



# Arid Zone Monitoring Project Summary



**Threatened  
Species  
Recovery  
Hub**

National Environmental Science Programme





**Thank you from the Arid Zone Monitoring Team**

This work was undertaken on the lands of many Indigenous groups and in collaboration with many Indigenous people. We acknowledge these Traditional Owners and their ongoing custodianship of Country, and pay respects to their past & present Elders.

The Arid Zone Monitoring Project was funded by the Australian Government's National Environmental Science Program through the Threatened Species Recovery Hub. The Project distils the very large collective effort of many people – Traditional Owners, Indigenous rangers, university researchers, consultants, and government staff - who live and work in Australia's deserts. It has been a privilege for the project team to be a small part of their deep commitment to caring for Australia's deserts.

The data collation and analysis for the Arid Zone Monitoring Project was carried out by Naomi Indigo, Anja Skroblin, Darren Southwell, Tida Nou, Liam Grimmett, David Wilkinson, Diego Brizuela-Torres, Taleah Watego, Katherine Moseby, Rick Southgate, and Sarah Legge. Brett Murphy assisted with fire history datasets. The project website, which displays and organises some of the project's key outputs, was developed by Alys Young. The project has relied heavily on the Hub's communications team of Steve Wilson, Mary Cryan, Nico Rakotopare and Jaana Dielenberg. Nelika Hughes advised us on data management options; the EcoCommons team and Martin Westgate helped us get the website off the ground; Chris Fenwick and Heather Christensen were invaluable project management support. We thank the Hub's Indigenous Reference Group for their guidance (Cissy Gore-Birch, Stephen van Leeuwen, Oli Costello, Teagan Goolmeier).

The project builds on the efforts of individuals who have used, or advocated for, coordinated track-based monitoring for many years, and who provided valuable advice to the project. As well as Katherine Moseby and Rick Southgate, this includes Rachel Paltridge (Kiwirrkurra); Laurie Tait, Kim Webeck, Sam Rando and Thalie Paltridge (Central Land Council); Danae Moore (AWC); Joe Benshemesh (Maralinga); Dorian Moro (Wiluna Rangers); Martin Dziminski (WA DBCA); Chris Curnow (WA Rangelands); Peter See (10 Deserts, Country Needs People); Pete Copley, Cat Lynch and Dan Rogers (SA DENR); Rob Brandle (SAAL NRM Board). Many more people have made the project possible, by collecting and sharing data, supporting data collection by rangers, facilitating project communication, and by being sounding boards. A complete list is available in the full report, and we thank them all for being part of this project.

Citation:

Indigo N, Skroblin A, Southwell D, Grimmer L, Nou T, Young A, Legge S and AZM Project Partners (2021). The Arid Zone Monitoring Project Summary. NESP Threatened Species Recovery Hub Project 3.2.5, Brisbane.



*Cover photos: S. Legge, J. Hausheer, A. Stow, S. Schultz, H. Bannister*

## What is the Arid Zone Monitoring Project?

The Arid Zone Monitoring project supports people and groups who are using track-based survey methods to monitor Australia's desert fauna – Traditional Owners, Indigenous rangers, university researchers, consultants, and government staff. The project aims to:

- Gather existing data together to see what can be achieved when desert groups and individuals share data into a national dataset.
- Give advice about future monitoring designs and data collection, to help people achieve their local, regional and national objectives.
- Showcase the work being carried out across Australia's deserts.
- Do the groundwork to build towards a national monitoring program for desert animals.

