

Koolyanobbing Iron Ore Expansion Project Mt Jackson J1 Deposit

EPBC 2008/4449 ANNUAL COMPLIANCE ASSESSMENT
REPORT 2024

April 2025



Revision History

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A	09/04/2025	J. Lambert	N Learoyd	N Learoyd	Draft – for internal review
B	15/04/2025	J. Lambert	N Learoyd	N Learoyd	Final Draft – for internal review
0	28/04/2025	J. Lambert	M Blacklow	A Bailey	Final – for submission to Agency

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1 INTRODUCTION

1.1 Project Overview

Mining has occurred at Koolyanobbing since the 1960's. Formerly known as Portman Iron Ore, Cliffs Asia Pacific Iron Ore Pty Ltd (Cliffs) recommissioned the operations following closure by BHP Pty Ltd in the early 1980's and operated the mine from 1994 until 2018.

Cliffs ceased mining operations at Koolyanobbing in early 2018 and entered into an Asset Sale Agreement with Mineral Resources Limited (MinRes) on 12 June 2018. The transaction was completed in August 2018 and included the transfer of legal title in Cliffs' mining tenements to MinRes and ownership of all remaining iron ore, fixed plant, equipment, and non-process infrastructure in the Yilgarn and at the Port of Esperance. All assets were transferred to the wholly owned MinRes subsidiary Yilgarn Iron Pty Ltd (YIPL).

YIPL commenced mining at Koolyanobbing in September 2018. Iron ore is mined from a number of open pits, blended, crushed and screened. Ore from the northern operations of Deception, Mt Jackson and Windarling is transported via a private haul road to Koolyanobbing or Carina Operations where it is selectively blended with ore, crushed, and screened to meet market specifications. The final product is transported to Esperance Port by rail.

The location of Mt Jackson, Windarling and Deception mines are shown **Figure 1**.

1.2 Approvals History

From 2003 to 2012, the Yilgarn Operations were regulated by seven (7) Ministerial Statements issued by the Western Australian Minister for Environment under s45 (5) of the *Environmental Protection Act 1986* (EP Act) and two Approvals issued by the *Department of Environment and Energy* (DoEE) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). In September 2012, Cliffs was approached by the Office of the Environmental Protection Authority (OEPA) to investigate the potential consolidation of the aforementioned Ministerial Statements into a single Ministerial Statement.

Cliffs was granted environmental approval for the consolidation of previous statements under both s45C and s46 of the EP Act on 24 September 2014 through Ministerial Statement 982 (MS982).

Negotiations then began between Cliffs and the DoEE to consolidate conditions under approvals EPBC 2001/174 and 2008/4449. The main aim was to reduce duplication of conditions that are covered at a State level under MS982. The variation to the conditions of EPBC 2008/4449 was granted under section 143 of the EPBC Act on 19 September 2016. A number of redundant conditions were revoked, and the remaining conditions amended to reflect the current operating status. A summary of amendments to the conditions of EPBC 2008/4449 is provided in **Table 1**.

YIPL assumed responsibility for these approvals in the third quarter of 2018, following the Asset Sale Agreement between Cliffs and MinRes.

Transfer of EPBC 2008/4449 from Cliffs Asia Pacific Iron Ore Pty Ltd (Transferor) to Mineral Resources Limited (Transferee) occurred on 25/04/2024.

1.3 EPBC 2008/4449

EPBC 2008/4449 outlines conditions regulating the mining of iron ore at Mt Jackson J1 Deposit, which is located approximately 70 km north of Koolyanobbing.

The approved action for EPBC 2008/4449 is:

- To construct and operate the J1 iron ore mine and haul road on the Mount Jackson Range, approximately 100 kilometers north-north-west of Southern Cross, Western Australia, as described in the referral submitted 5 September 2008 (EPBC 2008/4449 and as described in the Environmental Impact Assessment (Revision C) documentation submitted 29 June 2009.

Table 1 and **Figure 2** highlight the locations of operations relating to this EPBC Approval.

TABLE 1: KEY EPBC 2008/4449 APPROVAL AMENDMENTS

DATE	AMENDMENT	APPROVAL
19 September 2016	Removal of Conditions 1-8	Replaced with current conditions 1-8
	Remove Annexure A & B	Substituted with Attachments 1 & 2
	Revoke Annexure C & D	Removed
	Remove definitions	Replaced with current definitions

1.4 Annual Compliance Assessment Report

This Annual Compliance Assessment Report (ACAR) was prepared in accordance with EPBC 2008/4449 conditions for the period between 1 January and 31 December 2024.

The report is endorsed by Mr Ash Bailey, Alternate Site Senior Executive – Yilgarn Operations.

Mineral Resources Limited (ACN) is 118 549 910.

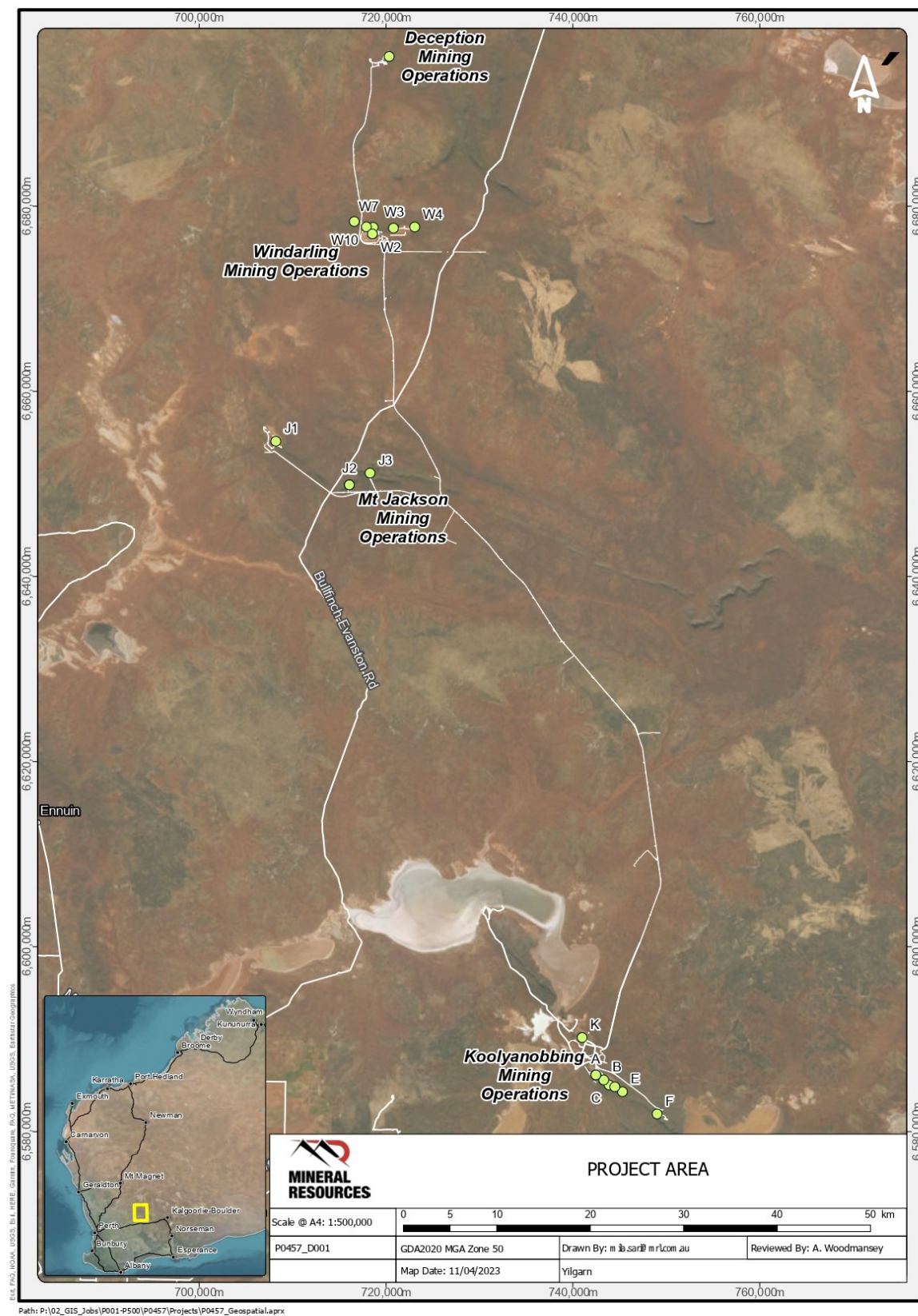


Figure 1: Yilgarn Operations



Figure 2: EPBC 2008/4449 Mt Jackson J1 Approval

2 PROJECT STATUS

During the reporting period, the J1 operation entered an operational pause, with no mining related activities carried out during the 2024 reporting period.

