



The conservation and management of the bilby (*Macrotis lagotis*) in the Pilbara

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Annual Report 2013-2014

October 2014



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October 2014

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The recommended reference for this publication is:

Dziminski, M. A. and Carpenter, F. 2014, *The conservation and management of the bilby (Macrotis lagotis) in the Pilbara. Annual Report 2013-2014*, Department of Parks and Wildlife, Perth.

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Acknowledgments

- Global Gypsies – Lorna Glen trial transects
- Nullagine Community School and Community
- Roy Hill Station
- Yarrie Station - Annabelle Coppin
- Aditya Birla Nifty – Michael Robinson
- Cameco – Tim Duff
- Rangelands NRM Western Australia
- Paul Gioia – NatureMap Theme
- Roy Hill
- *ecologia*
- Rangelands NRM WA Throssell Coordinating Group
- Frank Morris
- Neil Thomas
- Rebecca Coppen
- Kristina Koproicz
- Andrew Moore

Offset Funding

- Fortescue Metals Group
- Millennium Minerals

1 Introduction

This report summarises the work carried out on the conservation and management of the bilby (*Macrotis lagotis*) in the Pilbara during the period 2013 -2014.

Work undertaken in the period 2013-14 included:

1. Implementation of the Pilbara Threatened Fauna user-contributable data entry site
2. Collation of current and historic distributional data
3. Developing a population monitoring technique
4. Implementing population monitoring
5. Developing a broad-scale survey technique
6. Implementing the survey for bilbies in the Pilbara

2 Implementation of the Pilbara Threatened Fauna user-contributable data entry site

The online user-contributable data entry site has been finalized, and is now fully functional and online (Figure 1). It is directly linked to NatureMap, and entries in the Pilbara Threatened Fauna portal can be accessed and viewed through NatureMap. The database that supports the portal currently holds 1,281 records (Figure 2).

The system allows users to register and upload records, either singly or in bulk (spread sheet). Uploaded records are then reviewed by an expert assigned to each species, to ensure accuracy, prior to being accessible through NatureMap. Three major functions distinguish this system from others:

1. All records are reviewed by experts before public release.
2. Users can enter observations of signs of species:
 - Burrow
 - Track
 - Scat
 - Digging
 - Skin
 - Remains
 - Call
 - Sighting
 - Capture
 - Remote camera image
3. Users can upload photographs. Photographs assist with the confirmation of records, especially in the review process. The site can be accessed at this link: <http://dpaw.gaiaresources.com.au/bdrs-core/home.html> .

A Science Information Sheet on the Pilbara Threatened Fauna portal has been produced and published (Appendix 1).

