



# Dampier Peninsula greater bilby (*Macrotis lagotis*) research project: Progress report April 2018

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## Summary

The greater bilby (*Macrotis lagotis*) is a burrowing marsupial that was once wide spread across most of mainland Australia. Since European colonisation, the introduction of the cat and fox, changed fire regimes, the degradation of bilby habitat through pastoralism, introduced herbivores, and clearing, the range and abundance of greater bilbies have contracted severely and bilbies have disappeared from at least 80% of their former range across Australia with an ongoing northward decline. The bilby is now listed as Vulnerable both in Western Australia and under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Despite declines and extinctions elsewhere, populations of bilbies still persist on the Dampier Peninsula in the northwest of the Kimberley. This project aims to survey, monitor focal populations and commence management of threats to bilby populations across the Peninsula. This will improve understanding of the distribution and habitat preferences of bilbies on the Peninsula, and responses to management actions to ensure local persistence and possible re-expansion of this species.

Coordinated by the Department of Biodiversity Conservation and Attractions, the project involves extensive collaboration with Nyul Nyul, Bardi Jawi and Nyikina Mangala Rangers as well as Yawuru Country Managers, Jabirr Jabirr, and Bindunbur. This project will help fulfil a primary objective of the current interim bilby recovery plan (Bradley *et al.* 2015) and identified management priorities (Cramer *et al.* 2017). This is to retain/maintain the naturally-occurring distribution and genetic diversity of the bilby through understanding populations at the margin of the species' range on the Dampier Peninsula, gaining information on threats to populations and cost-effective strategies that can be implemented to manage threats.

A total of 125 plots of the proposed 180 first phase 2 ha sign plots have been surveyed across the Peninsula so far. In 20 of these plots (16 %), confirmed evidence of bilby presence was recorded. The occupancy survey has been improved with the aim to detect effects of fire frequency on bilby occupancy on the Dampier Peninsula. Traditional Owner Rangers together with Department of Biodiversity, Conservation and Attractions staff delivered a presentation titled: "Partnering indigenous biocultural knowledge and science: research and management of the threatened greater bilby on the Dampier Peninsula in the north-west of Australia" to the 12th International Mammalogical Congress held in Perth, July 2017.

A new Native Title determination in late 2017 has resulted in changes to Nyul Nyul native title group boundary and new determination to Bindunbur and Jabirr Jabirr native title groups. Future bilby surveys will incorporate these groups and reflect boundary changes. Design and planning of population monitoring is currently underway.

# 1 Introduction

The greater bilby (*Macrotis lagotis*) is a burrowing marsupial that was once wide spread across most of mainland Australia (Marlow 1958; Southgate 1990; Friend 1990; Gordon *et al.* 1990; Johnson and Southgate 1990; Abbott 2001; Abbott 2008; Bradley *et al.* 2015; Figure 1). The greater bilby is now listed as Vulnerable under the Commonwealth *EPBC Act 1999* (EPBC 1999); Schedule 3 - Fauna that is rare or is likely to become extinct as vulnerable fauna, under the Western Australian *Wildlife Conservation Act 1950* (Government of Western Australia 2015); and internationally listed as Vulnerable on the IUCN Red List of Threatened Species (IUCN 2014).

Since European colonisation of Australia, the range and abundance of greater bilbies have contracted severely (Southgate 1990; Bradley *et al.* 2015; Figure 1). Since the late 1800s, greater bilbies have disappeared from at least 80% of their former range (Southgate 1990; Figure 1), and the lesser bilby (*Macrotis leucura*), a closely related species, has become extinct (IUCN 2008).

The decline in bilbies has been attributed to a number of threats working directly or in combination. These threats include predation by introduced cats and foxes (Paltridge 2002; Bradley *et al.* 2015), changed and inappropriate fire regimes (Southgate and Carthew 2006; Southgate and Carthew 2007; Southgate *et al.* 2007; Bradley *et al.* 2015), and the degradation of bilby habitat through pastoralism, introduced herbivores, and clearing (Southgate 1990; Pavey 2006; Bradley *et al.* 2015; Department of Environment 2016).

The current distribution is now restricted to the Tanami Desert, Northern Territory (Johnson and Southgate 1990), the Great Sandy and Gibson Deserts, parts of the Pilbara and Kimberley in Western Australia (Friend 1990), and an outlying population between Boulia and Birdsville in south-west Queensland (Gordon *et al.* 1990). There is thought to be ongoing decline in populations with gradual contraction to the northwest of its range in the Kimberley and Pilbara Regions in Western Australia. In the Kimberley, bilbies occur in Dampierland, Ord Victoria Plain, Great Sandy Desert and Tanami IBRA regions, in a line following the coast from Port Headland to the Dampier Peninsula across to Fitzroy Crossing and Halls Creek (Figure 2).

Suitable habitat for bilbies can be defined as level or undulating plains including watercourses and dune systems, composed of cracking clay, soil or sand that allows burrowing, with vegetation consisting of open-tussock Mitchell grass (in SW Queensland) or hummock grassland (spinifex), with low shrubland, usually *Acacia* dominated. Habitat which is steep and/or rocky which does not allow burrowing may be used for foraging if it is adjacent to suitable burrowing habitat. The critical characteristic of suitable habitat for bilbies is the availability of a soil or sand substrate that enables the construction of burrows.

The Dampier Peninsula in the far northwest Kimberley comprises important bilby populations, due to widespread suitable sandy substrate, suspected abundance of populations, assumed lower past and present threat levels. These are the most northerly populations known in Australia. Tenure and responsibilities for management of lands on the Peninsula are complex. The majority of the Peninsula and the bilby

populations therein occur on lands owned or managed by Traditional Owner groups. Most lands are either subject to a determined or registered Native Title Claim, including Bindunbur and Rubibi. Indigenous Protected Areas have been declared across part of Bardi Jawi, Jabirr Jabirr and Yawuru country. Several large pastoral stations operate in these areas, including Country Downs, Kildo, Roebuck Plains and Yeeda. Parts of the western and northern coastal edges of the Peninsula are popular with tourism and recreation, however, to date main access via the Cape Leveque Road is hampered by poor road conditions, with the road subject to inundation and generally only passable by four wheel drive.

As part of the Cape Leveque Road upgrade project (EPBC 2013/6984), in 2016 Main Roads WA provided funding to offset impacts on local bilby populations, to undertake a three year project coordinated by the Department of Biodiversity, Conservation and Attractions. Key project activities are to survey, monitor and commence adaptive management of bilby populations to mitigate threats across the Peninsula.

The project aims to improve our understanding of the distribution, habitat preferences and threats to bilbies on the Peninsula, and to enable appropriate management to ensure the persistence of local populations.

The purpose of the project is to monitor the occupancy and abundance of bilbies as well as key threatening processes on the Dampier Peninsula, while initiating on-ground actions to reduce the impacts from key threatening processes.

The components of the project are:

1. *Defining the area of occupancy* – through an array of a minimum of 180 sign plot surveys and testing supplementary Remotely Piloted Aircraft (RPA) surveys across 12 sectors on the Peninsula;
2. *Population monitoring* – of core populations monitored annually, involving genotyping individuals from scats collected quantitatively along transects to measure abundance, occupancy from sign plots, predator occupancy from remote cameras, data on food resources, stock grazing pressure, introduced predators and fire regimes; and,
3. *Management of threats* – implementing management activities including managing fire and stock grazing.