3 COMPLIANCE

3.1 Non-Compliance and Corrective Actions

The licensee was in full compliance with the conditions of EPBC 2008/4449 for the 2024 reporting period. Refer to **Appendices**

Appendix A, Declaration of Accuracy – EPBC 2008/4449.

4 DETAILS OF DECLARED COMPLIANCE STATUS

Assessment of Compliance – EPBC 2008/4449 Audit Table (**Appendix B**) provides the evidence for the compliance status of each implementation Condition for this reporting period.

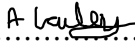
Appendices

Appendix A: Declaration of Accuracy EPBC 2008/4449

Declaration of Accuracy – EPBC 2008/4449

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) 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.

Signed: 

Full name: Ash Bailey

Position: Alternate Senior Site Executive – Yilgarn Operations

Organisation: Mineral Resources Limited (ACN 118 549 910)

Date: 28/04/2025

Appendix B: Assessment of Compliance, EBPC 2008/4449 Audit Table

STATUS OF COMPLIANCE WITH CONDITIONS OF APPROVAL EPBC 2008/4449

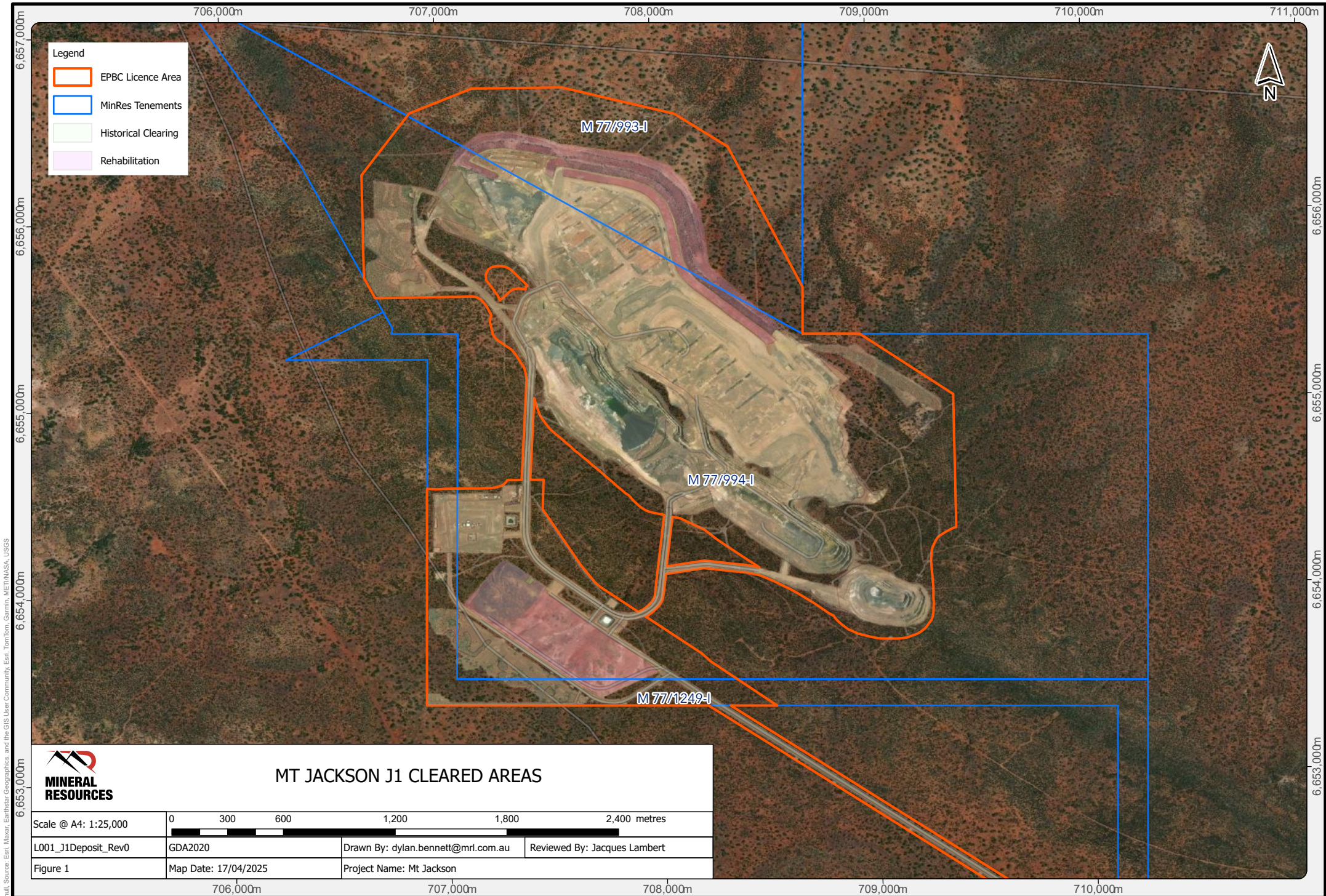
- The Audit Table provides a summary interpretation of the condition requirements applying to the Proposal under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Status: C = Compliant; CLD = Completed; DEL = Deleted; NC = Non – compliant; NR = Not Required at this stage; NA = Not Audited

CONDITION NO.	CONDITION	STATUS	EVIDENCE
1	The person taking the action must not clear an area greater than 605 hectares within the area designated as 'Area approved for clearing (605 hectares maximum)' as shown at Attachment 1 and Attachment 2.	C	385.97 hectares within the approved clearing area has been cleared to date. During the 2024 ACAR quality assurance data review, a discrepancy was noted whereby a disturbance figure of 382.05 hectares was incorrectly reported for the 2023 reporting period. The correct disturbance figure for the 2023 AER period is 385.97 hectares. No additional clearing occurred during the 2024 AER reporting period. See Appendix C - Mt Jackson J1 Clearing.
2	To manage the impact on the <i>Leipoa ocellata</i> (Malleefowl) the person taking the action must implement the Fauna Management Plan approved in accordance with condition 9 of the Western Australia Ministerial Statement 982.	C	The <i>Yilgarn Operations Fauna Management Plan June 2016 (Revision G)</i> was submitted to OEPA in June 2016. OEPA approval of the Plan was granted on 22 September 2016 (OEPA Ref: 16-030656), revised in February 2020. YIPL continues to implement the approved <i>Yilgarn Operations Fauna Management Plan (Revision 1)</i> in accordance with the requirements of condition 9 of MS982. The Yilgarn Operations - Fauna Management Plan contains environmental criteria as required by MS982:9 for Malleefowl mound activity, which if exceeded, initiates response actions in addition to monitoring of Malleefowl breeding activity, conducted annually. All operational activities are assessed against relevant trigger criteria and remained compliant with throughout the reporting period.
3.	The person taking the action must implement the Mine Closure Plan approved in accordance with	C	The licensee continues to implement the approved <i>Yilgarn Operations Mine Closure Plan (Revision 4, 2023)</i> in accordance with Condition 11-3 MS 982.

CONDITION NO.	CONDITION	STATUS	EVIDENCE
	condition 11 of the Western Australia Ministerial Statement 982.		
4.	Within 90 days after the commencement of the action, the person taking the action must Advise the Minister of the actual date of commencement of the action.	CLD	The project commenced on 15 February 2011 and The Minister was formally advised of this commencement via letter on that date.
5.	The person undertaking action must maintain accurate records substantiating all activities associated with relevant to the conditions of approval, including measures taken to implement the management plans required by this approval, and make them available upon request to the Department. Such records may be subject to audit by the Department of an independent auditor in accordance with section 458 of the EPBC Act, of used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's' websites. The results of audits may also be publicised through the general media.	C	All records relating to EPBC 2008/4449 are maintained within the licensee's internal electronic and/or hard copy filing systems in line with statutory records management requirements. Annual reports outlining activities conducted and approved management plans (as required) are made publicly available on the MINRES website. http://www.mineralresources.com.au
6.	By 30 April of each year after the date of the approval, the person taking the action must publish a report on their website addressing compliance with the conditions of the approval	C	The 2024 Annual Compliance Assessment Report and management plans specified in the conditions will be available on the MinRes website by April 30th, 2025. http://www.mineralresources.com.au

