

CARRAPATEENA

EPBC 2017/7895 Compliance Report 2022

Issue Date: March 2023



*Environment Protection and Biodiversity
Conservation Act 1999 (Cth)*

ACKNOWLEDGEMENTS

Acknowledgements go to all staff across the Carrapateena Operations for their contributions to the overall report and for undertaking all activities in a safe and effective manner. We also acknowledge the Kokatha People for their ongoing support and assistance provided at Carrapateena.

DOCUMENT CONTROL

CA-0000-ENV-REP-1033

Version	Description	Author	Approval	Date
1	EPBC 2017/7895 2022 Compliance Report	Josh Allen Senior Advisor – Environment	Matthew Kidner Manager – Safety, Health, Hygiene, Environment, Approvals & Social Performance	31/03/23

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EXECUTIVE SUMMARY

OZ Minerals submits this Compliance Report for the period January 2022 to December 2022; as required by the Conditions of Approval attached to EPBC 2017/7895 authorised under the *Environment Protection and Biodiversity Conservation Act, 1999* (Cth).

This Compliance Report has been prepared in accordance with the Annual Compliance Report Guidelines (DOE, 2014) and demonstrates compliance with the Conditions of Approval associated with EPBC 2017/7895.

1 INTRODUCTION

OZ Minerals Carrapateena Pty Ltd and OZM Carrapateena Pty Ltd (collectively referred to as OZ Minerals) are developing the Carrapateena mine located approximately 160 km north of Port Augusta, South Australia (Figure 1.1).

OZ Minerals submitted a Referral under the *Environment Protection and Biodiversity Conservation, Act 1999* (Cth) (EPBC Act) for Carrapateena in March 2017. The Carrapateena Operation (EPBC 2017/7895) was determined to be a Controlled Action in April 2017, to be approved via the *Mining Act, 1971* (SA) approvals process, in accordance with the Assessment Bilateral Agreement between the Government of South Australia and the Commonwealth of Australia. OZ Minerals submitted a Mining Lease Proposal (MLP) and Miscellaneous Purposes Licence (MPL) Management Plans (collectively referred to as the MLP) on 26 May 2017 (OZ Minerals, 2017a) to support applications for a Mining Lease and three MPLs as shown in Figure 1.1. An associated Response Document was submitted on 22 September 2017 (OZ Minerals, 2017b).

OZ Minerals received formal notification of the granting of the tenements ML 6471, MPL 152, MPL 153, MPL 154 on 3 January 2018 and MPL 156 was granted 11 December 2018. Subsequently, approval of Carrapateena under the EPBC Act was received on 29 March 2018, subject to Conditions of Approval; a variation of conditions was approved on 14 December 2018. The associated Program for Environment Protection and Rehabilitation (PEPR) for the tenements (OZ Minerals, 2018) was subsequently approved on 29 March 2018.

In November 2020, a consolidated PEPR was granted approval encompassing activities across all Carrapateena tenements (ML 6471, MPL 152, MPL 153, MPL 154 and MPL 156) (OZ Minerals, 2020).

OZ Minerals submits this Compliance Report as required by the Conditions of Approval EPBC 2017/7895.

Activities associated with Advanced Exploration, including the Airstrip, Workers' Accommodation Village, Access Road and Ancillary Infrastructure were referred as a component of EPBC 2012/6494 and determined to not be controlled actions and thus are outside the scope of this Compliance Report.

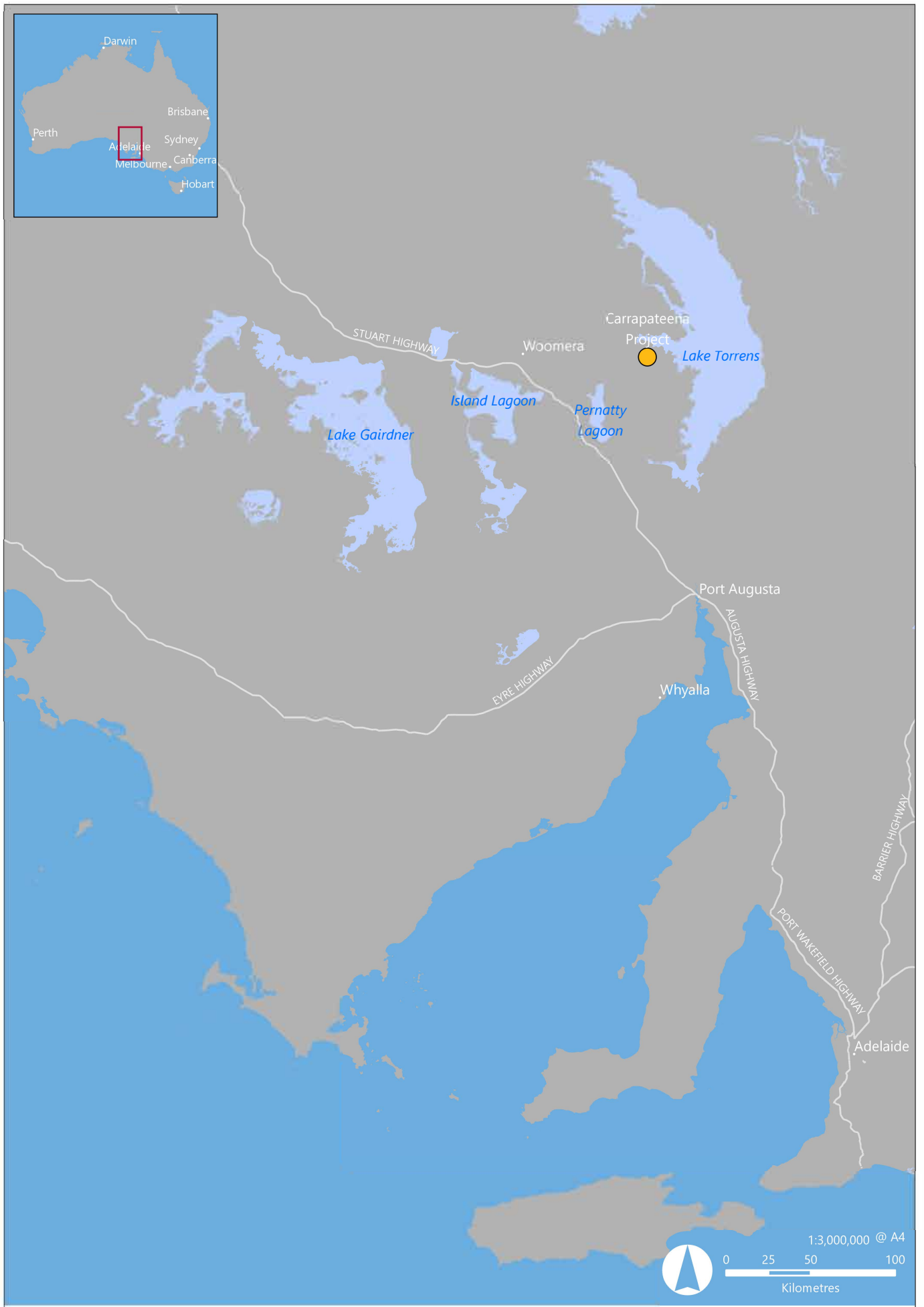



Figure 1-1: Operation Location

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2 DECLARATION OF ACCURACY

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this Compliance Report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Name	Position or Agent	Organisation	Signature	Date
Elton Peebles	General Manager – Carrapateena Province	OZ Minerals Carrapateena Pty Ltd, ACN 149 626 255 (42%) and OZM Carrapateena Pty Ltd, ACN 007 756 443 (58%)		31 March 2023

3 KEY ACTIVITY INFORMATION

Key information related to the activity as approved under EPBC 2017/7895 are summarised in Table 3.1.

Table 3.1: Key Activity Information

Operation Name	Carrapateena	EPBC Number	2017/7895
Approval Holder	OZ Minerals Carrapateena Pty Ltd (42%) and OZM Carrapateena Pty Ltd (58%)		
Australian Company Number	149 626 255 and 007 756 443, respectively		
Approved Action	To construct and operate an underground sub-level caving mine, processing facility and associated support infrastructure, 65 km east of Woomera, SA (refer to EPBC referral 2017/7895 and variation received 14 December 2018)		
Operation Location	Located approximately 160 km north of Port Augusta. Nearby townships include Woomera (approximately 45 km west) and Roxby Downs (approximately 44 km north-west). Refer to Figure 1.1.		
Site Contact	Elton Peebles, General Manager, Carrapateena Province		
Address	2 Hamra Drive	City (Postcode)	Adelaide Airport (5950)
Telephone	08 8422 3713	Email	Elton.peebles@ozminerals.com
Reporting Period	01 January 2022 to 31 December 2022		

4 ACTIVITIES UNDERTAKEN DURING THE REPORTING PERIOD

OZ Minerals submits this EPBC 2017/7895 Compliance Report for the Carrapateena Mining Lease (ML 6471) and associated Miscellaneous Purposes Licences (MPL 149, MPL 152, MPL 153 and MPL 154) for the reporting period of 1 January 2022 to 31 December 2022.

Following disruption to on-ground activity in 2020 due to Covid-19, Nature Foundation SA, acting on behalf of OZ Minerals, initiated a program of land management on the South Gap Offset in CY21. The work program was dictated by the management goals of the offset, which include:

- Establish baseline conditions, including the distribution and condition of Plains Mouse habitat, the presence and distribution of target species, and the identification and prioritisation of local threats
- Refine the presence, distribution and abundance of Plains Mouse within the offset
- Manage total predation pressure (from Cats, Foxes and Wild Dogs)
- Maintain and/or enhance the condition of habitat for the benefit of Plain Mouse, through the management of total grazing pressure and invasive weeds
- Improve knowledge of local target species populations including how they respond to management locally.

Details of the activities undertaken during the reporting period are described in Table 4.1.

A copy of the South Gap EPBC Offset Annual Report is provided as Appendix A.

Table 4.1: Activities Undertaken During the Reporting Period

Management Goal	Activities Undertaken
Monitor the state of vegetation	Weed assessments Flora surveys using the rangeland assessment method (RAM) Jessup transects to measure habitat structure Re-sampling of shrub health to assess recovery rates from 2018 – 2020 drought.
Refine the presence, distribution and abundance of plains mouse within the offset	Baited motion camera program across twelve (12) sites Incidental surveys for other bird and reptile species
Reduce predation pressure	Two feral eradication campaigns in May and November (spotlight shooting) Predator monitoring with motion cameras
Reduce total grazing pressure	Maintain stock exclusion boundary fence Motion camera program including at a core goat habitat location Rabbit monitoring and warren fumigation Maintain a sustainable population of Kangaroo within the offset to reduce impact – thermal cameras used in conjunction with a point-based survey methodology
Improve knowledge of local target species populations including how they respond to management locally	Collection of spatial data on the spread of all vegetation communities across the offset Property-wide monitoring using remote camera traps for Plains Mouse, feral animals and kangaroos to enable sufficient data for a food-web analysis

Baited motion camera trapping efforts culminated in twenty-six confirmed Plains Mouse sightings at eight of the ten sites, confirming population presence within the offset area. Details of the sightings were submitted to the Biological Databases of South Australia in March 2023.

Figure 4.1 shows the current disturbance footprint for activities subject to the action.