Outcomes will help fulfil a primary objective of the current interim bilby recovery plan (Bradley *et al.* 2015) and identified management priorities (Cramer *et al.* 2017). This is to retain/maintain the naturally-occurring distribution and genetic diversity of the bilby through understanding populations at the margin of the species' range on the Dampier Peninsula, gaining information on threats to populations and cost-effective strategies that can be implemented to manage threats.

The aim and objectives of this project also align with the research priorities for the greater bilby in the north of Western Australia, identified by a workshop hosted the Western Australian Department of Biodiversity Conservation and Attractions where the following five research priorities were identified through a facilitated process (Cramer *et al.* 2017):

1. Refine survey methods appropriate for all habitat types
2. Improve understanding of habitat use in relation to substrate type and food resources
3. Improve understanding of the genetic structure of (meta)populations
4. Improve understanding of the threat posed by introduced predators and herbivores
5. Improve understanding of how fire regimes affect bilby conservation

As the majority of the Peninsula lands are currently owned or managed by Traditional Owner groups, most project activities will be undertaken with or by Traditional Owners and Indigenous Ranger groups. Therefore effective liaison and engagement with these groups is integral to the project achieving milestones and delivering on agreed milestones.

The project employs Traditional Owners and Ranger Groups including Nyul Nyul, Bardi Jawi, Goolarabooloo, Jabirr Jabirr and Nyikina Mangala Rangers and Yawuru Country Managers on a fee-for-service basis. In late 2017, A new Native Title determination has resulted in changes to Nyul Nyul Native Title group boundary and new Native Title determined for Bindunbur and Jabirr Jabirr people. Future bilby surveys will incorporate these groups and reflect boundary changes. The project collaborates with WWF, Environs Kimberley and Rangelands NRM to contribute to the broader Kimberley Bilby program. Survey and monitoring in the first and second year has occurred on traditional land of six Native Title groups on the Dampier Peninsula: Bardi Jawi (N), Bindunbur (central), Yawuru (SW) Nyikina Mangala (SE), Nyul Nyul (NW), and Goolarabaloo/ Jabirr Jabirr (W).

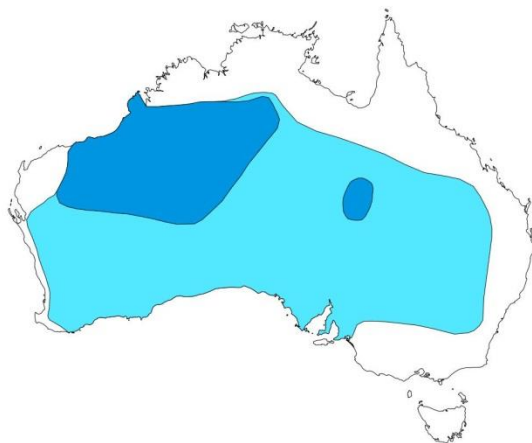


Figure 1. Current (■) and former (■) distribution of the greater bilby.



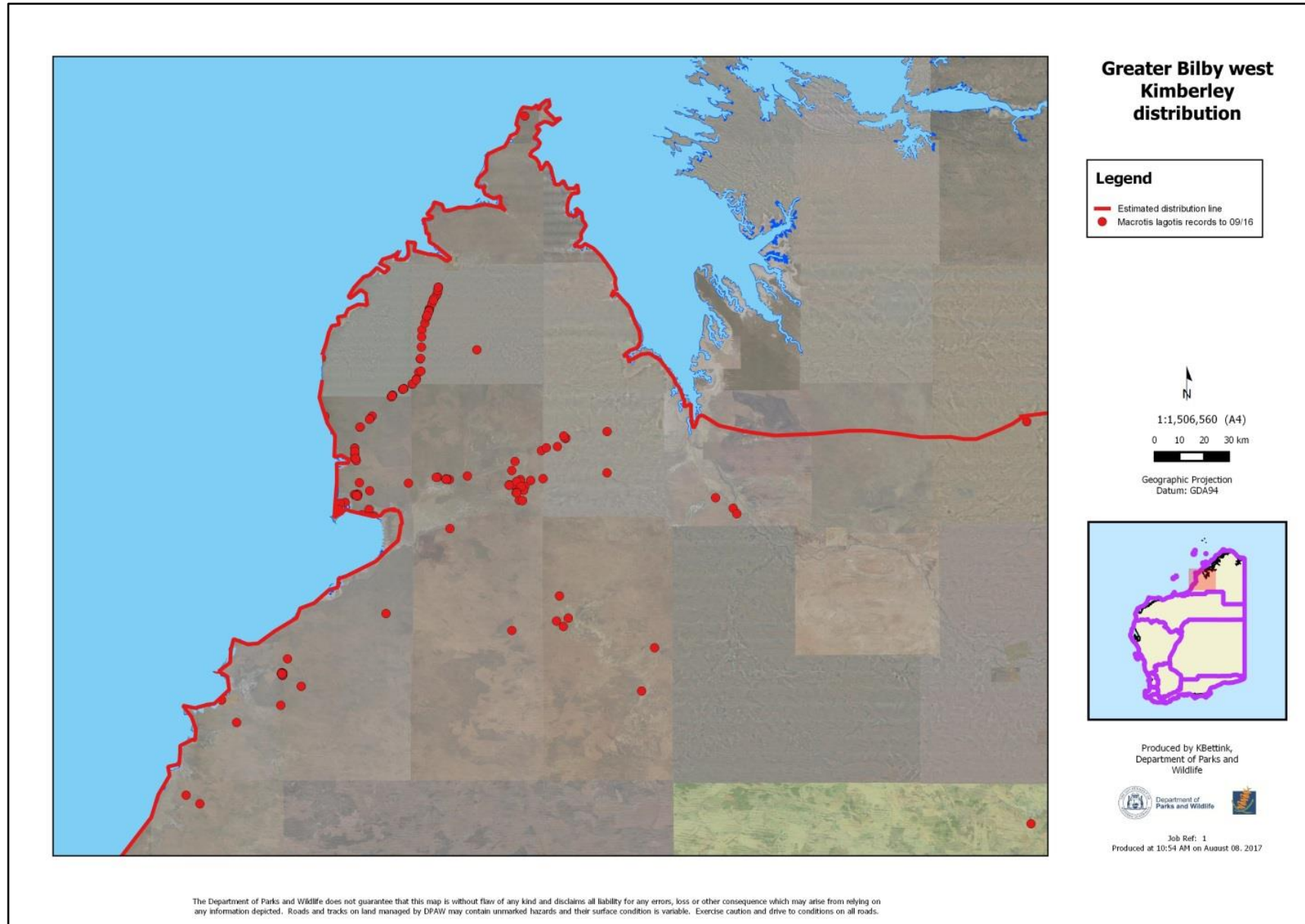


Figure 2: Distribution of bilbies in the West Kimberley based on historical records.

## 2 Information products

An information sheet outlining the project background, aims, major activities and partners was produced for distribution (Appendix 1). Additionally, to promote awareness of bilby research and survey by the Dampier Peninsula and other Kimberley Ranger groups, as well as a means for community members to report sightings of bilbies, posters tailored to each ranger group have been produced (Appendix 2).

## 3 Occupancy surveys

### 3.1 Software and refinement of 2 ha sign plot data collection

In 2017 a standardized app was developed using Mobile Data Studio (MDS; Creativity Corp 2017), along with an equivalent paper version for collecting sign plot data. Advice from experts conducting bilby surveys across Australia was incorporated during development. Other ranger groups in the Kimberley also developed this data template into a Fulcrum (2017) sequence.