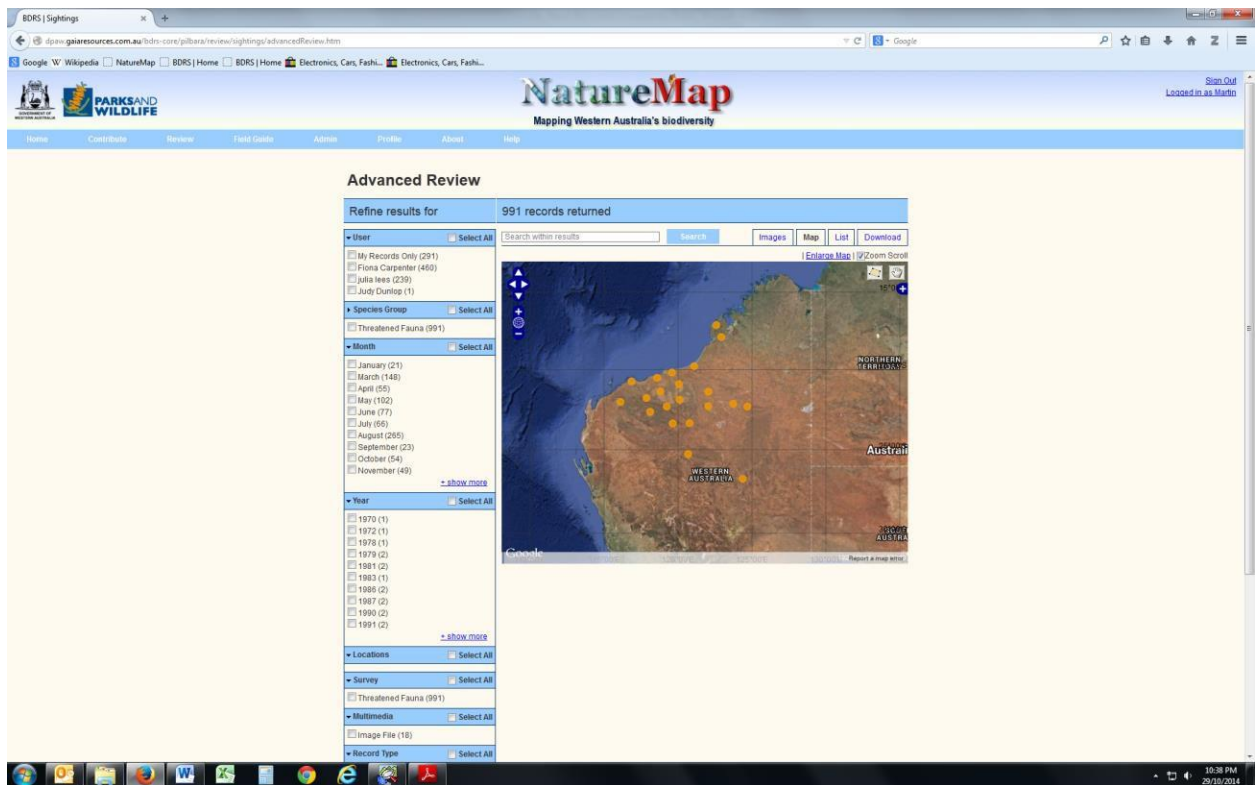


Figure 1 Screen capture of the Pilbara Threatened Fauna online user-contributable data entry site.

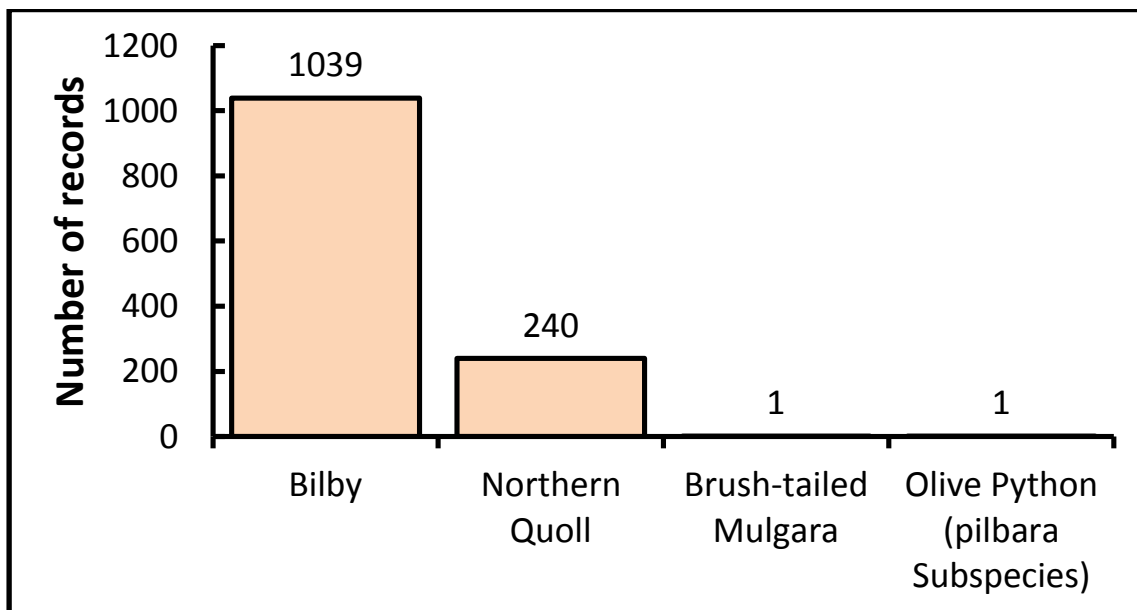


Figure 2 Total number of records in the Pilbara Threatened Fauna Portal.

3 Collation of current and historic distributional data

Current and historic records of bilbies in the Pilbara have continued to be accessed from the following sources:

- Published literature
- “Grey” literature (including consultants and CALM/DEC/Parks and Wildlife reports)
- WA Department of Parks and Wildlife, WAM and other national databases
- Liaison with Parks and Wildlife staff, ecologists, consultants and land holders/users
- Field trips to the Pilbara region

So far 357 records of bilbies have been collated and populated into the database described in Section 1 above (Figure 3). Records collated from external sources range from 1930 to 2014 and peak at 2010 to 2012 (Figure 4).