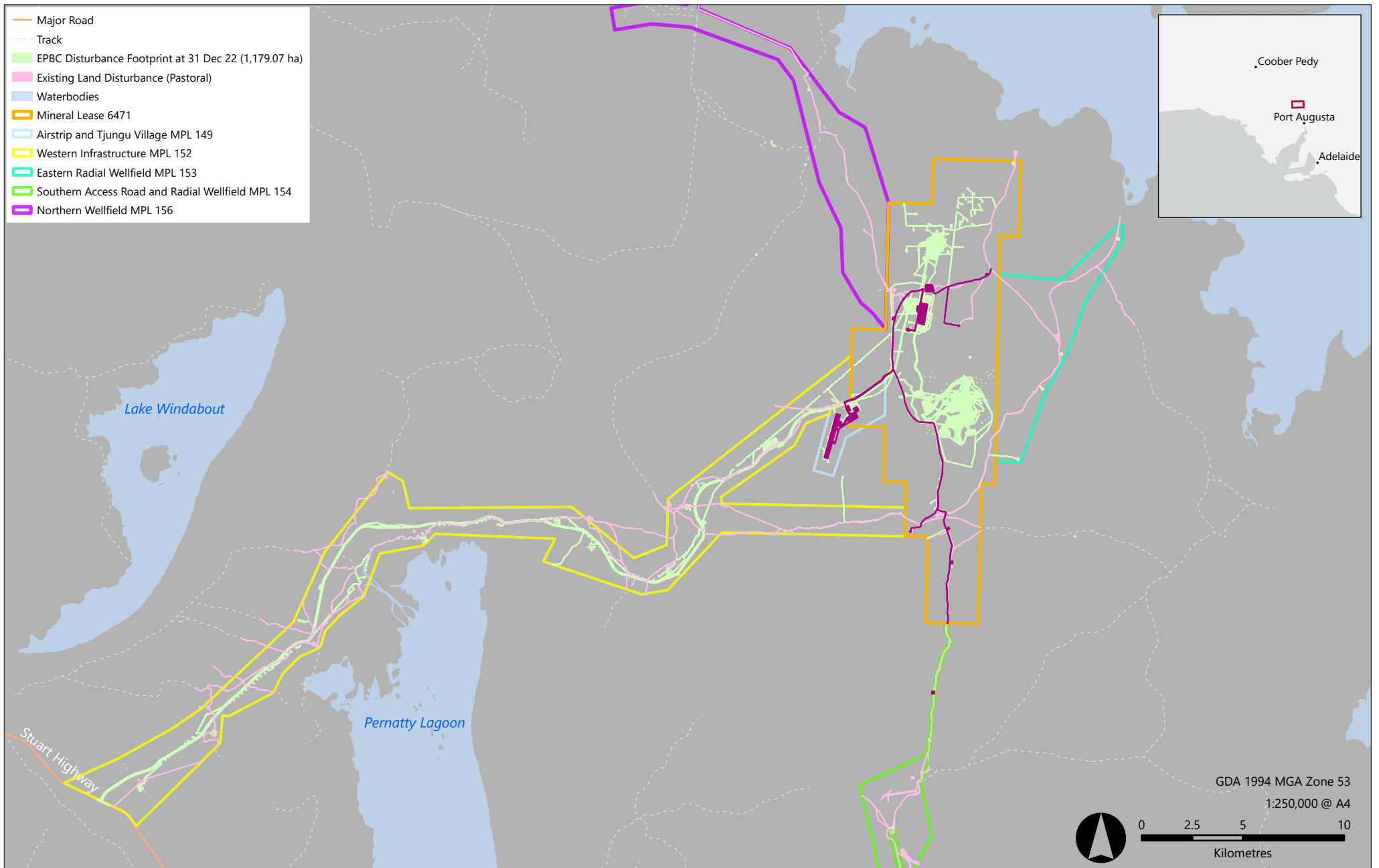


Figure 4.1: EPBC Disturbance Footprint (December 2022)

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5 EPBC ACT APPROVAL CONDITIONS AND COMPLIANCE STATUS

The Conditions of Approval associated with EPBC 2017/7895 are detailed in Table 5.1, together with clear statements regarding the status of compliance with the Conditions of Approval. Where necessary, statements regarding compliance are supported by a summary of evidence clearly demonstrating the conclusion that compliance with the condition was (or was not) fully met.

Table 5.1: EPBC Act Approval Conditions and Compliance Status

Condition number	Condition	Compliance Status	Evidence demonstrating compliance with condition
1	To manage the impacts of the action on the environment, the person taking the action must implement the conditions of the SA approval.	Compliant	The Compliance Report associated with the granting of the Carrapateena Tenements under the <i>Mining Act 1971</i> (SA) was submitted to the Department for Energy and Mining (SA) on 31 March 2023 indicating compliance with the conditions of the SA approval. This Compliance Report will be publicly available on the DEM website at: http://www.energymining.sa.gov.au/minerals/mining/mines_and_quarries/carrapateena
2	The person taking the action must not impact more than 1,740 hectares of Plains Rat habitat within the disturbance footprint.	Compliant	Total disturbance since the commencement of the referred action is 1,496.4 ha, including 203.63 ha of Plains Rat habitat, as shown in Figure 5.1.
3	Prior to commencement of the action, to compensate for residual impacts to the Plains Rat, the person taking the action must acquire an offset property which must contain: <ul style="list-style-type: none"> a. a population of the Plains Rat b. no less than 1,740 hectares of Plains Rat habitat c. habitat quality equal to that of the Plains Rat habitat within the disturbance footprint. 	Compliant	Following on from an "Agreement to Underlease" (CA-APR-AGR-1037) with the Pastoral Lessee of South Gap Pastoral Station two offset areas, OZ Minerals has established two individual Underlease Agreements, one for each offset area, securing a total of 3,251 ha of suitable Plains Rat habitat (Northern Offset Underlease Agreement 1,882 ha and Southern Offset Underlease Agreement 1,369 ha (CA-APR-LET-1178). The Underlease Agreements have a 10-year expiry term, with successive Agreements to be established totalling the required duration as per the approval conditions. The offset areas consist of Arcoona Tablelands habitat that is similar in quality and structure to the land disturbed at Carrapateena and are considered to represent equally viable Plains Rat habitat. Historical observations of Plains Rats have been recorded nearby the northern offset, and within the same stretch of continuous tablelands habitat connecting disturbed Plains Rat habitat at Carrapateena, to the offset areas on South Gap Station.
4	The person taking the action must maintain or improve the habitat quality of the existing Plains Rat habitat at the acquired offset property for the life of this approval.	Compliant	OZ Minerals has developed Environmental Offset Management Plan (CA-0000-ENV-PLN-1004) which aims to: <ul style="list-style-type: none"> • Monitor the state of vegetation • Refine the presence, distribution, and abundance of plains mouse within the offset • Reduce predation pressure (fox, cat, wild dog/dingo) • Reduce total grazing pressure (sheep, goats) • Improve knowledge of local target species populations including how they respond to management locally The Plan presents 14 individual objectives grouped under 11 management strategies to address EPBC Act offset liability, and associated legislative and policy obligations, for the first 10-year period of management.
5	Within 2 years from commencement of the action, the person taking the action must change the tenure of the offset property for conservation purposes using an appropriate legal mechanism for long term protection.	Compliant	Underlease agreements signed, executed and back-dated to 21 April 2020 (2 years from the commencement of the action) for the Northern Offset Area and the Southern Offset Area. The areas have been officially registered with the Lands Titles Office; two registrations as associated with each offset area. The Agreements to Underlease clearly define that the areas are to be set aside for environmental purposes. The change in land use will apply for 10 years, after which the change in land use will need to be renewed (Permission granted from the Commonwealth to manage as rolling terms to achieve the total required tenure).
6	Prior to the commencement of the action, the person taking the action must engage a suitably qualified expert to undertake a Night Parrot survey within the development envelope. The Night Parrot survey must be undertaken in accordance with the EPBC Act Night Parrot survey guidelines. Within three months of the Night Parrot survey being completed, the person taking the action must provide the Department with the Night Parrot survey results.	Compliant	OZ Minerals completed a targeted Threatened Species Survey for Night Parrot in March 2018 (CA-ENV-REP-1040). There were no Night Parrots or evidence of Night Parrots detected during the survey. The results of the survey were forwarded to the Australian Government Department of the Environment and Energy (DoEE) in April 2018 (DOE: CA-APR-EML-1077). Night Parrot has not been reconfirmed as locally extinct within South Australia.
7	Should the Night Parrot or evidence of the Night Parrot be recorded during the survey, the person taking the action must submit for the Minister's approval, a Night Parrot Management Plan that must include: <ul style="list-style-type: none"> a. Details of the Night Parrot survey results, including the methodology, timing and area surveyed. b. An assessment of the impacts to the Night Parrot that will result from the action. c. Management actions that will avoid, minimise and/or offset both the immediate and long-term impacts of the action on the Night Parrot. d. Monitoring and reporting requirements that demonstrate the management actions are effectively being implemented and achieve the intended results. This should include the frequency, intensity and duration of monitoring. The person taking the action must not commence the action prior to the Minister approving the Night Parrot Management Plan. The approved Night Parrot Management Plan must be implemented.	Not Applicable	The targeted survey (CA-ENV-REP-1040) did not find evidence of the Night Parrot in the Project area. Night Parrot has not been reconfirmed as locally extinct within South Australia.

Condition number	Condition	Compliance Status	Evidence demonstrating compliance with condition
8	Prior to the commencement of the action, the person taking the action must engage a suitably qualified expert to undertake a <i>Frankenia plicata</i> survey within the development envelope. The <i>Frankenia plicata</i> survey must be undertaken in accordance with contemporary survey methods. Within three months of the <i>Frankenia plicata</i> survey being completed, the person taking the action must provide the Department with the <i>Frankenia plicata</i> survey results.	Compliant	OZ Minerals completed a targeted Threatened Species Survey for <i>Frankenia plicata</i> in March 2018 (CA-ENV-REP-1040). <i>Frankenia plicata</i> was not detected during the survey. The results of the survey were forwarded to DoEE in April 2018 (CA-APR-EML-1077). Follow-up work by the engaged consultant uncovered the incorrect classification of locally collected <i>Frankenia</i> samples lodged with the South Australian Herbarium. Consultation with the SA Herbarium coupled with extensive survey work within the Carrapateena tenements and more broadly within the region has failed to detect this species, which is more likely to occur much further north of operations.
9	Should the <i>Frankenia plicata</i> be recorded during the survey, the person taking the action must submit for the Minister's approval, a <i>Frankenia plicata</i> Management Plan that must include: a. Details of the <i>Frankenia plicata</i> survey results, including the methodology, timing and area surveyed. b. An assessment of the impacts to the <i>Frankenia plicata</i> that will result from the action. c. Management actions that will avoid, minimise and/or offset both the immediate and long-term impacts of the action on the <i>Frankenia plicata</i> . d. Monitoring and reporting requirements that demonstrate the management actions are effectively being implemented and achieve the intended results. This should include the frequency, intensity and duration of monitoring. The person taking the action must not commence the action prior to the Minister approving the <i>Frankenia plicata</i> Management Plan. The approved <i>Frankenia plicata</i> Management Plan must be implemented.	Not Applicable	The targeted survey (CA-ENV-REP-1040) did not find evidence of <i>Frankenia plicata</i> in the Project area. Follow-up work by the engaged consultant uncovered the incorrect classification of locally collected <i>Frankenia</i> samples lodged with the South Australian Herbarium
10	Within 3 months following the change of tenure referred to in condition 5) the person taking the action must provide the Department with written evidence that the offset property has been secured for conservation purposes using an appropriate legal mechanism.	Compliant	Written evidence provided to DoEE via letter dated 16 December 2020, signed Andrew Oswald (CA-APR-LET-1178).
11	Within 30 days after the commencement of the action, the person taking the action must advise the Department in writing of the actual date of commencement.	Compliant	OZ Minerals advised DoEE of the commencement of the action on 21 April 2018 (CA-ENV-LET-1001).
12	The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website. The results of audits may also be publicised through the general media.	Compliant	OZ Minerals maintains an Environmental Management System that includes electronic data management systems for document control (InEight), obligations management and land access (Land Folio) and consultation/correspondence (Borealis). Data collected during Carrapateena monitoring is recorded on the site environmental data management system (MonitorPro) or within ArcGIS. Data collected for the environmental offsets on South Gap station will be collected, managed and reported on by a third party engaged to manage the offset (Nature Foundation South Australia) with select information captured back into the Carrapateena systems.
13	Within 30 days after completion of the action, the person taking the action must advise the Department in writing of the actual date of completion and provide a map clearly defining the date, location and actual impact within the Disturbance footprint of the action and be accompanied with a shape file.	Not Applicable	OZ Minerals is currently undertaking the action.
14	The approval holder must prepare a compliance report for each 12-month period following the date of commencement of the action, or as otherwise agreed to in writing by the Minister. The approval holder must: a) publish each compliance report on the website within 60 business days following the relevant 12-month period; b) notify the Department by email that a compliance report has been published on the website within five business days of the date of publication; c) keep all compliance reports publicly available on the website until this approval expires; d) exclude or redact sensitive ecological data from compliance reports published on the website; and e) where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within 5 business days of publication. NOTE: The first compliance report may report a period less than 12 months so that it and subsequent compliance reports align with the similar requirement under state approval.	Compliant	The EPBC 2017/7895 Compliance Report is posted annually in March to the OZ Minerals website where copies of previous Compliance Reports can also be located.
15	Upon the direction of the Minister, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister.	Not Applicable	OZ Minerals has not been directed by the Minister to commission an independent audit of compliance with the conditions of approval associated with EPBC 2017/7895.