The app and datasheet was optimised further by Department of Biodiversity, Conservation and Attractions staff and Traditional Owner Rangers during this project and others around Western Australia. Many fields have been simplified and unused data fields removed. We encourage all users (including Fulcrum users) to update devices to the latest version. The electronic MDS template (Figure 3) is available from the Department by request, and the paper version is attached at Appendix 3.

This standardised data collection template will be continue to be used for the Dampier Peninsula surveys, as well as other sign plot projects throughout Western Australia. We encourage all users to update devices to the latest version.

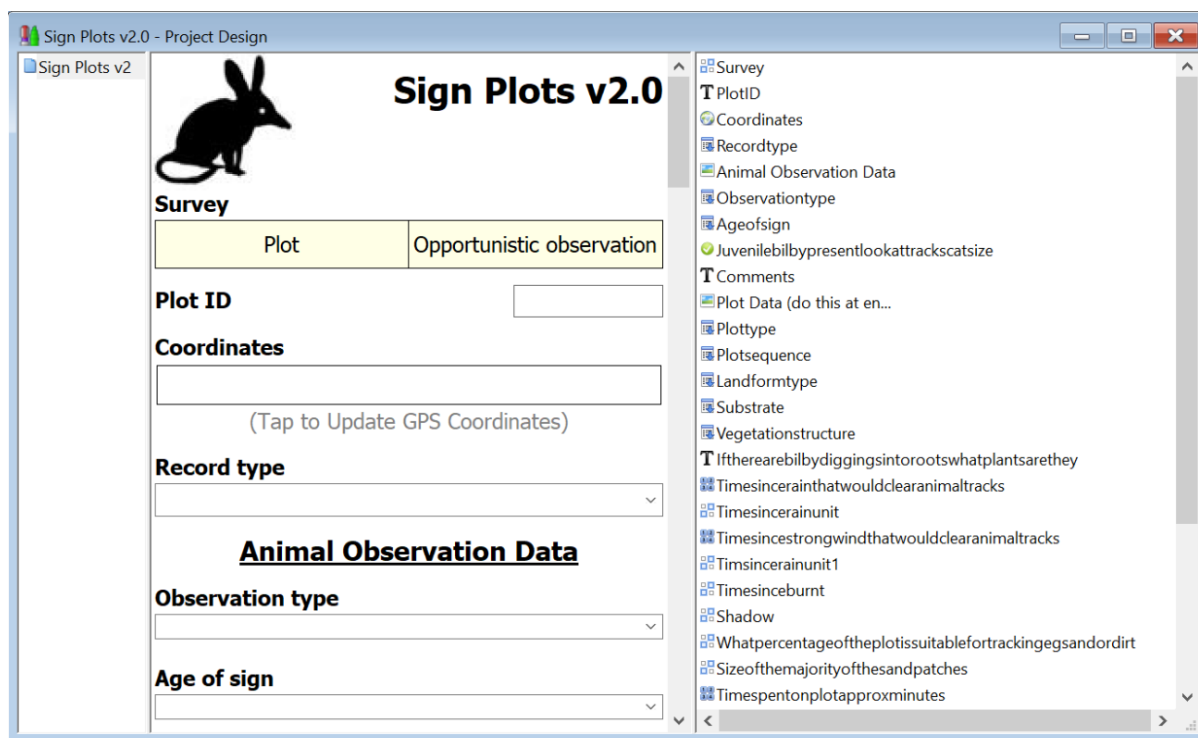


Figure 3. Screenshot from the standardised mobile data collection app.

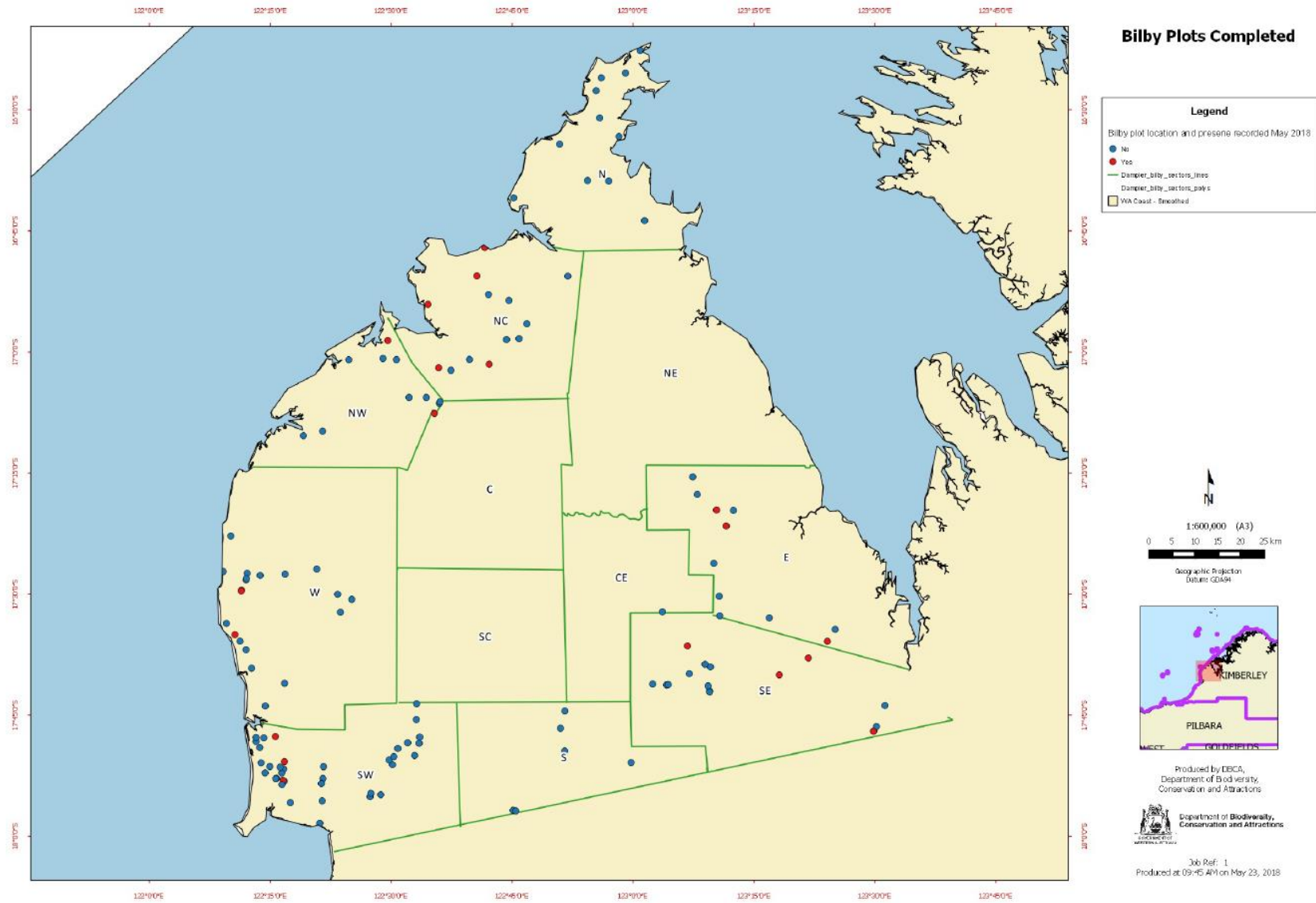


Figure 4: Completed 2 ha sign plots indicating bilby presence and absence.

## 3.2 Completed surveys

A total of 125 plots of the proposed 180 first phase plots have been surveyed across the Peninsula so far (Figure 4). In 20 of these plots (16 %), confirmed evidence of bilby presence was recorded.

