# Warru Recovery Team Progress Report 2016 - 2018

Recovery of *Petrogale lateralis* MacDonnell Ranges race in South Australia

*An initiative of the Australian Government, Department of Environment, Water and Natural Resources, Alinytjara Wilurara Natural Resources Management Board, Anangu Pitjantjatjara Yankunytjatjara, Zoos SA and Ecological Horizons.*

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Government of South Australia

Anangu Pitjantjatjara Yankunytjatjara

The University of Adelaide

Ecological Horizon

Zoos South Australia


HimKiek
Kapi
WARRU


Hinkick
Mai

This document is a progress report for the Warru Recovery Project, which outlines the activities of the Warru Recovery Team performed over a two year period from January 2016 to December 2018.

The WRT is a partnership which began in 2007 between the Federal Government, Department of Environment and Natural Resources (SA), Alinytjara Wilurara Natural Resource Management Board, Anangu Pitjantjatjara Yankunytjatjara (APY), Zoos South Australia, University of Adelaide and Ecological Horizons Pty Ltd.

Hard copies of this report may be obtained by contacting Zoos South Australia.

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# Introduction

Warru (black-footed rock-wallaby, *Petrogale lateralis* MacDonnell Ranges race) have contracted dramatically in range and abundance over the past 80 years. As a result they are classified as endangered in South Australia and vulnerable across Australia. In South Australia, the remaining populations occur in the Aboriginal owned and managed Anangu Pitjantjatjara Yankunytjatjara (APY) Lands. In early 2016 warru were identified amongst the 20 priority mammals species in the Australian Government Threatened Species Strategy.

The Warru Recovery Team (WRT) was formed in 2007 with the overarching vision of recovering populations of warru in South Australia and providing training and employment opportunities for Anangu, the traditional owners, landholders and community members of the APY Lands.

The WRT's work is guided by the objectives and actions outlined in the South Australian Warru Recovery Plan (WRP, Read and Ward 2011), formally launched in December 2011. Central to the WRP are two themes:

a. Warru conservation is currently and will in the future play a critical role in providing training and employment opportunities for Anangu, as well as strong connections to historical and contemporary Tjukurpa.

b. Management, research and cross-jurisdictional initiatives described and costed in the WRP are intended to facilitate tangible, positive environmental change at a landscape scale across the Anangu Pitjantjatjara Yankunytjatjara Lands.

Ongoing implementation of the WRP will be the foundation of success of warru recovery.

In order to assess and communicate the progress of the WRT in implementing the plan, this is the fourth progress report produced by the WRT, combining activities across the years 2016 - 2018.

Inside cover: Painting of warru recovery, including kapi (water) and mai (food) supplementation, in the Tomkinson Ranges by Matthew Miller.

# Executive summary
## 2016 - 2018

Many activities were undertaken from 2016-18, including:

- Continuation of the governance of the Warru Recovery Team (WRT) with greater responsibility by APY Land Management and independent WRT members;
- Successful translocation of warru from wild populations at New Well and Alice Springs and a semi-captive population in Pintji to Wamitjara in the Musgrave Ranges;
- Commencement of ground shooting of predators in the Musgrave Ranges by the APY LM rangers (Ethan Dagg) and continuation of shooting by Graham Miller resulting in seven cats and one fox from New Well recorded preying on warru;
- Further warru trapping studies in the Musgrave and Tomkinson Ranges as well as Pintji to increase the knowledge of survivorship, abundance, reproductive output of females, and recruitment of new individuals to the populations;
- Establishment of additional warru scat monitoring quadrats at ten locations at Wamitjara, and a completion of an extensive warru scat distribution survey at New Well;
- Trial deployment of 8 Felixer grooming traps to control cats and foxes at Wamitjara;
- Filming and release of the '*Saving Warru*' documentary and publication of the '*Book of Hope*' chapter that both feature the work of the Warru Recovery Team;
- Successful application and management of the WRT's first independent grant (assisting with the Wamitjara warru reintroduction) that was administered for the WRT by Zoos SA;
- Initiation of a program to re-establish a warru population in the Everard Ranges.

# Governance

Membership of the Warru Recovery Team (WRT) and staff involved with the warru project are listed in Table 1. Regular WRT Annual General Meetings have been held since the team was formed in 2007. Two AGMs, 11 formal recovery team meetings and numerous subcommittee phone linkups were held during the 2016-18 reporting period (Appendix A). Along with in kind contributions from each of the participating organisations, the bulk of the funding for WRT activities in the reporting period was derived from a Working on Country grant from the Australian Government managed by APY Land management. Additional resources were sourced from Threatened Species Recovery Fund for the Wamitjara warru translocation in a grant managed for the WRT by Zoos SA, and from the Australian Government Indigenous Protected Areas funding program to undertake warru habitat assessment in the Antara Sandy Bore IPA/Everard Ranges as an initial step to potential future warru reintroduction.

Table 1. Recovery Team membership from 2016 - 2018.

| Name | Organisation | 2016 | 2017 | 2018 |
|---|---|---|---|---|
| **Minyma** | | | | |
| Inpiti Winton | APYLM | √ | √ | √ |
| Nyinguta Edwards | APYLM | √ | √ | √ |
| Tjaria Stanley | APYLM | √ | √ | √ |
| Mrs Paddy | APYLM | √ | | |
| Inawantji Stanley | APYLM | | | √ |
| **Warru Rangers** | | | | |
| Jacob Mckenzie (Co-chair) | APYLM | √ | √ | √ |
| Bronson Bennet | APYLM | √ | √ | |
| Matthew Miller | APYLM | √ | √ | √ |
| Ethan Dagg | APYLM | √ | | |
| Sherada Stanley | APYLM | √ | √ | √ |
| **Members** | | | | |
| John Read (Chair) | Ecological Horizons | √ | √ | √ |
| Luke Ireland | APYLM | √ | √ | |
| Magdalena Zabek | APYLM | √ | √ | √ |
| Sara Weir | APYLM | √ | √ | √ |
| Peter Hamnett | APYLM | | | √ |
| Helen Palmer | APYLM | | √ | √ |
| Rebecca West | University of NSW | √ | √ | √ |
| Pete Copley | DEWNR | √ | √ | √ |
| Liberty Olds | Zoos SA | √ | √ | √ |
| Althea Guinsberg | Zoos SA | √ | √ | √ |
| Beth Pohl | Zoos SA | √ | √ | √ |
| Brett Backhouse | AWNRM | √ | √ | √ |
| Mark Eldridge | Australian Museum | √ | √ | √ |

# Management and monitoring program

Only two extant metapopulations of warru are currently known in South Australia – in the Eastern Musgrave Ranges (including Wamitjara since 2017) and the Tomkinson Ranges of the Anangu Pitjantjatjara Yankunytjatjara (APY) Lands. In addition, a population of captive-bred warru was reintroduced to a predator-proof exclosure in 2011 from Monarto Zoo. This exclosure known as the Pintji (fence), is located near Donald's Well, and is adjacent to the known Musgrave warru meta-population. The Warru Recovery Team's management and monitoring activities for each site are outlined below:

- Musgrave Ranges, including sites at New Well, New Well North, Kaanka Mangka, Alalka, and newly re-established warru colony at Wamitjara,
- Pintji, a semi-captive warru colony in the Musgrave Ranges, and
- Tomkinson Ranges wild warru population, including sites on Dulgunia Hill, Hinkley Ranges and Ankunytji

## Warru recovery – Musgrave Ranges

The Musgrave Ranges warru meta-population is known to occupy approximately 640 km$^2$ within the Eastern Musgrave Ranges, extending approximately 16 km west of Pukatja community to 10 km north of New Well and as of June 2017, 30 km east to Wamitjara. Although other warru colonies in the region were extant when last surveyed (Ward et al. 2011), five wild warru colonies and one semi-captive colony are currently monitored and managed as part of the Warru Recovery Plan (Figure 1). Management activities for this population are summarised in Table 2.


Figure 1. Map of warru sites in the Musgrave Ranges where monitoring and/or management is conducted in relation to Pukatja (closest community).

Table 2. Summary of management and monitoring activities in the wild warru colonies in the Musgrave Ranges from January 2016 to December 2018.

| Recovery action | | Frequency | Location | Description |
|---|---|---|---|---|
| Feral Carnivore Monitoring and Control | Aerial baiting | Once, Apr 2017 | Wamitjara, Alalka, Kaanka Mangka | 1800 Eradicat® baits were dropped across an area of approximately 80km² (on the hills only) |
| | Ground baiting | Weekly for four weeks May-Jun 2017 | Wamitjara | 38 bait stations around the perimeter of Wamitjara and 5 stations on the hill. Eradicat baits were buried at each station and checked 1 - 2 a week for four weeks. 24 stations were monitored by remote cameras. |
| | Shooting and/or trapping | 31 days in Wamitjara, 12 days in New Well | Wamitjara, New Well | 8 days in New Well and Kaanka Mangka (Jun–Dec 2016), and 9 days in Wamitjara (Sep 2016 – Mar 2017) conducted by APY LM team (shooter Ethan Dagg)<br><br>42 days in Wamitjara and 10 days in New Well from May – Dec 2017 by Graham Miller.<br>38 days in Wamitjara, 18 days in New Well and Kaanka Mangka and 12 days in Kalka, March 2018 to Dec 2018 conducted by Graham Miller |
| | Felixers | Continuous Dec 2017- Dec 2018 | Wamitjara | 8 Felixers set at Wamitjara, except brief periods when up to 3 removed due to March 2018 fire or repairs |
| | Remote cameras | Sep 2016 – Dec 2017 | New Well, Wamitjara | 24 remote cameras were placed in New Well, and 26 in Wamitjara. Images were checked on average every 6 weeks to measure the index of relative predator abundance. |
| Fire | Ecological burning | Jul 2017, approx. 4 days in each site | Wamitjara, New Well, | Prescribed burning around the perimeter of Wamitjara (308 ha) and New Well (141 ha) |
| Warru Scat Surveys | Quadrat sampling | Bi-annual | New Well, Wamitjara | 24 scat quadrats of 1m radius at the main New Well outcrop; 10 quadrats at New Well North, and 63 quadrats at Wamitjara |
| | Line transect survey | One-off (Sep-Oct 2016) | New Well | 186 line transects across the New Well outcrop to assess warru population distribution across the entire outcrop |
| Warru Trapping Surveys | Trapping | Jul 2016<br>Months Jul-Aug 2018 | New Well, Kaanka Mangka, Alalka, Kalka | 3 days of free feeding followed by 4 nights of trapping in each location. 20 traps at the main New Well outcrop, 6 at New Well Far West, 5 at Kaanka Mangka, and 9 traps at Alalka |
| | Trapping | May-Jun 2017 | New Well | 3 days of free feeding followed by 4 nights of trapping in New Well to remove 15 warru for translocation to Wamitjara |
| | Trapping | May 2018 | Wamitjara | 3 days of free-feeding, 4 nights trapping, with 30 traps. |

## Feral carnivore control and monitoring

### *Shooting*

Spotlight shooting has been crucial in controlling cats and foxes at New Well and Wamitjara leading up to the reintroduction of warru to Wamitjara in June 2017. In the 10 months prior to reintroduction, shooting was undertaken over eight nights at New Well and nine nights at Wamitjara by the APY LM staff. Additionally, a professional shooter was employed to control predators at Wamitjara for 22 consecutive nights, starting 11 days prior to reintroduction. Approximately three weeks after the reintroduction, data collected on remote cameras detected the presence of cats and foxes in Wamitjara, suggesting the need to continue control. Additional spotlighting and shooting was carried out in July, August, September and December 2017.

Ninety-five cats, 10 foxes and seven dingoes were removed from Wamitjara from May 2017 to December 2018 (Figure 2). Shooting effort and predator numbers were lower at other sites with three foxes and 36 cats shot from New Well, and 10 cats and one fox from Kaanka Mangka from January 2016 until December 2018 (Figure 3). Warru remains were recorded from four of the cats shot at New Well, and another cat was shot at a freshly killed warru carcass during the reporting period (Read et al. 2018). The gut contents of shot animals were collected and possible species eaten were identified (Figure 4). Warru remains were found in a further two cats shot at New Well in September 2018 and one fox shot at New Well in October 2018.

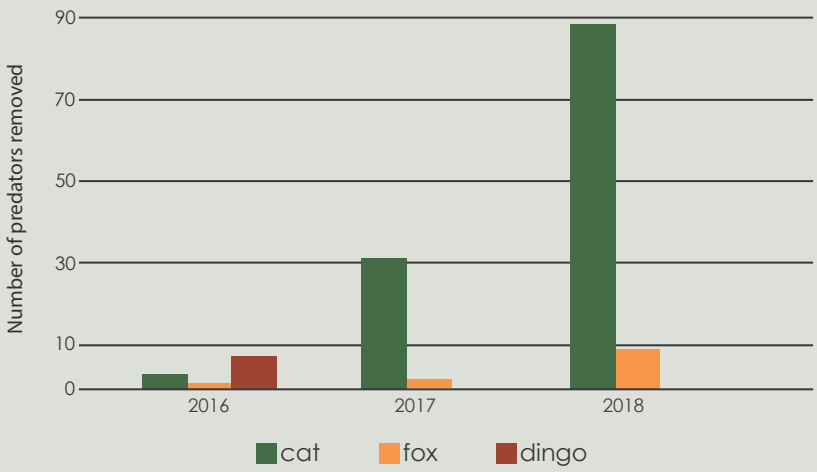



Figure 2. Total number of cats, foxes and dingos removed by shooting, trapping and baiting in Wamitjara from January 2016 – December 2018.

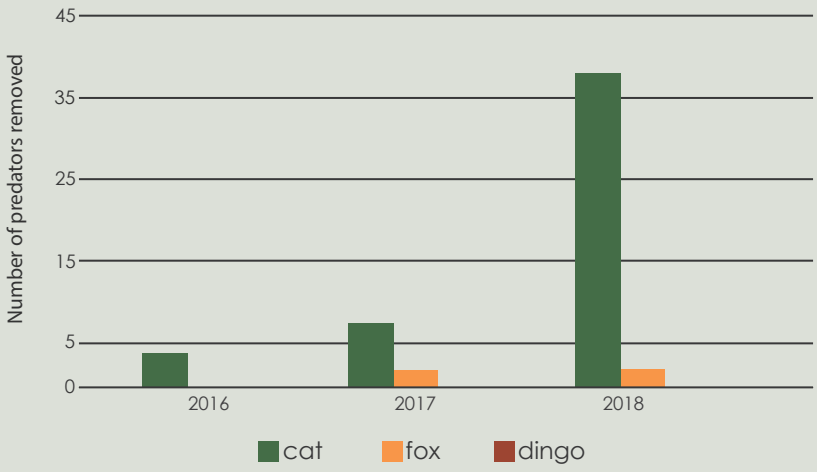



Figure 3. Total number of cats, foxes and dingos removed by shooting, trapping and baiting in New Well and Kaanka Mangka, from January 2016 – December 2018.

Figure 4. Juvenile warru hands found in the stomach contents of a cat shot at New Well.

### *Aerial and ground baiting*

Aerial baiting was conducted throughout the eastern Musgrave Ranges (including Wamitjara, Kaanka Mangka and Alalka, but excluding New Well; Figure 5) in April 2017 - one month prior to warru reintroduction to Wamitjara. Approximately 1800 Eradicat® baits were laid over an area of 80 km$^2$, an average density of 22.5 baits per square kilometre. Baits were only laid on the hills to minimise the chance of dingoes and domestic dogs consuming baits.