Condition number	Condition	Compliance Status	Evidence demonstrating compliance with condition
16	If, at any time after 5 years from the date of this approval, the person taking the action has not commenced the action, then the person taking the action must not commence the action without the written agreement of the Minister.	Not Applicable	OZ Minerals commenced the action in late March 2018, as communicated to DoEE in April 2018 (CA-ENV-LET-1001).
17	The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify: a) the condition which is or may be in breach; and b) a short description of the incident and/or non-compliance.	Compliant	There were no non-compliances with the EPBC 2017/7895 conditions of approval, nor non-compliances with commitments described in any plans required therein during the reporting period. There were no incidents associated with the action during the reporting period that caused, or had the potential to cause, significant impacts to matters of national environmental significance.
18	The approval holder must provide to the Department details of any incident or non-compliance with the conditions or commitments made in plans as soon as practicable and no later than 30 days after becoming aware of the incident or non-compliance, specifying: a) Any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future; b) the potential impacts of the incident or non-compliance; and c) the method and timing of any remedial action that will be undertaken by the approval holder.	Compliant	There were no non-compliances with the EPBC 2017/7895 conditions of approval, nor non-compliances with commitments described in any plans required therein during the reporting period. There were no incidents associated with the action during the reporting period that caused, or had the potential to cause, significant impacts to matters of national environmental significance.

Figure 5.1 shows the current disturbance footprint for activities subject to the action in relation to the Plains Rat habitat.

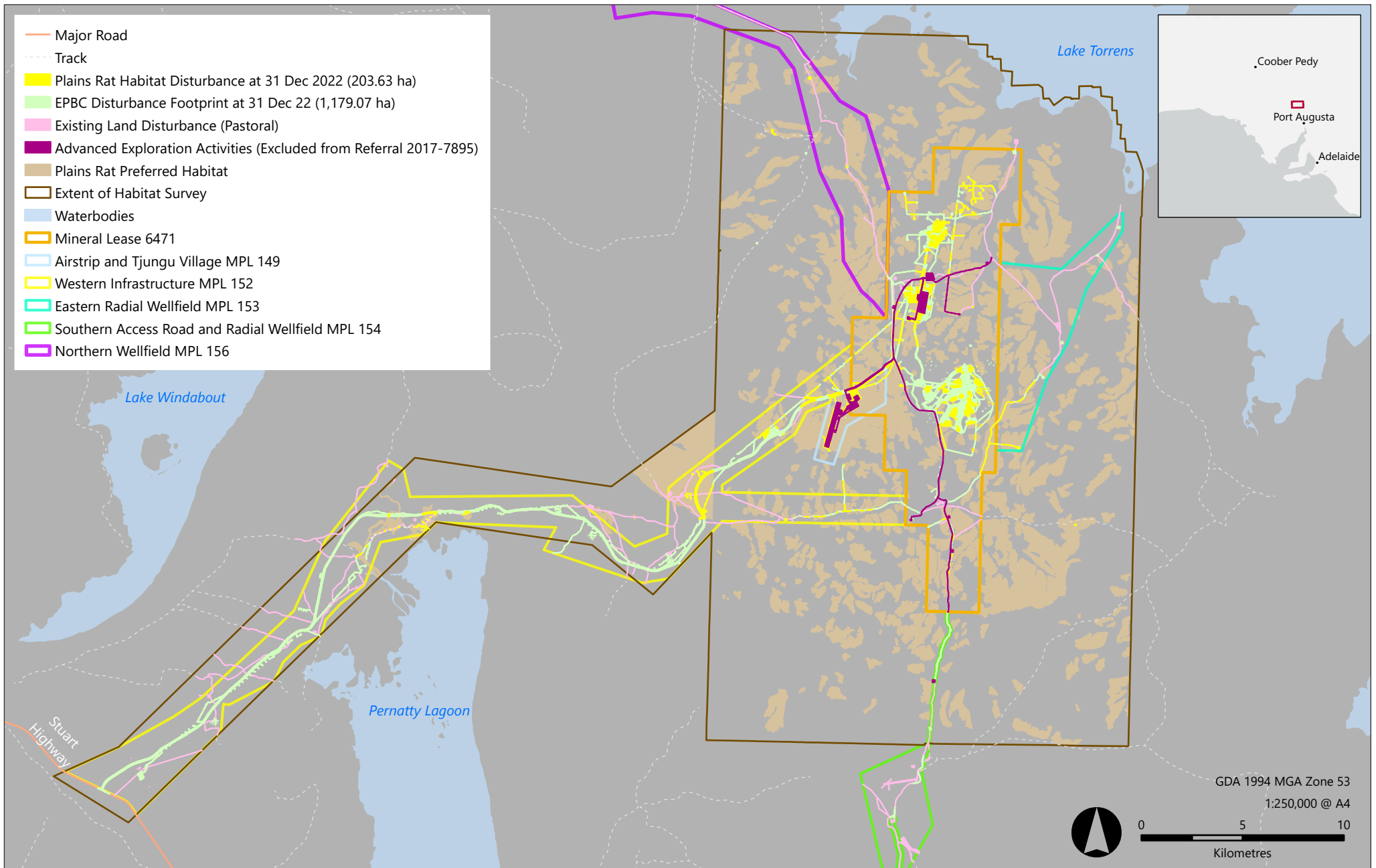


Figure 5.1: Plains Rat (*Pseudomys australis*) Habitat Disturbance at 31 December 2022

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6 CORRECTIVE ACTIONS

There were no non-compliances with the Conditions of Approval during the reporting period.

There were no corrective actions carried over from previous reporting periods, and therefore no assessment of the effectiveness of the corrective actions was required.

7 NEW ENVIRONMENTAL RISKS

There were no new environmental risks that were identified during the reporting period, and subsequently no risk analysis is presented.

8 REFERENCES

DoE. 2014. *Annual Compliance Report Guidelines. Environment Protection and Biodiversity Conservation Act 1999 – Guidelines*. Commonwealth of Australia 2014. Australian Government – Department of the Environment. Canberra.

OZ Minerals. 2017a. *Carrapateena Project Mining Lease Proposal and Miscellaneous Licence Purposes Management Plans*. 26 May 2017. Version A. CA-MIN-PPL-1001. Adelaide.

OZ Minerals. 2017b. *Carrapateena Project Mining Lease Proposal and Miscellaneous Licence Purposes Management Plans Response Document*. 22 September 2017. Version A. CA-MIN-PPL-1004. Adelaide.

OZ Minerals. 2018. *Carrapateena Project Program for Environment Protection and Rehabilitation, ML 6471 Mineral Lease, MPL 152 Western Infrastructure Corridor, MPL 153 Eastern Radial Wellfield, MPL 154 Southern Access Road and Radial Wellfield*. Version A. CA-ENV-REP-1035. March 2018. Adelaide.

OZ Minerals, 2019. *Carrapateena Project Program for Environment Protection and Rehabilitation, ML 6471 Mineral Lease, MPL 152 Western Infrastructure Corridor, MPL 153 Eastern Radial Wellfield, MPL 154 Southern Access Road and Radial Wellfield and MPL 156 Northern Wellfield*. Version A. CA-ENV-REP-1085. October 2019. Adelaide.

DEFINITIONS AND ABBREVIATIONS

Acronym	Expansion or Definition
Compliant	'Compliance' is achieved when all the requirements of a condition have been met, including the implementation of management plans or other measures required by those conditions.
DoEE	Australian Government Department of the Environment and Energy
EPBC	Environment Protection and Biodiversity Conservation
ha	hectare
km	kilometre
ML	Mining Lease
MLP	Mining Lease Proposal
MPL	Miscellaneous Purposes Licence
Non-compliant	A designation of 'non-compliance' should be given where the requirements of a condition or elements of a condition, including the implementation of management plans and other measures, have not been met.
Not applicable	A designation of 'not applicable' will be given where the requirements of a condition or elements of a condition fall outside of the scope of the current reporting period. For example, a condition which applies to an activity that has not yet commenced.
PEPR	Program for Environment Protection and Rehabilitation

Appendix A. 2021 South Gap EPBC Offset Annual Report



2 MARCH 2023

South Gap-EPBC Offset **2022 Annual Report**

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Abbreviations

IBRA	Interim Biogeographic Regionalisation for Australia (Region, Sub-region, Association)
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
RAM	Rangeland Assessment Method

Executive Summary

The South Gap EPBC offset area is managed to offset the impacts of the Carrapateena Mine in central South Australia to the EPBC listed threatened species the plains mouse (*Pseudomys australis*). The conservation management and science component have been the responsibility of the Nature Foundation since 2021. Here, we report our progress for the year 2022.

Overall, 2022 was a successful year. There was above-average rainfall, and the stated goals of feral herbivore and predator management were met. We began detailed vegetation assessments and have recorded signs of regeneration after the extensive drought of 2018 – 2020. Feral predators like foxes and cats were controlled, and their activity was kept below the stated threshold. No wild dogs were detected. Grazing pressures by domestic sheep were kept low. Rabbit numbers were very low throughout the year even before control was conducted, and control efforts reduced numbers by a further 90%. And critically, plains mouse made an incredible recovery, with many more detected than the previous year.

Management goals for 2023 will include ramping up feral animal control, conducting targeted fauna surveys for other species, and beginning research on the ecology of plains mouse in the region.

1. Introduction

1.1 Background

OZ Minerals have begun delivering the EPBC Act on-ground offset program on South Gap Station, located immediately south-east of the Mine, primarily for the protection and conservation of the EPBC listed plains mouse (*Pseudomys australis*). The EPBC Offset Management Plan (EOMP hereafter) details the management of on-ground offset of 1,882 ha (Northern Offset) on South Gap Station, which will satisfy relevant approval conditions. The plan also details a secondary on-ground offset area of 1,369 ha, which OZ Minerals may elect to manage as an advanced offset for plains mouse depending on future regional development.