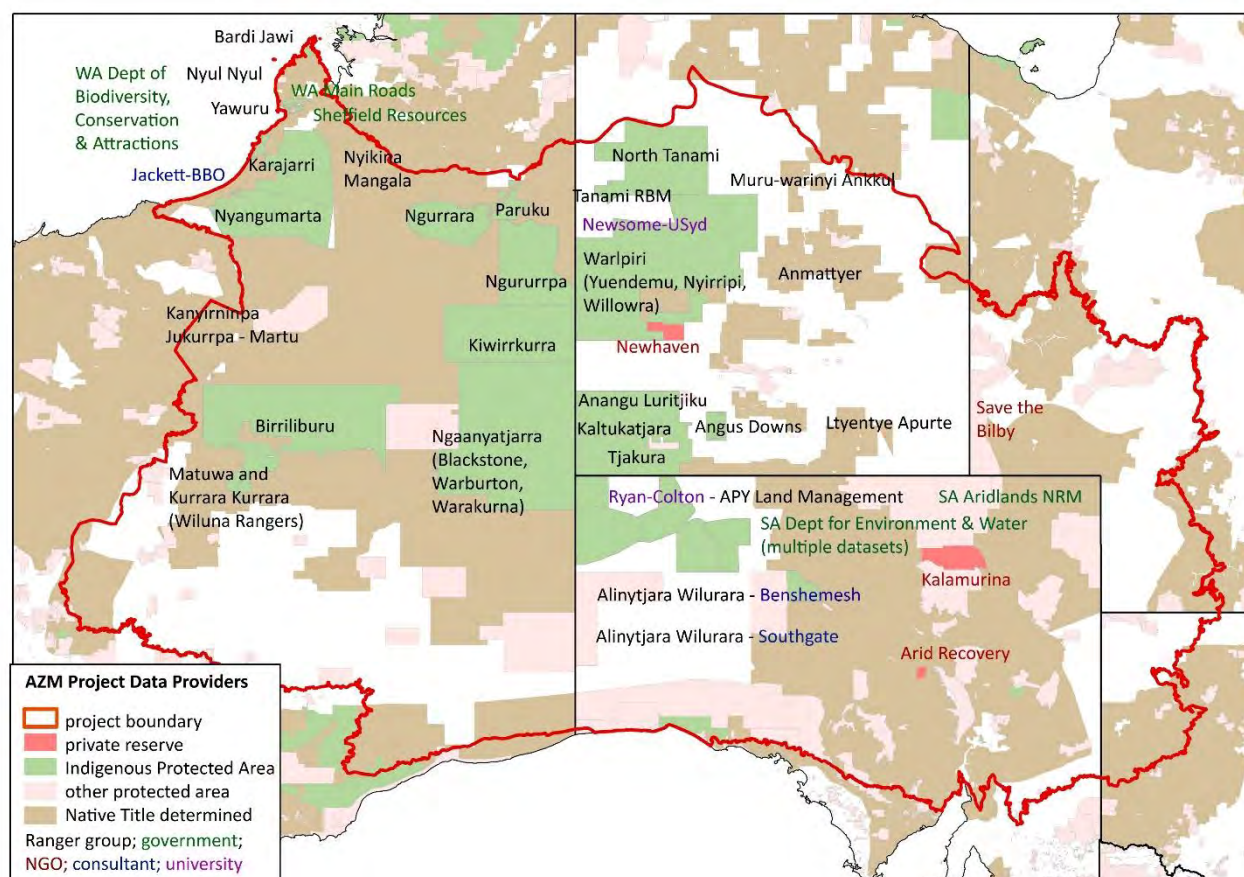
## Project development

We talked to partners to shape a project that respected the objectives and needs of desert groups who carry out track-based surveys. The project area covers over 3,270,000 km<sup>2</sup> of central Australia, including arid and semi-arid areas, and small areas of the low rainfall tropics.



Talking about the Arid Zone Monitoring Project with rangers from the southern Kimberley and western deserts, at Lake Paruku (Photo: J. Dielenberg).

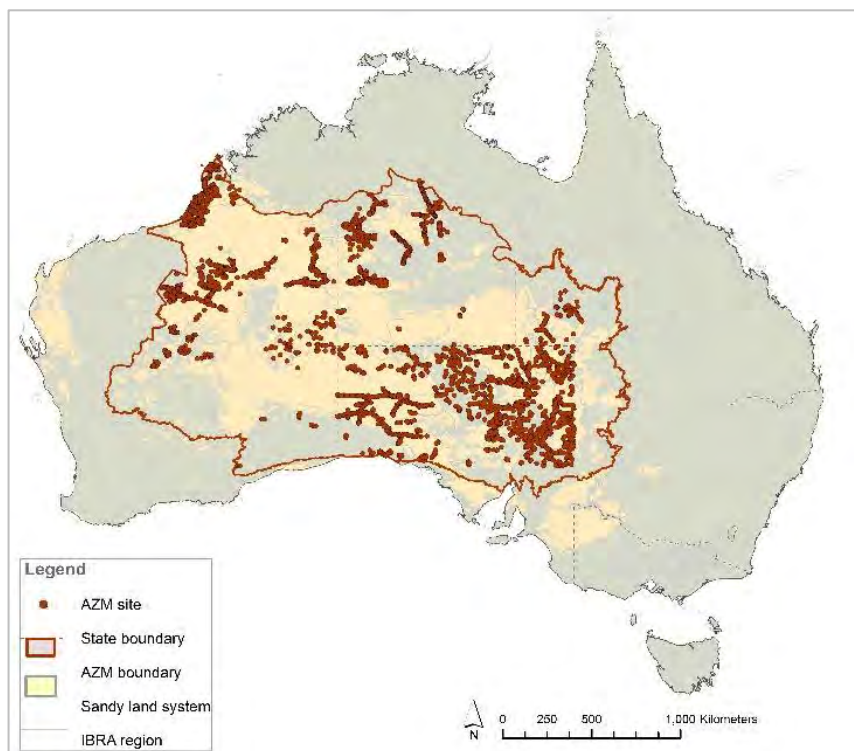
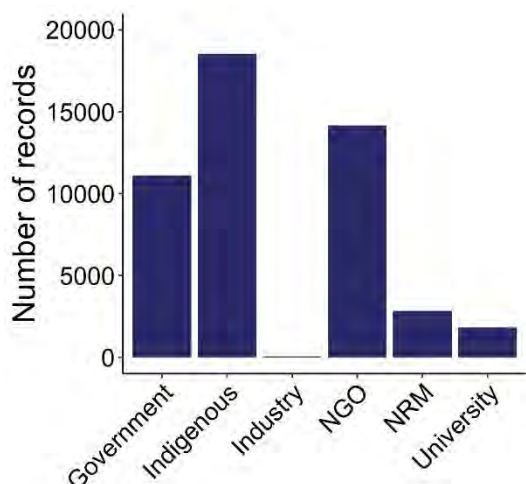
Thirty-seven different groups and people shared their data into the Arid Zone Monitoring National Dataset; these partners are shown on the map below. Data were collected by Indigenous rangers, government scientists, university scientists, NGOs and consultants, between 1982 to 2020.





## How much data was collected?

The Arid Zone Monitoring National Dataset has 48,525 presence records, from 14,815 surveys carried out at 5363 unique sites (see map).



## Who collected the data?

Traditional Owners, Indigenous rangers, university researchers, consultants, and government staff collected track-based survey data.

Most species detection records were made by Indigenous groups.



Karajarri Rangers recording data on the Karajarri IPA (Photo: N. Rakotopare).