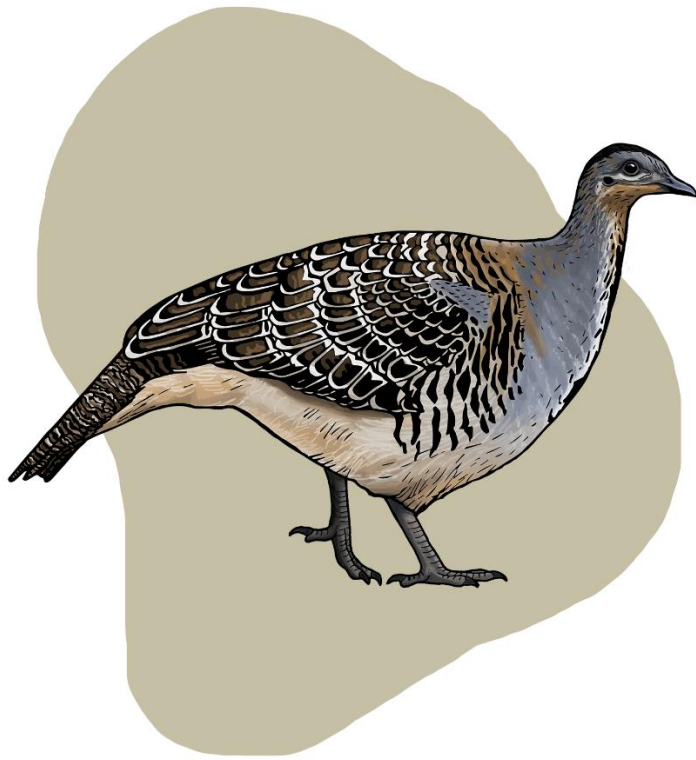
CONDITION NO.	CONDITION	STATUS	EVIDENCE
	over the preceding calendar year, including implementation of any management plans as specified in the conditions. The person taking the action must provide the Department with evidence of publication on the same day the report is published. The person taking the action must continue to meet the requirements of this condition until such time as agreed to in writing by the Minister.		
7.	The person taking the action must notify the Department within seven business days of first becoming aware of potential non-compliance with a condition of the approval. The notification must include details of the potential non-compliance as well as any remediation activities that have been undertaken.	NR	No non-compliances with licence conditions were identified during the reporting period.
8.	If the action has not been substantially commenced within 5 years of the date of this approval the action must not commence without the written agreement of the Minister.	CLD	The project officially commenced 15 February 2011 as evidenced by response to Condition 4. The substantial commencement that has occurred is evidenced by submission of the Annual Compliance Assessment Reports to the DoEE.

Appendix C – Mt Jackson J1 Clearing



Full Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Esri, TomTom, Garmin, METANASA, USGS

Appendix D – Malleefowl Monitoring Program (2024)



Malleefowl Monitoring at w17 Mt Jackson Mine, Western Australia: 2024/25 Season

**Report to Mineral Resources Ltd by National Malleefowl Recovery
Group Inc**

Jan 2025

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Executive Summary

Malleefowl conservation relies on monitoring data collected across Australia which is coordinated by the National Malleefowl Recovery Group (NMRG) in partnership with NRM agencies, private landholders, mining companies, government and other conservation organisations.

This report summarises monitoring data from the National Malleefowl Monitoring Database (NMMD) for the Mt Jackson Site w17 for the 2024/25 monitoring season. Additionally, it reviews the annual monitoring procedures at the site and provides recommendations for future improvements.

Monitoring 2024

- 144 mound records were visited in the field, of which we recommend 87 should be monitored annually, whereas 25 are so degraded that they need only be monitored every five years. 31 of the 144 records were false records as there was no mound at the recorded location.
- 27 mounds were recorded as active, which is amongst the highest recorded at the site.
- Inconsistencies in past monitoring data makes it difficult to interpret breeding population trends with high confidence, but both NMMD trend values, and the proportion of monitored mounds used for breeding, have both increased over the past 20 years. There is no indication of decline.

Monitoring process

- Monitoring at the w17 Mt Jackson site commenced in 2005, but data collection has varied. Some mounds have been monitored annually, others on a 3-year cycle, and some mounds have rarely been monitored. Adding to the confusion, many false records of mounds have been repeatedly monitored even though they had been recorded as false records many years ago.
- During this season, we monitored 144 mounds identified as high priority (i.e. classified as annual on the NMMD, or compliance listed by MinRes as mandatory) but found that only 87 of these mounds met the criteria for annual monitoring as 21 were very old and degraded and 31 were false records (no mound at stated location).
- We recommend MinRes continue the weed out false records and review the classifications of mounds that we did not monitor in 2024, many of which are likely to be false records.
- We also recommend MinRes adopt a more straightforward approach to monitoring that would be more consistent with other monitoring sites across Australia.

Introduction

Malleefowl Monitoring

Malleefowl conservation relies on monitoring data collected from regions across southern Australia. The National Malleefowl Monitoring Program is coordinated by the National Malleefowl Recovery Group (NMRG) in partnership with NRM agencies, private landholders, mining companies, government and other conservation organisations. Across Australia, approximately 150 monitoring sites containing over 6000 mounds are monitored annually in accordance to these national monitoring standards.

The NMRG provides on-going monitor training and maintains the National Malleefowl Monitoring Database (NMMD). The aim of the monitoring program is to estimate the trajectory of malleefowl breeding populations at each site, and in aggregate by region and nationally. This information contributes to decisions and management of the species conservation across Australia. Key features of the program include uniform monitoring methodologies across the range of malleefowl which ensures that the collected data are rigorous, accurate, and comparable across different geographical areas. At each site, most mounds are monitored annually during the breeding season regardless of climatic conditions, with long-unused mounds that are severely degraded visited every 5-years. Malleefowl breeding numbers at sites vary annually due to rainfall and other factors, and detecting population trends requires extended periods of observation unless the trends are particularly pronounced. While estimates of trends for each site and region are reported each year, the NMRG undertakes more elaborate analyses on population trends, and management experiments, every few years as the data accumulate and funds become available (e.g. Benshemesh and Southwell, et al. 2020; National Malleefowl Recovery Group 2023).

Mt Jackson Malleefowl Monitoring

Monitoring at the w17 Mt Jackson site started in 2005 under the management of Cliffs Asia Pacific Iron Ore. The data collected was given to the National Malleefowl Recovery Team at that time and entered into the National Malleefowl Monitoring Database. Monitoring data have been submitted to the NMMD annually since then, most recently by environmental staff or consultants from Mineral Resources (MinRes) and is managed by the NMRG.

The primary goal of the monitoring program is to describe trends in malleefowl breeding populations. However, there are a number of issues with the w17 monitoring dataset that makes the determination of trends more difficult than at other sites.

Firstly, there has been inconsistency in which mounds are monitored each year. The number of mounds monitored in the 10 designated site-parts that comprise site w17 has also varied each year (Table 1), which complicates or potentially invalidates direct comparisons in the number of active mounds across years. Part of this variability is due to some mounds and or areas scheduled for monitoring every three years rather than annually. To provide a more consistent foundation for describing trends in breeding numbers, Mineral

Resources (MinRes) provided us with a list of 83 ‘compliance mounds’ which provides a core set of mounds that are monitored annually. The compliance-mound set included 55 mounds that have been recorded as active at some time in the past 18 years, plus an assortment of other mounds. The number of compliance mounds monitored each year also varies over time (Table 1 and Figure 1 below) but is nonetheless a more consistent dataset for comparison across time

Table 1: Number of NMMD annual mounds that were monitored each year

<i>SitePart</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2022</i>	<i>2023</i>
A	22	18	17	23	4	29	2	4	23	4	15	16	5	8	11	4	14	15
B	7	6	8	4	2	9	2	3	8	3	7	8	3	8	7	4	5	7
C	39	40	16	29	22	24	21	22	21	34	12	12	31	9	6	31	7	6
D	0	36	34	26	4	11	4	12	12	26	27	27	26	26	13	24	13	13
E	0	0	0	12	10	22	14	12	10	7	12	8	5	14	4	4	13	4
F	0	2	13	17	0	34	0	3	3	33	34	36	36	27	7	30	5	5
G	0	0	0	0	7	16	8	11	48	11	10	45	10	10	40	13	12	0
H	0	0	0	0	0	1	55	57	19	18	58	20	19	57	19	18	60	2
O	0	0	0	4	4	11	10	20	8	8	22	13	12	18	8	12	19	6
Z	3	3	3	2	1	3	1	3	3	3	3	3	3	3	3	3	3	1
Total	71	10	91	11	54	16	11	14	15	14	20	18	15	18	11	14	15	59
		5		7		0	7	7	5	7	0	8	0	0	8	3	1	