The management goals of the on-ground offset are to:

Goal 1- Monitor the state of vegetation

Goal 2- Refine the presence, distribution, and abundance of plains Mouse within the offset

Goal 3- Manage total predation pressure (from cats, foxes and possibly wild dogs)

Goal 4- Maintain and / or enhance the condition of habitat for the benefit of plains mouse, through the management of total grazing pressure and invasive weeds

Goal 5- Improve knowledge of local target species populations including how they respond to management locally

The EOMP for South Gap presents 14 individual objectives grouped under 11 management strategies to address EPBC Act offset liability, and associated legislative and policy obligations, for the first 10-year period of management. We have updated Goal 1 since 2021, from establishing a baseline of vegetation to conducting ongoing monitoring.

This annual report will detail progress against the EOMP management objectives for the 2022 calendar year and outline management and monitoring actions for the 2023 calendar based on the learnings of 2022.

1.2 Location and site features

The South Gap EPBC offset area is 1,878 ha in size. It is located in central South Australia, approximately 100 km north of Port Augusta on the banks of Lake Torrens (Fig.1).

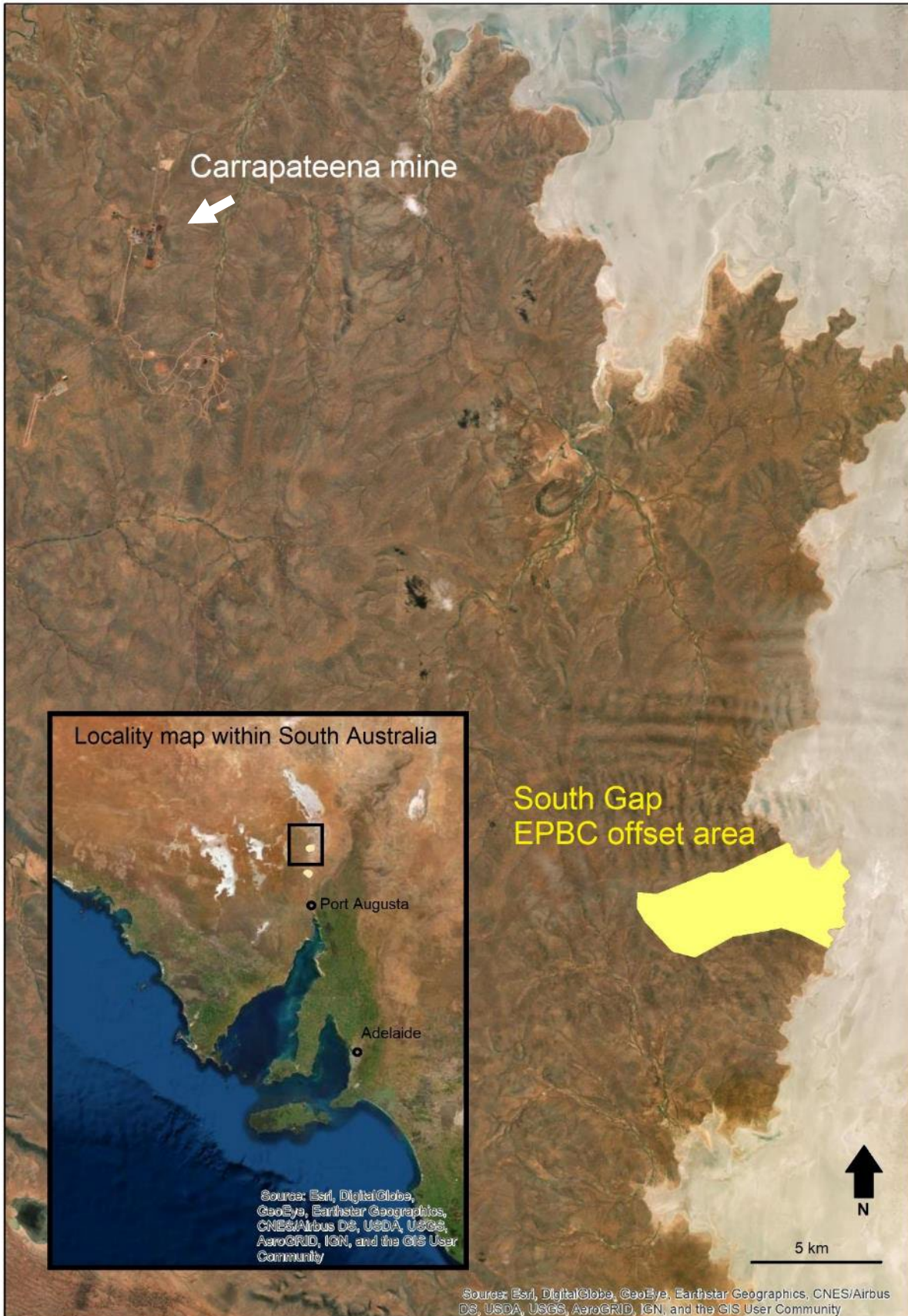


Figure 1. Location of the South Gap EPBC offset area within South Australia

1.3 Landscape

The key habitat to be protected and managed at the South Gap EPBC offset area are cracking clays (or Gilgai's) with low open shrublands. Vegetation of the site is dominated by low open shrubland, with scattered patches of cracking clay soil sites and eremophila shrublands. The landscape is also dissected by western myall creeklines (Fig. 2) The dominant shrubs across the site and samphire (*Tecticornia medullosa*) and bladder saltbush (*Atriplex vesicaria*).



Figure 2. Vegetation of the South Gap EPBC area, with low open dissected by myall creeklines.

1.4 Climate

The South Gap EPBC offset area has a semi-arid climate with low annual rainfall (average 180 mm per year, South Gap homestead, BOM station #016043). This rainfall is typically erratic, with substantial variation between years and no consistent seasonality. Temperatures are hot with average summer maximum temperatures of 33° C.

South Gap received substantial rains during 2022, with 252 mm through the year which was the highest yearly rainfall for the last 30 years (1992 received 430 mm). Despite this, Lake Torrens did not fill and there was no standing water on site through most of the year. Most rain that fell during 2022 was during spring and summer, with scant winter rainfall (Fig. 3). This rainfall came after a long drought, where three of the last four years had below-average rainfall. Although this was a substantial event in context of the last 30 years (Fig. 4), prior to that from 1962 to 1992 there were eight years with rainfall greater than 2022 (i.e. >252 mm).

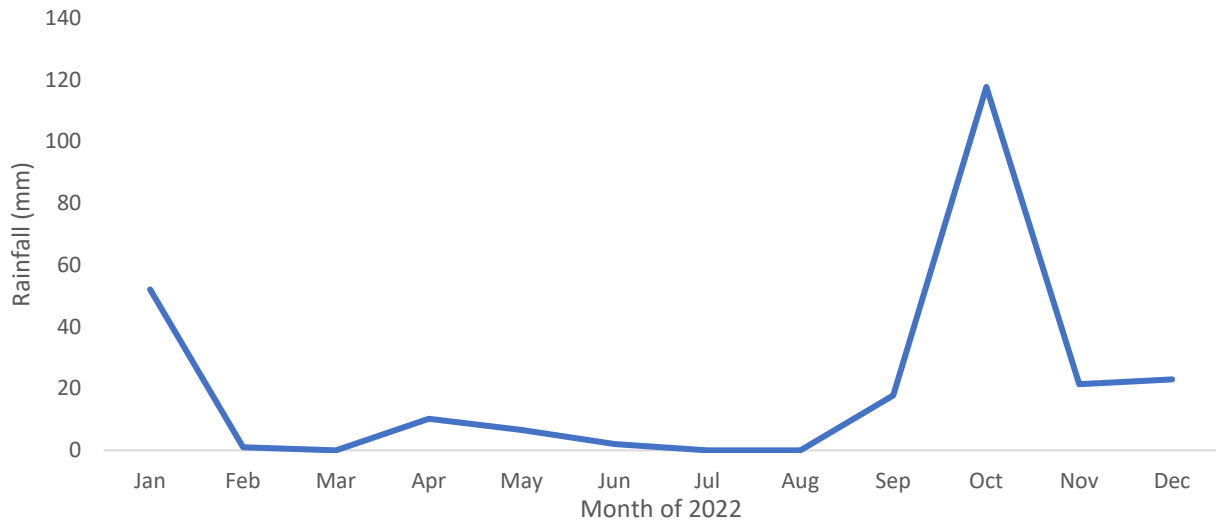


Figure 3. Rainfall at South Gap station for 2022, as recorded from South Gap homestead BOM station #016043

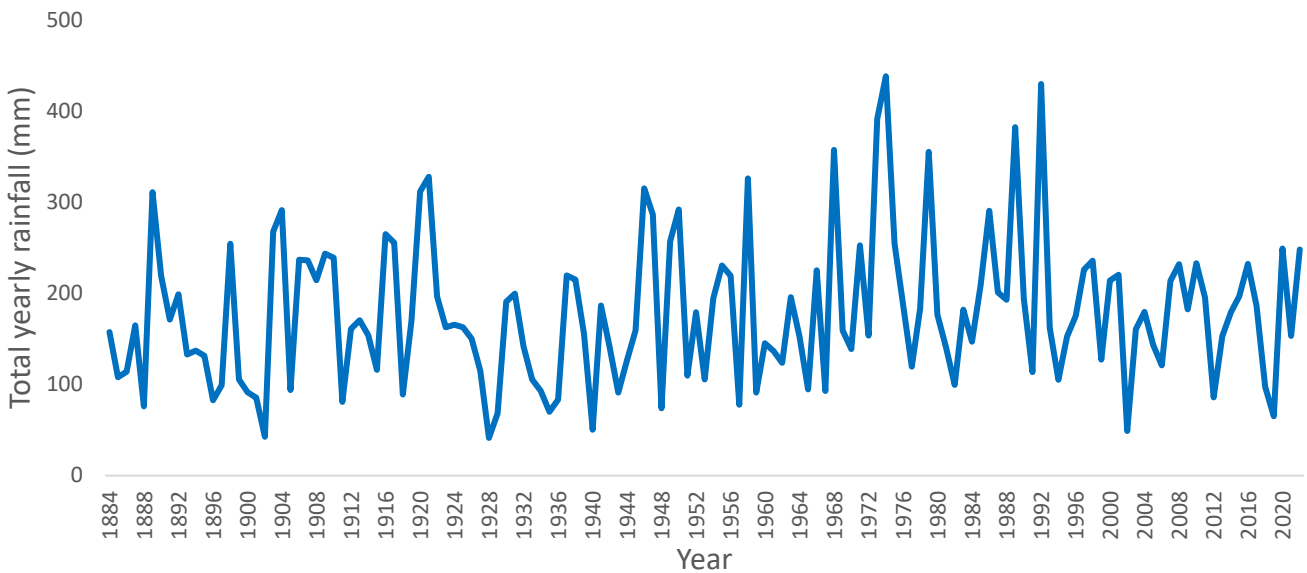


Figure 4. Long-term rainfall trends for South Gap (BOM station #016043), representing total yearly rainfall in millimeters (mm) from 1884 to 2022.

1.5 Conservation Values

The key species protected by the South Gap EPBC area is the plains mouse (*P. australis*). This is a small native rodent, on average weighing 55 g. Their size places them within the critical weight range of Australian mammals, where species between 35 – 5500 g have a high likelihood of being driven extinct due to predation by feral predators (Burbidge and McKenzie 1989; Johnson and Isaac 2009; Woinarski *et al.* 2015). They are listed under Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) as a Vulnerable Matter of National Environment Significance. Habitat for the plains mouse is typically open saltbush plains with cracking clay soils.