To aid in collating further information on historic and future bilby records a poster has been produced (Appendix 2) which shows general information on identifying bilbies and their sign and where to report sightings. The poster is being distributed to mine sites, airports, Parks and Wildlife offices, tourist information centres, caravan parks, community centres and other tourism and recreation facilities across the Pilbara.

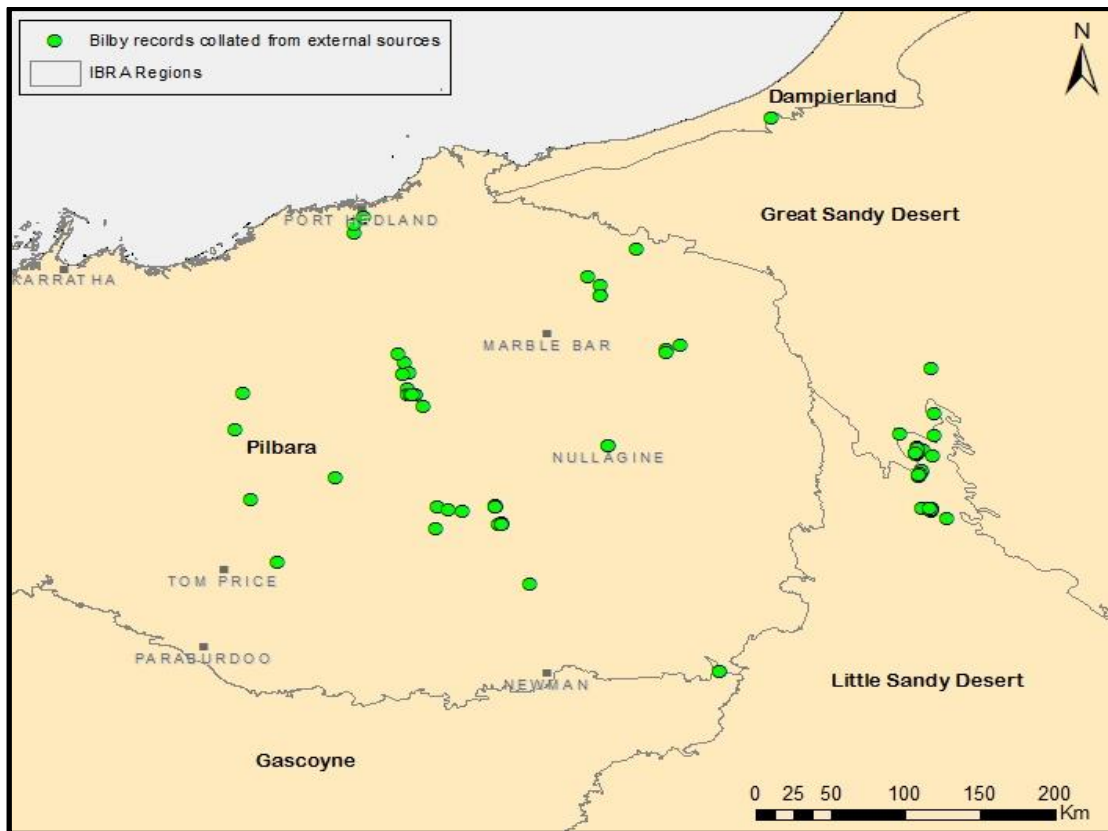


Figure 3 Bilby records collated from external sources.