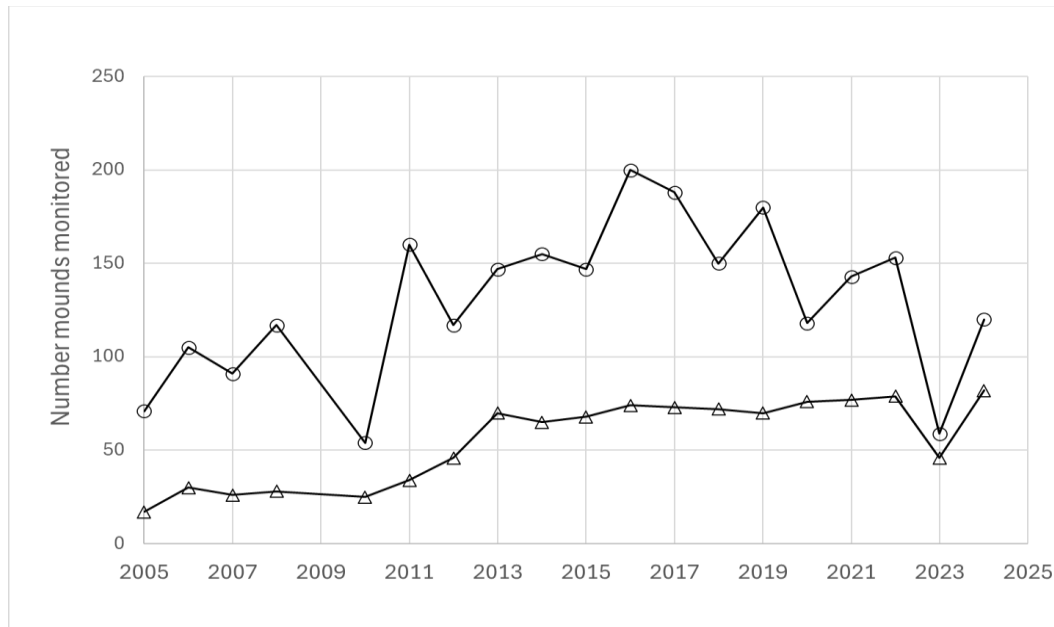


Figure 1: The number of compliance mounds (triangles) and total number of mounds monitored (circles) at w17 from 2005 to 2023 (source: NMMD)

Secondly, the site was originally partitioned into a series of 'site-parts' by previous mine managers, but since then newly found mounds have not always been correctly placed within the appropriate site-part. In the national malleefowl monitoring program, site-parts are geographically discreet areas which differ in regard to monitoring history or practise, environment or management, and are used to distinguish different areas for analysis. For instance, if an extension is made to a site after several years of monitoring, the new area will be analysed separately from the original site.

Thirdly, the NMRG has faced challenges in accessing and managing the monitoring data collected at site w17, particularly over the past few years. Significant time and effort have been invested in pursuing and adjusting this data. This poor communication between the NMRG and consultants has led to important corrections made by the NMRG to the monitoring lists not being implemented. For instance, numerous 'mounds' have been monitored for several years, despite having been identified from photographs or observer comments as not being malleefowl mounds long ago. They continue to be monitored because local monitoring lists have not been updated with current information on the NMMD.

The consequence of these systemic problems with the dataset is that the data is often difficult to interpret with the standard approach the NMRG uses to determine local and regional trends.

This Report

In this report we present monitoring data for the 2024/5 malleefowl breeding season. We aimed to visit all mounds that MinRes mandated for monitoring (henceforth termed the compliance list) plus other mounds that were most likely to be used for breeding and are classified on the NMMD as annual mounds, to best assess the breeding population's status based on available information.

We also review the w17 dataset and correct errors that have accumulated over many years and led to an inflated monitoring list that includes mounds that are non-existent but have been repeatedly monitored. The w17 dataset also appears unnecessarily complex and difficult to interpret and analyse compared with other monitoring sites across Australia. Our goal is to improve the efficiency and effectiveness of the monitoring program at w17, ensuring it aligns with other sites across Australia, enabling more streamlined processes and effective analysis.

Methods

Pre-monitoring

The NMMD provided a central source of malleefowl monitoring data. We made the following changes to the NMMD mound registrations to bring the data up to date:

- We added 32 mound records to the NMMD from the 2023 Phoenix Environmental Malleefowl Monitoring report (Phoenix Environmental Sciences, 2023) that had not been added to the NMMD. Assessing data and photos for these mounds, we classified 4 as annual, 26 old and degraded mounds were classified as 5yr, and 2 mounds were omitted from future monitoring as they were not considered to be mounds.
- We performed a desktop review of the mounds scheduled for annual monitoring in 2024 season to ensure that the classifications on the NMMD were accurate. We examined recent records of annual mounds and on the basis of data and photos reclassified 29 annual mounds to a 5-year monitoring schedule as they met the criteria of being old, eroded, and low (< 10cm rim height), and 3 mounds were omitted from future monitoring as they represented duplicate records or were not considered to be mounds.
- Mineral Resources staff provided us with a list of 83 'compliance mounds' which were prioritised for monitoring in 2024. This list included all mounds that had been recorded as active at some time over the past 18 monitoring seasons (55 mounds), plus an assortment of 28 other mounds that were selected for unspecified reasons or as a random sample, many of which had previously been determined as not being mounds. Nonetheless, all compliance mounds were scheduled for monitoring in 2024.

As a result of the above additions and mound schedule changes before monitoring in 2024, there were 170 records of mounds at w17 that were classified as annual and scheduled for monitoring in 2024. All of these mounds were targeted for monitoring in 2024.

In addition, the NMMD showed 165 mounds that were severely degraded but still recognisable as mounds and were scheduled for monitoring every 5 years, and 97 records were omitted from future monitoring because they were not malleefowl mounds and considered not worth monitoring. Five-year mounds were not the target of 2024 monitoring.

All field monitoring methods followed those described in the National Malleefowl Monitoring Manual (2024). Appendix 1 provides summary of mound characteristics recorded in the National Malleefowl Monitoring Program and glossary of terms used. All data was uploaded onto the NMMD, and all changes have been recorded on the NMMD.

Results

Overview Overall (review of monitoring process)

In October 2024, NMRG personnel and experienced volunteers visited 146 mounds at site w16, although two of these records were found to be duplicates. A daily log of the field-work undertaken is provided in Appendix 2.

Of the 144 mounds that were checked:

- 130 mounds were sought and found. Data and photographs for all of these mounds were uploaded to the NMMD where they were reviewed by experienced monitoring personnel.
- 11 mound records were sought but no mound was found at the specified location. Past data and photos for these mound records suggested they were false records, likely due to natural structures being mistaken for malleefowl mounds. These 11 mound records included #5, #8, #10, #17, #18, #60, #110, #209, #228, #405, #440. (see Appendix 3).
- Three mound records were not sought but were incidentally found while walking through the site. These mounds included 2 that were new to the NMMD (#450, #451) plus another structure that had been recorded on the NMMD (#284) but omitted from future monitoring in 2018 as it was regarded to not be a malleefowl mound. The two mounds that are new to the NMMD are old, eroded and indistinct, and have been categorised as 5-year mounds, whereas the previously omitted mound has been retained as omitted.

Changes to mound classifications of mounds monitored in 2024 data are shown in Table 2 below. Of the mounds monitored in 2024, 52 were removed from the annual monitoring schedule and placed either on the 5-year schedule (21 mounds) or were omitted from future monitoring (31 records) as a malleefowl mound was not found at the recorded location.

The mounds monitored in 2024 represent 77% of mounds on the NMMD scheduled for annual monitoring, and 6% of 5yr mounds.

Table 2: Mt Jackson w17 changes to mound classifications for 144 mounds monitored in 2024.

	Before monitoring	After monitoring	Change
Annual	131	87	-52
5y	10	25	+ 21
Omit	1	31	+31
Total	142	144*	0

*Includes 2 new mounds

Mounds We Did Not Monitor

Of the 170 mounds scheduled for annual monitoring in 2024, we did not monitor 38 mounds due to unforeseen circumstances that disrupted fieldwork. None of these 38 annual mounds had previously been recorded as active and most had not been monitored for many years (see Appendix 4 for annual mounds missed in 2024), in fact 9 of these registered mounds were not associated with monitoring records suggesting they could not be located again or were false records. Nonetheless, all these mounds should be monitored next year if only to correct NMMD registration records.

Table 3 below shows the current classification of all mounds at the Mt Jackson site in regard to whether they should be monitored annually, 5-yearly, or not at all. There are currently 125 mounds scheduled for annual monitoring, a reduction of 52 (see Table 2 above), and 178 scheduled for 5-yearly monitoring, an increase of 55 mounds (comprising 21 mounds reclassified after monitoring and mounds that were added from Phoenix Environmental reports).

Table 3: Current classification of all w17 mounds registered on the NMMD following monitoring and review

	Pre 2024 monitoring	After 2024 monitoring	change
Annual	177	125	-52
5y	123	178	+55
Omit	102	131	+29
Total	402	434	+32

Compliance Mounds

All 83 compliance mounds were visited and monitored in 2024 of which 26 were active. One active mound that we monitored was not on the compliance list (#83) but was listed for annual monitoring.