The threatening process most likely affecting the offset areas and the plains mouse include:

- Predation by European red fox (*Vulpes vulpes*)
- Predation by feral cat (*Felis catus*)
- Predation by wild dog (*Canis sp.*)
- Competition and land degradation by European rabbit (*Oryctolagus cuniculus*)
- Competition and land degradation by unmanaged goats (*Capra hircus*)

2. Legislative Framework

2.1 Environment Protection and Biodiversity Conservation Act (1999)

The Commonwealth EPBC Act is the primary Commonwealth legislation established to protect and manage matters of national environmental significance, including nationally and internationally important flora, fauna, ecological communities, and heritage places.

The EOMP provides guidance on the delivery of an on-ground offset, required to address residual impact to plains mouse (Condition 3, 4 and 5) as per the EPBC Act Approval conditions (granted on 29 March 2018). Other relevant legislation relating to the offset area includes the National Parks and Wildlife Act (1972), Native Title Act (1993), Aboriginal Heritage Action (1988), Landscape Act (2019) and the Pastoral Land Management and Conservation Act (1989).

3. Management Goals, Strategies and Objectives

Under the South Gap EOMP, we have outlined five main goals (Table. 1). For each, we have outlined our broad strategy and objectives. In the following Section 4, we then benchmark our progress against each of these goals and objectives.

Table 1. Management goals, strategies and Objectives

Goals	Strategies	Objectives
Goal 1- Monitor the state of vegetation	<ul style="list-style-type: none"> Strategy 2: Improve knowledge of target species population dynamics and management 	<ul style="list-style-type: none"> PM1: Quantify and monitor plains mouse habitat within the offset
Goal 2- Refine the presence, distribution, and abundance of plains mouse within the offset	<ul style="list-style-type: none"> Strategy 2: Improve knowledge of target species population dynamics and management 	<ul style="list-style-type: none"> PM1: Quantify and monitor plains mouse habitat within the offset
Goal 3- Reduce predation pressure	<ul style="list-style-type: none"> Strategy 3: Cat control Strategy 4: Fox control Strategy 5: Wild dog control 	<ul style="list-style-type: none"> CC1: Reduce cat density to less than 4 cats/100 km with the offset area. FC1: Reduce fox density to less than 1 fox/100 km with the offset area. DC1: Keep the offset area free of wild dogs / dingos.

Goals	Strategies	Objectives
<p>Goal 4- Reduce total grazing pressure</p>	<ul style="list-style-type: none"> • Strategy 1: Stock management • Strategy 6: Rabbit control • Strategy 7: Weed control 	<ul style="list-style-type: none"> • SM1: Keep the offset area free of domestic livestock. • RC1: By 2023, reduce rabbit numbers and warrens by 80% within the offset area. • RC2: Map and rip 5 km² of chenopod shrublands in priority areas each year for 4 yrs. • WC1: By 2028, the distributions of invasive weeds (i.e. Declared and/or WoNS) is reduced.
<p>Goal 5 - Improve knowledge of local target species populations including how they respond to management locally</p>	<ul style="list-style-type: none"> • Strategy 2: Improve knowledge of target species population dynamics and management 	<ul style="list-style-type: none"> • PM1: Quantify and monitor plains mouse habitat within the offset

4. Outcomes

4.1 Goal 1 - Monitor the state of vegetation

4.1.1 Overview

To monitor the state of vegetation in the South Gap EPBC area during 2022, we conducted weed assessments, Rangeland Assessment Method (RAM) floral surveys at multiple sites and measured habitat structure in three Jessop transects. We also re-sampled shrub-health sites sampled in 2021 to assess recovery rates from the 2018 – 2020 drought.

4.1.2 Rangeland Assessment Method floral surveys

To obtain a broad measure of vegetation condition on site, we measured RAM floral survey scores. This was conducted in accordance as per methods developed by the Department for Environment and Water, by Dr Andrew Sinel (Ecosphere Ecological Solutions). It collects data related condition of different vegetation communities and structures, and different biotic and abiotic disturbances (Sinel 2022). The sites sampled for the RAM surveys were the same as sampled in 2019 by Clive and Fels (2020), allowing a comparison of vegetation condition before and after management.

Vegetation condition at all sites was classed as 'moderate' (all scores were between 42 – 57 RAM score). Sites displayed minimal signs of grazing or erosion damage. Regeneration of some species was recorded. No weeds were observed. We compared results from this survey to samples assessed in 2019, and found RAM vegetation scores have remained similar (Fig. 5) and not significantly different (mixed effects linear model, coefficient = 0.05, standard error = 0.79, degrees freedom = 7, $t = -0.06$, $P = 0.95$). We anticipate more years will be required until we record significant changes in RAM vegetation condition as the vegetation regenerates with the removal of livestock and feral herbivores.

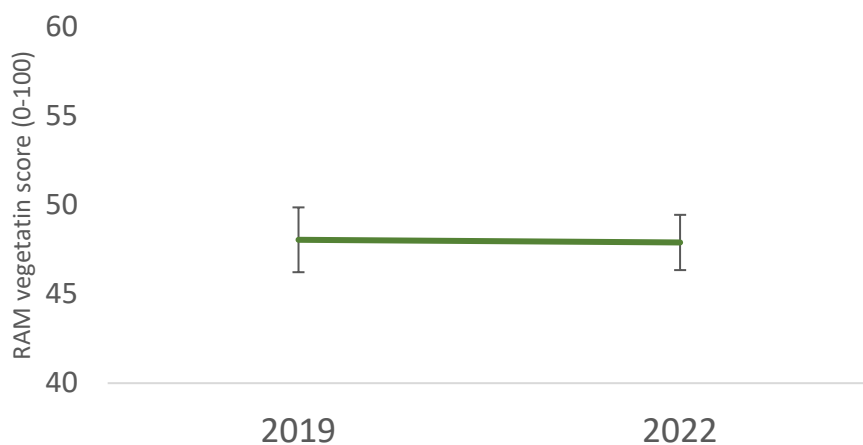


Figure 5. Trends in Rangeland Assessment Method (RAM) scores at South Gap EPBC offset area from 2019 to 2022 at eight different sites sampled.

4.1.3 Jessup transects

A permanent monitoring program was set up using Jessup transects. This method provides a quantitative measure of structure and frequency of vegetation, and is widely used across South Australia. At each site, it involves a fixed 4 m x 100 m transect, comprised of twenty smaller 10 x 2 m plots (Fig. 6). All perennial shrubs and grasses with their base inside the transect are recorded by species and age (adult/juvenile). This provides density and frequency estimates of each perennial plant species for each site. Three of these sites were set during 2022. This was also conducted by Dr Sinel.



Figure 6. A Jessup transect being sampled at the South Gap EPBC offset area during 2022 by Dr Andrew Sinel.

The Jessup transects conducted in 2022 provided an important quantitative benchmark of vegetation structure. Of the three sites sampled, density estimates of different shrub species were obtained. Regeneration was recorded of samphire, bladder saltbush and plains lantern bush (*Abutilon halophilum*). These sites will be continuously monitored over the coming years.

4.1.4. Shrub health

Our surveys from last year (2021) reported poor health of saltbush shrubs. In particular, we found condition of samphire to be very low, with 70% appearing in near-dead condition. Therefore in 2022 we conducted a follow-up survey to assess how plants have responded after more favorable rainfall conditions.

To monitor shrub recovery at the South Gap EPBC offset area, we revisited the same 31 sites in December 2022 as were sampled in October 2021. These 31 sites were spread across most habitat types proportional to their coverage, with 13 in low open shrubland, five in cracking clay, five in myall creeklines, four in sandy

shrubland, three in dense samphire and two in eremophila shrubland. Sites consisted of a 50 m transect which would be walked, and all shrubs or trees larger than 10 cm tall within two meters of the transect would be recorded either side of that transect line. The start and end position of each transect was recorded with a GPS. Due to GPS error the exact lines of transects were not identical between 2021 and 2022, but approximate to within five meters. For each shrub or tree within 2 m of the transect, we recorded whether it appeared alive (i.e. had live leaves), possibly dead (leaves appearing dead), or likely dead (no live leaves).

For the 31 sites sampled for shrub health in 2022, the approximate health of 554 trees and shrubs were sampled. As there had been above-average rainfall during 2022, almost all plants were unambiguously able to be classed as either alive or likely dead. Only 1% of plants were categorised as possibly dead in 2022, compared to 14% in 2021. Health of large shrubs and trees (e.g. *Casuarina pauper*, *Acacia* spp. and *Eremophila* spp.) remained high, with only 3 of 41 shrubs dead (7%). The dominant smaller shrubs had recovered well. In 2022, we found 25% of samphire (*T. medullosa*) recorded as likely dead, compared to 70% during 2021. For *Atriplex* spp., the portion of near-dead shrubs was near-identical between 2021 and 2022 (12% vs 13%).

Shrub health had recovered well in 2022. Large shrubs, trees and saltbush were mostly alive and had no sign of recent decline. Approximately 25% of samphire shrubs were recorded as likely dead (Fig. 7). However, their situation in 2022 is far better than reported in 2021. Almost all samphire sampled in 2022 were older shrubs that had recovered, as opposed to young recruits. This suggests that many shrubs recorded as 'likely dead' in 2021 were actually still alive, albeit in poor condition.



Figure 7. An example of low open shrubland at the South Gap EPBC area during 2022. Note most of the samphire is alive and thriving, but some likely dead samphire scattered between.

4.2 Goal 2 - Presence, distribution, and abundance of plains mouse

4.2.1 Overview

The primary focus of the South Gap EPBC offset area is the protection of plains mouse. This species was first detected here in 2021 at three sites on remote cameras. Our aims for 2022 were to continue monitoring the species, detect any noticeable response to habitat management, and understand how other native mammal species are faring.

4.2.2 Small mammal monitoring methods

To monitor activity of small native mammals including the plains mouse, we used baited remote camera traps spread across the South Gap EPBC offset area. Cameras were set at 12 sites, including 8 of the sites used previously by Clive and Fels (2020) for the initial baseline surveys and 10 of the sites used previously for monitoring during 2021. Each site consists of a remote camera placed on a star-picket 1 m high facing down facing a PVC container with peanut butter inside (Fig. 8). Cameras used were Reconyx Hyperfire 2 Professional HP2X with a modified lens to focus at 90 cm range. A corkboard is placed on the ground underneath the camera with gridlines at 10cm width to help us estimate the size of the animals detected. Remote cameras were deployed from the 27th of February 2022 until the 14th of December 2022. These were rebaited and rebatteried thrice throughout the year. Images from these remote cameras were reviewed, and animals detected were identified to species level wherever possible.



Figure 8. Example setup of remote cameras used to detect plains mouse, with a canister containing bait below.

We identified plains mouse from a head and body length of 90 to 145 mm and tail shorter than 125 mm (Van Dyck *et al.* 2013). Images of rodents with a head and body length of approximately 90 mm were only classed as ‘likely’ plains mouse. We could reliably identify to species level the spinifex hopping-mouse (*Notomys alexis*), Narrow-nosed planigale (*Planigale tenuirostris*), and desert short-tailed mouse (*Leggadina forresti*). Some individuals of the other small mammal species could be identified to species, though not all. For example, some dunnart images could be differentiated between *Sminthopsis crassicaudata* or *S. macroura*, though often not. Therefore, these species were often clumped together, along with small rodents (*P. bolami*, *P. hermanbergiensis* or *M. domesticus*).

