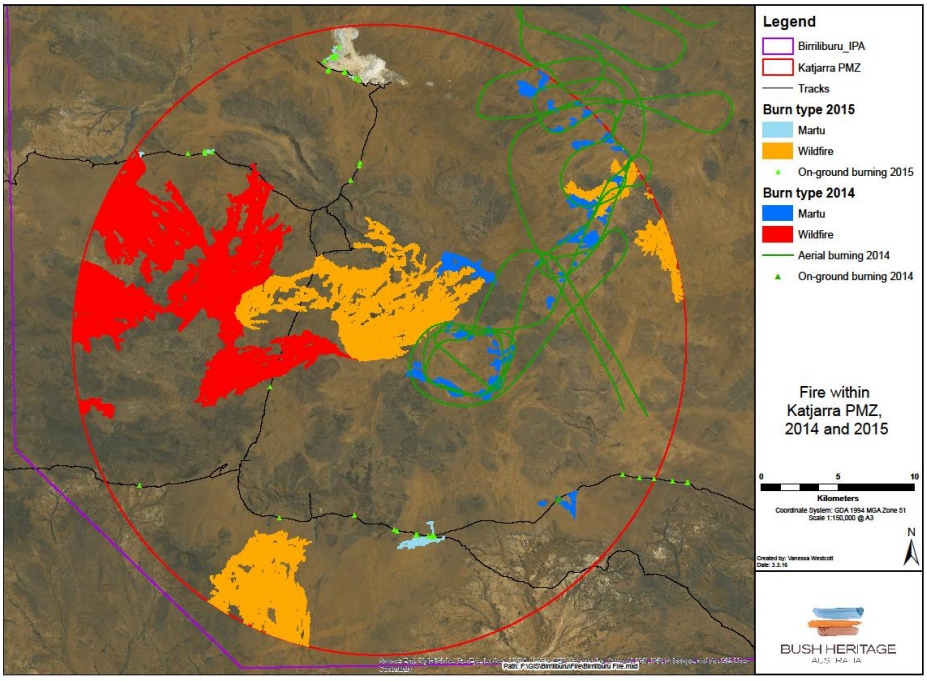


Ground burning is conducted along the Hanson River site - from the CLC presentation

Kanyirninpa Jukurrpa's Martu Rangers from Punmu, Parnngurr and Jigalong also conduct a lot of ground burning around Bilby sites close to their communities as well as implementing aerial incendiary burning in more remote areas to stop the wildfires carrying too far. Detailed fire mapping has revealed that Bilbies are persisting at sites where there is a good mix of different aged vegetation.

Fire scar mapping near Punmu - from the KJ presentation

A combination of Aerial and Ground burning is also being conducted by Martu Rangers to protect Bilby habitat from wildfires on the Birriliburu Indigenous Protected Area. The **Birriliburu Rangers** presented a firescar map that showed the aerial burning they conducted in 2014 stopped a large wildfire in 2015.



Fire scar mapping in the Katjarra Priority Management Zone of the Birriliburru IPA, from the Birriliburru presentation

Ngaanyatjarra Rangers have implemented small scale patch-burning at Bilby sites near Warburton, Tjirrkarli and Patjarr Communities and have also undertaken aerial burning in the broader area.

Workshopping Fire Management Guidelines for Bilby Recovery

The widespread distribution of the Bilby means it occurs in a variety of habitat types and across a rainfall gradient that ranges from a relatively reliable 700mm per year at the northern edge of Bilby distribution in the Kimberley to a highly variable average of 200mm per year at the southern edge of its distribution between Wiluna and Warburton. Rainfall affects fire frequency and extent of burning that needs to be done each year.

Ninu Festival participants agreed that fire management was very important to enhance the suitability of Bilby habitat in all parts of its current range in the NT and WA. All groups recommended vast hot wildfires should be prevented as much as possible and that a fine scale network of patches of vegetation in varying stages of regeneration from fire was optimal to maximise food availability whilst leaving some cover for protection from predators. However, fire management prescriptions vary between areas depending on rainfall reliability, habitat types and whether key food resources for Bilbies in each habitat are promoted or removed by fire.