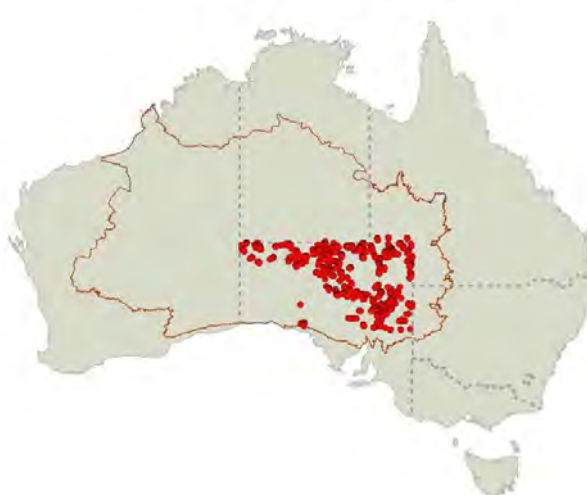
## When was the data collected?

From 1982 to 1999, data were mostly collected in Southern Australia, by ecologists funded by government grants. They visited the sites shown by the red dots in the maps below. After 2000, Indigenous ranger groups started to collect a lot of data – these are the blue dots in the maps below.

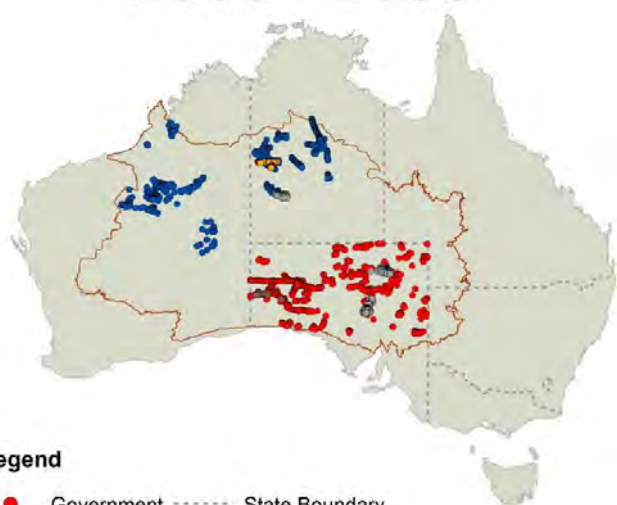
1982 - 1989



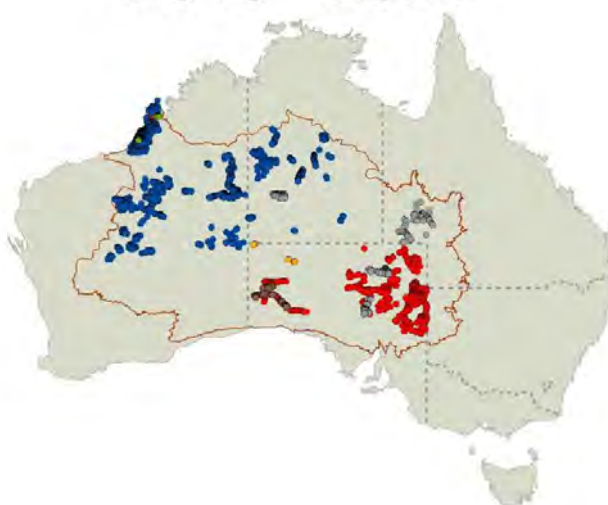
1990 - 1999



2000 - 2009



2010 - 2021



### Legend

- Government
- Indigenous
- Industry
- NGO
- NRM
- University
- State Boundary
- AZM boundary



0 550 1,100 2,200 Kilometers



Searching for tracks on APY Lands (Photo: S. Legge).