Active bilby sites continue to be found in the following major vegetation types:

- In southern areas of the Peninsula: wongai (*Acacia eripoda*) woodland with occasional Jigal (*Lysiphyllum cunninghamii*), turpentine tree (*Gardenia pyriformis*) and *Corymbia* sp. (bloodwood) on inland red pindan soils, with sparse to dominant blade grass (*Chrysopogon pallidus*) and *Jacquemontia* sp. understory (Figure 5).
- Northwest peninsula inland of Beagle Bay: Open Bloodwood woodland with clusters of dense *A. tumida*, (pindan wattle) with *G. pyriformis*, and *Ptilotus corymbosus*, (Figure 6).
- Southern central and southeast peninsula: Mixed *Acacia* woodland dominated by a shrub understory of cockroach bush (*Senna notabilis*) (Figure 7).
- Southwestern peninsula: Partly deciduous shrubland of mixed species (*A. coleii*, *Bauhinia* sp., *Gyrocarpus* sp. and , *Bridelia* sp.) on pinkish red sandy soils.



Figure 5: Examples of wongai (*Acacia eripoda*) woodland vegetation types with bilbies active during the late dry season.



Figure 6: Open *Corymbia* woodland with an understory of *Acacia tumida*, tussock grasses and annual herbs such as *Ptilotus corymbosus*.



Figure 7: Example of *Acacia* woodland dominated by a shrub understory of cockroach bush (*Senna notabilis*).

### 3.2.1 Nyul Nyul

Nyul Nyul Rangers were allocated plots to survey in the NW and NC sectors. A total of 24 plots have been completed.

### 3.2.2 Yawuru (Nyamba Buru Yawuru)

Yawuru Country Managers were allocated plots to survey in the SW and S sectors. A total of six plots in S sector and 36 plots in SW sector have been completed.

### 3.2.3 Bardi Jawi

Bardi Jawi Rangers were allocated plots to survey in the N sector and 11 plots have been completed.

### **3.2.4 Nyikina Mangala**

Nyikina Mangala were allocated plots to survey in both E and SE sectors. Eleven plots have been completed in sector E whilst 11 plots have been completed in the SE sector.

### **3.2.5 Goolaraballoo / Jabirr Jabirr**

At the commencement of this project Native Title had not been determined over the W sector. Surveys were undertaken with Traditional Owners from Goolaraballoo, with 20 plots allocated. With Native Title now determined for Jabirr Jabirr people, future plots will be undertaken with this group.

### **3.2.6 Other areas**

Organising surveys in the remaining sectors (SC, CE, C and NE) has been complicated by unresolved and undetermined native title claims. Representatives of these claims often do not have formalised ranger groups, but instead comprise Traditional Owners and/or individuals who are employed by neighbouring Ranger Groups. Liaison is underway with Jabirr Jabirr who has recently had native title determined in the W and NW sections, however boundaries have still not been finalised with Nyul Nyul and Bindunbur.

The people that have registered Native Title claim over part of the CE sector containing Mt Jowlaenga has limited on ground capacity. The proposed Thunderbird mineral sands proposal is located in this sector and presents ongoing complications for access, liaison and survey. Further complications have been created by Country Downs Station refusing access to Traditional Owner Rangers and Department staff to undertake surveys for bilbies. Further liaison and negotiation is required. Bilbies are known to occur on Country Downs Station from historical records, but current occupancy needs to be surveyed.

### 3.3 Improved occupancy survey design

Due to the findings of an extensive occupancy survey in the nearby La Grange area (Dziminski *et al.* 2018), the design of Dampier Peninsula occupancy survey has been improved according to the recommendations of that study. The improved design aims to detect the effects of fire frequency on the occupancy of bilbies on the Dampier peninsula. The adjusted survey design is shown in Table 1 and Figures 8 - 11.

Table 1. Numbers of 2 ha sign plots in each treatment of the adjusted occupancy survey design.

Ranger group	Number of plots in 0-7 years fire frequency	Number of plots in 11+ years fire frequency	Total plots	Total plots with 4× resurveys
Bardi Jawi	3	2	5	20
Jabirr Jabirr/Ngumbarl	4	10	14	56
Nimanburr	4	10	14	56
Nyikina Mangala	9	6	15	60
Nyul Nyul	6	10	16	64
Yawuru	14	2	16	64
Total	40	40	80	320