To develop guidelines for fire management to promote the recovery of the Bilby we asked workshop participants to list the key food resources for Bilbies in different habitats on their country and suggest how these food resources should be promoted or protected with fire management.

Bilby foods on Martu country, from the KJ presentation

Four management zones were identified with broadly similar fire management requirements:

The Kimberley zone where rainfall is >700mm per year and relatively reliable.

- Unmanaged fire frequency – annual
- Main habitats – Pindan Woodland, drainage lines, spinifex sandplains.
- Key food resources - Witchetty grubs in cockroach bush and Acacias is a key food resource 1-2 years post fire. Other ephemeral food plants come up in the first year after fire

producing seeds and fruits for Bilbies. In the Pindan woodland the main food resource is termites and other invertebrates that are most abundant in deep leaf litter, in longer unburnt habitat

- Desired fire frequency: Pindan Woodland >4 years, Sandplain >2-3 years. Recommended season for burning: April-June. Aim for a network of small burns with longer unburnt vegetation in between, but probably need to burn 30% of spinifex sandplain country each year and 10-20% of Pindan country

The Pilbara and northern Tanami Desert (Tennant Creek to Lajamanu) where rainfall is 400-500mm per year and lateritic habitats are favoured by Bilbies.

- Unmanaged fire frequency is 4-5 years
- Key food resources are witchetty grubs in Acacias on lateritic soils (which are killed by fire), and Yakirra seed in the sandplain (promoted by fire).
- Fire management recommendations: Burn patches of spinifex grasslands between the stands of grub shrubs with a maximum of 10-20% of sandplain burnt per year and patches ideally no wider than 1km. Aim for a fire frequency of 3-5 years in sandplain, but aim to protect a network of patches of unburnt stands of grub shrubs 5-10 years old to ensure continuous availability of grubs.

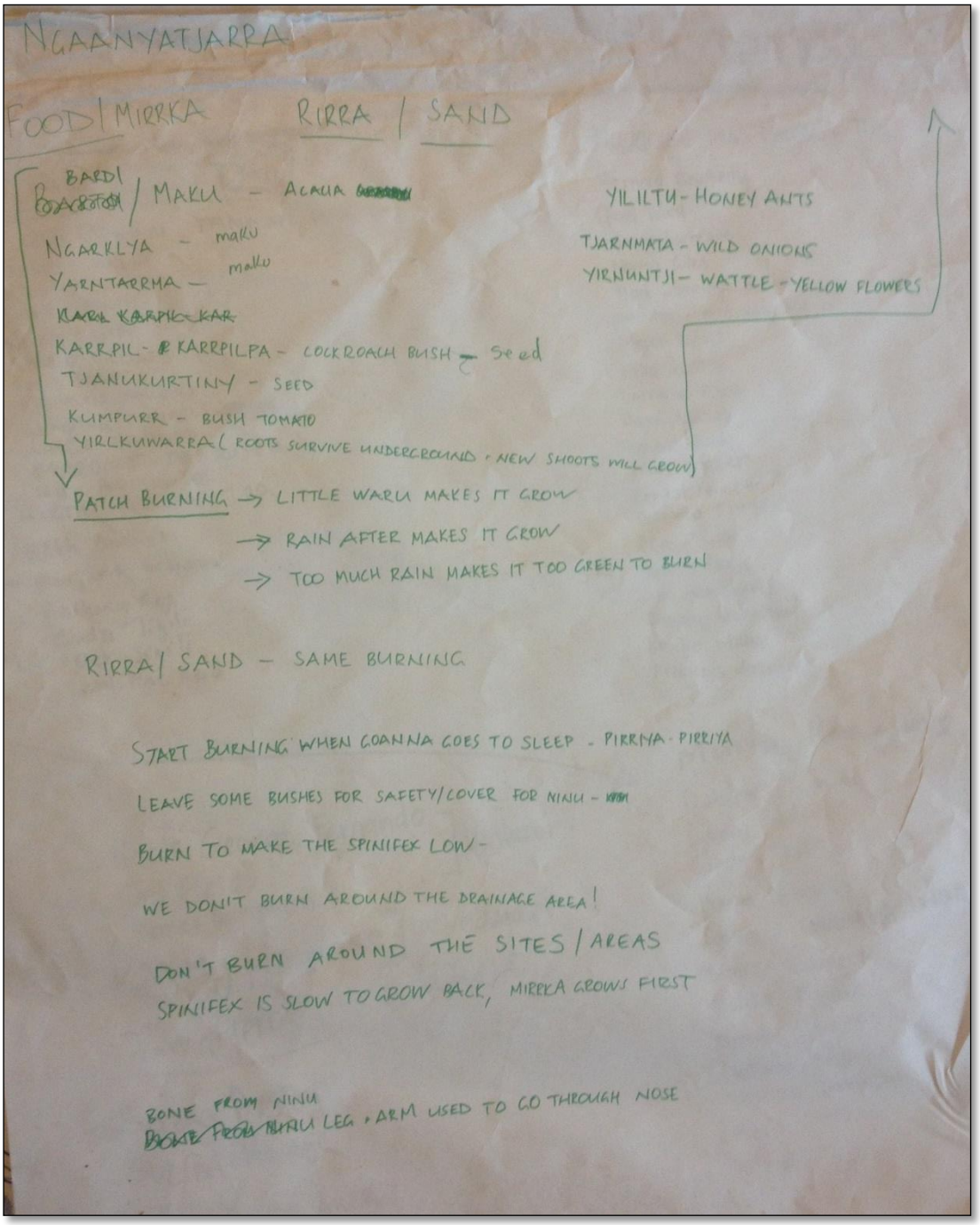
Great Sandy Desert (Sangsters Bore in NT to Kiwirrkurra and Punmu) where salt lake systems are key Bilby habitat and rainfall is 300-400mm but highly variable meaning fire frequency can be anything from 2-7 years