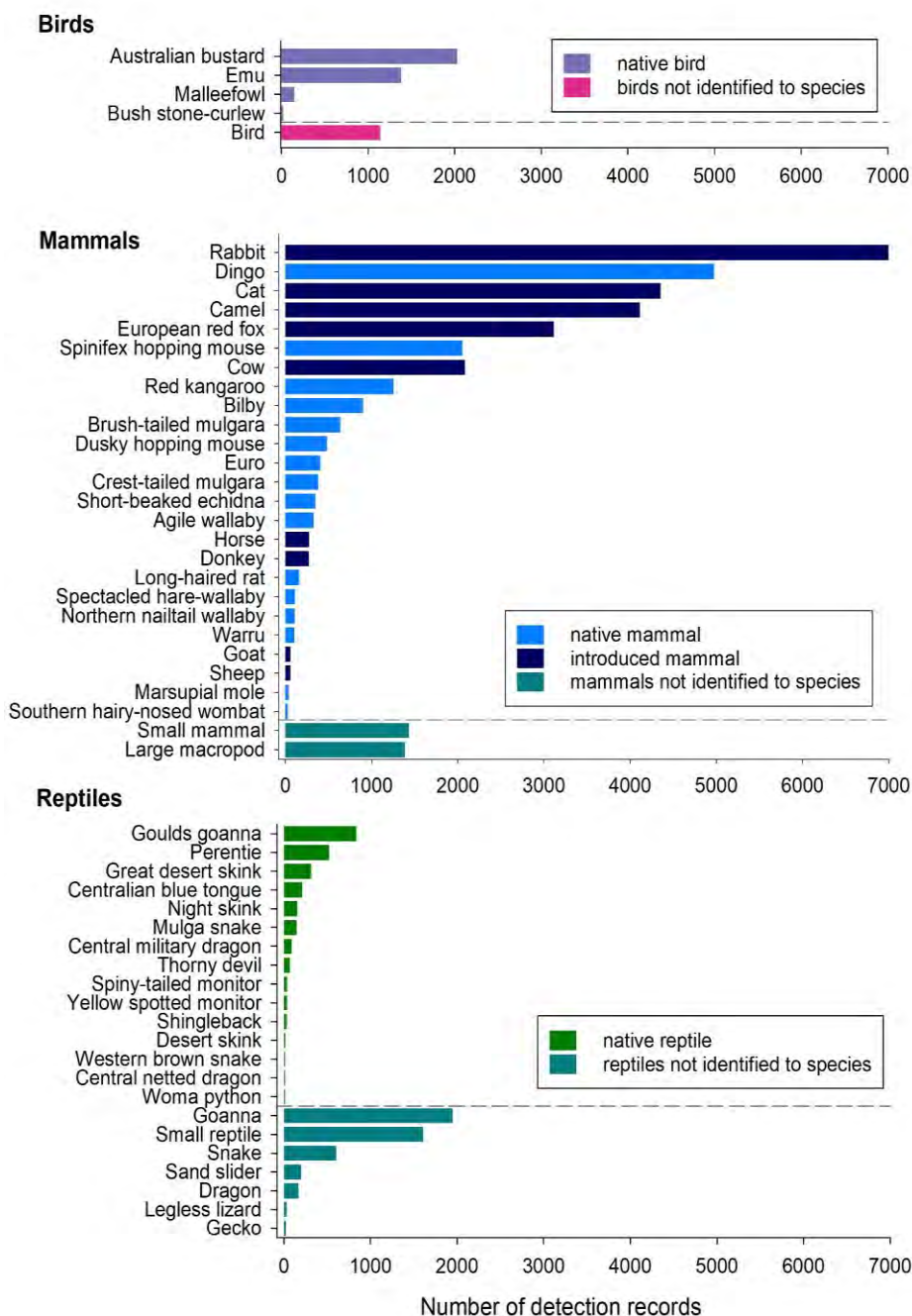


## What species are recorded?

The Arid Zone Monitoring National Dataset contains records of 76 individual species: 27 native mammal species, 11 introduced mammal species, 4 bird species and 34 reptile species.

Track-based surveys are most useful for medium to larger animals with tracks that can be identified, like echidnas, cats, goannas, turkeys, camels, and cows. Some threatened species, rare species, and species important to Traditional Owners, such as bilbies, great desert skinks, dusky hopping mouse, crest-tailed mulgara and perentie, are detected often compared to other species, because they are the focus of some surveys.

About one fifth of all records were identified to a group type (e.g. “goanna”, or “large macropod”) rather than a species.



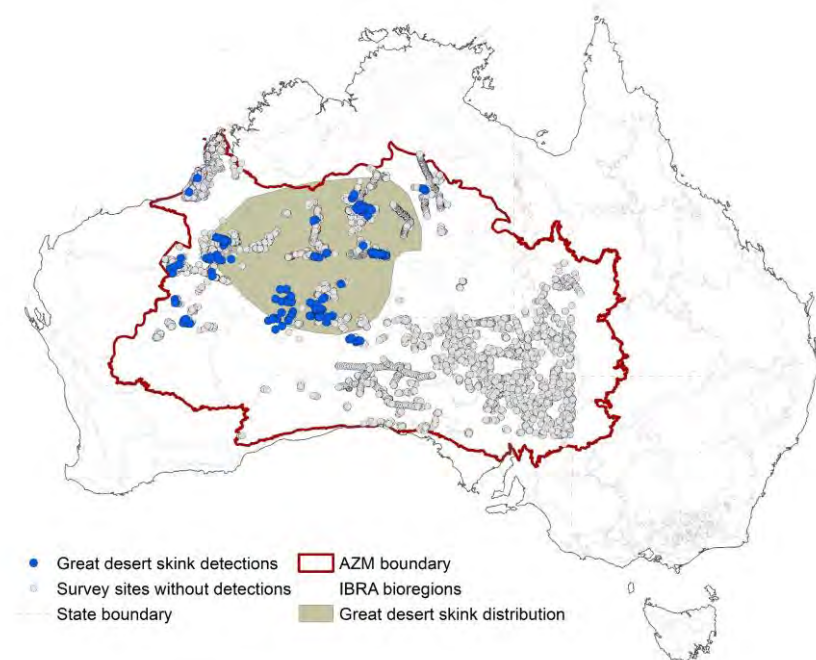
This chart shows detections of bird, mammal and bird species and groups. Only species with > 25 records (mammals) and >10 records (reptiles) are shown.