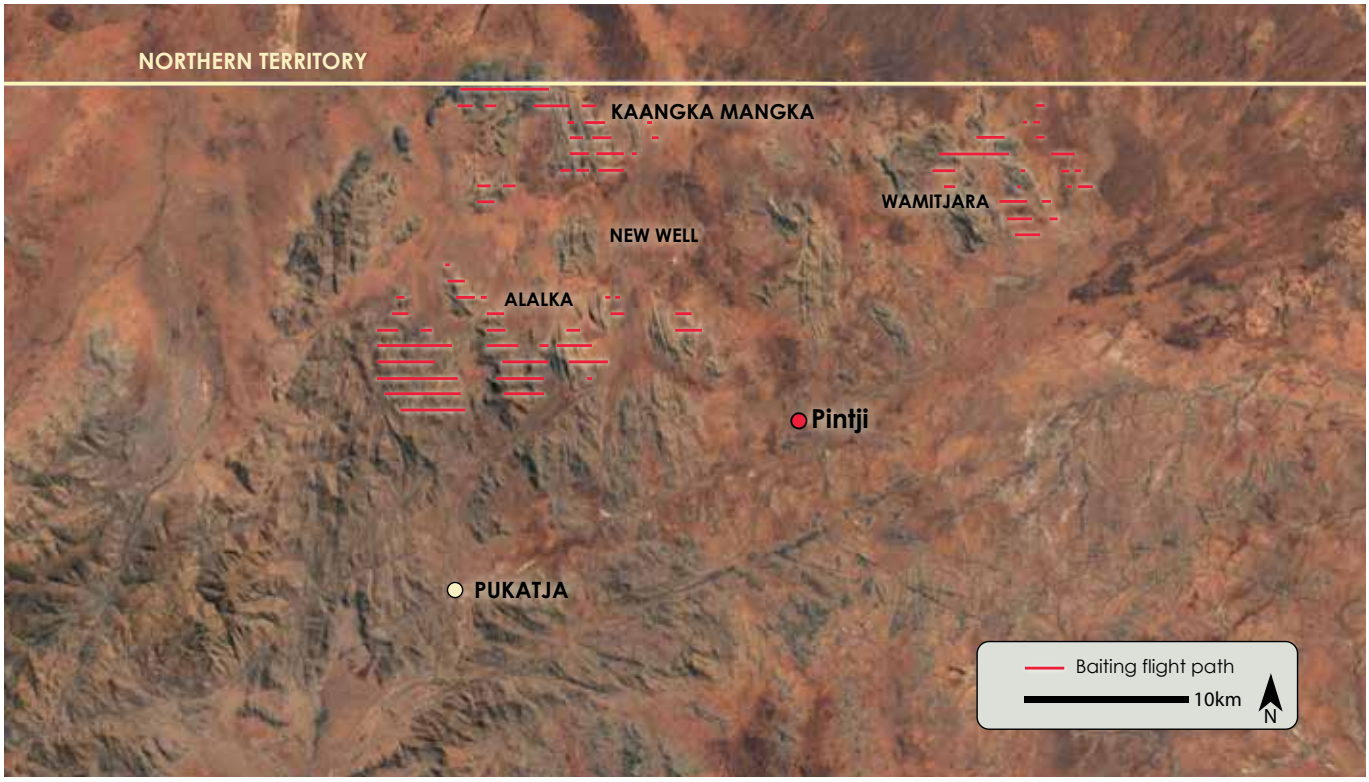



Figure 5. Flight path of aerial baiting in the Musgrave Ranges in April 2017.

Additionally, 38 ground bait stations were placed at Wamitjara three weeks prior to reintroduction, with baits being replaced once a week for four weeks, and one month post-reintroduction. Thirteen bait stations were placed in front of 13 cameras along the track, an additional 13 stations were placed between the cameras (making them approximately 500m apart), and 12 additional stations were placed along the creek lines and at the warru release site. A second round of aerial baiting was planned two months after reintroduction, but very few foxes were detected on remote cameras; therefore the resources were invested in targeted shooting instead.

In addition, eight Felixer® feral cat grooming traps that automatically detect and spray cats with toxin that is instinctively ingested by oral grooming were installed at Wamitjara in December 2017 to assist with cat and fox control in the area.

### *Feral carnivore monitoring*

Fifty remote sensing cameras were placed at New Well (n = 24) and Wamitjara (n = 26) from September to October 2016 to measure the index of relative abundance of predators at these two sites (Figures 6 and 7). Images recorded on the cameras were evaluated every six weeks. In addition, spotlight counts of predators were made biannually whilst driving around New Well and Wamitjara. Collectively this monitoring has revealed a low frequency of fox detection, especially at New Well but consistent records of both feral cats and dingoes.

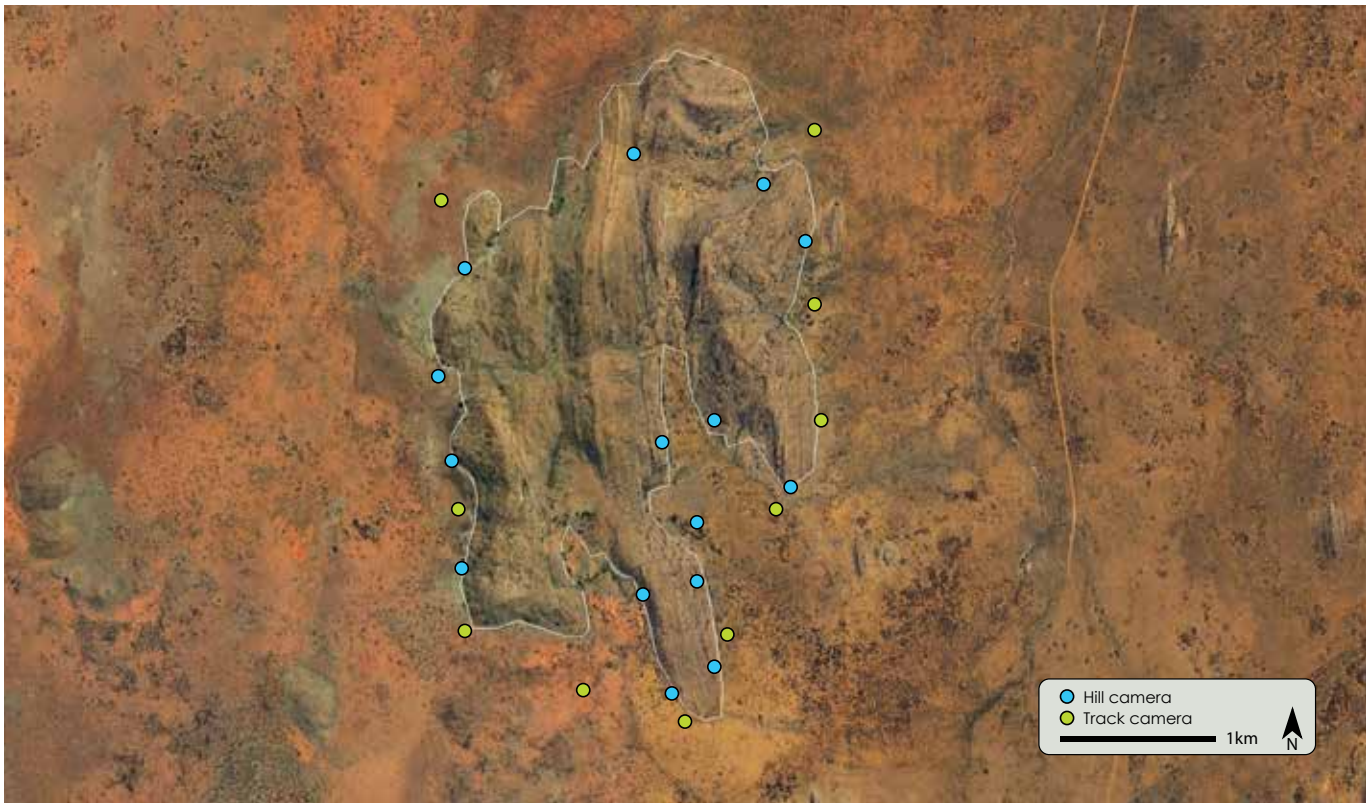



Figure 6. Location of remote sensing cameras installed at New Well.

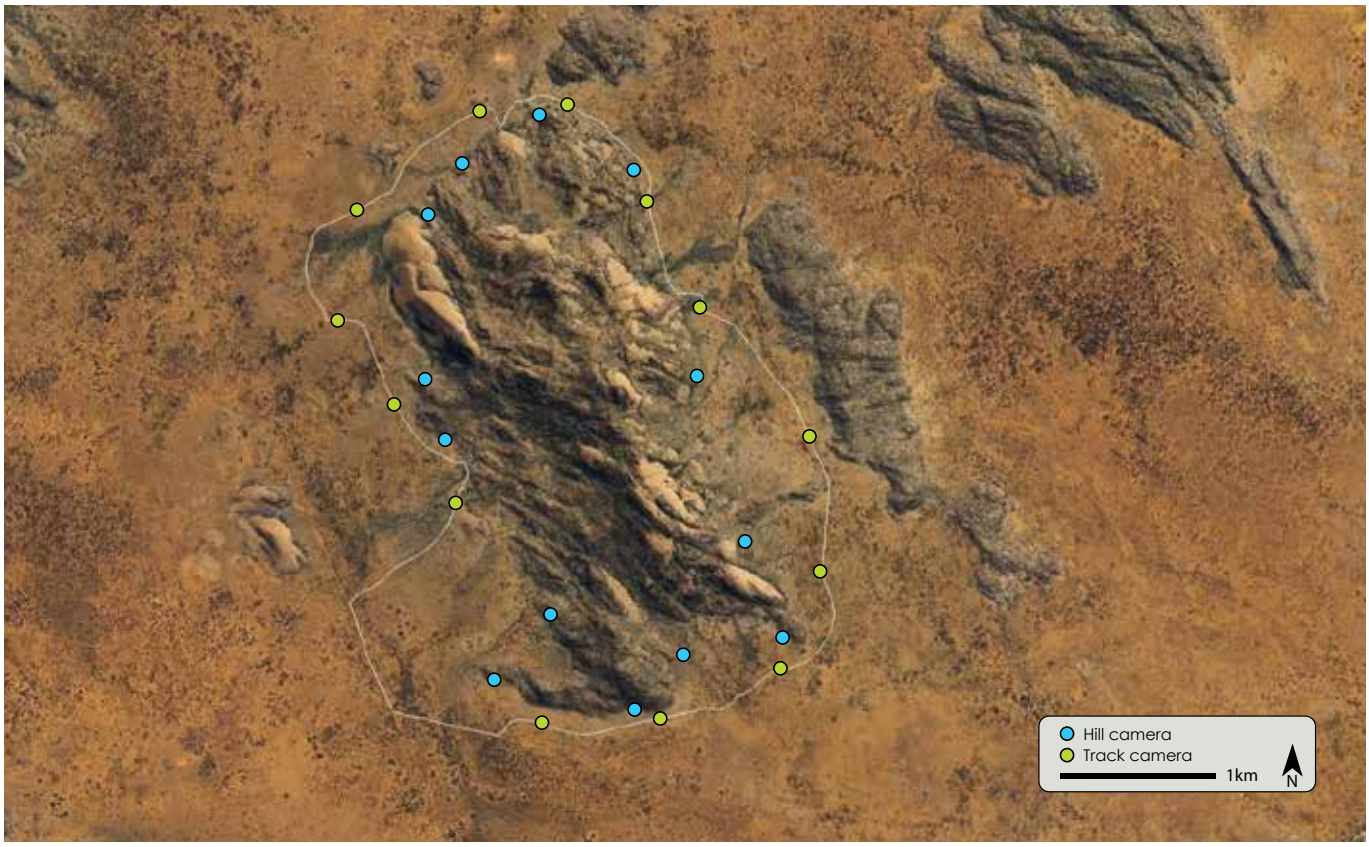



Figure 7. Location of remote sensing cameras installed at Wamitjara.

## Warru scat quadrats and spotlight surveys

Long-term biannual warru and kanyula scat monitoring and spotlight surveys have been conducted at key warru monitoring sites since 1998. Spotlight surveys take place around the base of New Well and Wamitjara outcrops with long-term scat quadrats located at New Well, New Well North, Wamitjara and Kalka.

The count of seven warru spotlighting at New Well in December 2017 (Figure 8) is a record high and supports the amazingly high diurnal observation of six warru by Peter Copley from the carpark areas in September 2017. Scat counts comparable to the pre-2006 crash and regular detection on spotlight counts suggest warru populations have made a considerable recovery in the past four years, despite removal of 15 warru for the Wamitjara translocation, and are now at near peak historical levels. Population densities at New Well in 2017-2018 may be approaching carrying capacity as evidenced by heavy browsing of spearbush and relatively low incidence of juvenile scats. These same spotlight and scat counts indicate a considerable reduction in kanyula numbers during the same period the warru have increased (Figure 9).

Warru scat counts at New Well North have rebounded from the apparent post fire decline in November 2015 to relatively high levels in 2017-18 (Figure 10), including evidence of juvenile scats in several quadrats. Variations in what remain relatively low scat counts could be attributed to low sample sizes and the different time intervals and seasons between scat counts but indicate that the colony is persisting at low numbers.

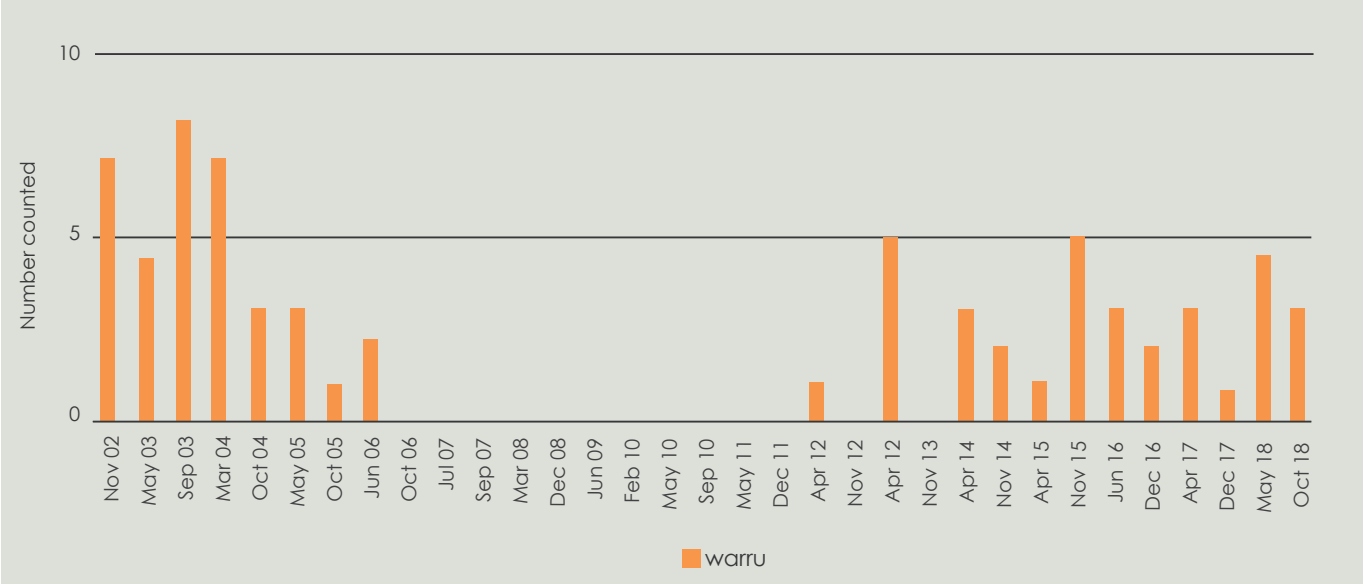



Figure 8. Spotlight counts of warru from New Well from 2001 - 2018.

