67751/ 163,126

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1. *Ophisternon candidum* (Vulnerable)– *Blind Cave Eel*

1.1 Background

The Guidelines for the Content of a Draft Public Environment Report: Mulga Downs Iron Ore Mine, WA. *Environmental Protection and Biodiversity Conservation Act 1999* (Reference: EPBC 2022/9255 (October 2022) (PER Guidelines) identified *Ophisternon candidum* (Blind Cave Eel) as one of the listed threatened species which was of particular relevance to the Proposed Action under section 18 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Under the direction of the PER Guidelines quantification of the extent of the Blind Cave Eel present both within and surrounding the Proposed Action Area, details of the resources used to identify and assess the Blind Cave Eel, and whether consultation was undertaken and/or advice sought from local community groups or experts.

Consultation was undertaken with the Assessing Officers from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on the likelihood of the presence of this MNES within the Proposed Action Area as being 'very low to not likely' based on habitat for this MNES not present.

It was accepted that it was highly unlikely that this MNES would be present in the Proposed Action Area nor within the subterranean environment and this species was not required to be considered further.

Evidence of the presence of this MNES, or the lack of, is presented in the Bennelongia 2024 Mulga Downs iron Ore Mine Subterranean Fauna Survey which presented the outcomes of a detailed and intensive targeted survey within the Proposed Action Area and the surrounding landscape.

This memo has been prepared to provide DCCEEW with information on why the Bennelongia 2024 report does not address this MNES as part of the sampling program and why the requirement to address sampling guidelines and conservation advice is not presented in this report. Subterranean fauna is being assessed as a key environmental factor under the *Environmental Protection Act 1986* (EP Act) environmental impact assessment (EIA) for the Mulga Downs Iron Ore Mine (MDIOM). The surveys undertaken were compliant with the guidance for subterranean fauna as required by the Western Australian Environmental Protection authority (EPA) (EPA, 2021) and is detailed in the survey report.

This memo is provided as an addendum to the Bennelongia (2024) report 'Mulga Downs Iron Ore Mine: Subterranean Fauna Survey', prepared for Hancock Prospecting Pty Ltd.

1.2 Ecology

Ophisternon candidum, is the only described Australian species of Blind Cave Eel and is listed as Vulnerable under the EPBC Act and the *Biodiversity Conservation Act 2016* (WA).

O. candidum belongs to the Synbranchidae – a family of eel like fishes which are found throughout the tropics and subtropics. It is one of five species which are subterranean. It is the longest cave fish in the world and only one of three Australian vertebrates restricted to subterranean environments (Moore et al., 2018).

1.3 Habitat

The Blind Cave Eel was previously thought to be restricted to subterranean karstic caves on the Cape Range Peninsula and karstic aquifers at Barrow Island off the Pilbara Coast. On Cape Range, where it was originally discovered, the Blind Cave Eel utilises cave floor sediments characteristic of crustacean-rich cave habitats. It has since been found in the Robe River catchment. In 2009 a specimen was collected from an iron ore exploration bore within Bungaroo Creek – a tributary of Robe River (Biota 2019). Additional sampling found records of the blind eel at 16 locations using sampling and eDNA evidence. The species is now found across the broader Robe River Catchment spanning over 100 km. This distribution was considered to be consistent with the theories proposed by Moore et al (2018).

The core habitat where the Blind Cave Eel was collected is considered to be the saturated alluvium along main channels of the Robe River. The habitat is primarily associated with the Robe River Catchment alluvial aquifers. These are interconnected with no geological or hydrological barriers. The channel iron deposits (CID) below the alluvial aquifer and patches of calcretes appear to provide habitat and potentially refugia.

The presence of the Blind Cave Eel within the Robe River catchment is the result of the species moving upstream. This has been explained using mitochondrial sequencing. Given their ability to migrate they could easily occupy other rivers such as the Ashburton or Fortescue; however, a water gap below Millstream is thought to preclude upstream migration of subterranean fauna (Moore et al., 2018). This has found to be the case with the genus *Halosbaen*a spp. Which like *Stygiocaris* spp. are only found on the coast (Moore et al, 2018). There is low level divergence of *O. candidum* unlike the other stygal taxa from Barrow Island and Cape Range indicating recent connectivity between populations.