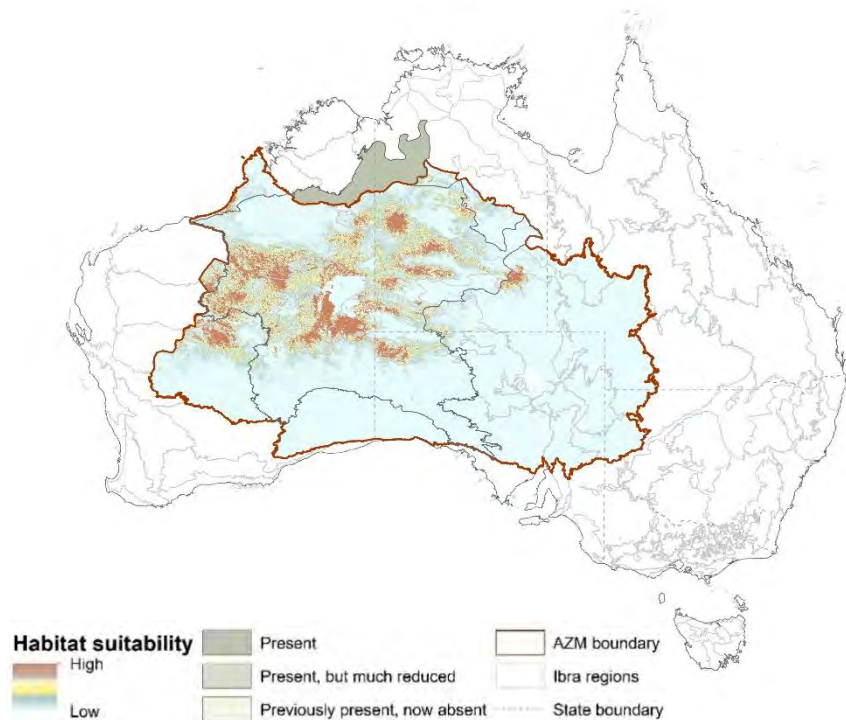
The most common bird was turkey (bustard); feral animal was rabbit; native mammal was dingo; reptile was sand goanna (Gould's goanna) (Photos: D. Nelson; I. Morris, C. Jolly).



## Using the data to gain knowledge about where species live



The records help improve shared knowledge about where species live. This map shows all the sites in the national dataset (grey dots), and the sites where great desert skink (Tjakura, Tjalapa) were recorded (blue dots). The green colour shows the great desert skink distribution mapped by the International Union for Conservation of Nature (IUCN). Rangers have made many records outside this distribution. This shared knowledge is important for making national plans to look after this threatened species.



With the species records, we can use 'habitat suitability modelling' (sometimes called species distribution modeling) to map where suitable habitat for great desert skinks is in the sandy deserts. The model looks for places that are the same as where great desert skink have been recorded (with the same temperature, rainfall, elevation, slope; soil, amount of vegetation (NDVI) and fire frequency).

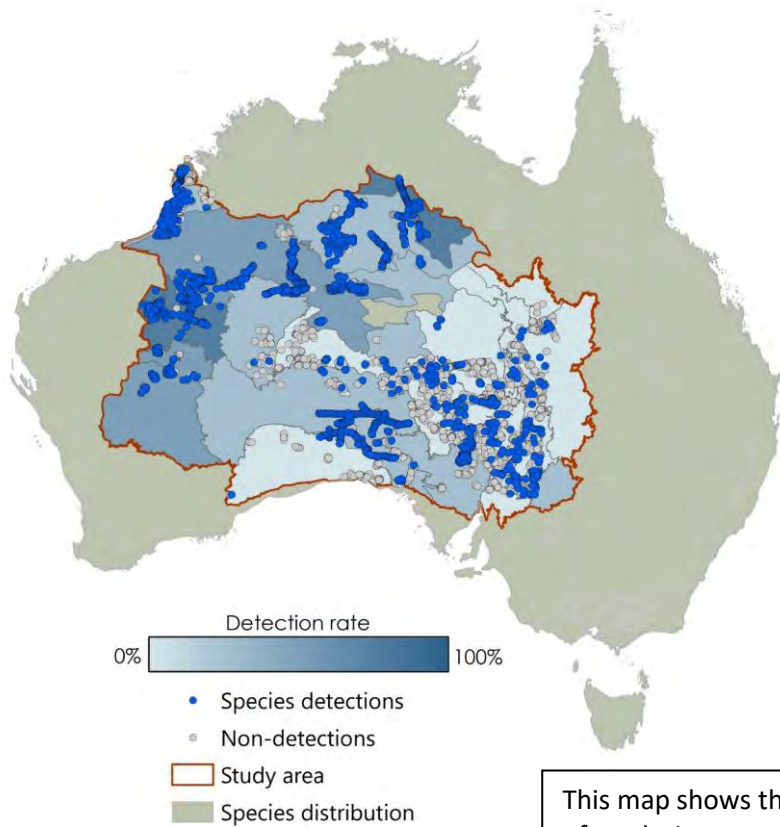
This mapping can show places that groups and individuals can target in future surveys if interested in great desert skinks. When these maps for many different species are laid over each other, we can choose where to survey to have a good chance of detecting lots of different species.



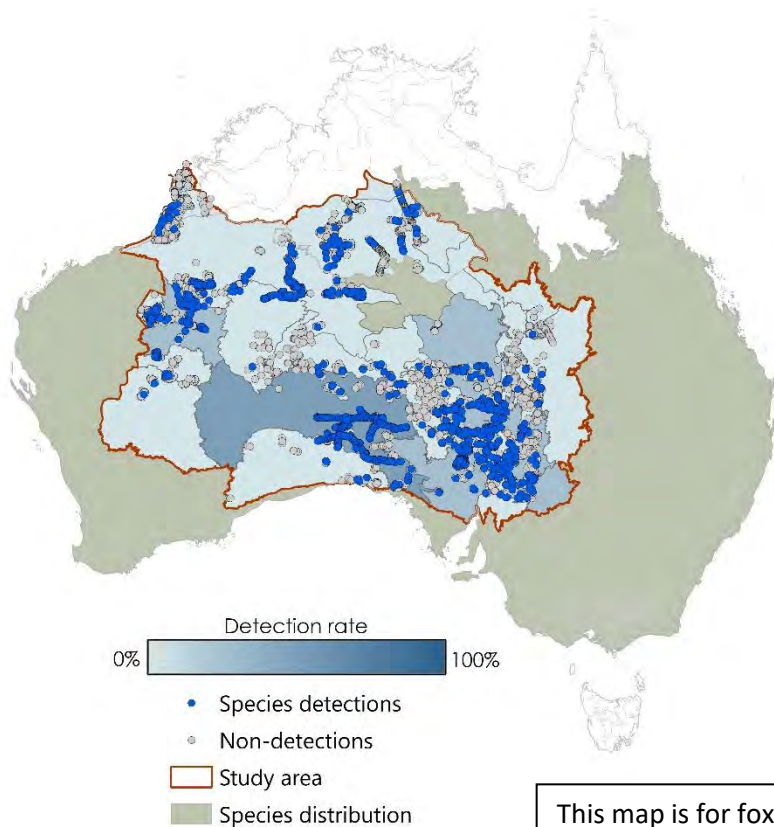
*Tjakura (Photo: Mutitjulu Tjakura Rangers).*