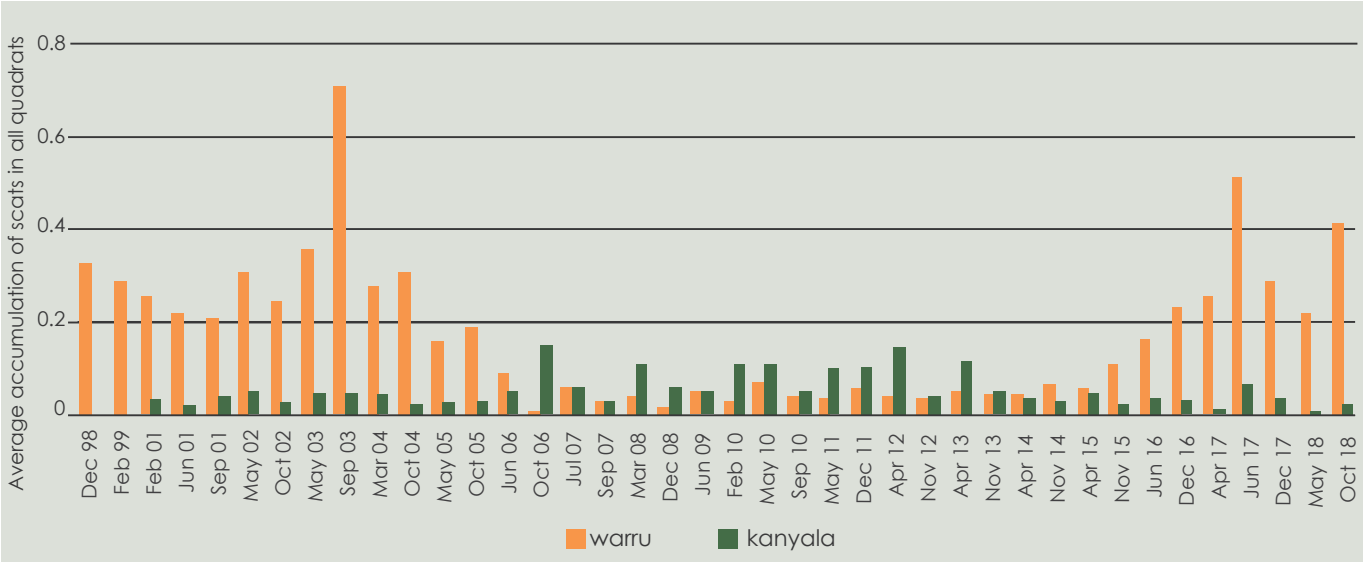



Figure 9. Average accumulation of scats collected from 24 quadrats during each biannual scat count from New Well for both Warru and Kanyala for the period 1998 - 2018.

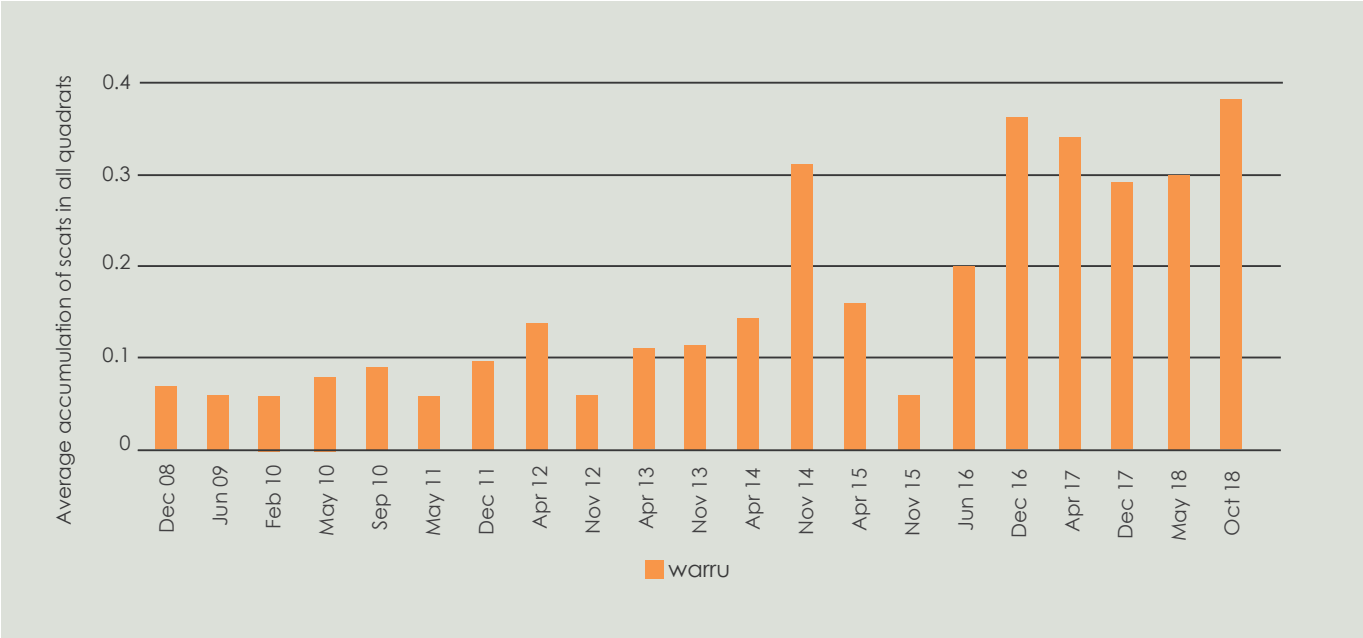



Figure 10. Warru scat counts from New Well North from 2008 - 2016.

## Detailed scat survey at New Well

A total of 186 transects (of length of 15m and width 1m) were surveyed across the entire New Well outcrop from August to October 2016 to measure distribution and density of warru scats at New Well. The survey indicated that warru scats were not evenly distributed within the outcrop, with the highest scat encounter rate reflecting the highest density of warru in central and south-western areas of the New Well (Figure 11, below).

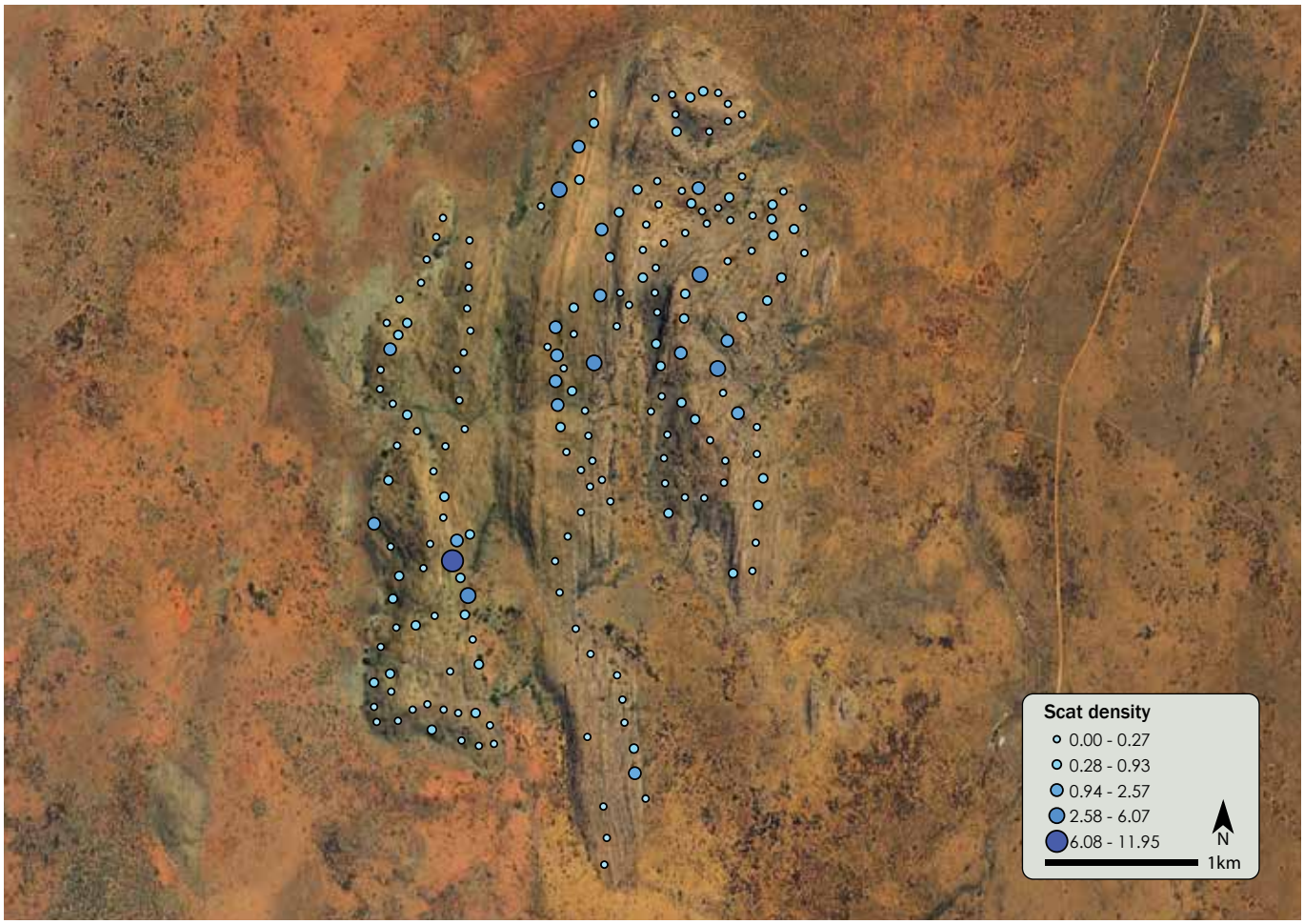



Figure 11. Distribution of warru scats in the 186 New Well scat quadrats in 2016, showing scat density/$m^2$.

## Fire management

In an effort to reduce the risk of extensive wildfires, on-ground patch burning was conducted in winter (July) 2017, with guidance from Steve and Rachel Murphy, to create fire breaks around the base of both Wamitjara and extant wild population site at New Well. Some areas on the hills in both sites were also burned to create different vegetation classes and to protect food-plants for warru in the event of a wildfire burning over this hill. Drip torches were used to burn strips around the base of the hills, while matches and incendiaries were used to target specific areas on the hills. A total of 76 individual fires were lit over the course of a week, covering 141ha at New Well and 308ha Wamitjara with the average size of burn patches being 3.7ha per burn at New Well, and 8.1ha per burn at Wamitjara.

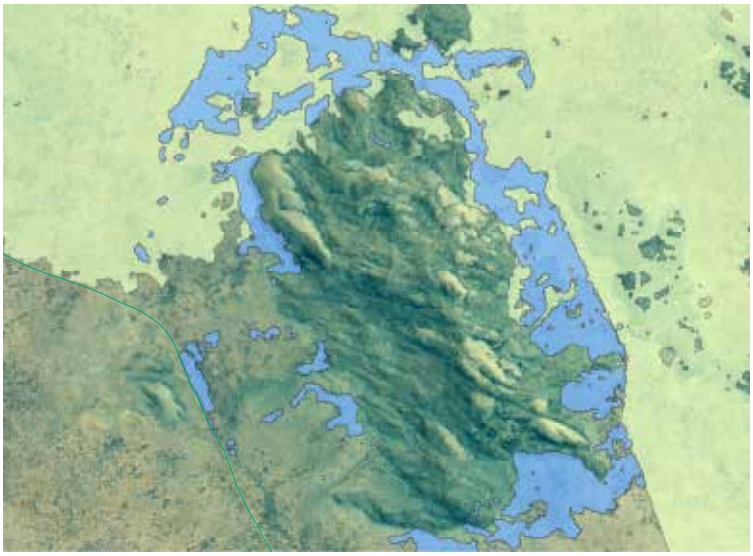


Figure 12. Fire scars (blue) of prescribed burns undertaken at Wamitjara in 2017.

## Warru trapping

The 11th wild warru trapping survey in the Musgrave Ranges was conducted in July 2016 (Figures 13 - 16). There were 53 warru trapped in 25 traps in New Well, Kaanka Mangka and Alalka. Out of 53 trapped animals, 31 (58%) of these were trapped in earlier surveys. All sub-adult and adult females had pouch young, indicating very high (100%) breeding rate of the population, and the high proportion of re-trapped adult warru from previous years suggested high survivorship of adult individuals.

The 12th wild warru trapping in the Musgrave Ranges was conducted in July 2018. Known to be alive estimates remain consistent with previous years for New Well, New Well Far West and Kaanka Mangka. The 2018 trapping results confirm that the removal of warru from New Well and New Well Far West for the Wamitjara translocation in 2017 have not negatively affected warru persistence at these sites. The continued presence of warru at the two satellite sites of Far West and Kaanka Mangka continues to be a promising sign for warru recovery in the East. A total of six individuals were trapped at Alalka, which while still small, is an increase of only two individuals in 2016 and suggests warru are persisting at this location, although reasons for the decline still require further investigation. Out of 69 animals trapped, 21 (30%) of these were retraps from previous sessions and 48 (70%) were new animals.

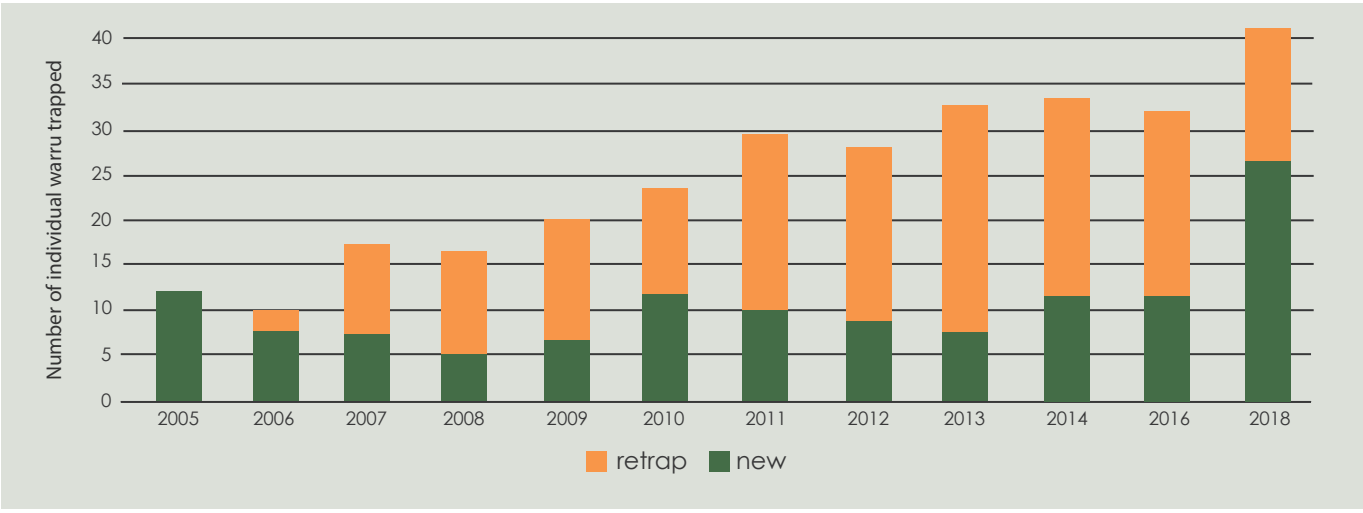



Figure 13. Warru captures at New Well between 2005 - 2018.