- Unmanaged fire frequency 5-7 years
- Key food resources are bush onions around lake margins and Yakirra seed in the sandplain, with some witchetty grubs in Acacias
- Fire management recommendations: Burn 5-10% of spinifex sandplain country every year to promote continuous availability of Yakirra seed. Focus burning in sandplain adjacent to salt lake country to give Bilbies a range of options and reduce reliance on salt lake country where rabbit and predator densities are usually highest. If large areas of spinifex are all the same age initially, start patch burning in cool season to reduce fire size but once fire mosaic is established introduce later season burns to promote Yakirra

Gibson Desert to Little Sandy Desert (Warburton to Birriliburu and Matuwa) where rainfall is highly variable and averages about 200mm per year

- Unmanaged fire frequency is usually at least 10 years
- Key food resources are Witchetty Grubs on the rirra (lateritic) substrates, and fire-promoted seeds and fruits in recently burnt sandplain
- Fire management recommendations: Aim to burn 5% in normal years but 10-15% after high rainfall years when short-lived tussock grasses come up and fill in the gaps between the spinifex clumps. Avoid burning grub shrubs as much as possible

It was suggested that further research into bilby diets throughout their range in response to habitat and fire management would be useful, but this would require standardising a method of quantitative scat analysis.



Recording fire management recommendations from Ngaanyatjarra Traditional Owners

Some very insightful fire management recommendations from groups included:

"*Start burning when goanna goes to sleep*" - Ngaanyatjarra Rangers.

"*Burn after walpatjiri has moved on, when you can only see old burrows and diggings*" - Warlpiri Rangers

"*Burn every year, but not the same patch*" - Muru-Warinyi Ankkul Rangers

"*Leave a windbreak around the Mankarr's burrow*" rather than burning right up to the Bilby burrow – KJ Rangers.

Where to from Here?

On the final day of the Ninu Festival we asked Ranger Groups to think about what they had learnt and discussed during the week, and make an Action Plan for what they were going to do to help save the Bilby when they got home to their country. Everyone had lots of ideas. Generally these ideas fell under 5 main themes:

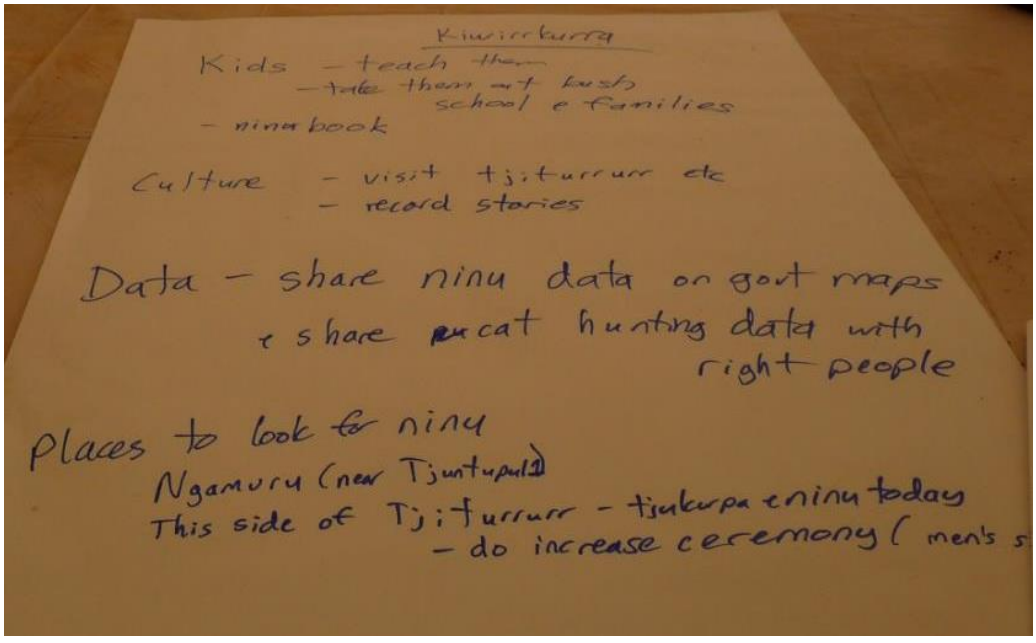
- Keeping the cultural knowledge about Bilbies alive and strong
- Increasing community awareness of Bilbies – locally and more broadly
- Strengthening and expanding Ranger Programs
- Ramping up Management efforts
- Mapping and Monitoring Bilbies and their threats

Keeping Cultural Knowledge Alive

Participants emphasized that culture should be at the heart of conservation. Throughout the festival it was clear that the motivation of Indigenous Rangers to protect the Bilby was largely based on the cultural connection people have with this iconic species. Maintaining a strong cultural connection is therefore fundamental to the recovery of the Bilby. People suggested that the Bilby should continue to be celebrated in art, poetry and songs.

All groups expressed the desire to capture more information from senior Knowledge Holders, either in books or audio/video recordings. But more than just preserving the knowledge in archives, Rangers want to keep the culture alive and in practice, such as visiting dreaming sites to perform Increase Ceremonies. One group suggested they needed to "rewild" their own mob.

Where Traditional Knowledge about Bilbies is diminishing, Rangers suggested inviting Traditional Owners with strong cultural knowledge to attend cultural festivals in their communities to share information that will remind and inspire people about the significance of the Bilby to Indigenous People.