Habitat connectivity and wider distribution within the Robe River catchment is also supported by distribution patterns observed in other stygofauna species, with some taxa sympatric with the Blind Cave Eel on Cape Range and Barrow Island also present in the headwaters of the Robe River, including prey items known from Cape Range.

The Blind Cave Eel is known from water with pH of 7-8, salinity (measure as electrical conductivity – EC) of 115 mS/m to 1250 mS/m. It is thought to burrow in faecal ooze characteristic of these habitats but has also been seen lying on rock surfaces in shallow water. The greatest known depth to the water table in which a Blind Cave Eel specimen has been sampled to date is approximately 11.6 mbgl within river alluvium, based on available hydrogeological data (Biota, 2019). The majority of Blind Cave Eels are in semi-permanent to permanent pools and the species continues to be collected from groundwater and surface water pools.

A search of Western Australian listed Threatened Ecological Communities (TEC) and Priority Ecological Communities (PEC) revealed the closest of these to the Proposed Action Area is the Priority 4 PEC 'Stygofaunal community of the Western Fortescue Plains freshwater aquifer'. This PEC is situated approximately 160 km to the north west of the Proposal. There are also two Priority 1 PECs, 'Subterranean invertebrate communities of mesas in the Robe Valley Region' and 'Subterranean invertebrate community of pisolitic hills in the Pilbara', located approximately 201 km and 240 km to the west of the Proposal.

1.4 Surveys in the Proposed Action Area

There have been no targeted surveys for the Blind Cave Eel within the Proposed Action Area. EPBC Protected matter search tool, DBCA's listed species (including NatureMap) and the Atlas of Living Australia (ALA), did not identify any listed subterranean species or other listed communities within 100 km of the Proposal.

However, by default, the sampling methods used to collect stygofauna as part of the EIA under Part IV of the EP Act are considered appropriate for sampling of the Blind Cave Eel (EPA, 2021). The conservation advice for this species is from 2008 and the advice on collection is outdated, stating that this species can only be collected on entry to karstic caves.

This species has been collected using standard phreatic stygal haul nets from the Robe River following a standardised technique as per the EPA guidelines. The guideline for Threatened fish provides no guidance for sampling and is outdated for this species.

The stygofauna sampling program in connection with the Proposal has been extensive. The technique applied for sampling since 2009 complies with the EPA 2021 guidelines and earlier version.

There have been more than 350 drill and bore holes sampled across the Proposed Action Area and in the surrounding area extending along the Fortescue Valley west of the Proposal (refer to Bennelongia 2024) using phreatic haul nets. Up to 572 samples have been collected. The surveys have included detailed and targeted surveys, selecting habitats which have the highest likelihood of stygofauna. This includes any calcrete aquifers and alluvial aquifers over CID which occurs along the Fortescue Valley. The surveys have yielded over 100 species of stygofauna. None of the collections yielded the Blind Cave Eel.

The hypothesis of wider distribution of the Blind Cave Eel within the Robe River catchment is also supported by distribution patterns in other stygofauna species, with some taxa sympatric with the Blind Cave Eel (in Biota 2019). None of the taxa which are sympatric with the Blind Cave Eel, such as *Halosbaena* and *Stygiocaris* species were collected in any of the samples.

There are no permanent or semi-permanent pools in the Proposed Action Area.

1.5 Significance Assessment

No Blind Cave Eels have been found in the Proposed Action Area and areas extending beyond the Action area. There are no karstic or anchialine habitats. Samples collected from the groundwater have not yielded any vertebrate stygofauna. As such, the Proposed Action will not place any population of Blind Cave Eel at risk. The closest population to date is at Robe River, approximately 200 km west of Mulga Downs intersected by Millstream.

1.6 References

Biota (2019) *Blind Cave Eel Survey Interim Report and Assessment*. Report prepared for Rio Tinto

Conservation Advice (2008)- Approved Conservation Advice for the *Ophisternon candidum* (Blind Cave Eel). approved by the Minister/Delegate to the Minister on: 26/3/2008

EPA (2021) *Technical Guidance - subterranean fauna surveys for environmental impact assessment*. Environmental Protection Authority, Perth, 35 pp.