**Bardi Jawi proposed Bilby plots fire frequency**

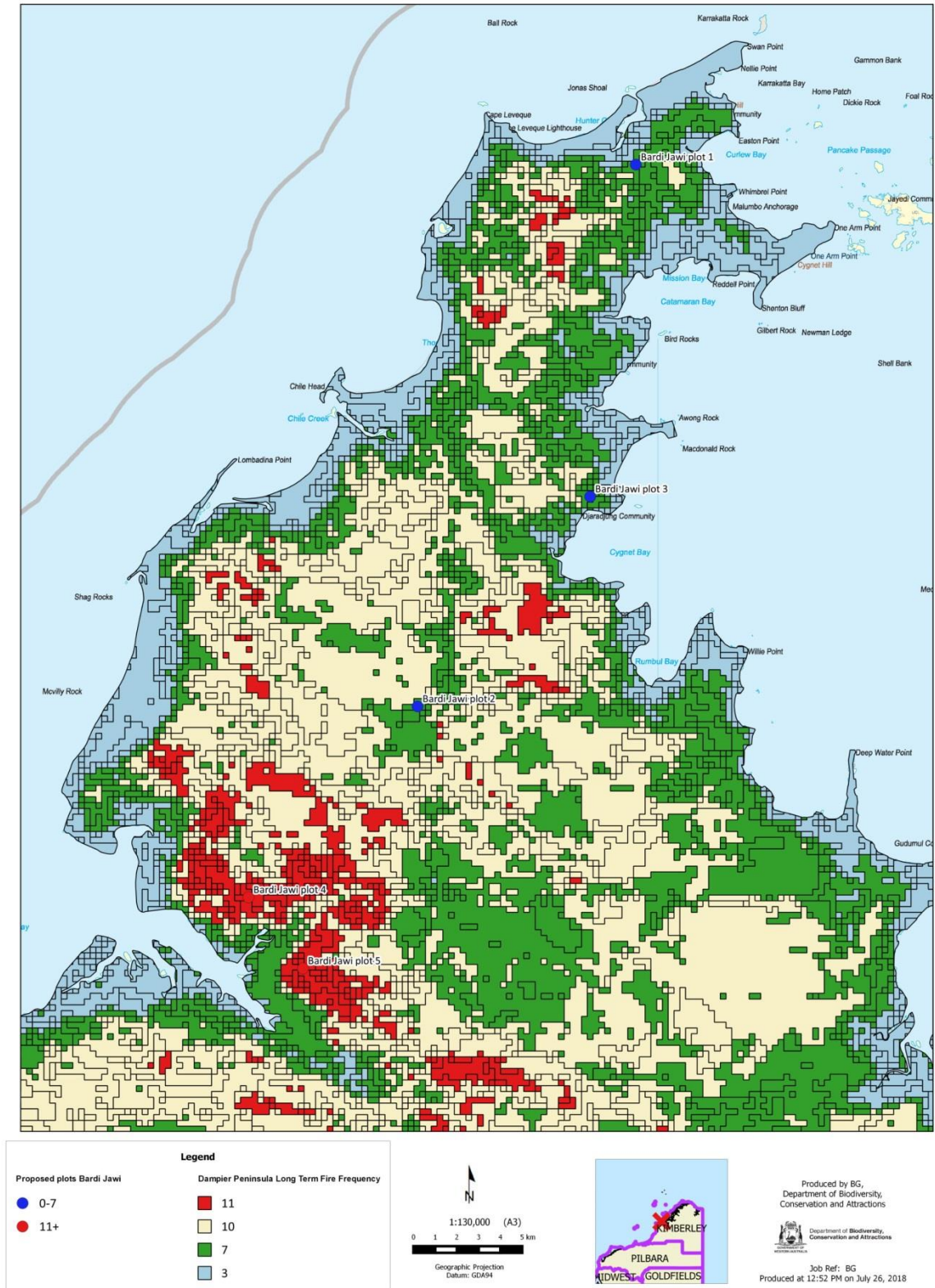
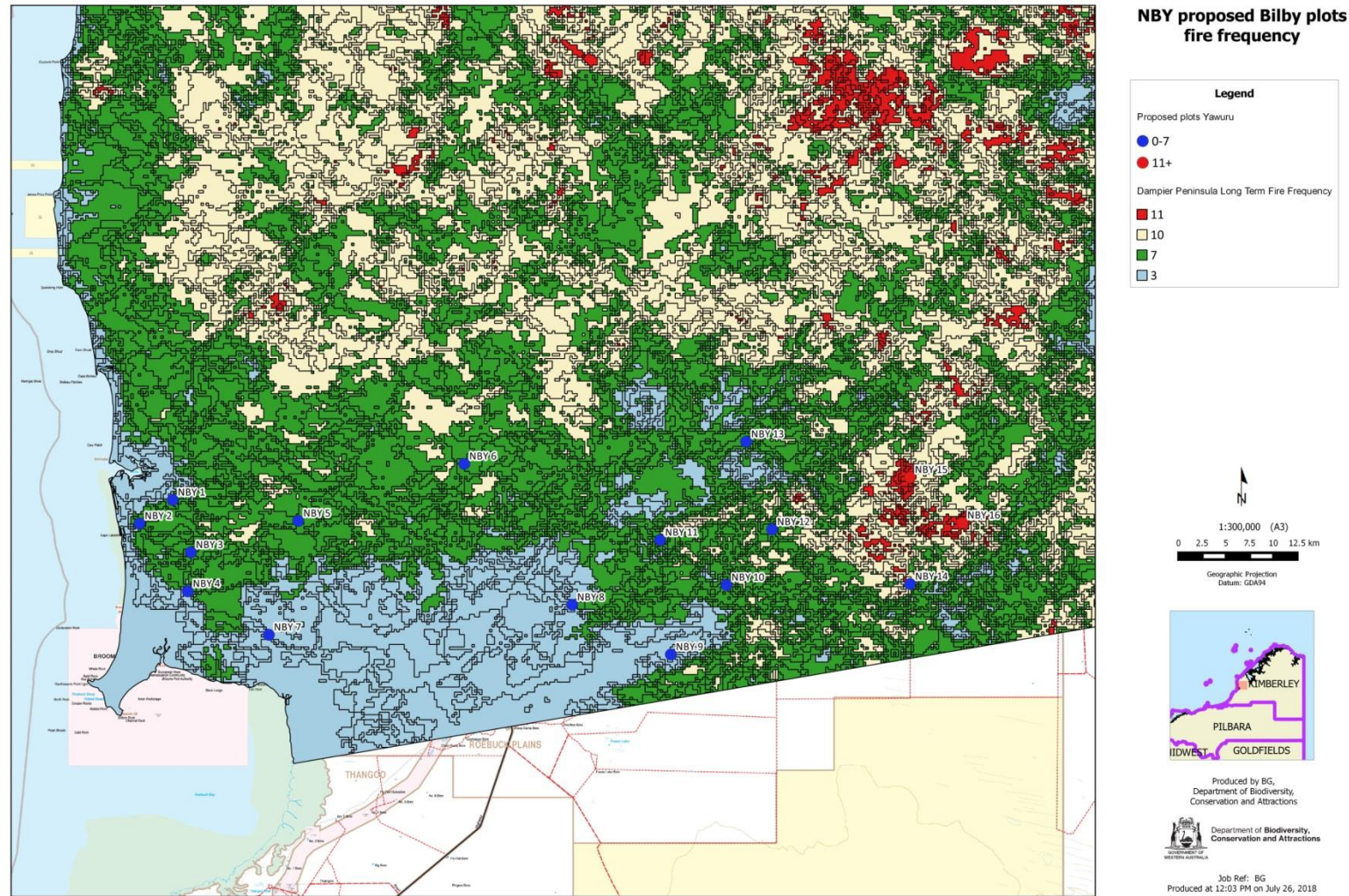


Figure 8. Proposed new plots in the Bardi Jawi sectors.



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Figure 9. Proposed new plots in the Yawuru sectors.