Actions from the Kiwirrkurra Rangers

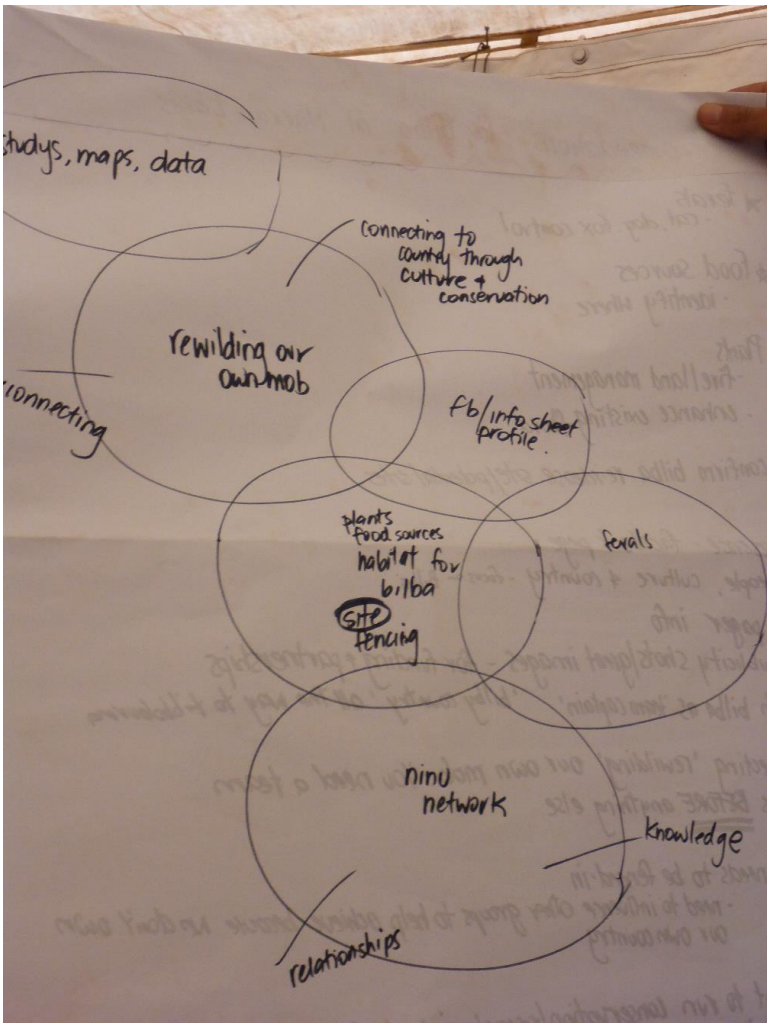
Increasing community awareness

The need to share knowledge about Bilbies with younger generations was emphasized by all groups, and working with school programs to take young people out on country to learn how to recognise Bilby sign and learn their traditional connections with Bilbies was an essential component of everyone's action plan. Some communities have Junior Ranger programs to help facilitate this process.

Other suggestions for increasing community awareness about the plight of the Bilby included producing articles for Land Rights News (on the Ninu Festival and other Bilby projects in general), sharing the Ninu Festival film with as wide an audience as possible and working with Remote Indigenous Media Associations to make more films about Bilbies.

People were reminded that National Bilby Day (the second Sunday in September each year) is a good opportunity to promote Bilby stories to the rest of Australia.

Streaming live footage from Bilby burrows through the internet was also suggested as a great way of engaging the public in Bilby conservation, and Save the Bilby Fund have already started doing this from a captive population. They also do Webinars that can be accessed by school groups.



Connecting NSW Traditional Owners to Country through Culture and Conservation

Strengthening Ranger Programs

With Indigenous Rangers at the frontline of Bilby conservation across 80% of their distribution, strengthening the Indigenous Ranger Program is paramount to the future of Bilbies in Australia.

Ninu Festival participants agreed that we all need to promote the Country Needs People campaign to compel politicians to not only commit long term funding to existing Working on Country and IPA programs, but increase the resources and support available for Indigenous Rangers, which are still spread very thinly across the range of the Bilby. There are still communities without Ranger Programs and large areas of Indigenous Lands outside of IPAs where we need to develop the capacity to monitor and manage Bilbies.

Representatives of Environmental organisations reminded us that continuing to tell simple positive stories about the important work Indigenous Rangers are doing to save threatened species such as the Bilby helps to raise the profile of the Ranger Program and make it harder for politicians to ignore the need for continued and additional support.