We can use the survey data to look at where animals are most common



This map shows that cats are detected more often during surveys in the northwestern deserts (Photo: H. McGregor).

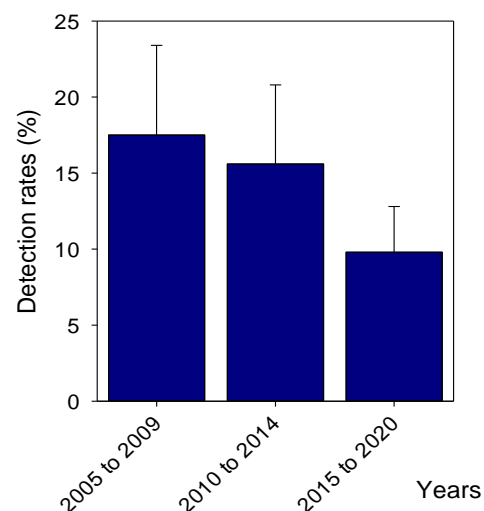


This map is for foxes, and it shows that they are more common in southern deserts, the opposite pattern to cats (Photo: N. Rakotopare).

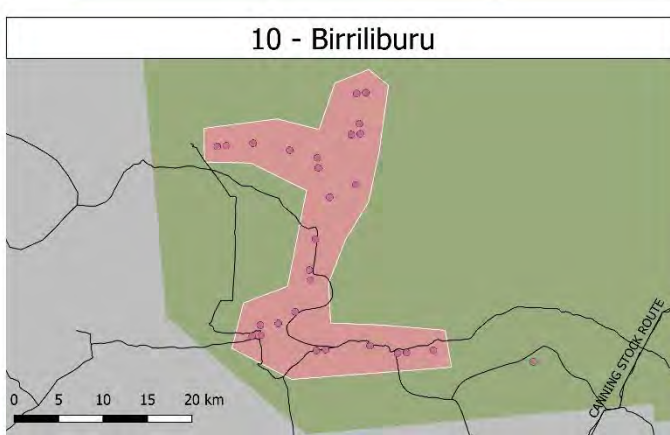
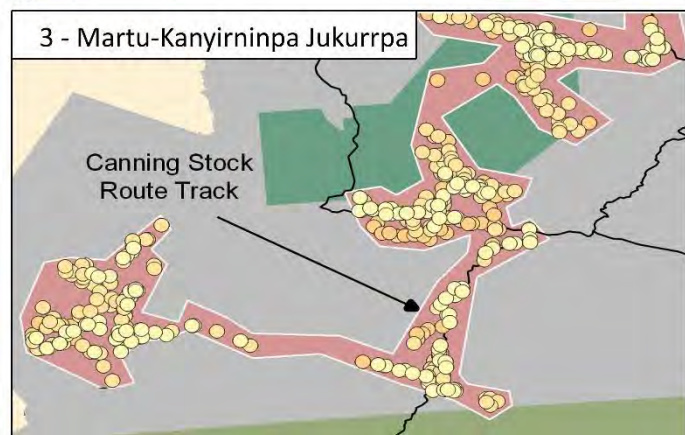
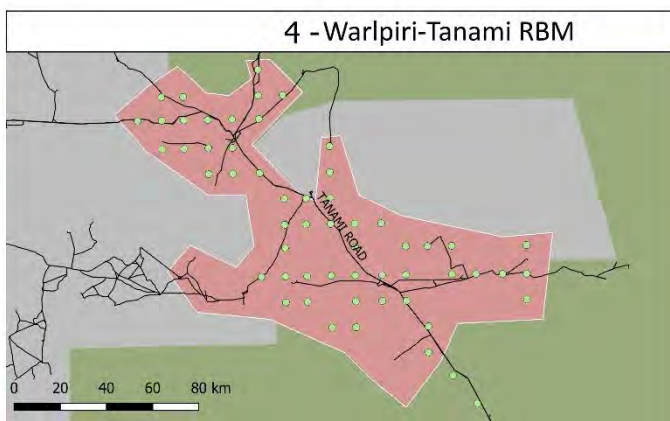
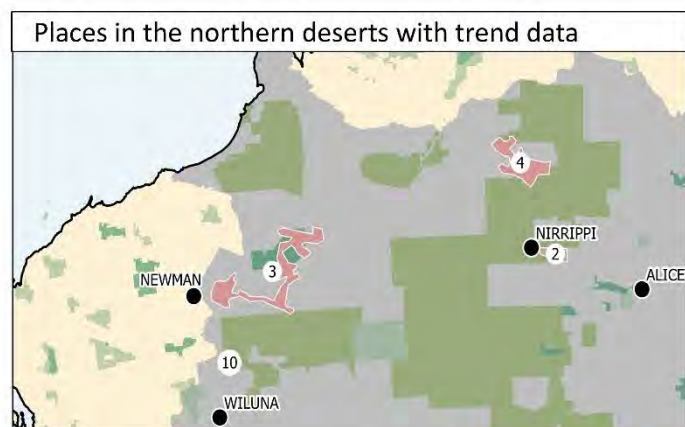