The compliance list of mounds comprises 55 mounds that have been recorded as active at some point in the past, along with 28 mounds that have not been recorded as active and in many cases are represented by degraded mounds or were not considered to be malleefowl mounds. Indeed, 20 mound records on the compliance list have been reclassified and removed from annual monitoring schedules: 11 have been reclassified as 5-year mounds and 9 records have been removed from monitoring entirely as there was no mound found at the registered location. There seems little point to prioritising monitoring toward old, disused mounds. Table 4 below summarises these changes.

Table 4: Current classification of w17 compliance mounds following monitoring and review

	Pre 2024 monitoring	After 2024 monitoring	change
Compliance annual	83	63	-20
5y	-	11	+11
Omit	-	9	+9
Total	83	83	

Appendix 5 provides a table listing compliance mounds which are recommended to be omitted and the number of annual mound photo records for each mound on the NMMD.

It is recommended that the following changes be made to a future Compliance listing:

- Retain the 56 mounds at Mt Jackson with active history (including mound #83).
- Of the 27 mounds never recorded as active, 20 should be removed (most are previous 5-year or omit mounds on the NMMD already): Nine (9) compliance mounds should be omitted and 11 to be listed as 5-year mounds.
- This leaves 7 mounds on the compliance list without any previous active history.

Activity Trends

As previously discussed, determining the breeding population trend at Mt Jackson is more difficult than at many other sites in the national malleefowl monitoring program for various reasons, particularly because the monitoring data has been irregular and not always consistent with national monitoring standards.

Appendix 6 shows the history of 56 mounds that have been recorded as active at w17 at least once with their activity status in each season to 2024.

Figure 2 below shows the trend at w17 based on past and current monitoring data along with the number of site-parts that were monitored each season. The graph presumes that the count of active mounds within each site-part is accurate, although this assumption is questionable due to the variability in the number of mounds monitored each season (refer to Table 1 and Figure 1 for details). Assuming the number of active mounds is accurately

represented, the trend in breeding malleefowl at w17 is positive with peaks occurring between 2013 and 2016, and between 2022 and 2024 (see Figure 2) where breeding numbers were well above the average for the site generally, although not always coinciding with years of higher rainfall (see Figure 3 below).

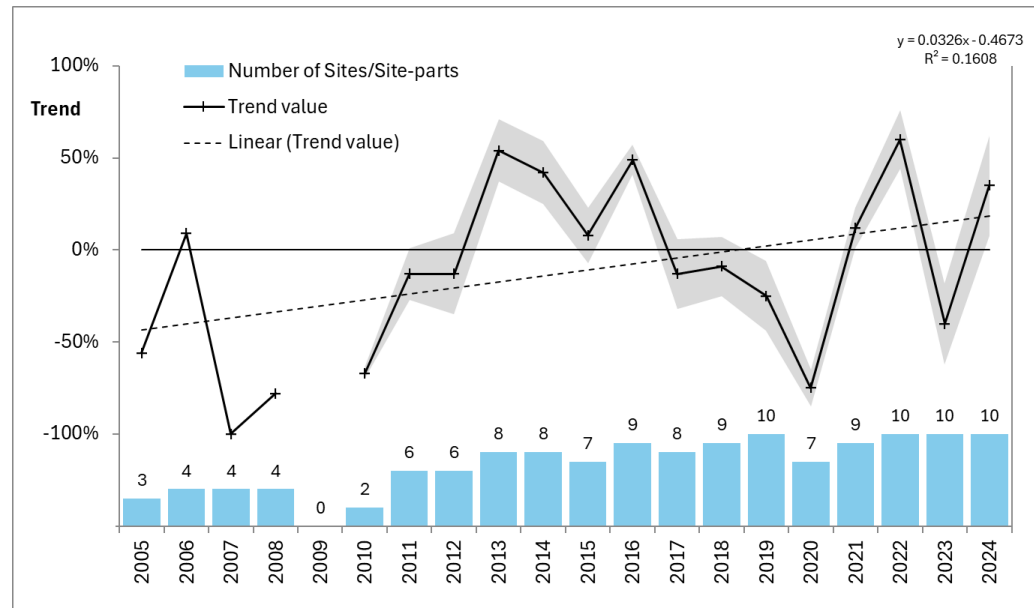


Figure 2. Malleefowl population trend at w17 based on past and current monitoring data along with the number of site-parts that were monitored each season. Trend values below zero indicate decline, and above zero indicate increase, in relation to the long-term average. Shading represents standard error values about the trend values.

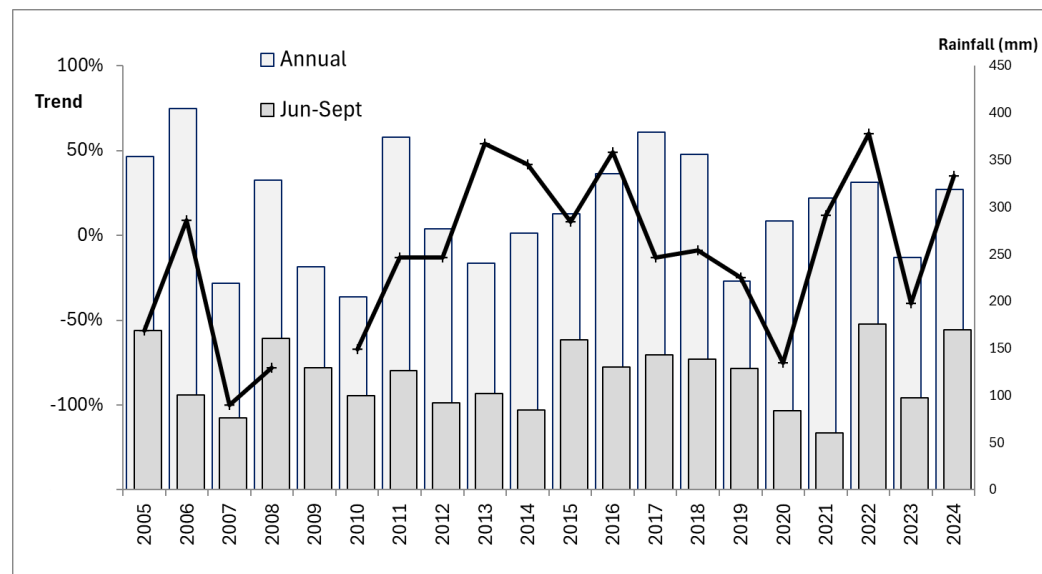


Figure 3. Malleefowl population trend (line) and annual and winter (June-Sept) rainfall (histograms) at Bullfinch, 70 km south of w17 (source: BoM).

Given the uncertainty in the monitoring data underlying the NMMD trend graph, examining the trends in alternative ways is warranted. The compliance list is valuable in this regard because it is a more consistent dataset across seasons and contains all mounds that have been recorded as active. Figure 4 shows the proportion of malleefowl mounds that were active and the number of compliance mounds that were monitored each season. The data suggests a positive trend (red dotted line) in the proportion of monitored compliance mounds that were used for breeding and is qualitatively similar to Figure 3.

While there are uncertainties in the w17 dataset, the available data suggest that the malleefowl breeding population has been neutral or increasing since monitoring began in 2005. This trend is particularly evident in the data collected since 2013, when compliance mounds were monitored more consistently.

The trend in malleefowl breeding numbers at w17 is broadly consistent with regional and statewide trends in that the population in the last two decades has been stable or increasing, although longer term trends suggest declines (see Figures 5 and 6 below).

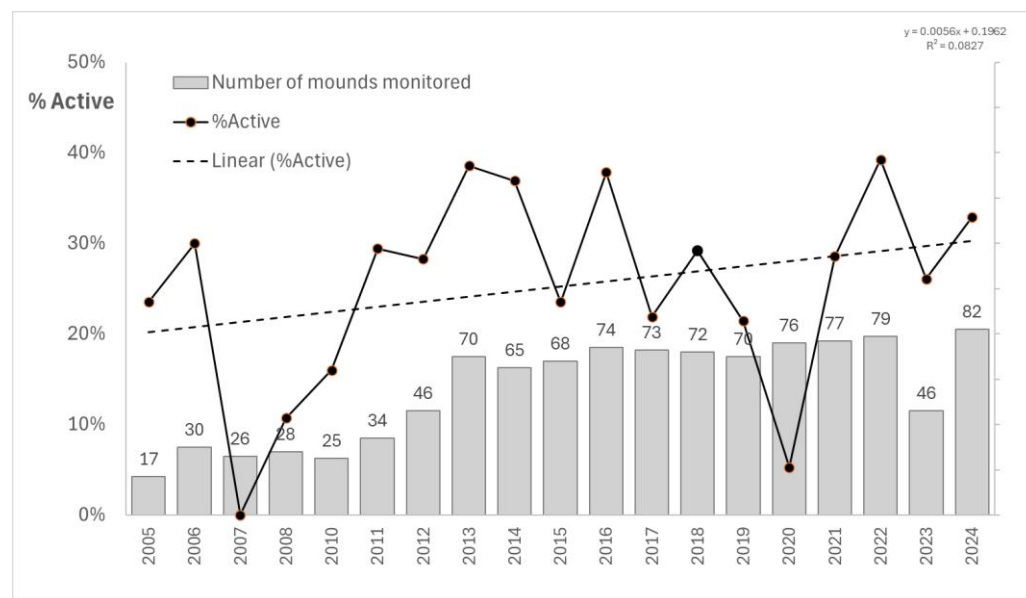


Figure 4. The proportion of malleefowl mounds that were active (solid line) and the number of compliance mounds that were monitored each season (grey bars)