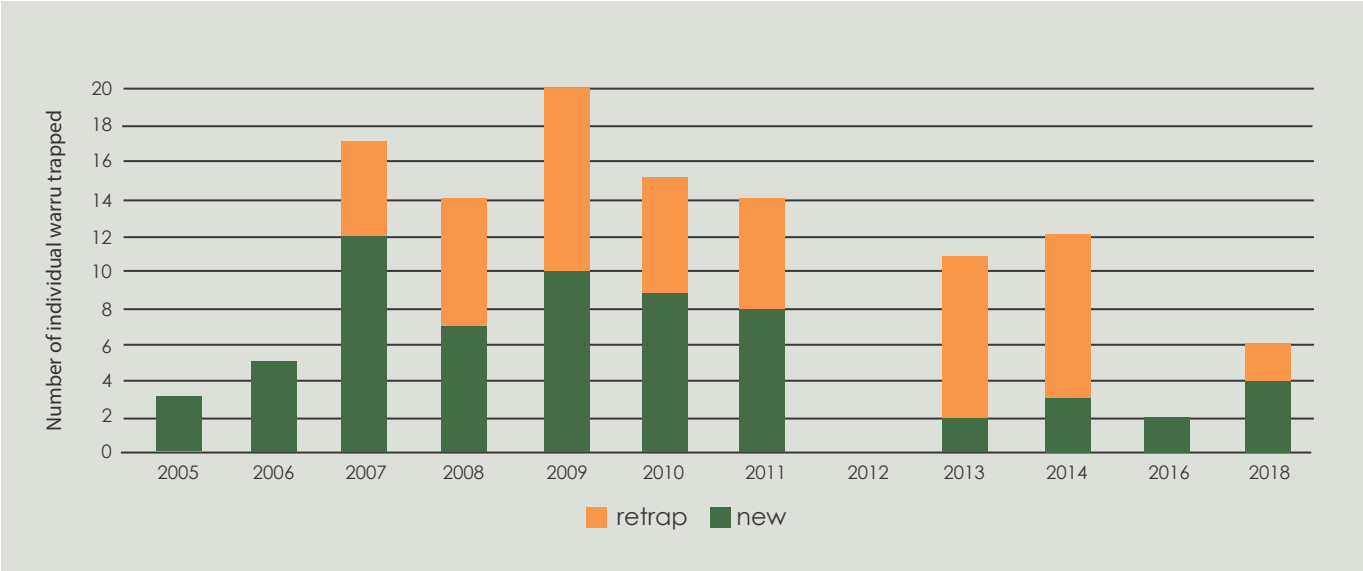



Figure 14. Warru captures at Alalka between 2005 - 2018.

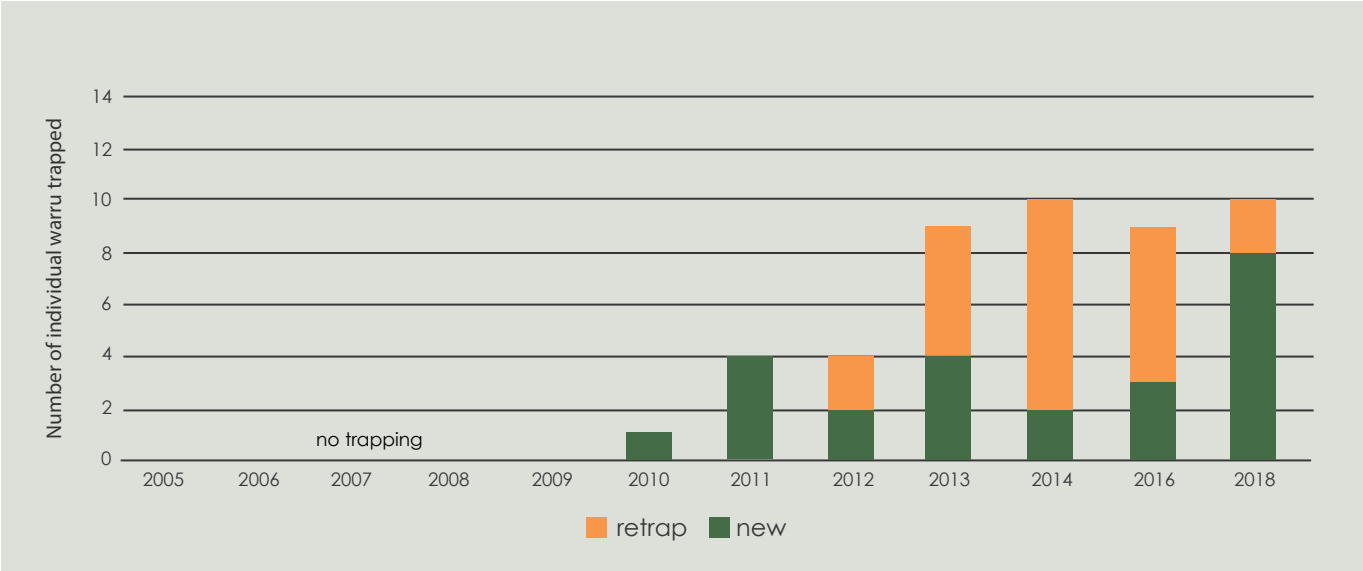



Figure 15. Warru captures at Kaanka Mangka  between 2010 - 2018.

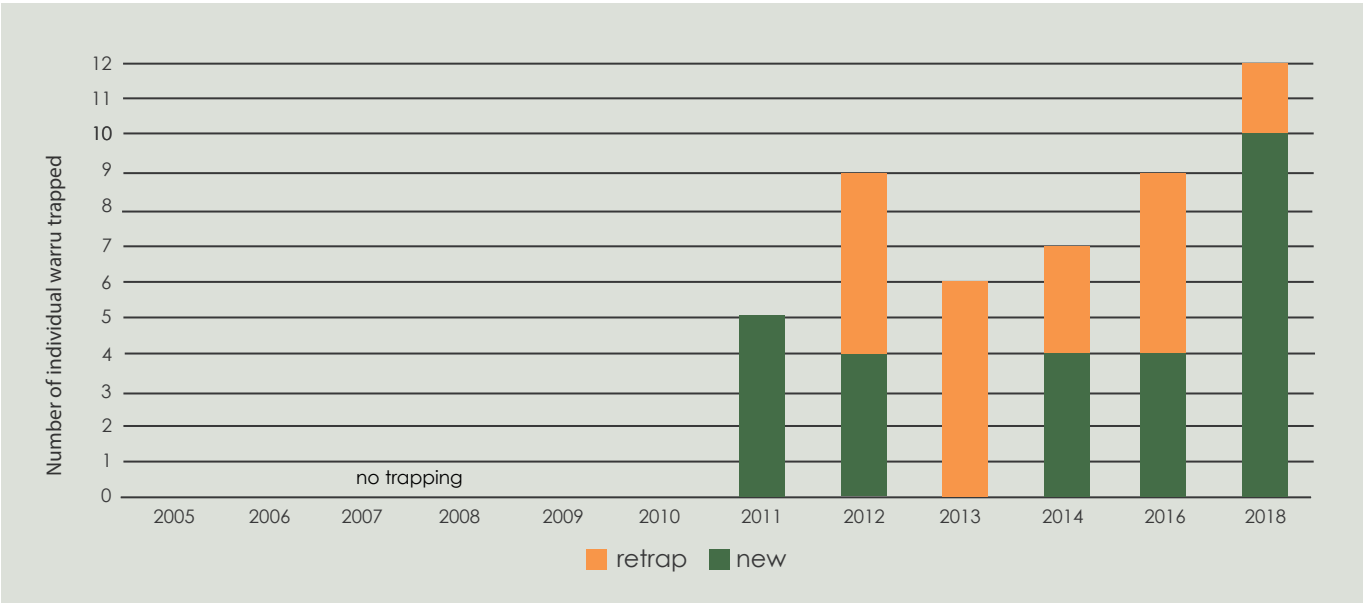



Figure 16. Warru captures at New Well Far West between 2011-2018.

## Translocation to Wamitjara

In May 2017, 40 warru were translocated to Wamitjara, to establish a new wild population in the Musgrave Ranges. Translocation was completed in six days and involved 15 animals from New Well, and 25 animals from the Pintji. All translocated warru were of breeding age, with the female to male sex ratio slightly biased towards males (0.7:1.0).

Each animal was fitted with a very high frequency (VHF) collar to monitor survival and movement of reintroduced animals. Released warru were radio-tracked every day for the first month post-release (until July) and twice per week for the following three months (until October). Weekly radio-tracking was initiated four months post-release. Radio-tracking continued until the next trapping survey scheduled 12 months post-release, where all collars were removed.

In addition, in the first and third month post-release, all animals were radio-tracked to their den sites to assess their newly established territories and spatial distribution across the outcrop. Also, 12 original and 50 new scat plots were established at Wamitjara, which will be revisited bi-annually to investigate changes in warru scat abundance and distribution.

Out of 40 animals, 31 (78%) were alive seven months after reintroduction in December 2017, which was within the accepted values in the approved reintroduction plan (Ireland et al. 2017). Six animals (five males, one female) were killed by predators within the first month; two animals were lost in August and one in September. Seven lost males and one female were from the semi-captive population in Pintji and one male was from New Well. The high proportion of warru mortality (90%) from the Pintji population suggests naivety towards predators. The DNA analysis performed from swabs taken from the six VHF collars, retrieved mainly on the flats surrounding Wamitjara, and body parts indicated dingo predation.

Twelve months post-release, a total of 38 individual warru were caught during the 2018 Wamitjara trapping session, consisting of 29 of the original translocated warru and nine new independent warru. In addition, two fully-furred pouch young were marked and one radio-collared individual evaded capture but was confirmed to be alive via radio tracking. These results provide a known-to-be-alive estimate of 41 for the Wamitjara population and a 75% survival rate of translocated warru as at June 2018. In addition, five warru were translocated to Wamitjara from Alice Springs in June 2018 were all still alive in December 2018.

Warru scat counts at established quadrats at Wamitjara in 2018 suggest the reintroduced population of approximately 40 warru is about half the number of warru present from 1999 to 2003, before the catastrophic decline that led to extinction in 2006 (Figure 17). New scat quadrats established on ten transects around Wamitjara support radio-tracking and trapping data that showing that warru densities are highest in the northwestern end of Wamitjara but some individuals have colonised suitable habitat on the eastern side of Wamitjara and even, temporarily, on an outcrop west of Wamitjara (Figure 18).

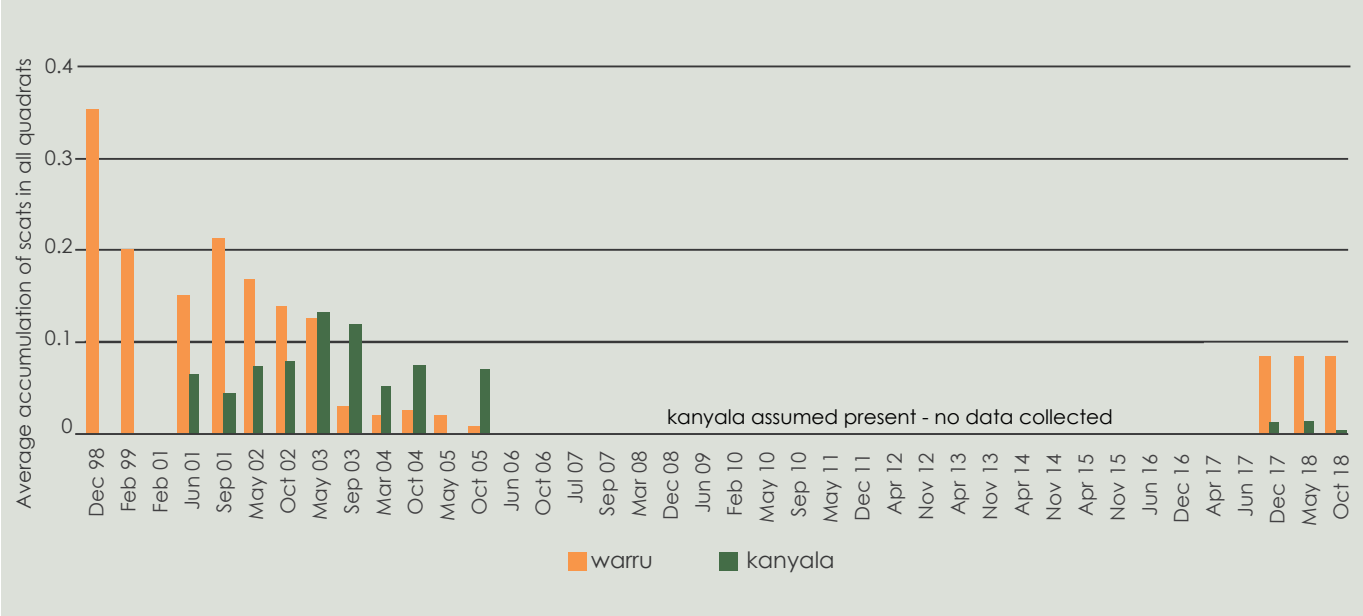



Figure 17. Average accumulation of scats collected from Wamitjara for both Warru and Kanyala for the period 1998 - 2018.

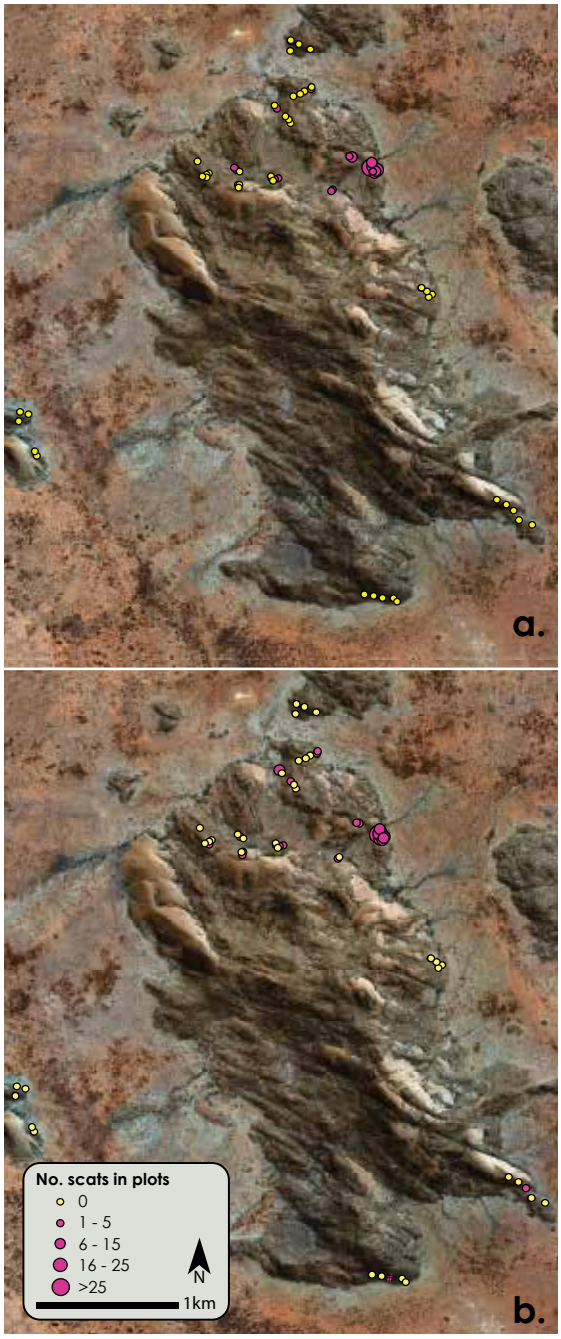



Figure 18. Number of scats recorded in plots at Wamitjara in a) December 2017,and b) October 2018.