## Looking for changes over time

Many project partners are interested in changes in animal populations over time. We can use the Arid Zone Monitoring National Dataset to look at changes in detection rates for some species, like the brush-tailed mulgara below. The chart suggests that brush-tailed mulgara have been detected less over time.



But - to look at changes over time properly, you need 'time series information'. This means you need to go back to resurvey the same sites several times over several years. If you keep going to new sites every year, it's hard to know if changes that you observe are because you are surveying a new place, or because of changes due to weather, or management, or anything else. About three-quarters of sites in the Arid Zone Monitoring National Dataset were only visited once, 15% were only visited twice (over two different years). This makes it harder to look at change over time. Repeated visits to sites in different years has only happened in a few areas. Some examples of areas with good time series data are in the map below.



To look at changes over time, you need to revisit the same sites over several years. The maps show examples from the northern deserts where trend analysis is possible.

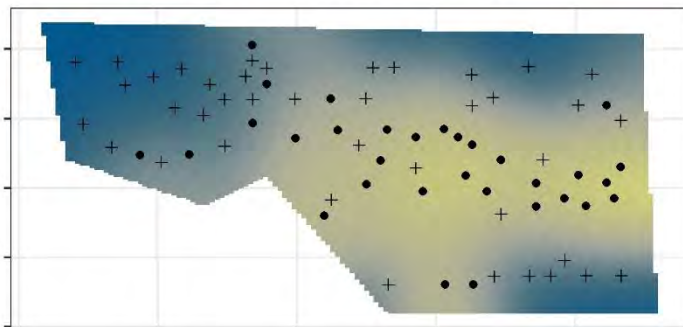
■ National Park    ■ Indigenous PA    — Major roads  
■ Other reserves    ■ Study area    ■ Trend analysis areas



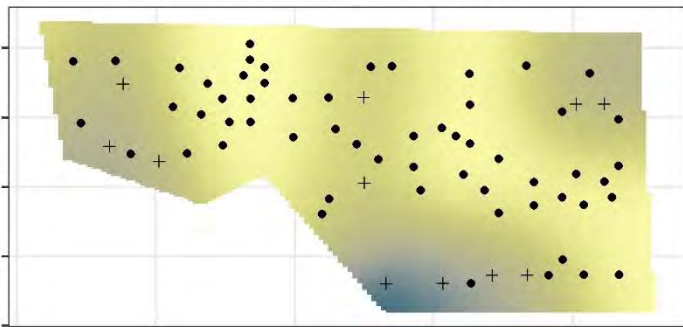
## Using track-based surveys to help management

The Newhaven Warlpiri Rangers collected track data on Newhaven for eight years. They revisited the same sites and collected good quality data each time, making it possible to look at how detections of animals changed. These maps below show detections of brush-tailed mulgara, or Jajina, over three example years. We can see that Jajina numbers go up after big rain, because the detections cover all of Newhaven after the wet years of 2010-11. When we crunched the numbers for Newhaven, and other places with good data for looking at trends (like KJ Martu, Birriliburu, and Warlpiri – Tanami), we can also see that Jajina are less common soon after fire, but then their numbers go up again.

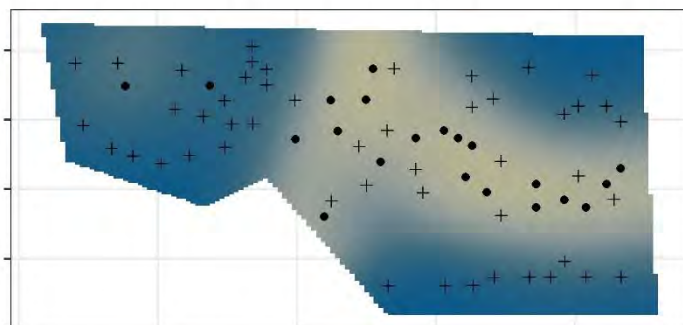
Mulgara detections in 2008 (dry year)