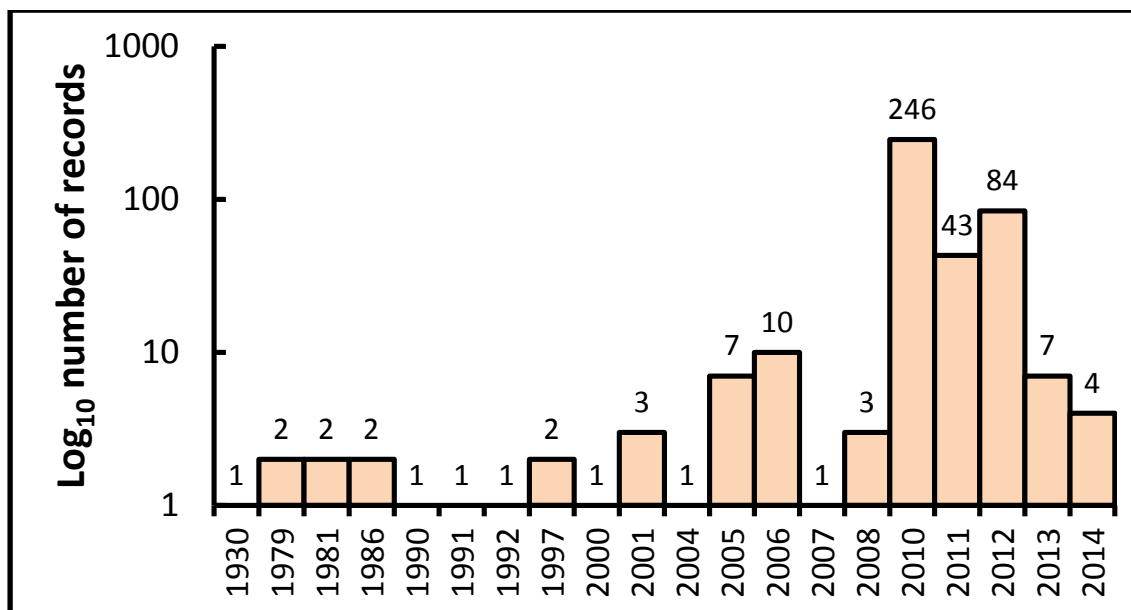


Figure 4 Frequency distribution of bilby records between 1930 and 2014 collated from external sources.

4 Developing a population monitoring technique

Since no reliable method of estimating bilby densities existed, and bilbies are not suitable for efficient mark-release-recapture studies, a new technique employing a combination of distance sampling (Buckland et al. 2001, 2004) and molecular markers has been developed. This technique involves the extraction of DNA from quantitatively collected bilby scats (Smith et al. 2009), and subsequently genotyping individuals using polymorphic microsatellite markers (Moritz et al. 1997; Smith et al. 2009).

A trial of this technique was conducted at Lorna Glen where a reintroduced bilby population exists under natural conditions. Scats were collected from 10 transects which were one kilometer in length. Genomic DNA was extracted from scats using a commercially available faecal extraction kit and subsequently used as templates for amplification of nine polymorphic microsatellite loci (Moritz et al. 1997; Smith et al. 2009) via the polymerase chain reaction (PCR). Amplified products were used in fragment analyses.

Bilby scats were found on four of the 10 transects and 19 scats were collected for analyses (Figure 5). Seven of the 19 scats (37 %) yielded DNA from which fragments were amplified. Genotyping identified five distinct individuals (Figure 5).

The trial proved successful, the technique has been fine-tuned and is being implemented as a standard population monitoring technique in the Pilbara (see Section 5 below) and other regions.