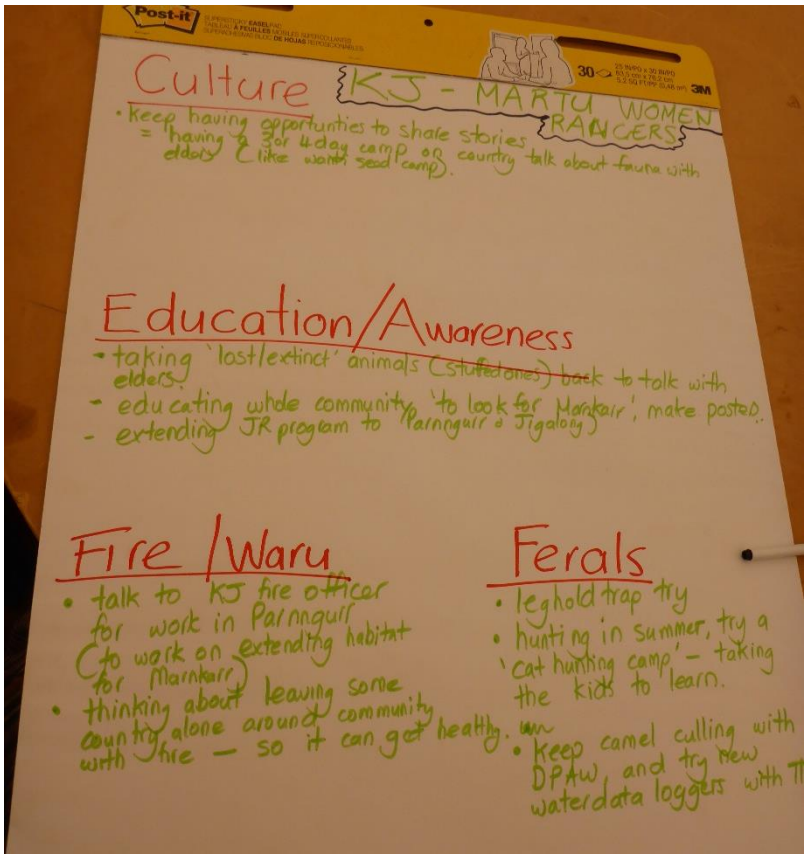
Planning Actions for Birriliburu

Ramping up Management Efforts

Nearly all groups listed targeted feral animal control as a high priority for Bilby management on their country. Feral cat was the main species Rangers wanted to target and most groups were interested in developing Predator Management Strategies that focussed on priority sites, integrated several techniques and included monitoring. Several groups were keen to start learning how to use leghold traps and others wanted to focus more on Traditional hunting techniques. One group planned to use leghold traps in the winter and cat hunting in the summer and suggested holding a cat hunting camp to teach more young people how to track cats. It was recommended that cat control programs could also be expanded to include other threatened species, such as the Great Desert Skink.

Dealing with large exotic herbivores is also a priority for groups in the northwest who stated the need to talk with people on cattle stations about protecting Bilbies from the impacts of cattle trampling and grazing, and also navigate through the influences of Christianity to gain support for donkey management in Bilby habitat.

Fire Management is also critical for the recovery of the Bilby, and was included in virtually all Action Plans. Most groups are already conducting some level of landscape scale fire management, often with aerial assistance, but Rangers are now thinking about the finescale burning in key Bilby areas to ensure a network of food resources are continually available for Bilbies in close proximity to unburnt areas with more vegetation cover. In some areas there may be too much burning occurring close to communities, and one group suggested leaving more patches of spinifex unburnt within their hunting zone. Good fire history mapping is important to plan burning.



Proposed Actions from the KJ Martu Women Rangers

Working together to understand the distribution and abundance of the Bilby and its threats

In the planning session Ranger groups thought about new areas that they wanted to search for Bilbies, and old areas that hadn't been visited for a long time that needed checking. Martu Rangers were keen to make posters to encourage the whole community to keep an eye out for Bilby sign, and report back to the rangers.

Participants agreed that the 2h track plot technique was appropriate for monitoring Bilbies and their threats but they needed help with managing and interpreting their datasets. Most groups were keen to also use cameras, as seeing images of Bilbies was more engaging than just looking at their tracks, especially for people who have never seen a live Bilby.

Ranger groups all included Bilby monitoring in their Action Plans and there was a groundswell of support for the Bilby Blitz collaborative track plot monitoring project. It was decided that this should start in 2017, to build on the momentum from the Ninu Festival.

Most groups were prepared to share their Bilby records with Government databases and enter cat sightings or kill data on the Feral Cat Scan app.

Kiwirrkurra Rangers planning their Actions, watched by "Business Bilby" aka the Threatened Species Commissioner

Priority Steps for the next 12 months

- Take what you've learnt home to your community, and share the Ninu Festival film, to let everyone know what's going on with Bilbies across Australia
- Keep looking for Bilbies and provide Bilby records to government databases to update the Bilby Distribution maps
- Collaborate through the Indigenous Desert Alliance to commence a nation-wide Bilby Blitz in 2017
- Develop predator management strategies for priority Bilby sites in each region based on the most appropriate methods for each local situation.
- Continued to implement landscape scale burning but also introduce fine scale patch burning around priority Bilby sites.
- Keep promoting the critical role of Indigenous Rangers in the recovery of the Bilby