## Northern Territory Translocation

To increase the genetic diversity of the reintroduced colony at Wamitjara and enhance the long-term adaptation and survival of the colony, the feasibility of translocating Northern Territory animals into the APY Lands was investigated by the WRT. Community consultation was undertaken and indicated that translocating animals from Bradshaw Hill on Telegraph Station Reserve was feasible within the required timeframes.

Intensive observational counts were undertaken at the Black-footed Rock-wallaby colony sites within Telegraph Station Reserve during May-June 2018. These indicated there were high density colonies, viable for translocation. Trapping was undertaken on 26th June 2018, and 19 adult wallabies were trapped. Of these, four prime females (with very small pouch young) and one male were flown to Pukatja, and driven to Wamitjara for release. Further details can be found in the translocation report (Weir 2018).

This has been an important addition to the program and another milestone for the Warru Recovery Team. A large number of people supported the translocation outside of the WRT, including Low Ecological Services, Northern Territory Government, Alice Springs Desert Park and St Joseph's Flexible Learning Centre. Their help was very much appreciated.

## Warru recovery – Tomkinson and Hinkley Ranges

Warru are now monitored at five locations in the west APY lands (encompassing the Tomkinson Range and the Hinkley Range) (Figure 19). The largest of these colonies occurs in the boulder-piles, cliffs and gorges on two sections (Maku Valley and Mutata Scree) of a large hill north of Pipalyatjara known as Dulgunia Hill. The Hinkley Range was extensively burnt in 2013, after which the small surviving populations were assisted with supplementary feeding. Management actions for these warru colonies are summarised in Table 3.

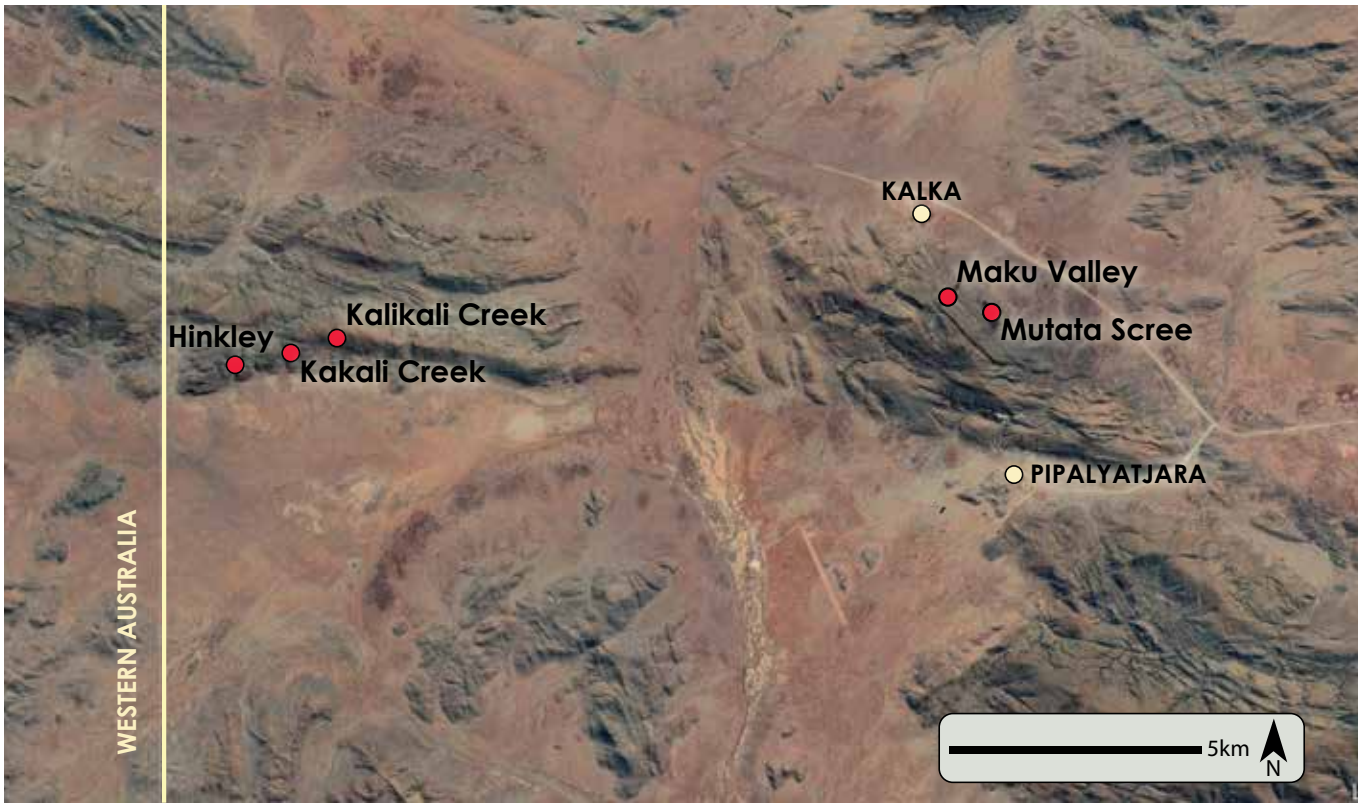



Figure 19. Locations of known warru colonies in the Tomkinson Ranges (in relation to Pipalyatjara community) which are monitored and managed as part of the Warru Recovery Plan. The location of the monitored Men's site is protected and not shown.

Table 3: Summary of warru management and monitoring activities for the Tomkinson Ranges in 2016 - 2018.

| Recovery action | Frequency | Description |
|---|---|---|
| Feral plant control | Intermittently | Small scale buffel grass management involving burning followed by herbicide application. Hand removal of buffel grass has occurred at Maku Valley and also on the Hinkley Range. |
| Feral Predator control (shooting) | 3 times a year | Graham Miller (Feral Solutions) typically shoots cats and foxes with warru rangers for 2-3 nights, three times a year. Eight remote cameras have been set up to assist Graham in his predator control, four at Hinkley and four on Dulgunia Hill. |
| Warru scat quadrats | Biannual | 13 x 1m scat quadrats across the Kalka Hill. 2 scat quadrat monitoring sites in the Hinkley Range (established late 2011). New quadrats installed at 4 Tomkinson range colonies in 2015 |
| Warru trapping | 2016 and 2018 | 3 days of free feeding is followed by 4 nights of trapping in winter each year. Traps are at Maku Valley, Dulgunia Hill and Mutata scree. |
| Remote camera monitoring at warru feeders and water points | Quarterly | Feeders (kangaroo pellets) and poultry water feeders are placed in suitable caves at Maku Valley – 2 feeders; Mutata Scree - 2 feeders, 2 water points; Hinkley Range; 2 feeders, 2 water points. All monitored by remote camera. |

## Spotlight shooting

Shooting was undertaken across the reporting period. Graham Miller (professional shooter) targeted foxes and cats in both the Kalka and Hinkley Ranges areas. The cats ranged in size from 3.2kg female to a large 6kg male. Figure 20 shows the location where feral cats and foxes were shot during 2018.

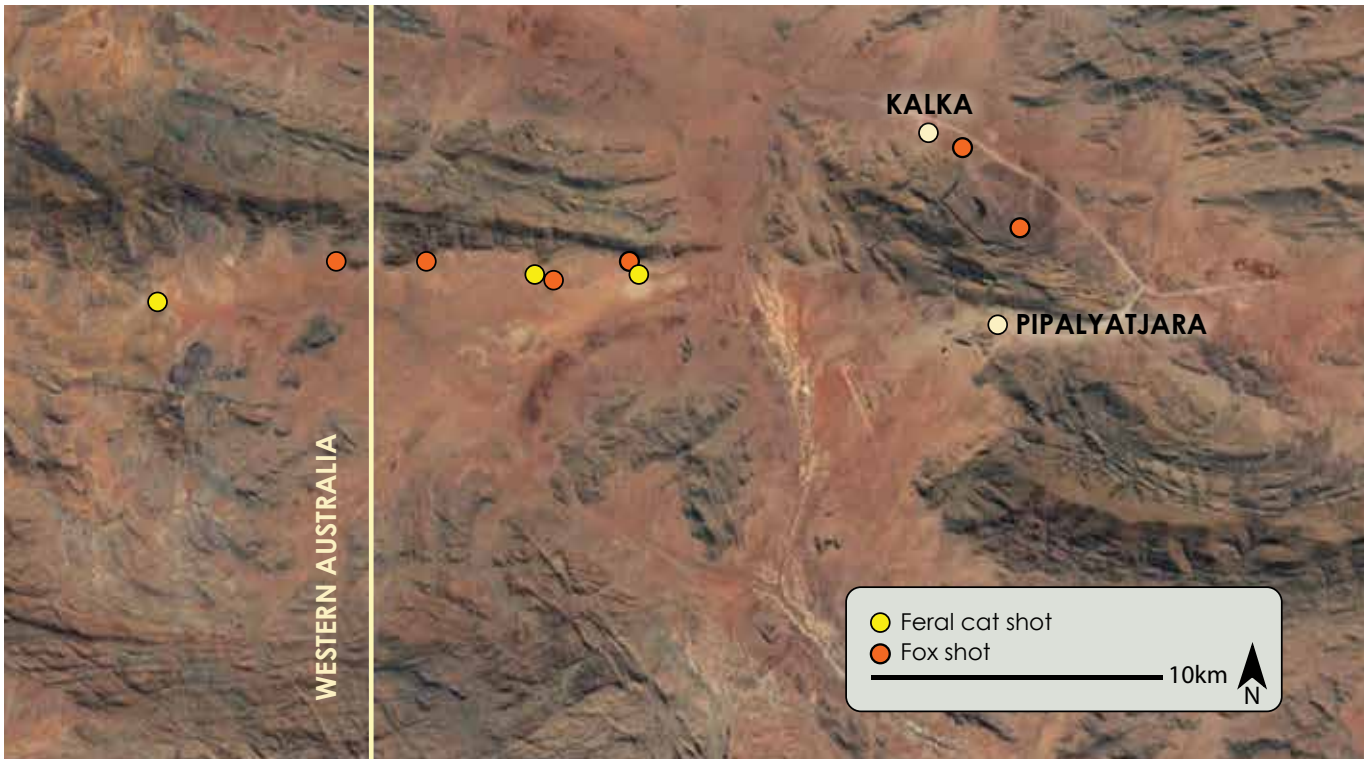



Figure 20. Locations in the Tomkinson Ranges where feral cats were shot during 2018. `

## Scat quadrats

Warru scats have been counted from 13 established quadrats on Dulgunia Hill since 2002. Warru scat counts at Kalka in December 2017 were slightly lower than for comparative periods in recent years (Figure 21) and only about half of those recorded in December 2016. Scat counts suggest that the population on Dulgunia Hill remains relatively small but stable and may have declined slightly during the dry conditions experienced in 2017-18 which saw many fig and spear bushes defoliated. Scat counts in the reporting period oscillated around or just above average counts recorded prior to the crash of 2005-2006.

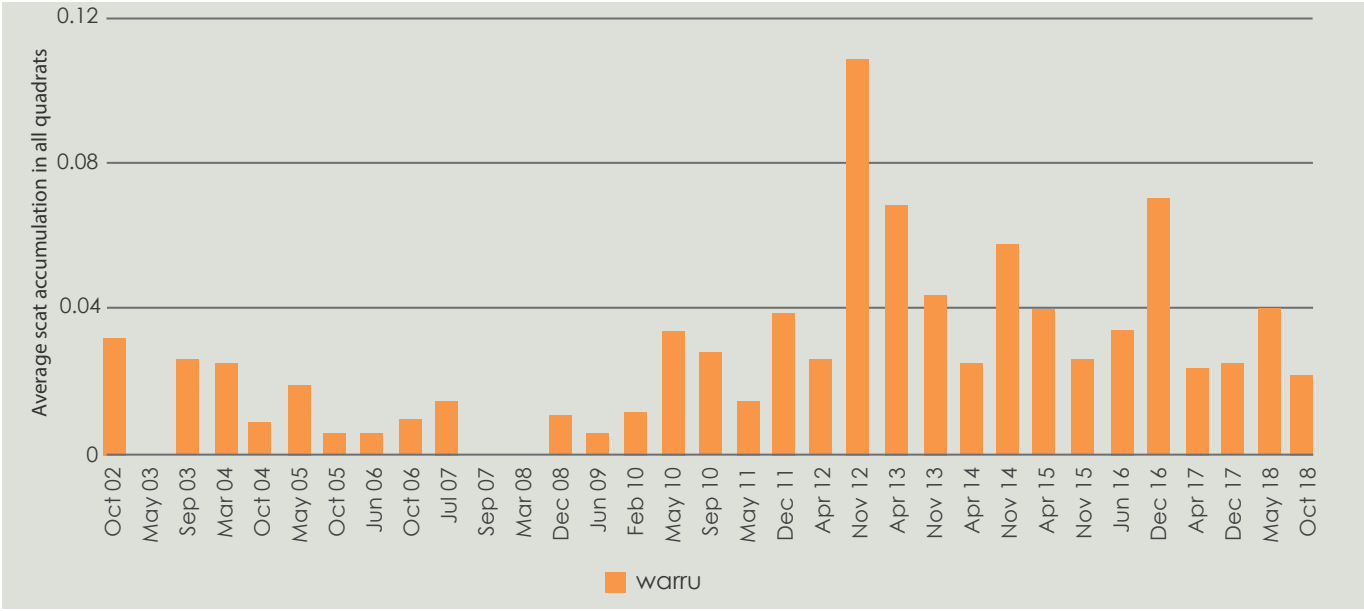



Figure 21. Average accumulation of warru scats collected from 13 quadrats during each biannual scat count from Kalka for the period 1998 - 2018.

## Warru trapping

Trapping occurred at Kalka in Maku Valley, Dulgunia  Hill and Mutata Scree in August 2018. The known to be alive estimate for the Kalka population is double the estimate for 2016, a very positive result following low population estimates since 2012 (Figure 22). The exact reasons for this increase still require further investigation but may be associated with recovery since large wildfires in 2012 and an increase in predator control through spotlight shooting around Kalka in 2017/2018.


Figure 22. Combined warru captures at Kalka sites (Maku Valley, Dulgunnia Hill and Mutata Scree) from 2005-2018.

Figure 23. Jacob Mckenzie with a juvenile warru during trapping at Mutata Scree.

## Kapi and mai / water and feeder points

There are a total of seven feeder points and six water points (one being a spring) set up across Maku Valley, Hinkley Ranges and Mutata Scree (Figure 24). These have been established since January 2014. The rangers have learned to prepare resources, fill and record details of resources and set up remote cameras to collect data (Figure 25).