There were 282 detections of small mammals on remote cameras in 2022, and most were of small rodent species or dunnarts (Tab. 2). Plains mouse were detected at eight of the 12 sites set up to monitor them (Fig. 9), comprising 26 detection events between May and September. This is a substantial significant increase since the previous year, where they were detected on three of 10 cameras on six occasions (Fig. 10). A plains mouse burrow system was found near one of the remote cameras (Fig. 11). In Figure 12 we show an example of one of the plains mouse images obtained in 2022. Also of note were multiple detections of the spinifex hopping mouse (Tab. 2), a new species for the offset area since surveys began in 2020.

Table 2. Detections of small mammal species on the small mammal remote camera array at the South Gap EPBC offset area in 2022

Species	Scientific name	Sites	Total detections
Dunnart species	<i>Sminthopsis</i> spp.	9	102
Narrow-nosed planigale	<i>Planigale tenuirostris</i>	1	1
Desert short-tailed mouse	<i>Leggadina forresti</i>	2	2
Spinifex hopping-mouse	<i>Notomys alexis</i>	3	26
Plains mouse	<i>P. australis</i>	8	26
	<i>P. bolami</i> ,		
	<i>P. hermanbergiensis</i> or		
Small rodent species	<i>M. domesticus</i>	10	125
Total		12	282

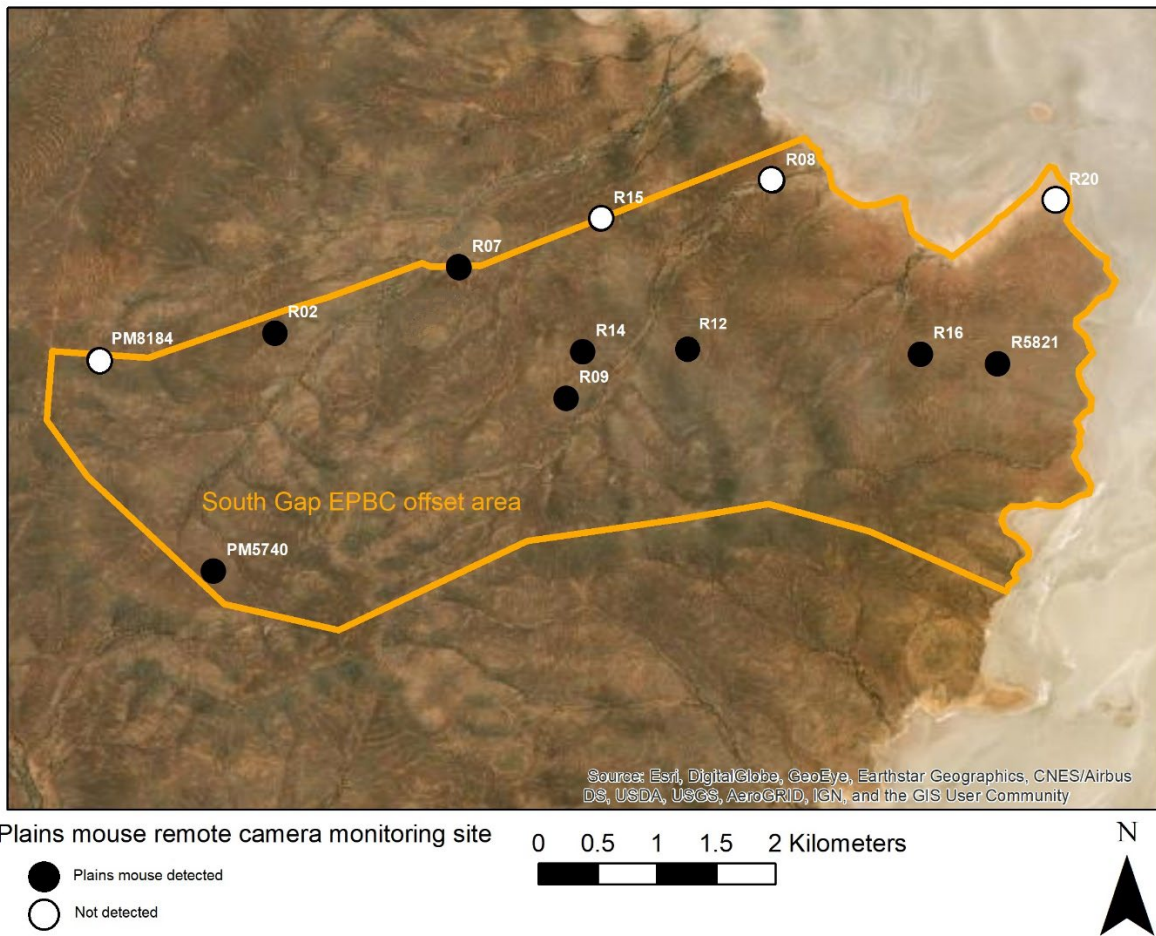


Figure 9. Location of remote camera sites set out across the South Gap EPBC offset area during 2022 (circles), including whether a plains mouse were detected at that site (black) or not (white).

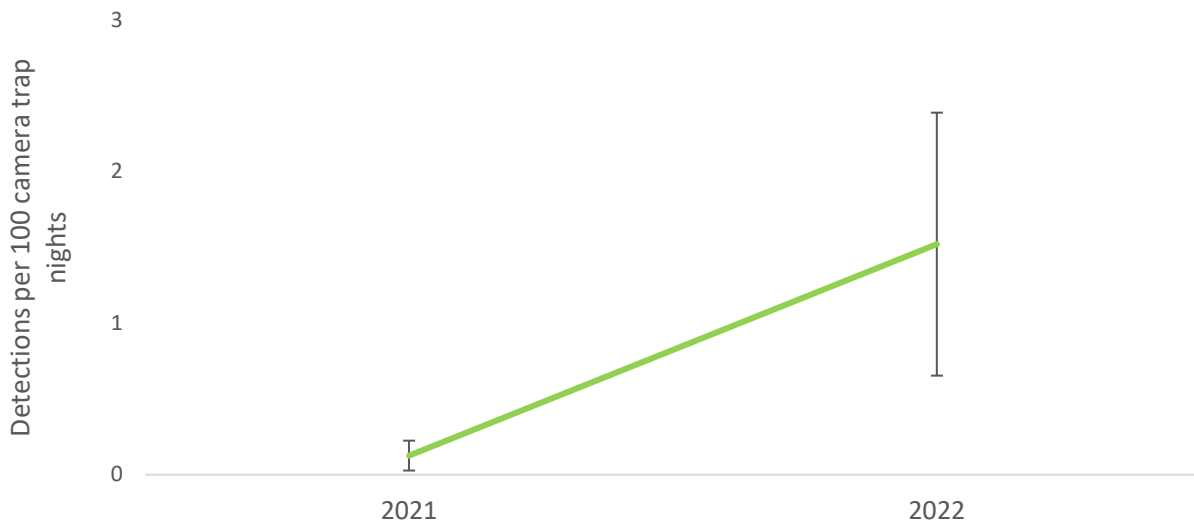


Figure 10. Plains mouse (*Pseudomys australis*) detections at 12 remote camera trap sites at South Gap EPBC offset area in 2021 versus 2022. Error bars denote standard error.



Figure 11. A burrow system of a plains mouse found on South Gap EPBC offset area.



Figure 12. Example of a plains mouse detected on a remote camera at the South Gap EPBC offset area in 2022.

Plains mouse have dramatically increased in activity at the South Gap EPBC offset area in 2022. This is likely primarily driven by a combination of better rainfall conditions, and reduced pressures from feral predators and herbivores (following chapters). We also recorded the spinifex hopping mouse, a similar species to the plains mouse and likely benefiting from the same conditions. During 2023, we aim to continue monitoring plains mouse from the remote cameras. We also plan to begin targeted research of plains mouse habitat use in the region.

4.2.3 Other fauna

We conducted incidental survey for other bird and reptile species on site. In total, 35 bird species were recorded in 2022. Birds of note detected were red-capped robin (*Petroica goodenovii*) and hooded robin (*Melanodryas cucullate*). We also conducted species specific call-playback surveys for the thick-billed grasswren (*Amytornis modestus*) at six sites with possible habitat (dense saltbush), however, none were detected. For reptiles, seven species were detected. This included the Lake Eyre dragons (*Ctenophorus maculosus*, Fig. 13) and painted dragons (*Ctenophorus pictus*).



Fig. 13. A Lake Eyre dragon recorded at South Gap.

4.3 Goal 3 – Reduce predation pressure

4.3.1 Overview

Feral predators are a key threat to native wildlife, such as the plains mouse, at the South Gap EPBC offset area and reducing the pressure they exert on native wildlife is a major priority. Feral predators from the region are feral cats, red foxes and wild dogs. The primary method of control is by a professional shooter. Activity of feral predators is monitored using an array of remote cameras, described below.

4.3.2 Feral predator control

During 2022, two feral predator hunting trips were conducted by a professional shooter (Graham Miller). These could not be conducted quarterly due to the abundant rain in 2022. These trips were in May and November 2022. In each trip, Graham would drive all roads throughout the site at night, then detect and shoot feral predators using a spotlight. In 2022, 8 foxes and 2 cats were shot.

4.3.3 Feral predator monitoring

Feral predators were monitored using a remote camera array, with twenty cameras set across the area (Fig. 14). The remote camera type used were Swift Enduro (Outdoor Cameras Australia), placed at a height on between 40 – 60 cm facing horizontal across a likely predator focal point (road, dry creek, or rabbit warren). No lures were used. These were placed on the 27th of Feb 2022, last checked on the 14th December 2022, and will remain in place for the foreseeable future. For comparison to 2021 feral predator activity rates, we compared results here to 10 remote cameras placed at similar sites from 1st Feb – 10th June 2021.

Feral predators remained at low activity rates (Fig. 15). Feral cat detection rate remained very low with less than 1.5 cat detections for 100 trap nights throughout 2022. However, we recorded a spike in red fox activity in April and May 2022 which was likely during a red fox dispersal stage. This dissipated by July, likely due in part to our control operations. No wild dogs were detected.

After the excellent rainfall conditions of 2022, we anticipate more feral predators are going to re-invade in 2023, and control efforts might have to be increased. Although density was not specifically monitored by the remote camera array, the detection rate reported is very low. During 2023, we will investigate methods to use this data to estimate density (Carter *et al.* 2019).