Moore, G. I., Humphreys, W. F., Foster, R. (2018) New populations of the rare subterranean blind cave eel *Ophisternon candidum* (Synbranchidae) reveal recent historical connections throughout north-western Australia. *Marine and Freshwater Research* 69: 1517 – 1524

Attachment A Bennelongia (2024) Mulga Downs Iron Ore Mine: Subterranean Fauna Survey.

Bennelongia
Environmental Consultants

Mulga Downs Iron Ore Mine: Subterranean Fauna Survey

Prepared for:

Hancock Prospecting Pty Ltd

December 2024

Final Report

Short-Range Endemics I Subterranean Fauna

Waterbirds I Wetlands

Mulga Downs Iron Ore Mine: Subterranean Fauna Survey

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Report Version	Prepared by	Reviewed by	Submitted to Client	
			Method	Date
Draft	Huon Clark	Stuart Halse	email	10 April 2023
Draft 2	Stuart Halse	Vitor Marques	email	7 May 2023
Draft 3	Stuart Halse Huon Clark	Vitor Marques	email	31 May 2023
Draft 4	Huon Clark	Robin Hare	email	21 June 2023
Final 1	Huon Clark	Stuart Halse	email	07 September 2023
More sampling	Stuart Halse		email	18 October 2023
More sampling	Stuart Halse		email	14 March 2024
Draft 8	Stuart Halse Vitor Marques		email	24 May 2024
Final 2	Stuart Halse Vitor Marques		email	18 July 2024
Changed footprint	Stuart Halse Vitor Marques		email	7 October 2024
Final 3	Stuart Halse Vitor Marques		email	2 December 2024

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EXECUTIVE SUMMARY

Hancock Prospecting Pty Ltd (HPPL) is proposing to develop the Mulga Downs Iron Ore Mine (MDIOM) on the southern edge of the Chichester Range. The MDIOM comprises a series of above and below water table open-cut mine pits with associated infrastructure. Mining includes the requirement to dewater around the mine pits, with excess groundwater to be reinjected into the aquifer at multiple locations. Mine pit excavation, dewatering and reinjection may each potentially impact subterranean fauna. Pit excavation and rising water level from reinjection will lead to loss of troglofauna habitat, and lowered water table and mixing of groundwater from dewatering and reinjection, respectively, will lead to loss of stygofauna habitat. Anthropogenic groundwater drawdown of ≥2 m and rise of ≥1 m are the commonly used thresholds when considering whether changes will impact subterranean fauna.

Subterranean fauna includes two distinct animal communities: aquatic stygofauna and air-breathing troglofauna. Sampling for subterranean fauna at the MDIOM has occurred in two major survey programs, the first in 2009-2014 and the second in 2019-2024. Collation of survey results shows that 151 stygofauna and 315 troglofauna samples were collected between 2009-2014. An additional 421 stygofauna and 321 troglofauna samples were collected in 2019-2024 with the aim of providing comprehensive, up to date information about subterranean fauna at the MDIOM and their distributions, and to identify any species that may potentially be restricted to the MDIOM.

Combining the results of the 2009-2014 and 2019-2024 survey programs, and accepting the taxonomy in this report as correct, at least 150 stygofauna species have been collected from the groundwater impact areas of the MDIOM and surrounding undisturbed areas. Groups represented include copepods (45 species), ostracods (31 species), amphipods (23 species), annelid worms (19 species), syncarids (18 species), rotifers (five species), isopods (three species), mites (three species), spelaeogriphacids (one species), flatworms (one species) and nematode worms (treated as a single species). Of these, 14 species are currently known only from the defined impact areas of ≥2 m drawdown and ≥1 m mounding associated with reinjection at the MDIOM. None of these species is likely to have been recorded under two names.

Fifty-seven per cent of restricted stygofauna species (eight species) are known from single sites. The linear ranges obtained by sampling at the MDIOM are mostly small and in broad agreement with the ranges provided by other surveys. Use of surrogates, including habitat and the ranges of related species, is recommended by the Environmental Protection Authority in place of additional sampling as a means of estimating likely ranges of singleton species. While detailed habitat characterisation was not available at the time of reporting, range information for related species is available and suggests species such as the five syncarids known only from impact areas are likely to have small ranges.