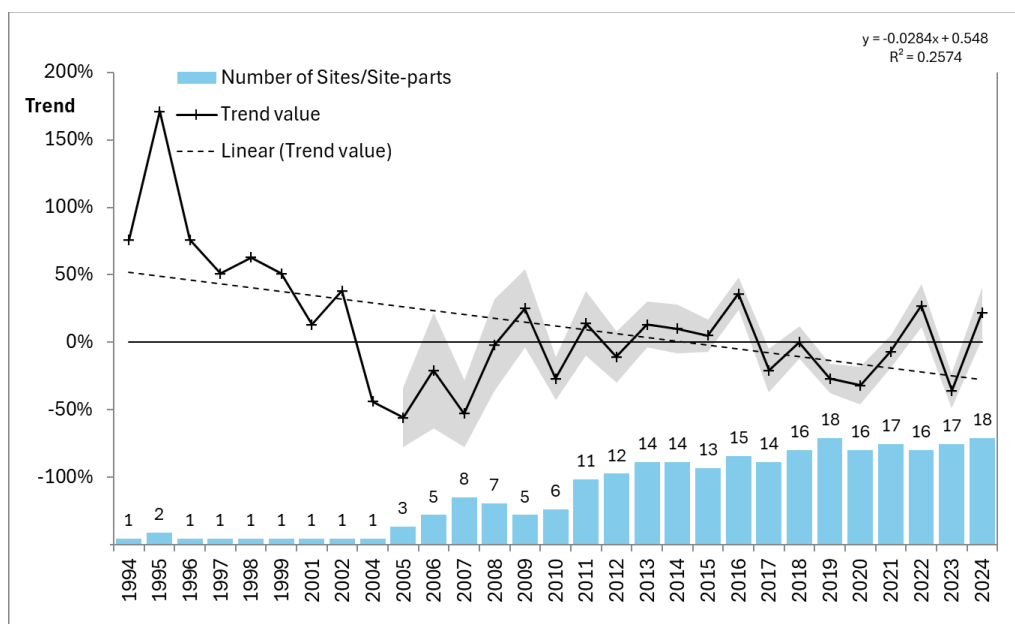


Figure 5. The Wheatbelt NRM region malleefowl population trend over the last three decades along with the number of site-parts that were monitored each season. See Figure 2 for explanation.

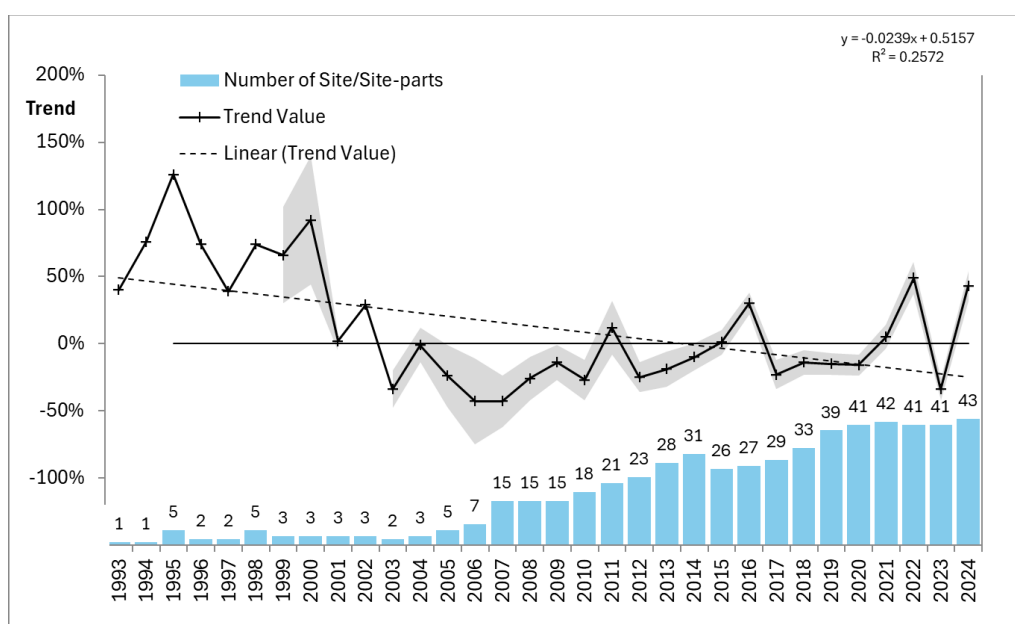


Figure 6. WA malleefowl population trend over the last three decades along with the number of site-parts that were monitored each season. See Figure 2 for explanation.

Discussion

Malleefowl Population Trend

Determining trends in malleefowl breeding numbers at w17 was more difficult than at most monitoring sites because of inconsistencies in the mounds monitored each year.

Nevertheless, the high number of malleefowl breeding records in the 2024 monitoring results suggests that the population trajectory is neutral or positive, and unlikely to be negative. For instance, NMMD trend indicators are positive (although there are caveats concerning the completeness of past records), and the breeding numbers in 2024 closely resemble the peaks observed in previous years, including 2013, 2016, and 2022. Moreover, a lower proportion of mounds were active between 2005 and 2012 than in 2024, further suggesting a neutral or positive trend in breeding numbers, although fewer mounds were monitored. Malleefowl trends at w17 are broadly consistent with regional and statewide trends.

Monitoring Processes

We encountered several issues with the w17 dataset that made trends difficult to determine and undermine the efficiency and effectiveness of the monitoring program. The most important of these has been the lack of consistency in which mounds were monitored each year and the failure to regularly update mound classifications with field observations. In the past, the large number of mound records at w17 has meant that it was difficult to visit them all every year, and so various decisions were made to reduce the number monitored each year. However, part of the reason the mound list is large is because there are many records that are dubious: of the mounds monitored in 2024, nearly a quarter were false records. We examined each of these records in the field and corrected classifications, and as a result the number of mounds scheduled for annual monitoring shrank by a third. This process should continue until all malleefowl mounds recorded at w17 have been observed, photographed, and categorized as either requiring annual monitoring, needing assessment at least every five years, or deemed unnecessary for further observation.

In 2024 the NMRG team had intended to visit 170 mounds but only managed to monitor 85% of these due to unforeseen circumstances. For the upcoming season, we recommend that all annual mounds be monitored, including the 38 annual mounds that were not monitored in 2024, some of which we anticipate may be reclassified for less frequent monitoring or potentially no monitoring at all. We also recommend monitoring as many 5-year mounds as feasible, excluding those already monitored in 2024, to streamline this list and improve the efficiency of the monitoring program. We expect that a considerable portion of these 5-year mound records may be inaccurate and will be removed from the monitoring list. Conversely, a smaller number may be prioritized for annual monitoring if there are indications that malleefowl are showing interest in them. Once all mounds designated for annual or five-year monitoring have been inspected in the field and their classifications updated, malleefowl monitoring at w17 will become simpler, more manageable, and more aligned with practices at other sites throughout Australia.

For the 2024 monitoring at w17, MinRes provided a list of mounds that were mandated for monitoring that we have referred to as the compliance list. This list includes included all 55 mounds that had been recorded as active in past monitoring. In 2024, 26 of the 27 mounds that were active were on this list and it has served an important purpose, providing a relatively consistent set of mounds for assessing trends. However, we recommend adopting a more straightforward and systematic approach to monitoring by focusing on all annual mounds at the site. This would encompass not only those mounds previously identified as active but also those that are of a shape that may draw the interest of malleefowl and thus may become active in the future. This approach would also be more consistent with other monitoring sites across Australia. In any case, the compliance list should be updated as it currently contains numerous entries for which no mounds could be located in the field, along with records of old, degraded mounds that do not warrant prioritization for monitoring.