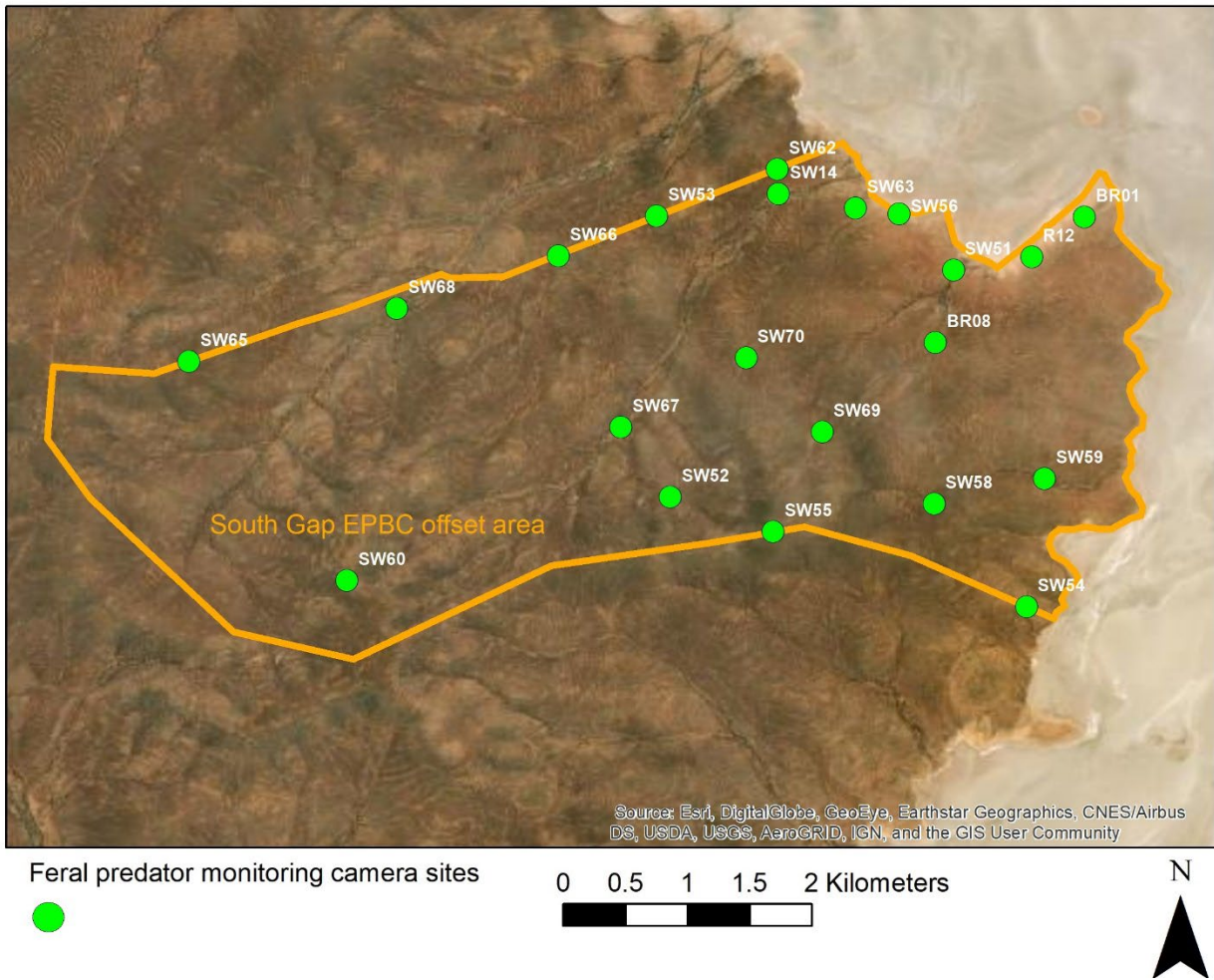


Figure 14. Location of the remote camera sites used at the South Gap EPBC offset area to monitor feral predators in 2022.

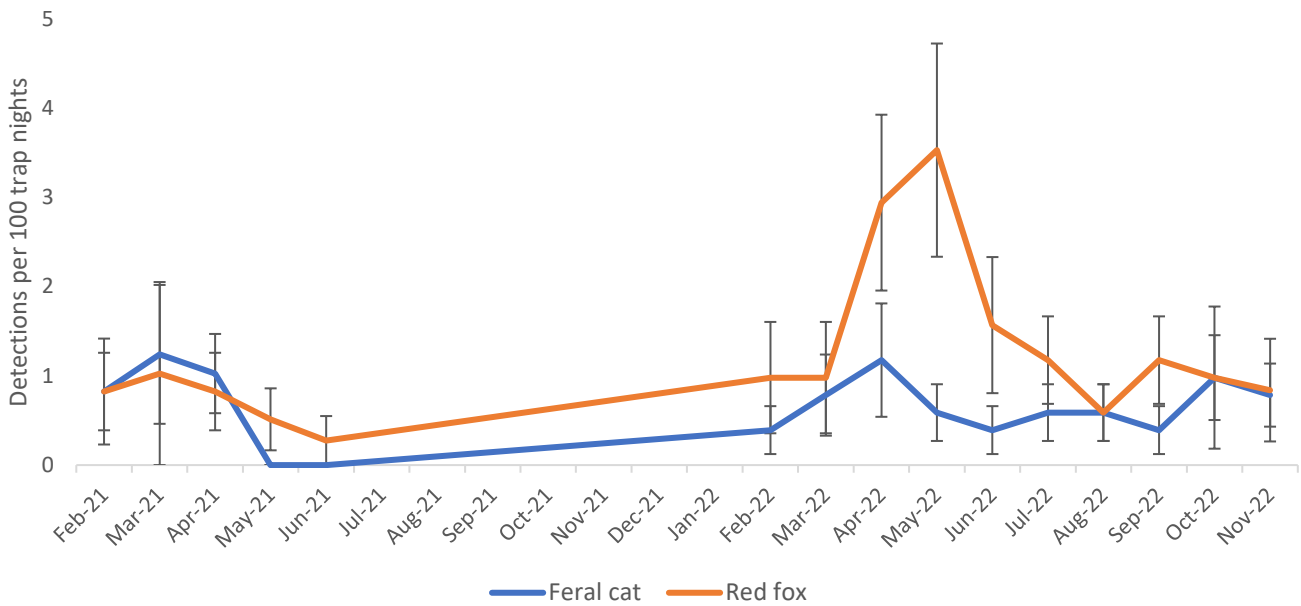


Figure 15. Detection rates of feral cats and red fox at remote camera trap sites spread across South Gap EPBC offset area in 2021 and 2022. Error bars denote standard error.

4.4 Goal 4 - Maintain habitat condition through management of grazing and invasive weeds

4.4.1 Overview

Overgrazing has been identified as a key threat to the habitat quality for plains mouse (Young *et al.* 2017), and is an important focus for management by Nature Foundation on the South Gap EPBC offset area. Overgrazing could be caused by domestic stock (sheep), feral herbivores (goats, rabbits) or even native herbivores if at inflated densities (red kangaroos). Here are our efforts to date to control and monitor each species.

4.4.2 Domestic sheep

Keeping domestic stock outside of the South Gap EPBC area is a key goal for management, and as such, the boundary fence was primarily built to exclude stock animals. Unfortunately, during 2022 there were three incursions by sheep into the South Gap EPBC offset area during 2022. The first two of these incursions occurred during February and March, after corrosion had caused part of the fence to collapse on the northern boundary near Lake Torrens. In those cases, between two and five sheep got inside the paddock, and these were mustered out soon after (Fig. 16). The northern fence was partially fixed, in response, and has held up since. The third incursion occurred during October 2022, where a flock of approximately 30 sheep were detected on remote cameras. However, these were no longer observed in the paddock by November, and likely made their own way out. It is possible these sheep got in under a low part of the fence, and three such parts were detected. All such sections will be fixed during 2023.



Figure 16. Mustering part of a small flock of sheep out of the South Gap EPBC offset area paddock.

4.4.3 Feral goats

Goats are another feral herbivore present in the region. To monitor goat activity, we used goat detections from the remote camera array for feral predators, along with tracking detection rates from a single camera set at a core goat habitat location. This is at a large rocky overhang, which is used as a day-refuge. It is the only known overhang in the area (Fig. 17). This remote camera has been active continuously since early 2021. No goats were detected on site during 2022 on any remote camera.



Figure 17. The rocky overhang at the South Gap EPBC offset area where goat activity was highest during 2021. None were detected there in 2022.

4.4.4 Rabbit monitoring

The stated goal for management was to ‘reduce Rabbit numbers and warrens by 80% within the offset area by 2023’. Specifically, our three aims for rabbits in 2022 were to understand the spread of the rabbit population across the EPBC offset area, monitor rabbit activity, and conduct management to reduce rabbit activity by 80%. Below we discuss how we aimed to monitor and achieve these aims.

Spatial spread of rabbits

To understand the spread of rabbits through the South Gap EPBC offset area, we conducted large-scale walking surveys to find rabbit burrows and sign. We would identify possible rabbit burrows from satellite imagery, and then walk out to these possible warrens. Each walk was between three and nine kilometers in length. All evidence of rabbits were recorded (burrows, buck-heaps or tracks), and details taken for each. This was used to create a map of activity sign across the whole site.

During 2022 we walked 62 km looking for rabbit evidence (Fig. 18). The only location that fresh rabbit warrens were found was the sandy habitats on the banks of Lake Torrens. Numerous other old rabbit warrens were found on the clay and calcite substrates though the area, however, these were all flat and none contained any rabbit warren entrances. We suspect after the drought from 2018 to 2020, these warrens became uninhabited by rabbits and collapsed. Since then, rains have solidified the soils and made reopening these warrens difficult.

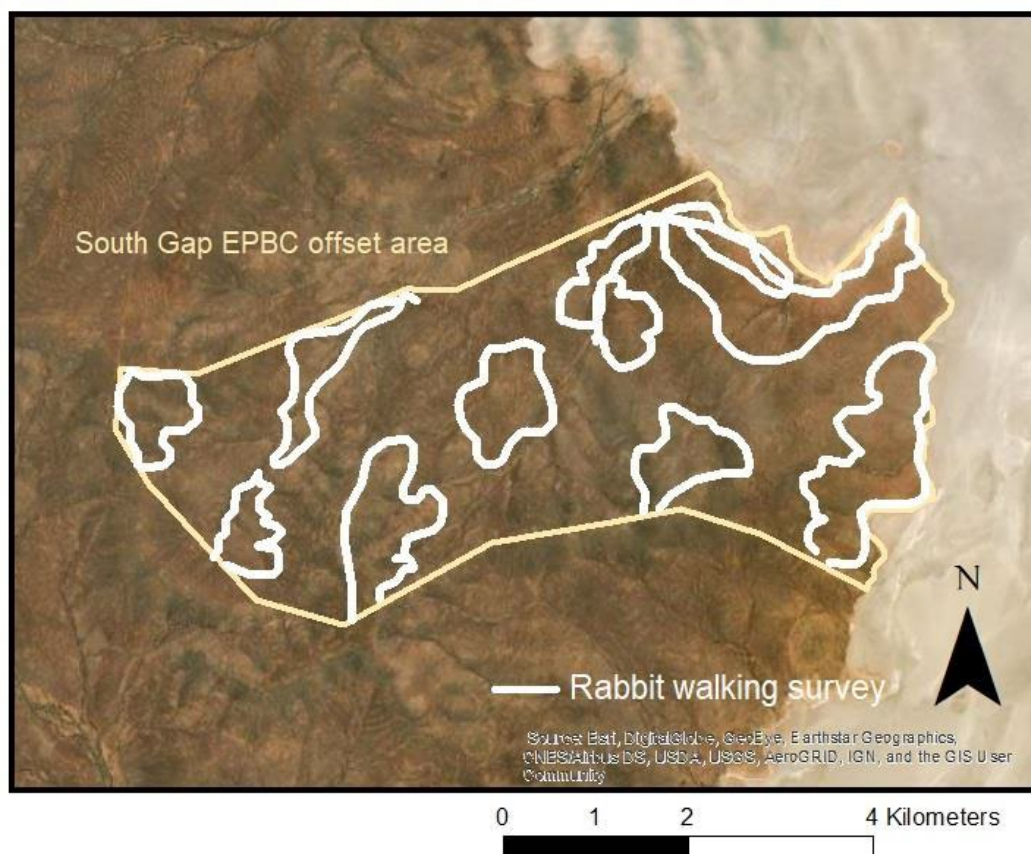


Figure 18. Locations of the walking surveys for rabbit sign (white line) across the South Gap EPBC area conducted during 2022.