**Nyikina Mangala proposed Bilby plots fire frequency**

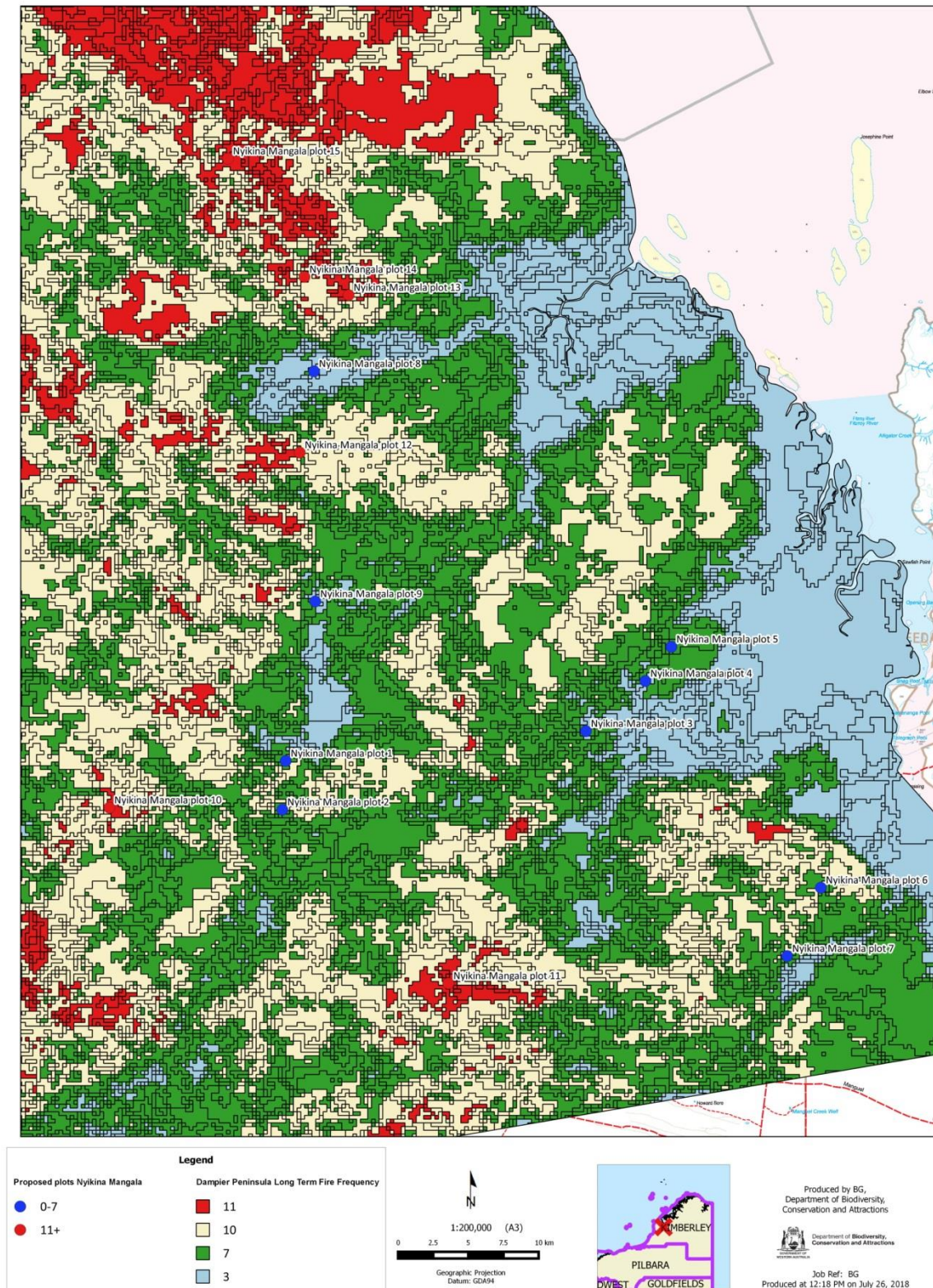
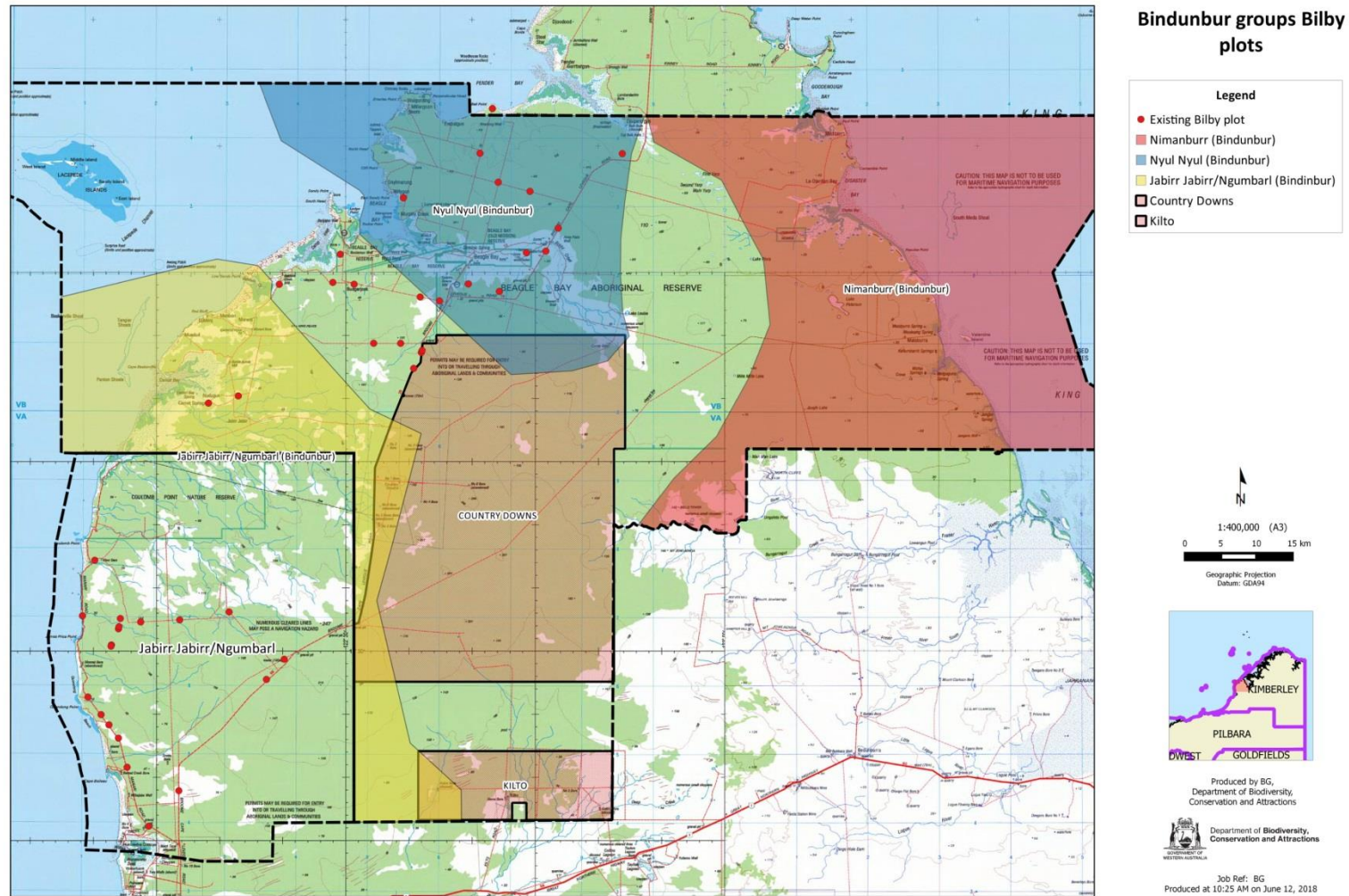


Figure 10. Proposed new plots in the Nyikina Mangala sectors.



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Figure 11. Proposed new plots in the Bindunbur Groups' sectors.

## 4 Presentation at the 12th International Mammalogical Congress

Traditional Owner Rangers together with Department of Biodiversity, Conservation and Attractions staff delivered a presentation titled: “Partnering indigenous biocultural knowledge and science: research and management of the threatened greater bilby on the Dampier Peninsula in the north-west of Australia” to the 12th International Mammalogical Congress held in Perth, July 2017. The presentation described the design, implementation and preliminary results of the Dampier Peninsula greater bilby research project. The abstract is attached in Appendix 4.

## 5 Ongoing work

The following ongoing work is planned to continue in 2018 and beyond:

- Continue collation of bilby records from internal and external sources.
- Continue sign plot surveys with Ranger Groups, implementing the improved occupancy survey design.
- Finalise selection of bilby populations with Ranger Groups (and pastoral stations where appropriate) for detailed population monitoring and commence fieldwork.
- Commence and continue liaison with relevant groups (Nyul Nyul, Bindinbur, Jabirr Jabirr and Jowlaenga) for either undertaking or granting permission to undertake remaining plot surveys.
- Resolve access issue with Country Downs Station
- Consolidation and storage of all sign plot data on the online newly implemented BIOSYS.
- Initiate design and costing of potential management activities to secure populations of bilby on the Peninsula.

## Acknowledgments

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Rangelands NRM

WWF

Environs Kimberley

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Main Roads Western Australia

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# Appendices

## Appendix 1

### Project information sheet



**The Dampier Peninsula in northwest Western Australia is a stronghold of the greater bilby (*Macrotis lagotis*). This is despite the lesser bilby becoming extinct, and the greater bilby disappearing from at least 80 percent of its former range across Australia with an ongoing northward decline. The greater bilby is now listed as Vulnerable both in WA and under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*. As part of the Cape Leveque Road upgrade, in 2016 Main Roads WA provided offset funding to undertake a three year project to survey, monitor and commence adaptive management of threats to bilby populations across the Peninsula.**

Coordinated by the Department of Biodiversity, Conservation and Attractions, this project will help fulfil a primary objective of the current interim bilby recovery plan (Bradley *et al.* 2015) and identified management priorities (Cramer *et al.* 2016). This is to retain/maintain the naturally-occurring distribution and genetic diversity of the bilby through understanding populations at the margin of the species' range on the Dampier Peninsula, gaining information on threats to populations and cost-effective strategies that can be implemented to manage threats.