Finally, we note that many of the problems with the w17 dataset have arisen because, although the NMMD has been the recipient of monitoring data, the NMMD has not been used to direct which mounds should be monitoring each year by those undertaking the monitoring. This issue would be easily fixed by those undertaking the monitoring requesting an update of mounds that should be monitored each year from the NMRG in September before monitoring occurs. The NMRG does not charge for this service, but requests that monitoring data is promptly uploaded to the NMMD each year so that the data can be checked, updated, validated and ready for analyses of population trends across Australia.

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- Phoenix Environmental Sciences (2021). Annual Malleefowl monitoring report (2021) for the Yilgarn Operations (Mount Jackson), Prepared for Mineral Resources Ltd, March 2022.
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Appendix 1: Summary of mound characteristics recorded in the National Malleefowl Monitoring Program and glossary of terms used

The primary objective of the national malleefowl monitoring program is to determine trends in the breeding populations. This is achieved by first searching an area for malleefowl mounds and subsequently visiting these each year during the malleefowl breeding season to ascertain whether they are used for breeding ('active'). Typically, only about one in ten mounds is active in any year (although this varies greatly) and it is difficult to predict which may be used.

In the field, monitoring involves visiting each known mound either annually, or at least every five years in the case of long unused and very degraded mounds which have a very low (but not zero) chance of becoming active again in any particular year. Each mound visited is described according to a series of characteristics (Table 5 below) and photographed. The observer also records whether they regard the mound as active (i.e. likely to contain eggs). Upon uploading the data to the National Malleefowl Monitoring Database, this assessment of whether the mound is active is cross-checked with observed characteristics to ensure its accuracy.

Terms used:

Active/inactive mounds: Active mounds are defined as those that are prepared for breeding to the stage where they may contain eggs. Inactive mounds are mounds that are not classified as active.

Annual mound: A mound that is routinely monitored as part of the annual monitoring program.

Optional or 5-year mound: A mound that is not routinely monitored as part of the annual monitoring program but should be checked at least every 5 years to confirm their continued inactivity. Monitors have the option of monitoring these mounds each year. Also known as a 5-year mounds, they are generally very low (height less than 10cm), inconspicuous mounds that have not been regarded as active for at least 20 years and have a demonstrably very low probability of becoming active again.

Site-part: These are geographically discreet areas within a monitoring site, which differ in regard to monitoring history or practise, environment or management.

Trend: Trend is calculated here as the breeding number at each site each season minus the long-term average, divided by the long-term average for that site. To obtain a regionally representative score for each season, a weighted average of these values across monitored sites is calculated and expressed as percentages (statistics are weighted regarding the long-term averages at each site). Trend values can range from -100% (indicating no breeding compared to previous occurrences) to values greater than +100% (indicating breeding numbers much higher than the long-term average). Trend values below zero indicate decline, and above zero indicate increase, in relation to the long-term average.

Table 5 Mound characteristics

Criterion	Definition
Profile	The shape of the mound, which is assigned a number from 1 to 6 based on characteristics Described in the National Malleefowl Monitoring Manual 2024.
Scaped	Whether or not the surface of the mound has recently been raked by malleefowl. Refers to the entire surface of the mound and not isolated diggings or scratchings.
Eggshells	The presence of eggshell on the mound, an indicator that the mound contained eggs and was active in previous years.
Cross-sticks	Whether or not cross sticks are apparent on the mound. Cross-sticks are routinely placed at the centre of a mound.
Inner crust	Whether or not a crust on the surface of the mound.
Inner herbs	Whether or not there is vegetation growing/present on the inner surface of the mound.
Inner moss	Whether or not there is lichen/moss on the inner surface of the mound.
Fauna tracks	Whether or not there are tracks on the mound of other animals of interest (e.g. fox, kangaroo, goat, pig, etc).
Fauna scats	Whether or not there are identifiable fauna scats on the mound.
Lerps	Whether or not there are lerps (a white sugary secretions produced by tiny sap-sucking scale insects (Psyllids)) on the mound.
Mound photograph	A photograph of the entire mound is taken.
Height north	The height of the rim above ground level on the northern side of the mound.
Height south	The height of the rim above ground level on the southern side of the mound.
Outer diameter	The distance from northern to the southern outer edges of the mound.
Mound depth	The depth from the base of the centre of the mound to the top of the rim.
Rim diameter	The distance from the northern to the southern topmost part of the rim.
X-sticks replaced	On leaving, whether or not cross-sticks are on the mound. cross-sticks are not placed on mounds that are unambiguously active or active.

Appendix 2: Mt Jackson w17 Malleefowl Monitoring Field Summary

National Malleefowl Recovery Group

Mt Jackson Malleefowl Monitoring

Field Summary 10th to 26th October 2024

Elizabeth Kington, NMRG Contract Manager

30th October 2024

Overall summary

146 mounds monitored (target 170) including 83 MinRes Compliance mounds.

Day 1 – Thursday 10th October

No mound monitored (HSE target 5)

NB. All 8 contractor inductions, mine-spec utility inspection, JHA established and drive from Koolyanobbing to Windarling.

Day 2 – Friday 11th October

32 mounds monitored (HSE target 55) – NMRG Map E completed

First mound monitored at 9:12am

Last mound monitored at 12:56pm

4 teams (8 individuals)

NB. Late start due to set up delays (start-time, kits set up, housing) and JHA review process

Max. temperature: 31°C.

Day 3 – Saturday 12th October

47 mounds monitored (HSE target 55) – NMRG Maps C & D completed

First mound monitored at 6:58am

Last mound monitored at 11:57pm

4 teams (8 individuals)

NB. JHA review & early start. Stood down at 12:00pm due to field accident involving Julie D’Ercole

Max. temperature: 33°C.

Day 4 – Sunday 13th October

57 mounds monitored (HSE target 55) – NMRG Maps A & B (and residual C) completed

First mound monitored at 8:00am

Last mound monitored at 4:30pm

4 teams (8 individuals), including MinRes Juliana (replacement for Julie D’Ercole)

NB. JHA review & later finish. One vehicle returned early at 1:00pm

Max. temperature: 33°C.

Day 5 – Monday 14th October

3 mounds monitored (HSE target 5 mounds) – NMRG unmapped mounds monitored

First mound monitored at 10:30am

Last mound monitored at 12:32pm

1 team (3 individuals), including MinRes David (OH&S Advisor)

NB. JHA review, JMP & Fatigue forms completed. Late start due to airport drop at 7:30am and early finish due to drive to Perth post-monitoring

Max. temperature: 32°C.

Day 6 – Monday 26th October

6 mounds monitored (target 6 mounds).

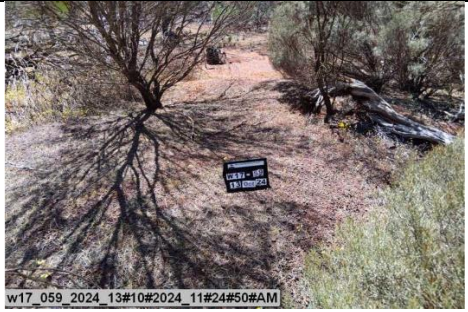
Compliance mounds

A total of 83 compliance mounds were monitored, representing all mounds on the list.

Appendix 3: Mound records that have been omitted from future monitoring this season

The number photos of each mound on the NMMD includes the 2024 season

NMMD number	2024 Photo		Number photos on NMMD
w17_005			1
w17_007	 w17_007_2024_12#10#2024_10#47#57#AM		4
w17_008			1
w17_010			2

W17_015		2
w17_017	No mound-like structure found in 2024	0
w17_018	No mound-like structure found in 2024	0
w17_059		7
w17_060		1
w17_067		1

w17_070		1
w17_076		14
w17_079		1
w17_110		12
w17_132		9

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w17_158		11
w17_195		1
w17_206		6
w17_209		1
w17_218		1

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w17_225		6
w17_228	No mound-like structure found	0
w17_298		10
w17_304		10
w17_317		9
w17_326		3

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w17_328		12
w17_329		1
w17_345		13
w17_405		1
w17_427		1
w17_440	No mound-like structure found	0

Appendix 4: Annual Mounds that were not monitored (missed) in 2024 showing the number of times the mound was previously monitored

Site	mound	Sitepart	1st monit	Last monit	N monit	Photos
w17	23	A	2004	2020	10	2020
w17	25	A	2004	2014	7	2014
w17	27	A	2004	2011	5	none
w17	34	B	2004	2011	5	2019
w17	41	A	2004	2011	7	none
w17	43	A	2004	2014	6	2014
w17	44	B			0	none
w17	50	C	2005	2014	7	2014
w17	56	C	2005	2021	10	2021
w17	82	C	2005	2009	4	none
w17	86	C	2005	2009	4	none
w17	87	C	2005	2007	3	none
w17	97	D	2007	2021	8	2021
w17	98	D	2007	2021	8	2021
w17	99	D	2007	2021	9	2021
w17	101	D	2006	2021	8	2021
w17	106	D	2006	2021	2	none
w17	114	D			0	none
w17	120	D	2006	2007	2	none
w17	123	D	2006	2009	3	none
w17	130	D			0	none
w17	133	D			0	none
w17	138	D	2006	2006	1	none
w17	151	F	2011	2011	1	none
w17	157	F			0	none
w17	162	F			0	none
w17	165	F			0	none
w17	173	F			0	none
w17	188	F	2007	2021	8	2021
w17	189	F	2015	2021	4	2021
w17	194	F	2007	2021	6	2021
w17	219	E			0	none
w17	255	O	2010	2014	4	none
w17	408	O	2015	2021	3	2021
w17	410	A	2015	2015	1	2015
w17	411	F	2017	2020	2	2020
w17	412	F	2017	2020	2	2020
w17	446	T	2022	2022	1	2022

Appendix 5. MinRes compliance list of mounds showing the recommended changes, the 2024 photo, and the number of photos on the NMMD which were examined in considering status changes

Photos are shown only for mounds where status changes are recommended. 1 addition and 20 exclusions are recommended.