Rabbit activity monitoring

We used two methods to monitor rabbit activity. First, we counted rabbit activity on the feral animal remote camera array. However, as rabbits have been at very low densities since 2020, this method does not appear to adequately capture differences in activity. Therefore, we also conducted a walking transect where we walked 9 km looking for signs of rabbit activity in and around the key habitat for rabbits on site; the sandy area on the banks of Lake Torrens. This walk is conducted quarterly and all rabbit sign is recorded.

On the remote camera arrays, rabbit detection rates remained low (on average, 0.3 rabbit detections per 100 trap nights). On most cameras, rabbits were either not detected at all or only once throughout the whole year. However, on the cameras placed in the sandy habitat rabbit detection rate was much higher, with approximately 7 detections per 100 trap nights. For the walking transects, rabbit tracks and warrens remained low and stable throughout 2022 (Fig. 19), until control was conducted (next chapter).

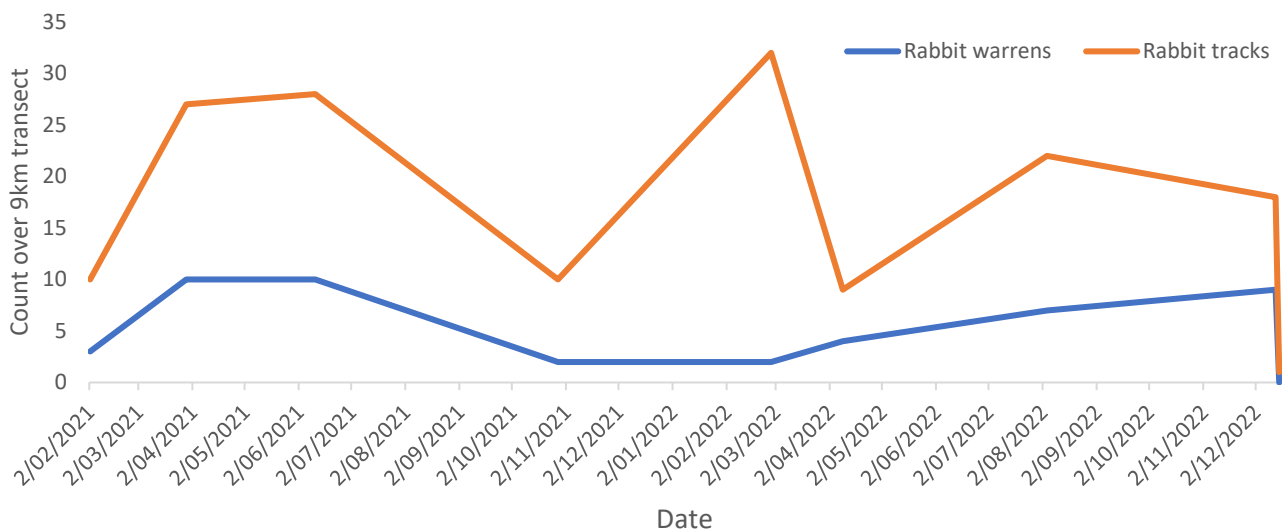


Figure 19. Rabbit warrens and activity recorded along a 9km walking transect at the South Gap EPBC offset area.

Rabbit control

To reduce rabbit populations, we aimed to fumigate and collapse each of the nine known burrows on the South Gap EPBC offset area. On 13th December 2022, all nine burrows had a poisonous fumigant tablet placed at least 60cm down the burrow entrance, and then the entrance was collapsed (Fig. 20). All other possible entrances were also collapsed. Two days later, all these warrens were revisited, and no fresh sign was detected at any. The rabbit activity transect was walked and sampled again on the 15th December, and rabbit tracks dropped from 18 (sampled on 13th Dec) to 1 track (Fig 18), suggesting a 94% drop (Fig. 21). However, since the ‘after’ sample was taken two days post control, it is possible this reflects a change in behavior rather than rabbit numbers. For example, it is possible rabbits were scared by our presence conducting fumigation and vacated the area, but will return soon after we left. We will need to continue monitoring the rabbit population through

2023, and potentially conduct small-scale control operations such as this more frequently, with a greater focus on restricting rabbit populations' ability to rebound, than reducing rabbit numbers.



Figure 20. Before and after rabbit control at a rabbit warren. A fumigant tablet was placed deep within a rabbit warren (left), then the entrance was collapsed (right).

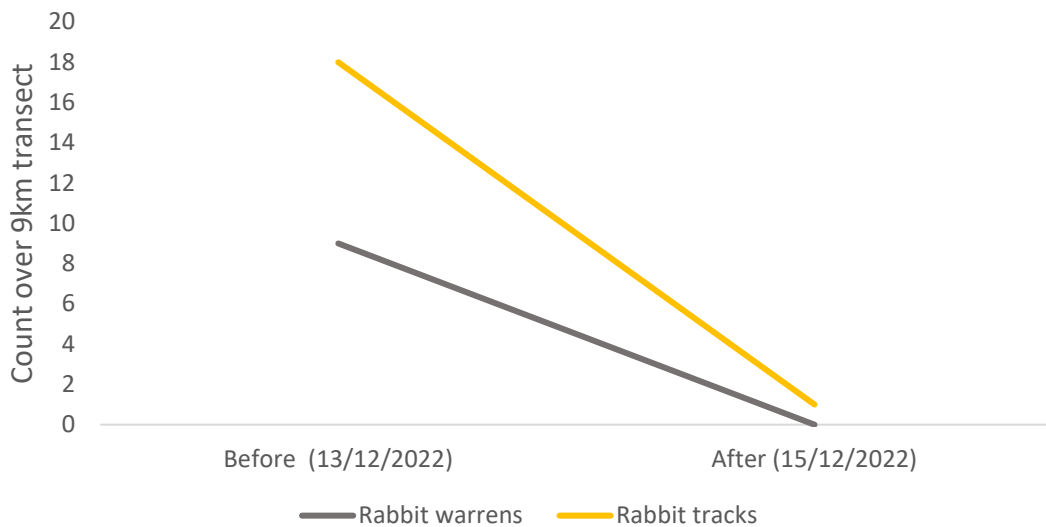


Figure 21. Rabbit activity along the 9km walking transect before and after rabbit control efforts in 2022.

4.4.5 Kangaroos

Kangaroos are a native species, and a key element to most Australian ecosystems. However, in certain circumstances their grazing pressures can be intense and lead to detrimental impacts on vegetation if not managed (Mills et al. 2020). Kangaroo density is monitored using thermal camera point-based surveys, developed by Alex Nankivell. This involves driving the central road at the South Gap EPBC offset area at night, and stopping at 500 m intervals, totaling 22 stops during each survey. At each stop point, vehicle lights would

be turned off and a thermal camera used to scan in all directions. When an animal heat signature is spotted, a range-finder was used to measure distance from the observer. We also monitored kangaroo activity by counting detections on remote cameras set for feral predators (see Section 4.3.3). This was standardized to detections per 100 traps nights, standardizing for different numbers of remote cameras set up for different months.

For the thermal camera survey of kangaroo numbers, we reported an increase. During 2021 we detected only four kangaroos across all sites, yet in 2022, we recorded 30 in August and 23 in December. On remote cameras, we also recorded an increase in kangaroo activity (Fig. 22).

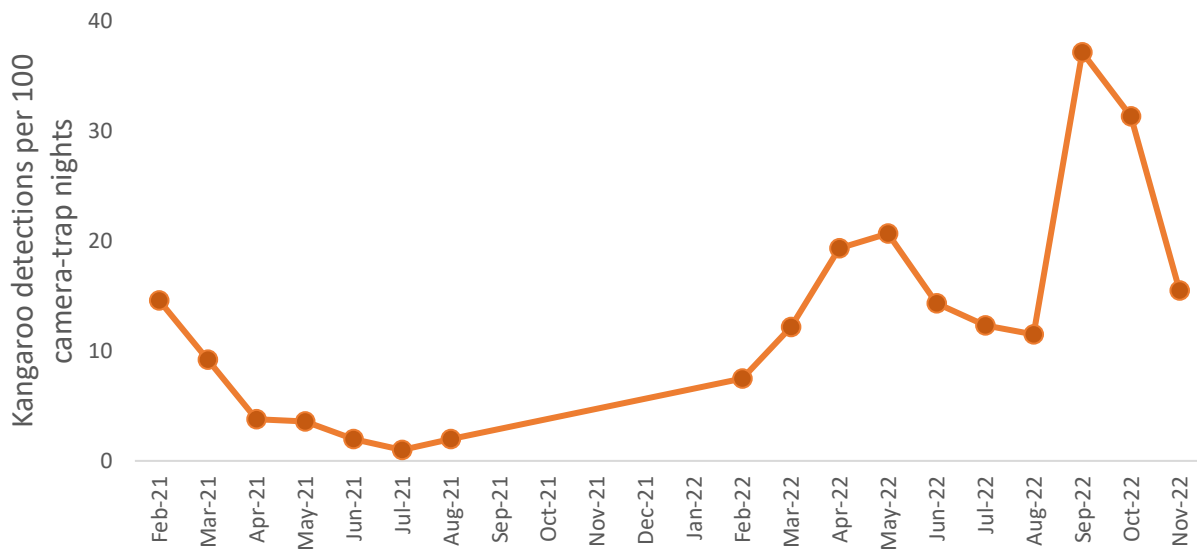


Figure 22. Detection rates of kangaroos on remote cameras at South Gap EPBC offset area, from

4.4.7 Weed management

During all the vegetation survey conducted at the South Gap EPBC offset area, no weeds of national significance have been detected on site. This means no weed management has yet been conducted. To prevent weed introduction to the area we are washing vehicles before entry, to ensure our actions do not create a future problem for management.

4.4.8 Summary

Feral herbivores were kept at low densities in 2022. Whilst some sheep had got inside the offset area, these were removed. Rabbit numbers remained low, and we have also conducted control operations to keep their densities low. Our goals for 2023 will be to further shore up the integrity of the perimeter fence, and continue rabbit control to keep their populations low.

4.5 Goal 5 – Improve knowledge of local target species populations

Since 2021 we have been able to collect spatial data on the spread of all vegetation communities across the South Gap EPBC offset area, fulfilling objective ‘PM1’ in Goal 5 (see Section 3). We have also conducted a property-wide monitoring program using remote camera traps for plains mouse, feral animals and kangaroos. Once this data has been collected for three or four years, this will enable sufficient data for a food-web analysis. This analysis is also called structural equation modelling (Keith 2019; Cunningham *et al.* 2020), and will allow us to measure the interconnected dynamics of each of animal and threat, and investigate whether our management was effective.

Now we have established the distribution and abundance of plains mouse in the South Gap EPBC offset area, we will conduct further ecological research in 2023. This might include a targeted study on which specific herbivores are exerting the greatest grazing pressures on the cracking clay soils (plains mouse preferred habitat), a wider distribution study of plains mouse for the surrounding region, and a study on the details and threats to plains mouse warrens.

5 Conclusions and future priorities

Plains mouse have had a major resurgence during 2022 at the South Gap EPBC offset area, and both activity rates and spatial spread across have increased dramatically since 2021. This would likely be due to both the increased rainfall and effective feral herbivores and predator management. However, favorable conditions such as these can also lead to increased breeding success for feral animals and weeds elsewhere in region, and lead to pressures from constant reinvasion. Management of feral herbivores, predators and weeds will continue to protect plains mouse present on the South Gap SEB offset area in 2023.

Our plans for 2023 include:

- Strengthen the perimeter stock fence to reduce incursions by sheep and goats
- Continue detailed flora monitoring
- Increase feral predator control efforts if an increase in feral predator activity is recorded
- Begin research into the ecology and habitat preferences of plains mouse in the region



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