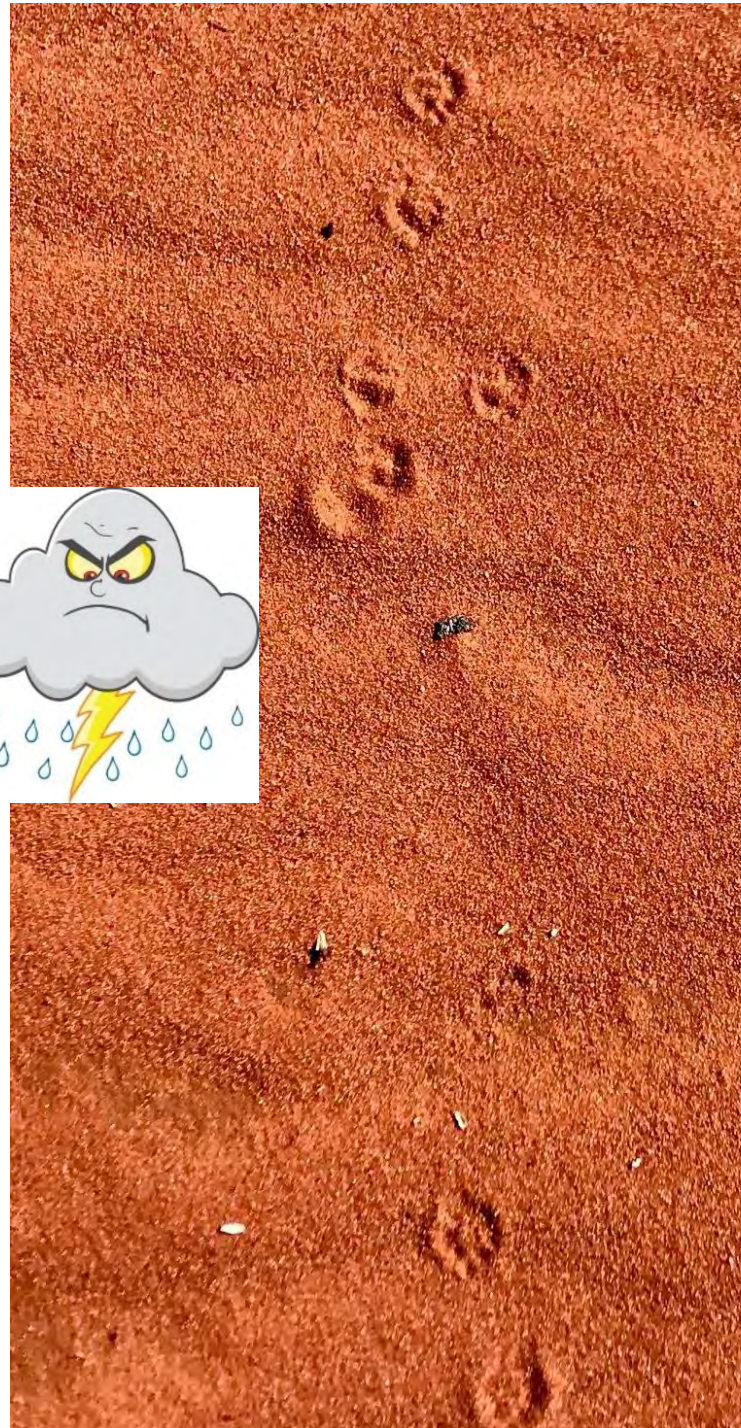
Rain in 2010-11....and mulgara get common



Country gets dry again....and mulgara are rarer by 2014



rare  common  
+ Mulgara not detected  
• Mulgara detected



In dry years, mulgara (Jajina) are detected in smaller refuge areas; these are the yellow areas on the maps in the middle of Newhaven in the 2008 and 2014 maps. If the Newhaven Warlpiri Rangers are worried about cats killing Jajina, then hunting cats in these refuge areas, during dry years, could help Jajina. The photo shows Jajina tracks, taken by the Kiwirrkurra Rangers.



## Improving the way we do track-based surveys

Like all surveys, track-based surveys need to be designed carefully to record data that are useful for answering the questions your team is interested in. It is best to get advice from an experienced ecologist to design your survey, but the project produced general guidelines about the number of sites, where to put them, and how often to re-survey them. The guidelines are available on the [AridZoneMonitoring.org.au](https://AridZoneMonitoring.org.au) website.



*Ngurrara rangers recording data (Photo: H. Bijlani).*

Collecting the data in good tracking conditions, and recording the right data consistently, is very important. The project worked with tracking experts to design a data collection template that can be used anywhere in the deserts. This template can be downloaded from the project website: [AridZoneMonitoring.org.au](https://AridZoneMonitoring.org.au).



*Walalkara Rangers sharing knowledge about tracks (Photo: N. Indigo).*

People do track-based surveys for different reasons, such as:

- To share knowledge, including between generations.
- To say what species are present on country, and what habitat they prefer.
- To see if animal numbers are going up or down.
- To see if management is working.

The number of sites you need to survey, and how often you need to revisit them over time, depends on why you are doing the surveys. For example, if the aim is to share knowledge, then you should go to the places that support that experience, and you don't need to revisit sites for scientific reasons. If you want to know about changes over time, you will need to revisit sites, and you may need to sample a larger number of sites.



## What's next?

The Arid Zone Monitoring Project has shown that

- Desert groups and people have collected a very large amount of track-based data.
- The data can be collated even though the survey objectives and data collection methods differed.
- The data is useful for understanding species distributions and their preferred habitats.
- The data can show changes over time if collected in the right way, and future surveys can be designed to show these trends at local, regional and national scales. That way, rangers and partners can tell a strong story about what is happening on desert country.

Most of all, the project shows that it is possible to build a large partnership that can show patterns in animal distributions and trends at a national scale, whilst respecting the Intellectual Property and diverse interests of the partners.

With this foundation in place, the next step is to shape the next phase of the project, based on a partnership between a lead Indigenous organisation, universities, governments, and NGOs. The new project could aim to establish a national and collaborative monitoring program, where each partner collects data from 10-20 sites each year, summing to 400-600 sites across the country. A new project could also continue to provide advice on survey design and data collection to partner groups, and could automate parts of the data collection and curation so that people can upload data and generate reports from an online portal.

For more information, go to: [AridZoneMonitoring.org.au](https://AridZoneMonitoring.org.au)



*Kiwirrkurra rangers talking about tracks (Photo: N. Rakotopare).*