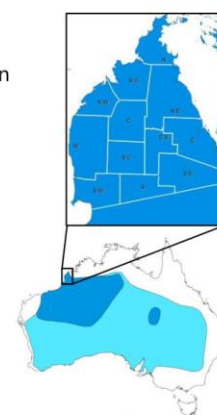
#### Project objective

**To monitor the occupancy and abundance of bilbies as well as key threatening processes on the Dampier Peninsula, while initiating on-ground actions to reduce the impacts from key threatening processes.**

#### Aims and methods

- *Define the area of occupancy* through an array of a minimum of 180 sign plot surveys and supplementary Remotely Piloted Aircraft (RPA) surveys across 12 sectors on the Peninsula;
- *Population monitoring* – four core populations monitored annually, involving genotyping individuals from scats collected along transects to measure abundance, occupancy from sign plots, predator occupancy from remote cameras, data on food resources, stock grazing pressure, introduced predators and fire regimes and
- *Management of threats* – priority management activities including managing fire and stock grazing implemented.

The project will employ Traditional Owners and Ranger Groups including Nyul Nyul, Yawuru, Bardi Jawi, Goolarabooloo, Jabirr Jabirr, Nimanburr and Nyikina Mangala on a fee-for-service basis. Best practice bilby survey and data collection methods will be used with Indigenous Biocultural Knowledge. The project will collaborate with WWF, Environs Kimberley and Rangelands NRM to contribute to the broader Kimberley Bilby Project.



Past and present distribution of the greater bilby in Australia and survey sectors on the Dampier Peninsula

#### Contacts

Parks and Wildlife: Martin Dziminski, (08) 9405 5120, [martin.dziminski@dbca.wa.gov.au](mailto:martin.dziminski@dbca.wa.gov.au), Bruce Greatwich, 111 Herbert St Broome, (08) 9195 5500, [bruce.greatwich@dbca.wa.gov.au](mailto:bruce.greatwich@dbca.wa.gov.au)



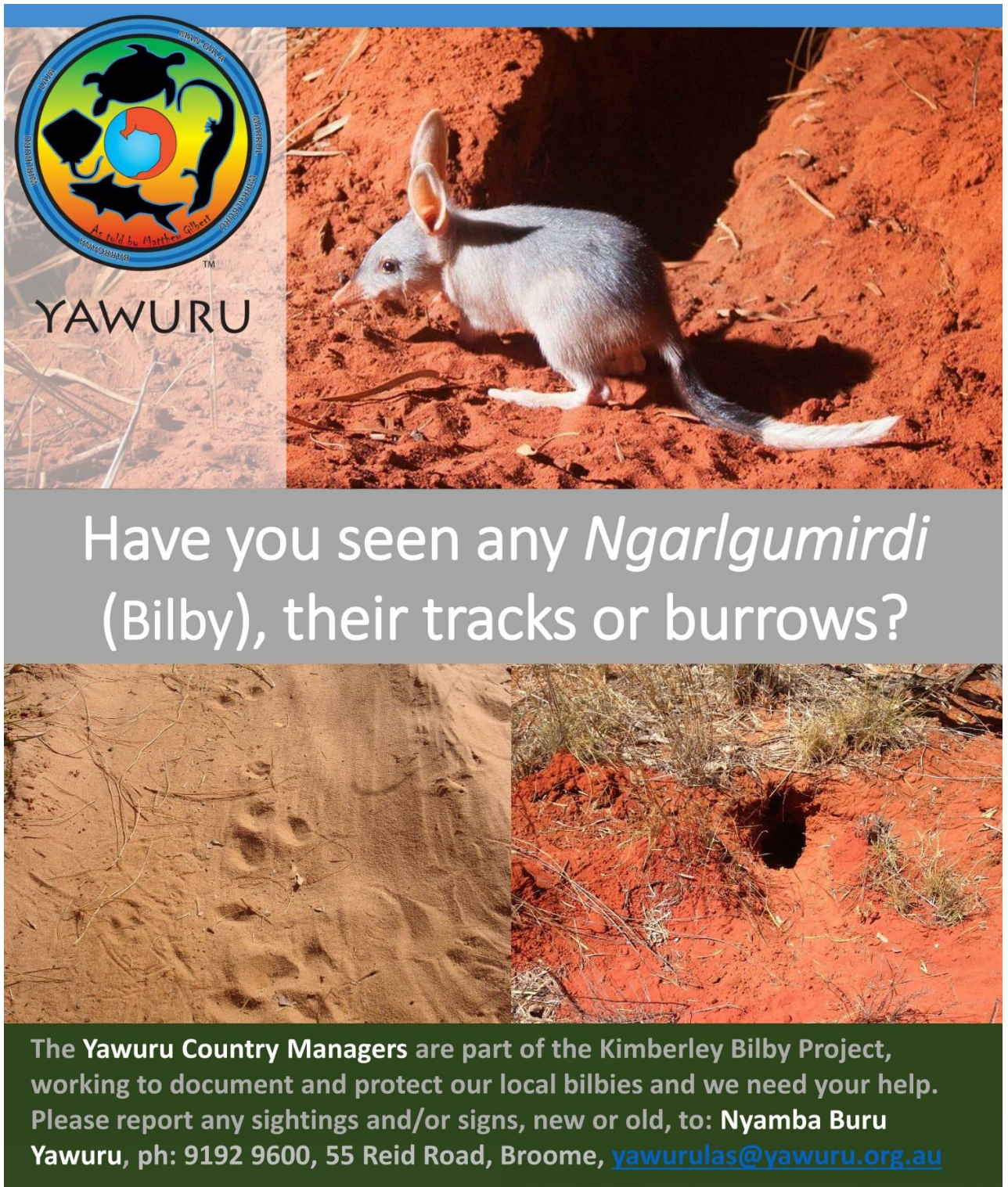
Department of Biodiversity, Conservation and Attractions



Bradley, K., Lees, C., Lundie-Jenkins, G., Copley, P., Paltridge, R., Dziminski, M., Southgate, R., Nally, S., Kemp, L. (2015) *2015 Greater Bilby Conservation Summit and Interim Conservation Plan: an Initiative of the Save the Bilby Fund*. IUCN SSC Conservation Breeding Specialist Group, Apple Valley, MN.  
 Cramer, V. A., Dziminski, M. A., Southgate, R., Carpenter, F., Ellis, R. J., van Leeuwen, S. (2016) A conceptual framework for habitat use and research priorities for the greater bilby (*Macrotis lagotis*) in the north of Western Australia. *Aust. Mammal.*

## Appendix 2

### Bilby awareness and sightings posters for Ranger Groups.



Have you seen any *Ngarlgumirdi* (Bilby), their tracks or burrows?

The Yawuru Country Managers are part of the Kimberley Bilby Project, working to document and protect our local bilbies and we need your help. Please report any sightings and/or signs, new or old, to: Nyamba Buru Yawuru, ph: 9192 9600, 55 Reid Road, Broome, [yawurulas@yawuru.org.au](mailto:yawurulas@yawuru.org.au)



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Images: Damian Kelly and Environs Kimberley



Have you seen any *Mangaban* (Bilby), their tracks or burrows?



The Nyul Nyul Rangers are part of the Kimberley Bilby Project, working to document and protect our local bilbies and we need your help. Please report any sightings and/or signs, new or old, to: Nyul Nyul Rangers ph: 9192 4051, Beagle Bay [nyulnyulrangers@klc.org.au](mailto:nyulnyulrangers@klc.org.au).



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Images: Damian Kelly and Environs Kimberley



Have you seen any *Jidardu* (Bilby),  
their tracks or burrows?