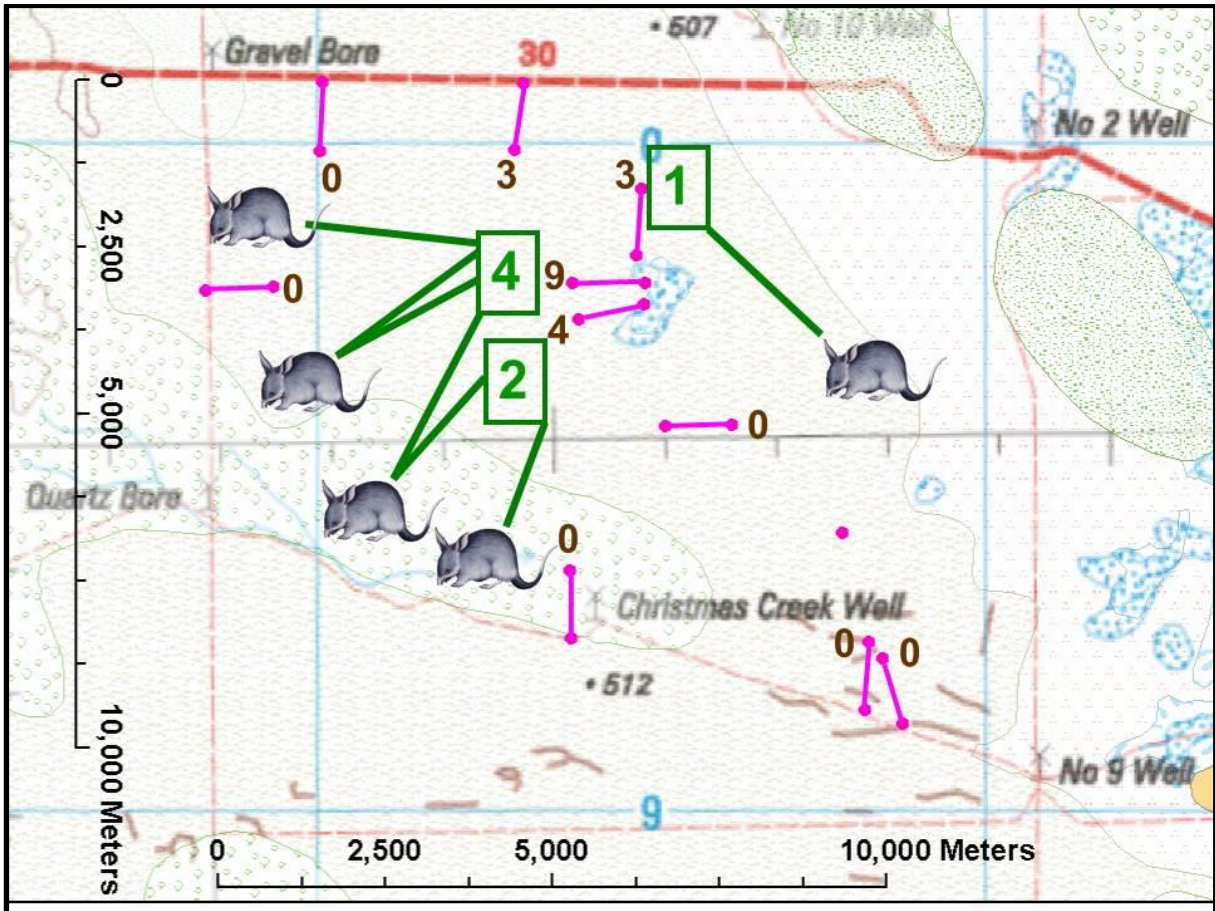


Figure 5 Transects walked for collection of bilby scats in a 10,000 ha area at Lorna Glen (— = 1 km transects; figures in **brown** indicate number of scats collected on each transect; boxed figures in **green** indicate numbers of scats from which DNA was successfully extracted and individuals were able to be genotyped from; bilby images indicate number of individuals genotyped from scats with green lines — linking individuals to which transects that they were present on).

5 Implementing population monitoring

Using the technique developed in Section 4, population monitoring has now been implemented at four sites across the Pilbara, with a further four to six sites envisaged as being implemented in the next 12 months (Figure 6). Two of the populations (Turner River and Hillside) are being collaboratively monitored with the Fortescue Metals Group and *ecologia*. The Nullagine population is being collaboratively monitored with the Nullagine Community School and Traditional Owners (Figure 7).

From the four populations being monitored so far, preliminary results are shown in Table 1. It needs to be noted that these are results for the number of individuals identified along transects. Further analyses of these results will enable an estimation of the number of individuals within an area to be estimated and mapped.