NMMD mound number	Status change	Mound photo 2024	Number of photos on NMMD
W17n083	Add to compliance mound		4
w17n055	Remove from compliance list: 5-year		14

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w17n064	Remove from compliance list: 5-year	 w17_064_2024_13#10#2024_9#38#02#AM	14
w17n119	Remove from compliance list: 5-year	 w17_119_2024_13#10#2024_8#39#56#AM	10
w17n207	Remove from compliance list: 5-year	 w17_207_2024_13#10#2024_9#26#21#AM	14
w17n213	Remove from compliance list: 5-year	 w17_213_2024_27#10#2024_10#27#56#AM	13

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w17n216	Remove from compliance list: 5-year	 w17_216_2024_27#10#2024_10#40#01#AM	13
w17n267	Remove from compliance list: 5-year	 W17-267 11 Oct 24	9
w17n333	Remove from compliance list: 5-year	 w17_333_2024_11#10#2024_9#52#21#AM	9
w17n398	Remove from compliance list: 5-year	 w17_398_2024_12#10#2024_10#24#47#AM	12

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w17n400	Remove from compliance list: 5-year		12
w17n449	Remove from compliance list: 5-year		2
w17n076	Remove from compliance list: Omitted from future monitoring		14
w17n110	Remove from compliance list: Omitted from future monitoring		12

w17n132	Remove from compliance list: Omitted from future monitoring		9
w17n158	Remove from compliance list: Omitted from future monitoring		11
w17n298	Remove from compliance list: Omitted from future monitoring		10
w17n304	Remove from compliance list: Omitted from future monitoring		10

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w17n317	Remove from compliance list: Omitted from future monitoring		9
w17n328	Remove from compliance list: Omitted from future monitoring		12
w17n345	Remove from compliance list: Omitted from future monitoring		13
w17n002	Retain		14
w17n024	Retain		15
w17n028	Retain		8
w17n035	Retain		15
w17n038	Retain		15
w17n045	Retain		12
w17n046	Retain		11
w17n047	Retain		10
w17n048	Retain		14

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w17n057	Retain		12
w17n062	Retain		14
w17n073	Retain		5
w17n095	Retain		15
w17n100	Retain		12
w17n102	Retain		11
w17n109	Retain		12
w17n111	Retain		11
w17n112	Retain		12
w17n116	Retain		14
w17n121	Retain		13
w17n126	Retain		14
w17n129	Retain		14
w17n136	Retain		10
w17n150	Retain		12
w17n167	Retain		10
w17n184	Retain		9
w17n186	Retain		11
w17n204	Retain		13
w17n222	Retain		10
w17n223	Retain		10
w17n244	Retain		11
w17n247	Retain		14
w17n263	Retain		13
w17n283	Retain		7
w17n288	Retain		13
w17n294	Retain		7
w17n301	Retain		12
w17n303	Retain		13
w17n312	Retain		10
w17n327	Retain		13
w17n349	Retain		12
w17n354	Retain		12

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w17n356	Retain		12
w17n360	Retain		7
w17n368	Retain		10
w17n369	Retain		12
w17n373	Retain		8
w17n375	Retain		11
w17n376	Retain		12
w17n380	Retain		12
w17n384	Retain		11
w17n386	Retain		12
w17n389	Retain		8
w17n390	Retain		12
w17n391	Retain		11
w17n395	Retain		12
w17n403	Retain		13
w17n409	Retain		8
w17n415	Retain		2
w17n417 (MTJL031)	Retain		2
w17n418 (MTJL032)	Retain		2
w17n436 (MTJL017)	Retain		2
w17n448 (MTJL029)	Retain		2

Appendix 6: History of 56 mounds that have been recorded as active at w17 at least once with their activity status in each season to 2024

A= Active; n=not active; blanks indicate the mound was not monitored

w17_#	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
24	n	n	n	n		n	A	A	A	A	A	A	A	A	n	n	n	n	n	A
28	n	n	n	n			n			n		n	n		A	n	n	n	n	n
35	n	n	n			n	n	n	A	A	n	n	n	n	n	n	n	A	n	A
38	n	n	n			n	A	A	A	A	A	A	A	A	n	n	A	A	n	A
45	A	A	n	A			A		A	A	n	A	n	n	n	n	A	A	n	A
46	A	A	n	n			A		A	A	n	A	n	A	A	A	A	A		n
47	n	A	n	n			A		A	A	A	A	A	n	n	n	A	A		n
48	A	n	n			n	A	n	n	A	A	A	n	A	n	n	n	n	n	n
57	n	n		n		n	n	n	n	A	n	A	n	A		n	n	A	A	A
62	n	n				A	n	n	n	n	n	n	n	n	n	n	n	n	n	n
73	n			n							n			n			A	A		A
83	n	n	n	n							n			n			n			A
95	A	A	n			n	A	A	A	A	n	n	n	A	A	n	n	A	A	A
100		n	n	n					A	n	n	n	A	n	n	n	n	A	n	n
109		A	n	n					A	A	n	A	n	n	A	A	A	A	A	A
111		A	n	n					n	n	n	n	n	n	n	n	n	n	n	n
112		A	n	A					A	A	n	A	A	n	n	n	n	A	n	A
121		n	n	n		n	A	A	n	n	n	n	A	n	n	n	n	n	A	A
126		A	n	n		n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
129		A	n	n		n	n	n	n	n	n	A	n	n	n	n	A	n	A	A
136		n	n	n			n				A	n	n	A	n	n	n	n	n	A
150							A		A	A	A	A	n	A	n	n	A	A	n	A
167		n	n				n				A	A	A	A	n	n	n	n	n	n
184											A	A	n	A		n	A	A	A	A
186				n			n		n	n	n	n	n	n	n	n	n	A	n	n
204				n		n	n	A	n	A	n	n	n	n	A	n	n	n	n	n
222				n					n			n	n	A	n	n	n	n	A	A
223				A					A			A	A	A	n	n	A	A	A	A
247						n	A	A	n	n	n	n	n	A	n	n	A	A	A	n
263						n		A	A	A	A	A	A	A	A	n	A	n		A
283						A		A					n			A	A	A		A
288						n		n	A	n	A	A	A	n	n	n	n	A		n

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w17_#	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
301						A			A	A	A	A	A	A	A	n	A	A		A
303						A		A	A	A	n	A	A	A	A	n	A	A		A
327						n		n	n	n	n	n	n	n	n	n	n	n		n
345								A	n	n	n	n	n	n	n	n	n	n	n	n
349								n	A	A	n	A	A	n	n	n	n	n		n
354								n	n	n	n	n	n	A	n	n	n	A		n
356								A	A	A	n	n	n	n	A	n	n	n		n
360								n	n			n			A	n	n	n		n
368								n	A			A	n	n	n	n	n	A		A
369								n	n	A	A	A	A	n	n	n	A	A		n
373								n	A			A			A	A	A	n		A
375								A	A	A	A	A	A	A	A	n	A	A		n
376								n	A	A	A	A	n	A	A	n	A	A	A	A
380								A	A	n	n	n	n	A	A	n	A	n		n
386								n	A	n	n	n	n	n	n	n	n	n		n
389								n	A			n			A	n	n	A		n
391								n	n	A	A	A	n	n	n	n	n	n		n
395								n	A	A	A	A	A	A	n	n	A	A		n
403								n	A	A	n	A	n	n	n	n	A	A	A	A
409												A	n	n		n	n	A		n
415																			A	A
418																			n	A
436																		A		n
448																		A		n
num	13	21	19	20		18	20	33	44	39	43	49	47	47	46	50	52	53	30	56
act	4	9	0	3		4	10	13	27	24	16	28	16	21	15	4	22	31	12	27