The Nyikina Mangala Rangers are part of the Kimberley Bilby Project, working to document and protect our local bilbies and we need your help. Please report any sightings and/or signs, new or old, to: Nyikina Mangala Rangers [nyikinamangalarangers@klc.org.au](mailto:nyikinamangalarangers@klc.org.au) Jarlmadangah.



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Images: Damian Kelly and Environs Kimberley



Have you seen any Bilby, their tracks or burrows?



The Bardi Jawi Rangers are part of the Kimberley Bilby Project, working to document and protect our local bilbies and we need your help. Please report any sightings and/or signs, new or old, to: Bardi Jawi Rangers ph: 9192 4047, One Arm Point, bardijawirangers@klc.org.au.



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Images: Damian Kelly and Environs Kimberley

# Appendix 3

## Updated sign plot paper data sheet



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### 2HA SIGN PLOT DATASHEET v1.4 FOR OCCUPANCY SURVEYS



**1. RECORD LOCATION AT THE START**

Site Name/Location/Plot ID \_\_\_\_\_

GPS:Lat/Easting \_\_\_\_\_ Long/Northing \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

Ranger group \_\_\_\_\_ Time started \_\_\_\_\_ Time finished \_\_\_\_\_

Team members \_\_\_\_\_

**2. TEAM SPLIT UP EVENLY AND WALK A 2HA AREA FOR APPROXIMATELY 20 MINUTES**  
(Approximately 200m x 100m area)

**3. INSPECT 100M OF THE ROAD FOR SIGN** (ensure to tick “on road” for this sign)

**4. RECORD ANIMAL DATA** (tick boxes in table below ✓)

**5. RECORD AGE OF SIGNS AT END OF WALKING 2 HA PLOT** (1,2 or 3 in last column below)

**Age of Sign:** 1. Fresh 1-2 days old 2. Older, 3 days to 1 week 3. In hard mud/substrate or >1week

Species (add if not listed) <small>All species prelisted</small>	Tracks	Scats	Burrow	Digging	Digging into roots of plants	Tracks or sign on road	Other (eg sighting, remains, nest, resting place etc – add)	Juveniles present?	Age of most recent sign (1,2,3)
Bilby									
Bandicoot									
Bettong									
Dingo									
Echidna									
Euro									
Hopping mouse									
Kangaroo Red									
Kangaroo unknown									
Kangaroo W Grey									
Large rat									
Marsupial mole									
Mouse / Small Rodent / Dunnart									
Mulgara/Ampurta									
Possum									
Quoll									
Wallaby Agile									
Wallaby Hare									
Wallaby - Northern Nailtail									
Wallaby - Spectacled Hare									
Wallaby - unknown									
Lizard - Blue tongue									
Lizard - Goanna large									
Lizard - Goanna small									
Lizard - Great Desert Skink									
Lizard - Medium									
Lizard - Small									
Lizard - Thorny devil									
Sand slider (Lerista)									
Snake - other									
Snake - Python									
Bird - Curlew									



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**2HA SIGN PLOT DATASHEET v1.4**  
FOR OCCUPANCY SURVEYS



Species (add if not listed) All species prelisted	Tracks	Scats	Burrow	Digging	Digging into roots of plants	Tracks or sign on road	Other (eg sighting, remains, nest, resting place etc – add)	Juveniles present?	Age of most recent sign (1,2,3)
Bird - Emu									
Bird - Hopping									
Bird - Quail									
Bird - Turkey (Bustard)									
Bird - Walking									
Insect									
Other									
Cat									
Camel									
Cow									
Donkey									
Fox									
Goat									
Horse									
Pig									
Rabbit									

**6. WHEN FINISHED WALKING RECORD THE FOLLOWING**

**Plot type**

- Random                       Targeted at habitat                       Known location of target species

**Plot sequence**

- First time                       Repeat survey                       Unknown

**Landform type**

- Drainage line                       Dune or dunes                       Other (type in below)  
 Salt lake system                       Hill or higher area  
 Plain (flat low ground)

**Soil type (substrate)**

- Sand                       Soil/clay                       Gravel

**Vegetation structure**

- Shrubland                       Open woodland                       Dense woodland                       Open grassland

**Vegetation thickness**

- Open (easy to walk through)                       Thick (very hard to walk through)

If there are bilby diggings into roots what plants are they? \_\_\_\_\_

**What percentage of the plot is suitable for tracking (eg sand or dirt)?**

- To ¼ (0-25%)                       To ½ (25-50%)                       To ¾ (50-75%)                       Up to all (75-100%)



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**2HA SIGN PLOT DATASHEET v1.4**  
**FOR OCCUPANCY SURVEYS**



**How big are the majority of the sand patches?**

less than 1m in width     1-3 m in width     more than 3 m in width     No sand patches

**Shadow (look at own shadow)**

Distinct shadow     Slight shadow     No shadow

**Time since rain that would clear animal tracks**  
(enter number)

Days     Weeks     Months

**Time since strong wind that would clear animal tracks**  
(enter number)

Days     Weeks     Months

**Time since burnt (if known)**

<1 month     <1 year     >1 year

Photos of habitat taken? Y / N (if yes –list photo file names) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[OPTIONAL] If bilby burrows are found GPS the location of each one:**

GPS Location (lat, long)	Any notes - location (e.g under log or tree), sensor camera number if placed

**Any other comment/ notes:**

**Please submit datasheets to:**  
Department of Biodiversity, Conservation and Attractions - [threatenedfauna@dbca.wa.gov.au](mailto:threatenedfauna@dbca.wa.gov.au), Woodvale Wildlife Research Centre, Bilby Research, Locked Bag 104 Bentley Delivery Centre WA 6983. (08) 9405 5105

**Acknowledgements:** WWF and Environs Kimberley assisted in producing the initial version of this template.



## Appendix 4

### Abstract of the presentation delivered to the 12<sup>th</sup> International Mammalogical Congress held in Perth, July 2017.



#### **Partnering indigenous biocultural knowledge and science: research and management of the threatened greater bilby on the Dampier Peninsula in the north-west of Australia**

Jacob Smith, Johani Mamid, Eduardo Maher, Albert Wiggan, Zynal Cox, Karen Bettink, Martin Dziminski and Stephen van Leeuwen

The greater bilby (*Macrotis lagotis*) is an ecologically and culturally important marsupial that has disappeared from at least 80 percent of its former range. In the extreme northwest of this range, the Dampier Peninsula (approximately 1.6 million ha) represents a stronghold for bilby populations, where like many remaining wild bilby populations elsewhere, largely occur on Aboriginal owned and managed lands and on pastoral leases. The pindan woodland habitat on the Dampier Peninsula is very different to other localities where wild bilby populations are still found. The Western Australian Department of Biodiversity, Conservation and Attractions, together with Indigenous Ranger organisations have initiated research to determine the status of bilbies and their threats on the peninsula, and to implement and determine the effects of management on bilby populations. The occupancy survey of bilbies commenced in late 2016 using a standardised sign plot tracking technique that also provides data on the occupancy of predators and herbivores, such as domestic and unmanaged stock, as well as habitat variables. Significant populations and threats will be identified during the occupancy survey, monitoring of key populations will be undertaken, and threat management will be initiated. The activities will be undertaken in partnership with Indigenous Rangers. Study outcomes will guide future management strategies to ensure the persistence of wild populations and in so doing reinforces the benefits and importance of engaging Indigenous Rangers and capturing Indigenous Biocultural Knowledge in research programs and management activities for threatened mammal species. Preliminary results from the occupancy survey will be presented.