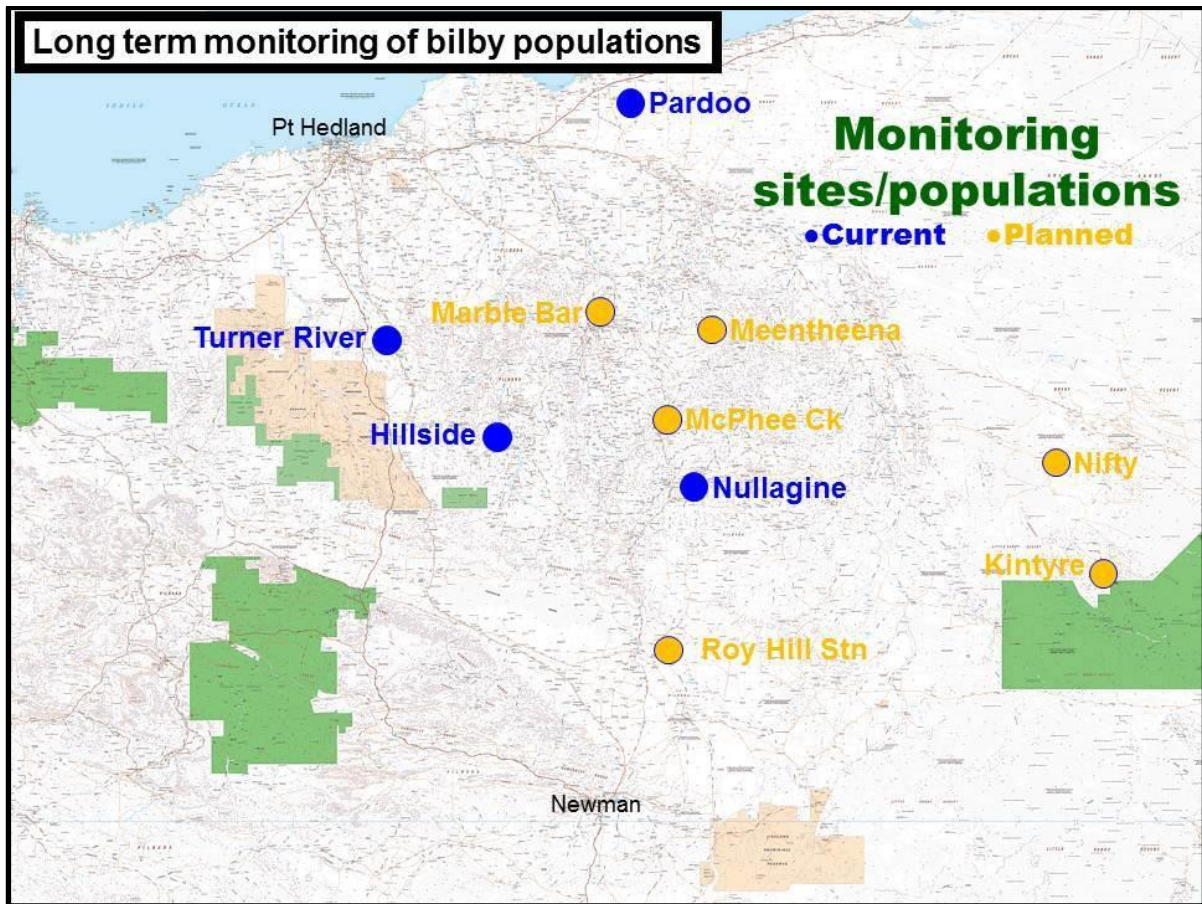


Figure 6 Current and planned long-term population monitoring sites



Figure 7 Community engagement: Collaborative monitoring with the Nullagine Community School and volunteers at Nullagine.

Table 1 Numbers of individuals identified from scats collected along transects at monitoring sites

Population	Total number of scats collected	Total number of scats yielding DNA (% yielding DNA)	Number of individuals identified on transects (range)
Pardoo	40	10 (25 %)	6-9
Hillside	49	17 (35 %)	4-9
Turner River	50	20 (40 %)	2-6
Nullagine	44	7 (16 %)	1-2

6 Developing a broad scale survey technique

The current technique of surveying for the presence/absence of bilbies involves assessing 2 ha plots for bilby sign (Moseby et al. 2011). This technique is predominantly restricted to being adjacent to roads due to the availability of access. A range of remote sensing techniques were assessed and it was concluded that Remotely Piloted Aircraft (RPA) fitted with real-time video feed to detect bilby burrows in the landscape was the most practical and efficient technique to be investigated.

The technique involves flying the RPA along a pre-plotted course whilst viewing the real-time video feed to detect bilby burrows. This method provides instant results rather than lengthy post-processing required from other remote sensing techniques. An RPA has been constructed (Figure 7A) and trialed in Perth, using artificially constructed bilby burrows (Figure 7B). The concept has been proved and the next step is to trial the RPA in the field at several sites occupied by bilbies.

7 Implementing the survey for bilbies in the Pilbara

As mentioned in Section 6 above, the current survey method is to search 2 ha plots on foot for bilby sign (Moseby et al. 2011). It is envisaged that the RPA technique will be implemented for future surveys if it proves successful in trials. This will allow more ground to be covered in much less time.



Figure 8A: RPA that was trialed to detect bilby burrows. 8B Image from 20 m height.

Using the current technique of 2 ha plots, 578 plots targeted in likely bilby habitat have been surveyed across the Pilbara for the presence of bilbies (Figure 9). Evidence of bilbies was recorded at 172 of the surveyed plots (Figure 9). This data has been uploaded into the Pilbara Threatened Fauna Portal described in Section 1.