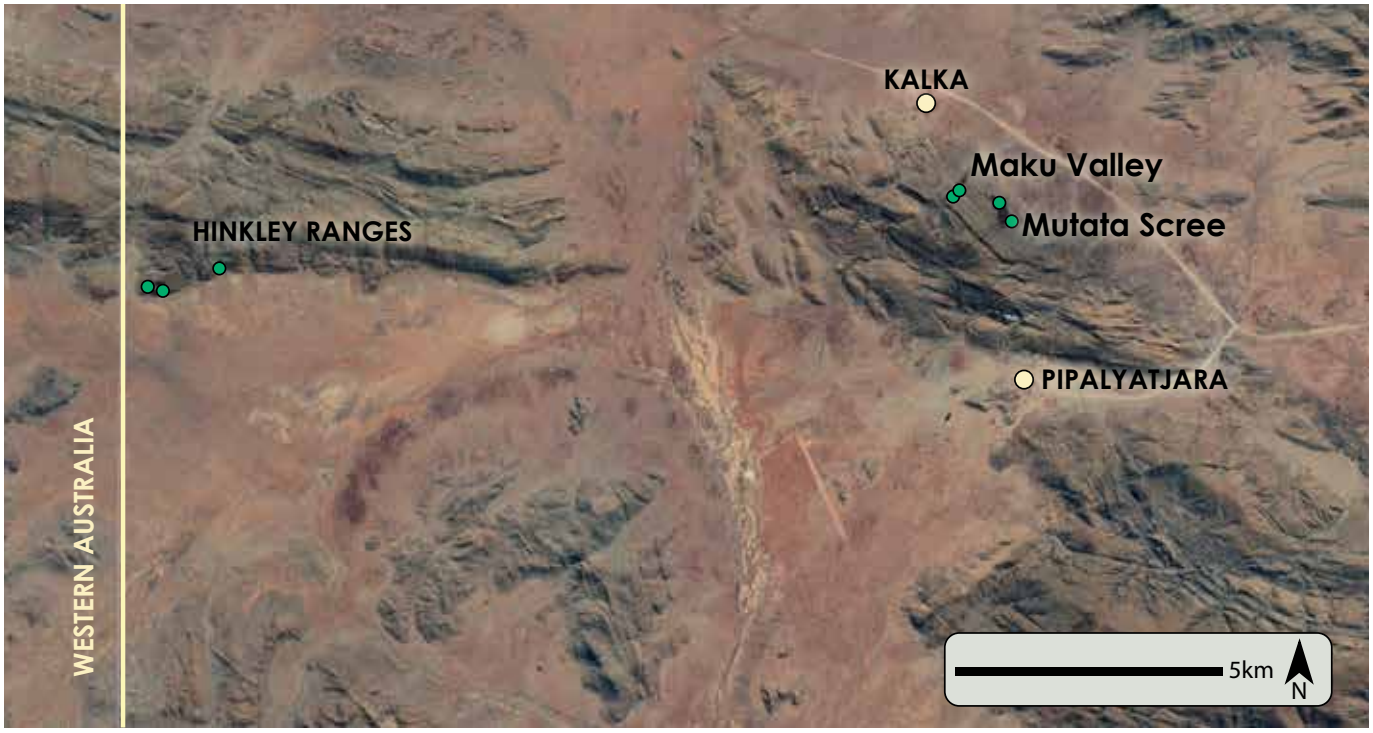



Figure 24. Locations of water and feeder points around Hinkley Ranges (West), Maku Valley and Mutata Scree (East).

Figure 25. Feeder being filled with mai (kangaroo pellets).

## Fire management

Fire management was also conducted in early spring 2018 at Kalka - approximately 23 hectares was burnt. A patch to the north of Maku Valley encompassed the majority of the burn and also a strip to the west of this site.

## Warru recovery – Pintji

The warru Pintji was completed in early 2011 – a 100ha predator-proof exclosure for warru built on the lands to act as a hardening off facility for captive warru. The first five captive warru were released into the pintji in March 2011. There were three supplementations to the pintji population with warru from Monarto Zoo, with the final releases in April 2015. Management actions for the warru pintji are summarised in Table 4.

Table 4. Summary of management and monitoring activities for the warru pintji from January 2016 to December 2018.

| Recovery action | Frequency | Description |
|---|---|---|
| **Maintenance** | Weekly (2016), bi-monthly (2017 - 2018) | The entire length of the fence is inspected on the inside and outside for damage. Mesh joins are checked, and the buried skirt is examined for wash-outs. The overhang is checked to ensure it is sufficiently floppy. |
| **Feral plant control** | 36 days, May 2016 – September 2018 | Spraying with herbicides and manual removal of weeds around the perimeter of exclosure and buffel grass within the exclosure. |
| **Track monitoring (tjina ngurini)** | Weekly (2016), bi-monthly (2017) | The fence-line perimeter monitored for the fenceline integrity and presence /absence of predator footprints within exclosure. |
| **Trapping** | Annual: April 2016, March 2017, and March 2018<br>May 2017 (for translocation) | 3 days of free feeding followed by 4 nights of trapping. 31 traps were used in 2016, 2017 and 2018 trapping surveys. |
| **Small vertebrate monitoring** | Annual | There was no pitfall trapping survey in 2016, and one pitfall trapping in both 2017 and 2018. Eight pitfall sites inside and eight sites outside of the Pintji exclosure. |
| **Rabbit Control** | April – June 2018 | Rabbit scats and active warrens were detected in the pintji during annual pitfall trapping in 2018. Warru Rangers and Graham Miller have attempted to use leg hold traps to catch rabbits with no success. The locations of known warrens have been recorded in order to fumigate at a later date. |

## Trapping

Twelve trapping surveys have now been conducted in the Pintji to determine the abundance, condition and reproductive output of animals released and born in the exclosure (Figure 26).

In 2016, 35 warru were trapped, and in 2017, 38 warru were trapped in the Pintji with the use of 31 traps and four nights of trapping in each survey. In May 2017, animals were trapped again, in order to remove 25 warru for the reintroduction program at Wamitjara. A total of 38 traps were used and a total of 51 warru were trapped over four nights, from which 25 animals (six females and 19 males) were removed to Wamitjara (described in Wamitjara section above).

In 2018, 37 warru were trapped in the Pintji with the use of 31 traps and four nights of trapping. Many of the warru trapped were new animals that had not previously been trapped in the Pintji. It is likely that with the removal of warru for the Wamitjara translocation, the traps became more accessible to more subordinate animals.

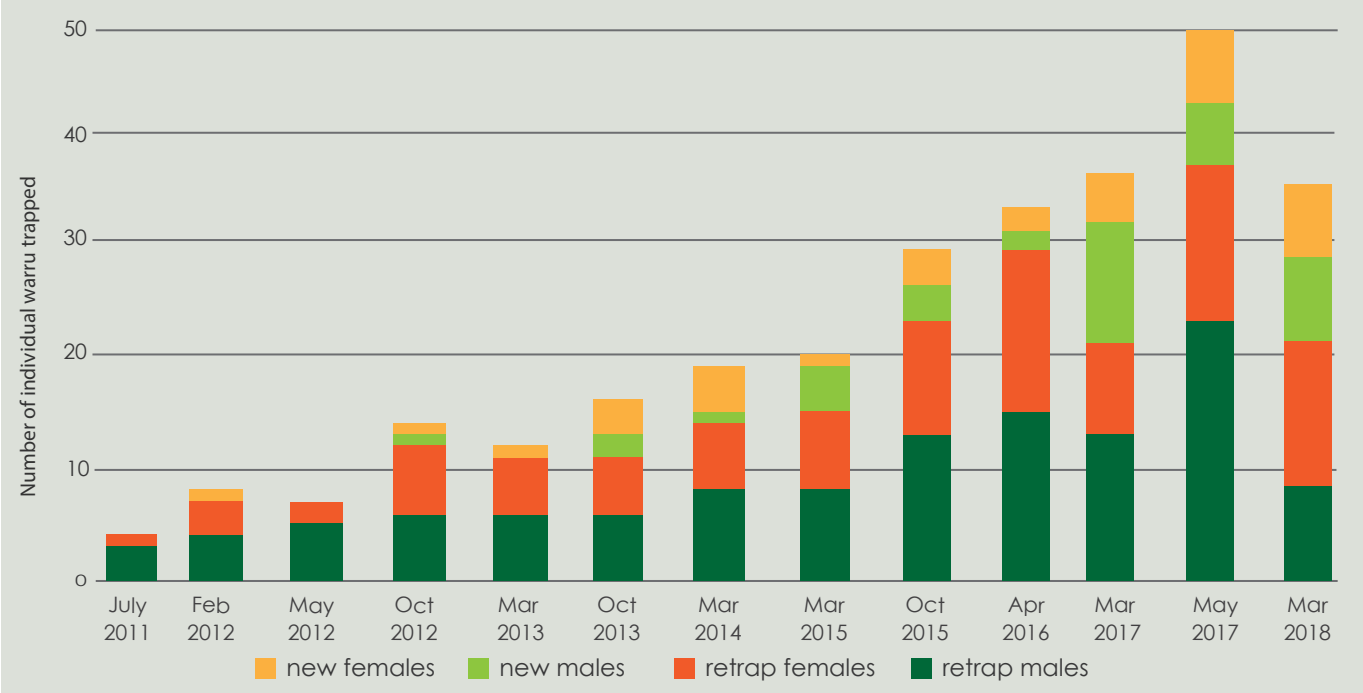
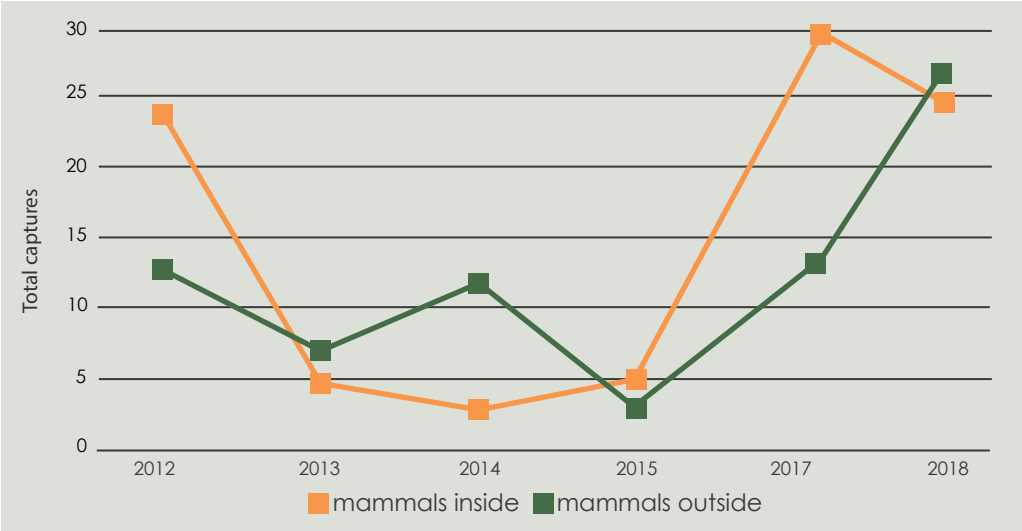



Figure 26. Pintji warru trapping results from 2011 - 2018.

## Pintji small vertebrate monitoring

Small vertebrates were pitfall trapped inside and outside the Pintji for the fifth and sixth times in April 2017 and 2018 (Figures 27 - 29), which provided opportunities for warru and IPA rangers to capture and identify small wildlife. This monitoring showed increased numbers of the desert mouse (*Pseudomys desertor; Figure 29*), particularly inside the Pintji where cats and foxes have been excluded. In total, 34 species of reptile and 10 species of mammal (not including warru) are known to occur inside the Pintji (see Appendix B for Species List).

Figure 27. Checking pitfall traps inside the Pintji.





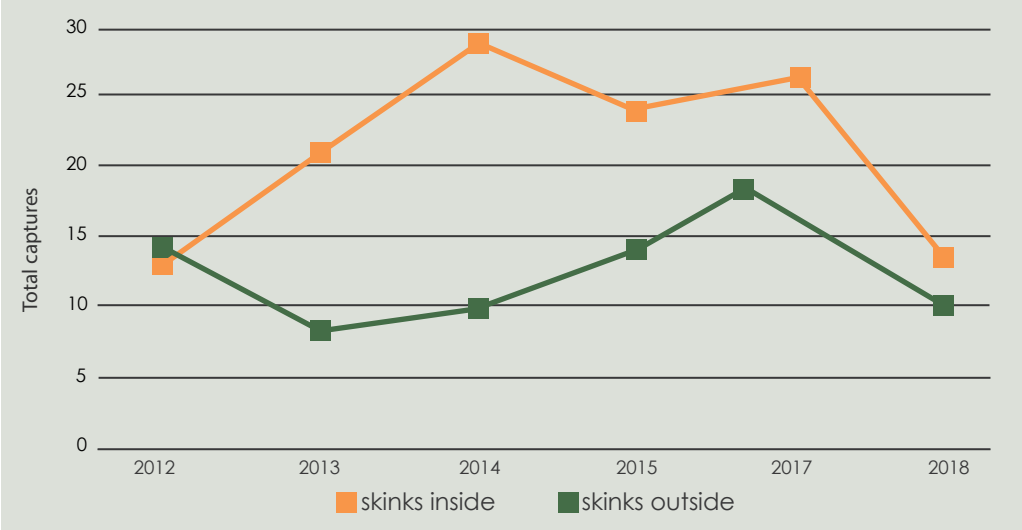



Figure 28. Captures of a) small mammals, b) geckoes and c) skinks inside and outside the Pintji from 2012 - 2018.

Figure 29. Desert mouse (*Pseudomys desertor*) captured in a pitfall trap.

# Captive populations

## Monarto Zoo

The captive warru population at Monarto Zoo has not changed significantly across 2016 - 2018. Currently, five individuals are housed at Monarto Zoo (Table 5). One of the females is from New Well, two females are from Kalka, and one female is from captive cross-breeding of New Well and Alalka parents. The last release into the Pintji of Monarto Zoo animals was in 2015 and there have been no further releases in this reporting period.

Table 5. Captive warru population at Monarto Zoo as of 1st January 2016. * during reporting period.

| Name | Sex | Source Site | Source date | Capture weight (g) | Rearing | Current weight (kg) | Estimated D.O.B | Bred* |
|---|---|---|---|---|---|---|---|---|
| Maureen | F | New Well | 12/08/2007 | 34.3 | Cross-fostered | 3.8 | 13/06/2007 | No |
| Zoe | F | Kalka | 23/07/2009 | 86.5 | Cross-fostered | 2.2 | 24/04/2009 | No |
| Delilah | F | Kalka | 31/08/2010 | 518 | Hand reared | 2.8 | 15/03/2010 | No |
| Karkalaya | F | Monarto (Kalka) | Captive | n.a. | Hand reared | 3.5 | 15/08/2011 | No |
| Alalka | M | Alalka | 28/07/2011 | 470 | Hand reared | 4.8 | 15/03/2011 | No |

There was only one death between 2016 - 2018 (Table 6). Langki was a male from Kalka originally, who was cross-fostered at Monarto Zoo. He was euthanased on 30th July 2017. He had experienced a number of health problems, which were deteriorating. Langki looked a little different, his ears and tail were amputated in his early years after some fighting. Nevertheless, he was a true gentleman and will be sadly missed.

Table 6. Deaths of Warru in 2013 – 2016 at Monarto Zoo.

| Name | Sex | Sire | Dame | Origin | Rearing | Estimated D.O.B | Date of death | Age | Weight (kg) | PM results |
|---|---|---|---|---|---|---|---|---|---|---|
| Langki | M | Wild | Wild | Kalka | Cross-foster | 5/3/2008 | 30/6/2017 | 9yrs 3 months | 3.0 | Health deterioration |

A breeding strategy was used to guide pairings of the remaining animals held at Monarto Zoo. This was intended to allow new animals to be handraised. Maureen has provided incredible support for telling the warru story (Figure 30 & 31), and it was hoped new animals would be able to fulfill her role and retain the captive population at Monarto Zoo. The importance of her role was discussed with the warru Rangers and Recovery Team. Unfortunately, the pairings were not successful and no joeys have been born. It is likely that the animals are past their breeding age. The changes in the captive warru population are summarised in Table 7.

Some of the Warru Rangers had the opportunity to visit Monarto and Adelaide Zoo in 2018 (Figure 32).

Table 7. Changes in the captive warru population 2007 – 2016. Population sizes represented by: number of males. number of females. number of unsexed juveniles (overall total).

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Population at January 2016** | 0.0.0 (0) | 7.6.0 (13) | 11.9.0 (20) | 14.14.0 (28) | 13.13.0 (26) | 6.10.0 (16) | 4.7.1 (11) | 5.9.0 (14) | 5.8.0 (13) | 2.4.0 (6) | 2.4.0 (6) | 1.4.0 (5) |
| **Acquisition** | | | | | | | | | | | | |
| Births | 0 | 0 | 3.3.0 (6) | 1.0.0 (1) | 0.2.1 (3) | 0.1.0 (1) | 1.3.1 (5) | 0 | 0 | 0 | 0 | 0 |
| Captures from wild | 8.8.0 (16) | 4.3.0 (7) | 1.2 .0 (3) | 0 | 1.1.0 (2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total acquisitions | 16 | 7 | 9 | 1 | 5 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| **Dispositions** | | | | | | | | | | | | |
| Deaths | 1.2.0 (3) | 0 | 1.0.0 (1) | 2.1.0 (3) | 2.1.0 (3) | 0.1.0 (1) | 0.1.1 (2) | 0.1.0 (1) | 1.0.0 (1) | 0 | 0 | 1 |
| Releases | 0 | 0 | 0 | 0 | 6.5.1 (12) | 2.3 (5) | 0 | 0 | 2.4 (6) | 0 | 0 | 0 |
| Total dispositions | 3 | 0 | 1 | 3 | 15 | 6 | 2 | 1 | 7 | 0 | 0 | 1 |
| **Population at December 2018** | 7.6.0 (13) | 11.9.0 (20) | 14.14 (28) | 13.13.0 (26) | 6.10.0 (16) | 4.7.0 (11) | 5.9.0 (14) | 5.8.0 (13) | 2.4.0 (6) | 2.4.0 (6) | 1.4.0 (5) | 1.4.0 (5) |

Figure 30. Superstar Maureen posing for the camera.

Figure 30. Maureen continues to be a wonderful ambassador, meeting and greeting, and sharing the warru story with people from all over Australia and the world, including Flinders University students (Nick Congedi and Sarah Baker) and Ministerial visits (Tony Pasin Federal Member and Hon Josh Fydenberg MP).

Figure 32. Warru Rangers meeting a White Rhino at Monarto Zoo.

# Community employment, engagement and awareness

## Employment

Day-to-day management of in situ and reintroduced warru colonies in the APY Lands is the responsibility of APY Land Management. In 2016-17 the warru project employed six permanent, eight casual rangers and seven casual Minyma pampa (senior women) to oversee the project.

The rangers have continued to complete training in relation to their roles during 2016-18:

- Training in remote first aid, GPS and tablet use, remote camera set ups, ground and aerial baiting, and predator spotlight surveys
- The use of computers, typing and emailing (at work and at TAFE training)
- Warru processing skills (biopsy, ear tagging, microchipping, suturing etc.)
- Both East and West Rangers regularly attended TAFE in Pukatja and Pipalyatjara, respectively, to work on literacy and numeracy activities.
- A number of West Warru Rangers undertook coursework towards earning Cert 2 Conservation and Land Management. Courses completed included Participate in environmentally sustainable work practices (AHCWRK209A) and Participate in OHS processes (AHCOHS201).
- East and West Warru Rangers attended firearms training in Umuwa in October 2018
- Three East Warru Rangers obtained their South Australian P-Plates in June 2018, with the assistance with Pukatja TAFE and On The Right Track (SA Government).

## Education visits and presentations

Warru Rangers continue to emphasise the importance of sharing their roles, knowledge and warru work with school students from across the APY lands. In 2017 warru rangers visited students at Pukatja and Pipalyatjara schools with the presentation showcasing the importance of the warru project. Kids from many schools and communities across the APY Lands watched two short films about the warru project made by the APYLM team.

In addition, the East Warru rangers hosted kids from the school at Kenmore Park in a field excursion to the Pintji, educating kids about the importance of maintaining semi-captive warru colony. The kids were involved with re-filling kapi (water) points, checking remote cameras, and were briefed about the fence maintenance. Rangers explained the need to control feral predators near the wild warru colonies and described steps taken to reintroduce warru back to Wamitjara in late autumn 2017.

Kids from the Pukatja School were involved in providing a list of warru names for 20 male and 20 female warru. These names were utilised by the Minyma, who named newly trapped animals that were released at Wamitjara in May-June 2017 (Figure 33).

In February 2017, Sara Weir and Ethan Dagg presented the warru reintroduction proposal to the NT team, which included a request to source animals from the NT populations .

In June 2018, East Warru rangers attended the Pukatja School to present a slide show to middle primary students, demonstrating the variety of work that they complete during trapping, day-to-day monitoring and maintenance. The visit also included a demonstration of how to set Thomas traps and the method for processing of the wallabies during surveys.

In August 2018, middle primary students from Pipalytjara School attended trapping at Kalka. The students arrived on the Thursday night and woke up early the next morning to follow trapping teams at Mutata Scree and Maku Valley on the final morning of trapping.

In September 2018, the West Warru rangers were visited by a school group from Murputja School. The students were given a tour by rangers, visiting a number of sites including water and feed points in Maku valley.

In November 2018, warru rangers and project staff attended the Indigenous Desert Alliance conference in Perth. The preconference included presentations by ranger teams and researchers from across central Australia and provided an excellent opportunity for rangers and project staff to network with peers and learn about other similar work being completed in other parts of the country.

Junior primary students from Pukatja School visited the Pintji in late November 2018 to learn about the warru project. The visit included demonstrations of radio-tracking, trapping and processing, plus discussion about the purpose of the Pintji and the problems caused by introduced predators and weeds. In addition, the school trip was attended by warru Minyma, Tjaria Stanley and Inpiti Winton, who spoke to the children about their involvement in the warru project as well as demonstrating traditional bushfoods growing in and around the Pintji.

In late November, students from St Aloysius College, Adelaide, visited the APY Lands as part of their annual school field trip. The group spent a day in the field with West Warru Rangers, visiting warru sites at Maku Valley and Hinkley. This trip was led entirely by warru rangers with no support from the West Warru Field Officer.

Figure 33. Warru Minyma attended the Wamitjara translocation and chose names for the released warru.


Ready

# Media

There continues to be media interest in the Warru Recovery Project (Table 8). In addition to items listed below, the warru project regularly provides project updates and activity reports via the APY Facebook page.

Table 8. Summary of media relating to warru recovery 2016 - 2018.

| Media | Summary |
|---|---|
| Film | 'Short story about warru'<br>Short film depicting warru rangers at work during the warru project<br>Film made and produced by APYLM; October 2016 |
| Film | 'Invitation video for the Threatened Species Commissioner'<br>Short invitation video to invite Gregory Andrews, Threatened Species Commissioner to the APY Lands.<br>Film made and produced by APYLM, October 2016 |
| Film | 'Saving warru'<br>Documentary film depicting reintroduction of warru back to their land<br>Film made and produced by Ninti Media; October 2017<br>Official film screening in Monarto Zoo, October 2017<br>Screening at Alice Springs Cinema, June 2018 |
| Book | 'Book of Hope: Recovery of Australian threatened species'<br>Chapter about warru recovery project in the APY Lands published by CSIRO Publishing, Australia; May 2017<br>Walkekly Award Nominated |

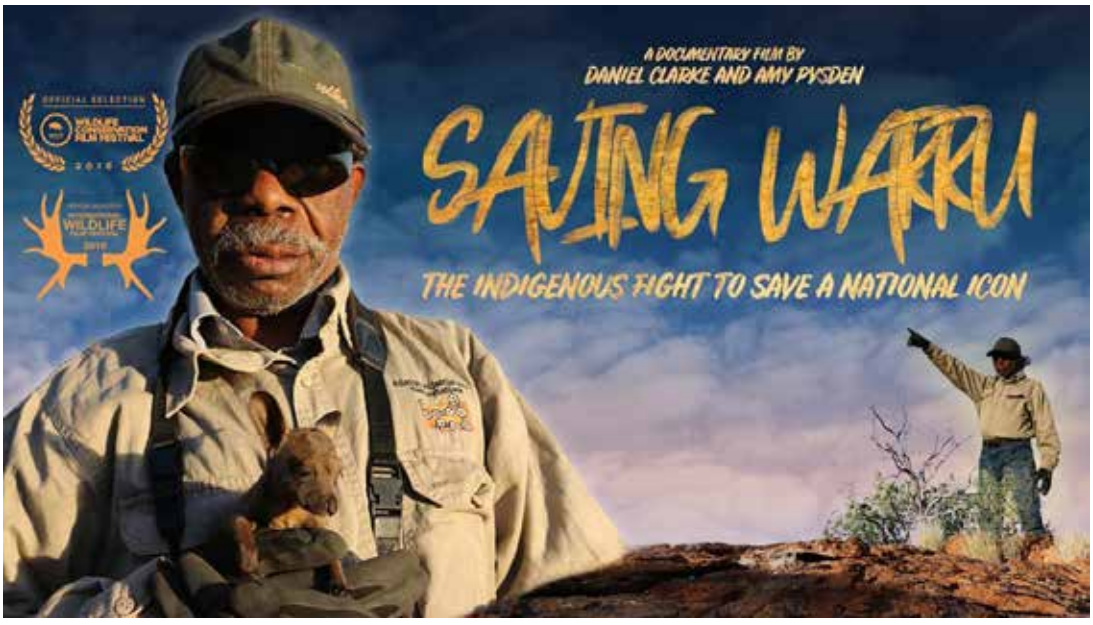



Figure 34. 'Saving Warru' documentary.

# Research and Science

## Published articles

West, R., Read, J.L., Ward, M.J., Foster, W.K., & Taggart, D.A. (2017). Monitoring for adaptive management in a trial reintroduction of the black-footed rock-wallaby Petrogale lateralis. Oryx, 51(3), 554-563.

West, R., Ward, M. J., Foster, W. K., & Taggart, D. A. (2017). Testing the potential for supplementary water to support the recovery and reintroduction of the black-footed rock-wallaby. Wildlife Research, 44(3), 269-279

West, R., Potter, S., Taggart, D., & Eldridge, M. D. B. (2018). Looking back to go forward: genetics informs future management of captive and reintroduced populations of the black-footed rock-wallaby Petrogale lateralis. Conservation Genetics, 19(1), 235-247.

Read, J.L., Dagg, E. and Moseby, K.E. (2019). Prey selectivity by feral cats at central Australian rock-wallaby colonies. Australian Mammalogy (in press)

Read, J., Copley, P., Ward, M., Dagg, E., Olds, L., Taggart, D. and West, R. (2018). Bringing back warru: return of the black-footed rock-wallaby to the APY Lands. Pp 237-248 in: Recovering Australia's threatened species: a book of hope. (Eds Garnett, S., Woinarski, J., Lindenmeyer, D. and Latch, P.) CSIRO Publishing, Clayton South, Victoria.

## Reports

Zabek, M.A. (2016). 2016 warru survey shows a promising future. 'Palya' Natural Resources Alinytjara Wilurara, Summer edition.

Zabek, M.A., and Ireland, L.J. (2016). Distribution, demography and dynamics of black-footed rock wallaby (warru) in the New Well in the Musgrave Ranges, APY Lands. Internal report prepared for the Warru Recovery Team.

West, R.S. (2016) Warru annual trapping report 2016. Report prepared for the Warru Recovery Team.

Zabek, M.A., and Ireland, L.J. (2017). Demography and dynamics of semi-captive population of black-footed rock wallaby in Warru-Pintji from 2011 to 2017 in the Anangu Pitjantjatjara Yankunytjatjara Lands. Internal report prepared for the Warru Recovery Team.

Ireland, L.J., Zabek, M.A., Weir, S., West, R., Read, J.L. and Copley, P. (2017) Proposal for the reintroduction of black-footed rock wallaby (*Petrogale lateralis*; MacDonnell Ranges race) from New Well, Warru Pintji (Donald's Well) and MacDonnell Ranges, NT to Wamitjara (Sentinel Hill) on the APY Lands. Report prepared for the Warru Recovery Team.

APY LM (2017). Warru rangers in the APY Lands are saving the endangered black-footed rock wallaby from extinction. Brief story for the Prime Minister and Cabinet, Canberra.

Weir (2018). Black-footed rock-wallaby NT Translocation June 2018 Trapping Summary Report – Alice Springs Telegraph Station Historical Reserve, Central Australia. Report prepared for the Warru Recovery Team.

West, R. S. (2018) Wamitjara warru trapping report. Report prepared for the Warru Recovery Team

West, R. S. (2018) Warru wild population trapping report 2018. Report prepared for the Warru Recovery Team.

# Summary

The Warru Recovery Project is guided by the objectives, 50 management actions and research knowledge gaps set out in the Warru Recovery Plan 2010-2020 (Read and Ward 2011) and also the deliverables of the Working on Country project established to address these management actions. These guidelines set out the overarching direction of the project and can be used as an assessment of the effectiveness of the Warru Recovery Team in delivering the project.

Many of the actions of the Warru Recovery Plan have been completed and a further actions progressed between 2016 - 2018 (Table 9). The captive breeding, genetics research, field monitoring, additional surveys and management of the Pintji population all progressed very well during the reporting period. This report summarises outputs of two years. A major focus has been on the first wild reintroduction of warru. The preparation for this was immense and supported by a range of people. Targeted efforts to understand and control introduced predators formed a large component of the on-ground work, along with buffel control, burning and other preparations. This was a significant milestone for the Recovery Project.

In 2019 and beyond, new actions will progress, particularly around more reintroductions of warru into the wild, which will include site selection and preparation and logistics for building upon the reintroduction to Wamitjara.

The WRT thanks its supporters and is looking forward to working together, tjunguringkunytja, in implementing the WRP in the future.