8 Planned activities

The following activities are planned for 2015:

- Continuing collation of records from external sources
- Maintenance of the Pilbara Threatened Fauna Database and websites
- Continue distribution of posters in the Pilbara Region to maintain public awareness
- Using presence data to model the distribution of bilbies in the Pilbara
- Continuing survey of the Pilbara using the existing 2 ha plot methodology
- Testing developed RPA technology to survey for bilbies in the field

- Implement monitoring at a further 4 to 6 populations aiming for community engagement and involvement in population monitoring
- Initiate population genetics project using existing bilby DNA library collected from population monitoring
- Initiate GPS tracking of individuals to investigate movement patterns and home ranges

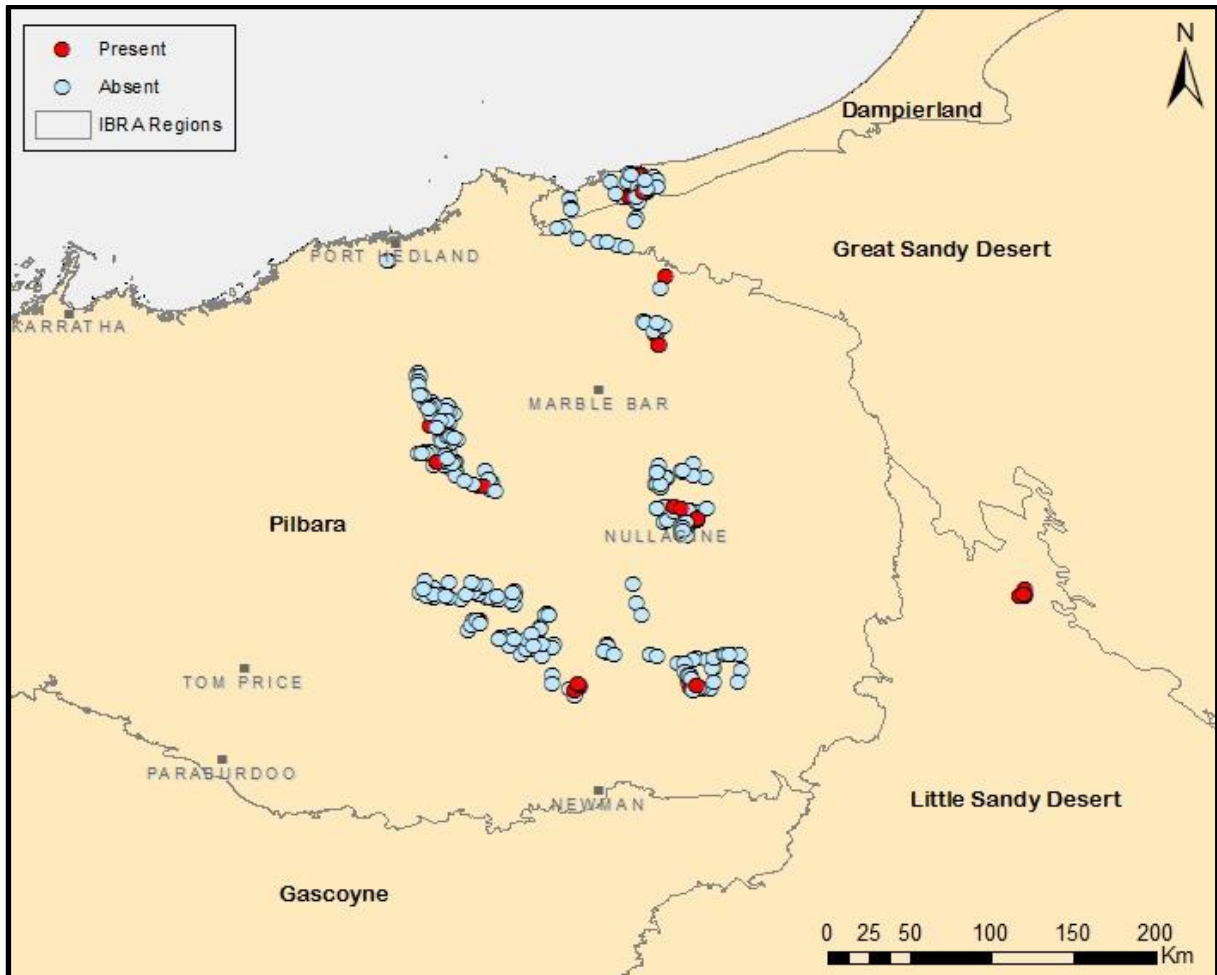


Figure 9 Plots (2 ha) surveyed for bilbies.

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- Smith, S., P. McRae, and J. Hughes. 2009. Faecal DNA analysis enables genetic monitoring of the species recovery program for an arid-dwelling marsupial. *Aust. J. Zool.* 57:139–148.

Appendices

Appendix 1 Information sheet: A portal to the Pilbara's threatened fauna.

The full information sheet can be accessed at:

<http://www.dpaw.wa.gov.au/images/documents/about/science/pubs/infosheets/sdis075.pdf> .



Department of
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Information Sheet 75 / 2014
Science and Conservation Division

A Portal to the Pilbara's Threatened Fauna

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Background

The Pilbara region of Western Australia is home to a number of fauna species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* including the greater bilby (*Macrotis lagotis*), mulgara (*Dasycercus spp.*), northern quoll (*Dasyurus hallucatus*), Pilbara leaf-nosed bat (*Rhinonicterus aurantia*) and Pilbara olive python (*Liasis olivaceus barroni*).

One of the issues hindering conservation planning and management of these species is the lack of centralised, reliable and up to date information on where the species occur, or have occurred, in the Pilbara. Historically, distribution records incorporated into NatureMap were limited to captures and sightings, particularly during planned surveys. Other sources of evidence, such as tracks or scats, were not readily captured despite their potential value. This is especially important for many of the threatened Pilbara species which are cryptic, nocturnal and/or trap shy and therefore difficult to catch or see. By not recording these other sources of evidence our understanding of species distributions is not as good as it could be.

To address this issue, the Department of Parks and Wildlife has recently developed the Pilbara Threatened Fauna Data Entry System, accessible through NatureMap. This portal allows members of the community, mining industry, planning sector, consultants, educational institutions and government departments to register on the site, and view and contribute distribution records derived from a number of sources.



Likely Pilbara olive python habitat



Remote camera image of northern quoll



Bilby tracks

Findings

The new Pilbara Threatened Fauna theme provides species information, recommended survey methodology, photographs, key references and research currently being undertaken by the department in efforts to conserve and manage these threatened species.


In addition, the portal allows for the inclusion of presence records from a variety of sources including scats, tracks, burrows, diggings, shed skins, animal remains (carcass, bones), calls and remote camera images as well as sightings and captures. All contributed records are reviewed by a species

Appendix 2 Bilby Poster


The poster below can be requested by contacting threatenedfauna@dpaw.wa.gov.au or by phone on (08) 9405 5100.

Bilby


Macrotis lagotis




Bilby




Bilby burrow: note the high, dome shape.




Bilby digging at the base of Acacia bushes exposing roots.



Bilby digging at the base of Acacia bushes exposing roots.



Bilby droppings: are round in shape with distinctive palmated tips.



Bilby tracks have three very distinctive toe marks.

The bilby is a nocturnal, burrowing marsupial with large ears, soft, blue-grey fur, a long pointed snout and a black tail with a white tip. Body size can be up to 55cm long with a tail up to 29cm long.

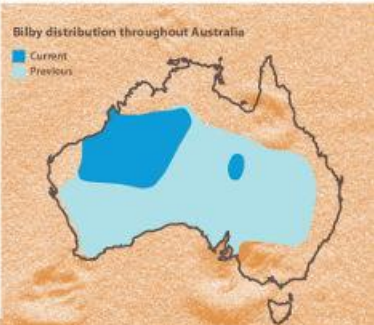
Once found across most of arid and semi-arid Australia, the bilby is now only found in the Pilbara, Kimberley, north-western deserts in Western Australia and Northern Territory, and an isolated population in south-west Queensland.

The presence of bilbies can be identified by large, high-arched burrows, distinctive tracks and scats, as well as diggings that are usually at the base of Acacia (wattle) shrubs to access grubs in the roots.


Parks and Wildlife is undertaking research on bilbies in the Pilbara. This research aims to survey where bilbies are in the Pilbara, and to develop long-term monitoring of populations.

If you see bilbies or their signs, or have historical information, visit naturemap.dpaw.wa.gov.au/threatenedfauna and upload your records, locations and photos. Alternatively, email threatenedfauna@dpaw.wa.gov.au or phone (08) 9405 5100. Your contribution will help in the conservation of this species.


Bilby distribution throughout Australia



■ Current
■ Previous



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For more information visit:
naturemap.dpaw.wa.gov.au/threatenedfauna