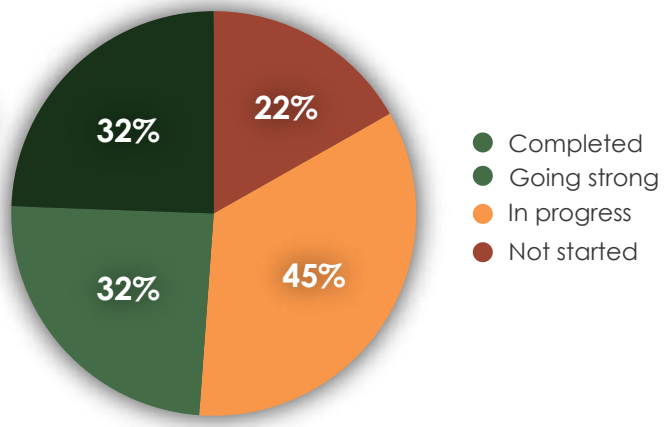



Table 9. Summary of warru recovery actions for 2013-2015: Actions completed fully for calendar year; Actions with strong progress; and include those which cannot begin until other actions have been completed.

| Objectives | Action | Description |
|---|---|---|
| 1. Maintain the genetic diversity and increase the distribution and abundance of warru in South Australia. | 1.1 | Implement appropriate threat abatement and monitoring and refine with added knowledge |
| | 1.2 | Maintain current warru monitoring regime at known warru colonies in the Eastern Musgrave and Tomkinson Ranges |
| | 1.3 | Maintain captive warru populations with genetic representation from known in-situ colonies and suitable facilities at Monarto |
| | 1.4 | Encourage and support specific dedicated research and development projects on warru conservation ecology |
| | 1.5 | Supplement existing colonies only where appropriate |
| | 1.6 | Conduct reintroduction of warru into the APY Lands within former range |
| | 1.7 | Support and encourage surveys of warru in adjacent ranges in Western Australia and the Northern Territory |
| | 1.8 | Engage pastoral industry as potential icon species for conservation on pastoral leases within former range (i.e. Davenport Ranges). |
| 2. Community objectives are met, and Anangu have ownership of key WRT decisions, on-ground actions, employment opportunities and educational outcomes. | 2.1 | Conduct regular WRT meetings |
| | 2.2 | Employ an iterative decision-making process for the WRT between Piranpa and Anangu members of the WRT. |
| | 2.3 | Ensure all on-grounds works have an appropriate level of Anangu employment |
| | 2.4 | Ensure there are at least two Traditional Owners who can speak for each warru metapopulation involved in the Warru Recovery Team |
| | 2.5 | Translate Warru Recovery Plan |
| | 2.6 | Hold community meetings with relevant communities in the APY Lands to discuss the objectives and actions of the Warru Recovery Plan |
| | 2.7 | Develop an agreed media protocol for the WRT |
| 3. The Warru Recovery Project is jointly managed and administered strategically towards long-term visions | 3.1 | Update WRT Terms of Reference (2007) |
| | 3.2 | Produce WRT annual report |
| | 3.3 | Maintain Warru Wiki |
| | 3.4 | Produce intellectual property agreement between WRT members |
| | 3.5 | Develop a stand-alone funding strategy based on the Warru Recovery Plan |
| | 3.6 | Finalise memorandum of understandings between stakeholders. |
| | 3.7 | Communicate Warru Recovery Plan with outside stakeholders and align with National Recovery Plan |

Actions which are underway, about to be implemented, or are currently on hold; Actions which have not yet been implemented

| Sub | Description | Progress |
|---|---|---|
| 1.1.1 | Maintain predator management monitoring around existing colonies (ground-based) | |
| 1.1.2 | Conduct an ongoing trial of Eradicat baits in Eastern Musgrave Ranges by July 2011 (aerial) | |
| 1.1.3 | Develop and implement plan for control of large feral and superabundant native herbivores in core areas of warru range by July 2013 | |
| 1.1.4 | Control rabbits and rabbit warrens within a 1km buffer of the hills on which known warru colonies occur | |
| 1.1.5 | Implement APY Lands Fire Management Plan (Paltridge and Latz 2010) with respect to warru habitat by July 2013 | |
| 1.1.6 | Encourage and support production and implementation of APY Lands Buffel Grass Management Strategy and promote state and national control initiatives | |
| 1.2.1 | Conduct scat quadrat counts | |
| 1.2.2. | Conduct warru trapping program | |
| 1.2.3 | Conduct adult survivorship monitoring | |
| 1.2.4 | Conduct warru distribution surveys | |
| 1.3.1 | Maintain existing colony captive animals and breed captive animals for colony maintenance | |
| 1.3.2 | Undertake routine or opportunistic assessment of genetic diversity in wild and captive populations | |
| 1.4.1 | Conduct population viability analysis for remaining metapopulations based on trapping results and survival analysis | |
| 1.4.2 | Define inherent natural predator dynamics and warru population dynamics in a landscape where warru populations are apparently stable and robust | |
| 1.4.3 | Determine optimum techniques for predator management (especially cats) to minimise warru predation | |
| 1.4.4 | Determine influence of supplementary feeding, supplementary water and patch burning on recruitment | |
| 1.4.5 | Define inherent natural warru population dynamics with respect to climate | |
| 1.4.6 | Determine effect of interactions between human settlements and warru populations. | |
| 1.4.7 | Determine fate of young warru through recruitment / dispersal studies | |
| 1.4.8 | Examine the prevalence of toxoplasmosis and other diseases in extant warru populations | |
| 1.5.1 | Define supplementation thresholds for current extant colonies | |
| 1.5.2 | Conduct supplementation if population thresholds are met | |
| 1.6.1 | Establish and maintain genetically diverse captive breeding population of warru | |
| 1.6.2 | Establish and maintain a predator-proof facility (the Warru Pintji) in the APY lands with no incursions affecting warru and conduct trial hardening-off and free-breeding. | |
| 1.6.3 | Rank potential reintroduction sites and test site selection criteria (Ward et al. 2010b) | |
| 1.6.4 | Implement research project to define thresholds of threats (predation) considered viable to conduct reintroductions. | |
| 1.6.5 | Increase range of threat abatement, as directed by Actions 1.4.1 and 1.4.2 to maximise chances of success of reintroduction (if needed according to research). | |
| 1.6.6 | Undertake cross-fostering program for warru once reintroduction sites are identified, prepared and appropriately managed. | |
| 1.6.7 | Conduct hard reintroduction of warru into the APY Lands once actions 1.6.1 to 1.6.6 have been undertaken. | |
| 1.6.8 | Investigate need for Warru Pintji in the Tomkinson Ranges | |
| | Contact key agencies in WA and NT and assist with joint grant application in conjunction with SA searches | |
| | Use results of 2.1.4 to determine potential for success of Davenport Range reintroduction, see cooperation from pastoral lessees and establish threat monitoring program | |
| 2.1.1 | Conduct regular WRT meetings with land management, technical and scientific staff | |
| 2.1.2 | Conduct annual WRT meetings with Anangu and Piranpa representatives and with a translator present. | |
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| | | |
| | Communicate aspirations of the WRP into Pitjantjatjara and Yankunytjatjara (support Mobile Language Group project, Uni of Adl). | |
| | | |
| 2.7.1 | Determine appropriate future media opportunities which need to be pursued | |
| 2.7.2 | Develop an agreement on types of media opportunities which require pre-approval | |
| 2.7.3 | Develop a memorandum of understanding around process and use of images | |
| 2.7.4 | Define a proper process for acknowledgment of funding bodies | |
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| | Key stakeholders meeting to establish key performance indicators, endorsed by Warru Recovery Team. | |
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# Appendices

## Appendix A

***Summary of key discussion points and actions from Warru Recovery Team and APY Land Management meetings in 2016 – 2018***

| Meeting date | Key discussion points | Key actions |
|---|---|---|
| May 2016 | - Warru genetics;<br>- Succession plan for Maureen at the Monarto Zoo;<br>- Plan logistics for wild warru trapping in Musgrave and Tomkinson Ranges in July;<br>- Jacob McKenzie stepped into a team leader role for 4 weeks before the west warru project officer (SW) was recruited;<br>- Sara Weir (warru west project officer), and Magdalena Zabek (warru east project officer) were recruited in April-May 2016;<br>- John Read and Bec West put together a draft of the WRT progress report for 2013 – 2015;<br>- Graham Armstrong has been working on a WRT data review; he resigned from WRT due to conflict of interest. | Determine whether warru reintroduction can be funded through the Threatened Species Recovery Fund;<br>Develop site selection criteria for the translocation/release site;<br>Using underspend budget to purchase equipment for translocation |
| August 2016 | - Circulate Pintji trapping report when completed;<br>- Luke Ireland has been recruited as a new warru project coordinator;<br>- Summary of wild warru trapping surveys in the Musgrave and Tomkinson Ranges;<br>- Monarto Zoo provided update on captive warru population and their future;<br>- Data management update;<br>- Discussing roles for current warru rangers and engaging new warru rangers and TOs;<br>- Discussing WRT terms of reference, roles and responsibilities;<br>- Discussing translocation proposal, e.g. site selection, priority of animals taken from Pintji and priority locations for trapping in New Well. | - Create a video invitation for the Threatened Species Commissioner;<br>- Preparation of the draft predator and rabbit monitoring and control plan;<br>- Contract Ethan Dagg to assist with predator shooting in the Tomkinson Ranges;<br>- East warru rangers to set cameras at Alalka to detect new warru and warru that were not trapped during July trapping survey. In addition, set up scat plots in Alalka;<br>- East warru rangers to look into possibility of spotlight shooting around Alalka.<br>- Magdalena Zabek to analyse survival and population abundance of warru post wild trapping survey;<br>- Planning and implementation of fire management plan for warru sites |

| Meeting date | Key discussion points | Key actions |
|---|---|---|
| October 2016 | - Discussion whether WRT should register as a Recovery Team with federal agencies;<br>- Ninti Media's filming plans for a warru documentary;<br>- Update on captive warru breeding program at Monarto Zoo;<br>- Discussing priority actions for next year's warru translocation. | - John Read to inquire about logistics with national registration of the recovery team;<br>- Luke Ireland to develop an agreement with Ninti Media re: warru film;<br>- Magdalena Zabek to estimate survival and population abundance of the Pintji population;<br>- Luke Ireland to present translocation proposal to the APY Board once finalised |
| February 2017 | - Discussing timing of translocation;<br>- Assessing predator monitoring (RAI), predator control, and predator trigger thresholds, aerial baiting and shooting;<br>- Choosing sites in the NT to source NT warru for translocation;<br>- Discussing warru transportation and release at Wamitjara. | Define the number, sex and age of animals to be sourced from two source populations;<br>Follow up on the Threatened Species Recovery Fund as warru budget is shrinking |
| May 2017 | - Discussing site accessibility around Wamitjara with WRT and TOs;<br>- Discussing predator control at Wamitjara post aerial baiting;<br>- Further logistics with warru transportation and release;<br>- Ethan Dagg left the position of the East warru team leader in March;<br>- Allan and Angelina Frazer joined the East warru ranger team in April | - Luke Ireland to organise Graham Miller for shooting at Wamitjara prior to warru release;<br>- Installation of kapi points at Wamitjara;<br>- Brett Backhouse to organise Ninti Media attendance for translocation. |
| June 2017 | - Summary of the translocation week;<br>- Update on scat monitoring;<br>- Update on warru semi-captive population at Pintji and captive population in Monarto Zoo;<br>- Warru project update from the Musgrave Ranges;<br>- WOK funding has been extended until 2020;<br>- Threatened Species Recovery Fund (200,000) has been granted for warru translocation;<br>- Warru rangers working towards Chemical certificates. | - West and East rangers to collect dingo scats to assess whether dingoes eat warru;<br>- Add another ngintaka to Pintji to get rid of the rabbit/s;<br>- Discuss with Troy Bowman about residual herbicides for vegetation clearing at Pintji;<br>- Look into options for adding 2 – 3 warru to Monarto Zoo collection. |
| July 2017 | - Discussing search effort for warru moving away from Wamitjara;<br>- Assessing predator control and predator RAI post translocation;<br>- Consider predator training of warru in Pintji;<br>- Langki passed away in Monarto Zoo in July;<br>- Sara Weir and Magdalena Zabek announced leaving their project officer's positions at the end of the month | - Record animals that did not survive and/or moved away from Wamitjara;<br>- Monitor and refill kapi points at Wamitjara;<br>- Maintain the same level of predator control;<br>- SW and MZ to prepare handover notes; LI to assess the recruitment for their positions, including job sharing |

| Meeting date | Key discussion points | Key actions |
|---|---|---|
| November 2017 | - Luke Ireland resigned<br>- Damien Griffiths welcomed<br>- 9 translocated warru assumed dead but still well exceeding threshold for Wamitjara translocation<br>- Discussed value of training Pintji warru with dogs | - CGS to prepare pre-winter 2018 burn planning for warru sites<br>- Due to high predator numbers at Wamitjara graham to be contracted again and 8 Felixers ordered for Wamitjara<br>- MacDonnell Ranges translocation to be scheduled just after Wamitjara trapping in June |
| February 2018 | - Big Kenmore fire in early Feb, from Pintji to Wamitjara and beyond<br>- Pitfall and pintji trapping to be planned for same week<br>- Need to replace Maureen as warru ambassador | Prioritise radiotracking all collared warru and intensifying predator control post fire at Wamitjara<br>JR write to NT to advance Alice Springs supplementation of Wamitjara warru |
| May 2018 | - 35 warru including 7 independent young captured at Wamitjara – great success<br>- Telegraph station most likely source population for warru<br>- $50,000 IPA underspend to contract Sara Weir et al to survey Everard Ranges for translocation potential | - Rangers want drivers licences and to be able to operated Felixers independently<br>- Rangers to take Warru Roadshow to Amata and Wingelina<br>- Investigate chemicals for buffel control that won't affect frogs at Ninuku spring |
| September 2018 | - Supplementation to Tomkinson Ranges suggested for surplus Pintji warru<br>- Initial survey of Everard Ranges suggests multiple suitable sites for warru, social issues to be considered next<br>- Kalka supplementation data requires review to determine value in continuing | - Investigation of optimum ear tags, placement and technique initiated<br>- Amendment to AEC for trapping proposed to acknowledge freak nature of single trapping mortality<br>- P Copley to approach Shark Bay RT to gauge support for a trial WBB reintroduction to Pintji |

# Appendix B

***Small mammal and reptile species known to occur in the Pintji***

| Mammals | Reptiles | | |
|---|---|---|---|
| *Pseudomys desertor* | *Diplodactylus conspicillatus* | *Moloch horridus* | *Ctenotus schomburgkii* |
| *Pseudomys hermonsburgensis* | *Gehyra purpurascens* | *Pogona minor* | *Lerista labialis* |
| *Leggadina forresti* | *Lucasium stenodactylus* | *Tympanocryptis centralis* | *Lerista desertorum* |
| *Notomys olexis* | *Nephrurus levis* | *Brachyurophis bertholdii* | *Liopholis inornata* |
| *Mus domesticus* | *Rhynchoedura ornata* | *Demansia sp.* | *Menetia greyii* |
| *Antechinomys laniger* | *Strophurus ciliaris* | *Pseudechis australis* | *Morethia boulengeri* |
| *Sminthopsis ooldeo* | *Pygopus nigriceps* | *Pseudonaja modesta* | *Morethia ruficauda* |
| *Sminthopsis youngsoni* | *Ctenotus leonhardii* | *Pseudonaja nuchalis* | *Gowidon longirostris* |
| *Tochyglossus aculeatus* | *Ctenotus quattuordecimlineatus* | *Anolis bituberculatus* | |


Warru Recovery Team Logo by Amanyi Haggie, Traditional Owner, Pukatja.

This annual report was prepared by John Read, Magdalena Zabek, Rebecca West and Liberty Olds with contributions from the Warru Recovery Team. Photographs used in this document were supplied by the Warru Recovery Team unless stated in the caption.