The 2009-2014 and 2019-2024 survey programs for troglofauna at the MDIOM yielded at least 86 species. Groups represented include diplurans (13 species), isopods (nine species), beetles (eight species), pauropods (eight species), pseudoscorpions (eight species), silverfish (seven species), true bugs (six species), schizomids (five species), centipedes (four species), palpigrads (four species), cockroaches (four species), spiders (three species), symphylans (three species), millipedes (two species), and flies (one species). Up to 41 of these species are known only from within proposed mine pits and areas of predicted groundwater mounding ≥1 m, including 16 species that may reflect use of multiple names. This suggests the number of troglofauna species known only from the proposed mine pits and areas of predicted groundwater mounding is somewhere between 29 and 41 species.

Fifty-two per cent of potentially restricted troglofauna species are known from single sites. The linear ranges obtained by sampling at the MDIOM are mostly small and in broad agreement with the ranges provided by other surveys. The habitat characterisation done by AQ2 suggests that if troglofauna species at the MDIOM occupy single broad geological units, then the species in banded iron formation and calcrete most likely have small ranges because of the small areas of these geologies above the water

table. More generally, all troglobitic species tend to have small ranges that are driven by their biology or various types of barriers within individual geological units and this is reflected in many of the troglofauna species known only from impact areas.

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1. INTRODUCTION

Hancock Prospecting Pty Ltd (HPPL) is proposing to develop the Mulga Downs Iron Ore Mine (MDIOM), located on the southern edge of the Chichester Range and within the Fortescue Valley of the Pilbara Region (Figure 1). It is currently proposed to mine up to 12 million tonnes per annum (Mtpa) of iron ore at the MDIOM

Elements of the MDIOM that may affect subterranean fauna include:

- Excavation of a series of open cut mine pits, most of which extend below the water table;
- Groundwater abstraction for mine pit dewatering (and to supply water for ore processing, dust suppression and mine facilities); and
- Reinjection of surplus abstracted groundwater into selected aquifers through a process referred to as managed aquifer recharge (MAR) (Figure 2).

Some areas at the MDIOM are proposed to experience both groundwater abstraction and reinjection during mine life (Figure 2) but the activities will occur sequentially rather than simultaneously.

This report provides the results of baseline surveys and targeted surveys undertaken to support assessment of the potential impacts of MDIOM development on subterranean fauna, as well as incorporating the results of a small amount of prior historical survey (Bennelongia 2019). The report does not provide an assessment of the likely impacts of mine development on subterranean fauna conservation values but does discuss the distribution of subterranean species in relation to MDIOM development.

Thus, the aims of the report, which should be read in conjunction with Bennelongia (2019), are to:

- Describe the extent of stygogfauna and troglofauna sampling undertaken at the MDIOM;
- Provide a list of stygofauna and troglofauna species collected, with details of DNA analyses undertaken to support the morphological identification process;
- Map the distributions of species known only from areas of impact (groundwater drawdown and mounding, mine pits) at the MDIOM; and
- Discuss stygofauna and troglofauna species distributions and relate occurrence of troglofauna species to geological habitat mapping by AQ2 (2024).

Species currently known only from the proposed impact areas of the MDIOM are sometimes referred to in this report as 'restricted' for brevity. This statement describes the distribution of current records and is not a definitive statement about the full range of the species.

1.1. Subterranean Fauna

By global standards, the Pilbara region supports very rich and diverse subterranean communities (Guzik et al. 2010, Halse et al. 2018a; Clark et al. 2021). Subterranean fauna includes two distinct animal communities: aquatic stygofauna and air-breathing troglofaunal and both are well represented in the Pilbara.

The overwhelming majority of subterranean fauna species in Western Australia are invertebrates, apart from two species of fish and one snake. Troglofauna species belong to a wide variety of invertebrate groups such as isopods, palpigrades, spiders, schizomids, pseudoscorpions, harvestmen, millipedes, centipedes, pauropods, symphylans, bristletails, silverfish, cockroaches, true bugs, beetles and fungus-gnats. On the other hand, most stygofauna species are crustaceans, although they include earthworms, beetles, snails and some other groups that have poorly defined taxonomy, such as nematodes and rotifers (Halse 2018a).

Most subterranean species satisfy Harvey's (2002) criterion for short-range endemism, having total geographic ranges of less than 10,000 km^2 and occupying patchy or discontinuous habitats within those ranges. Eberhard et al. (2009) suggested 1,000 km^2 was a more appropriate threshold for distinguishing

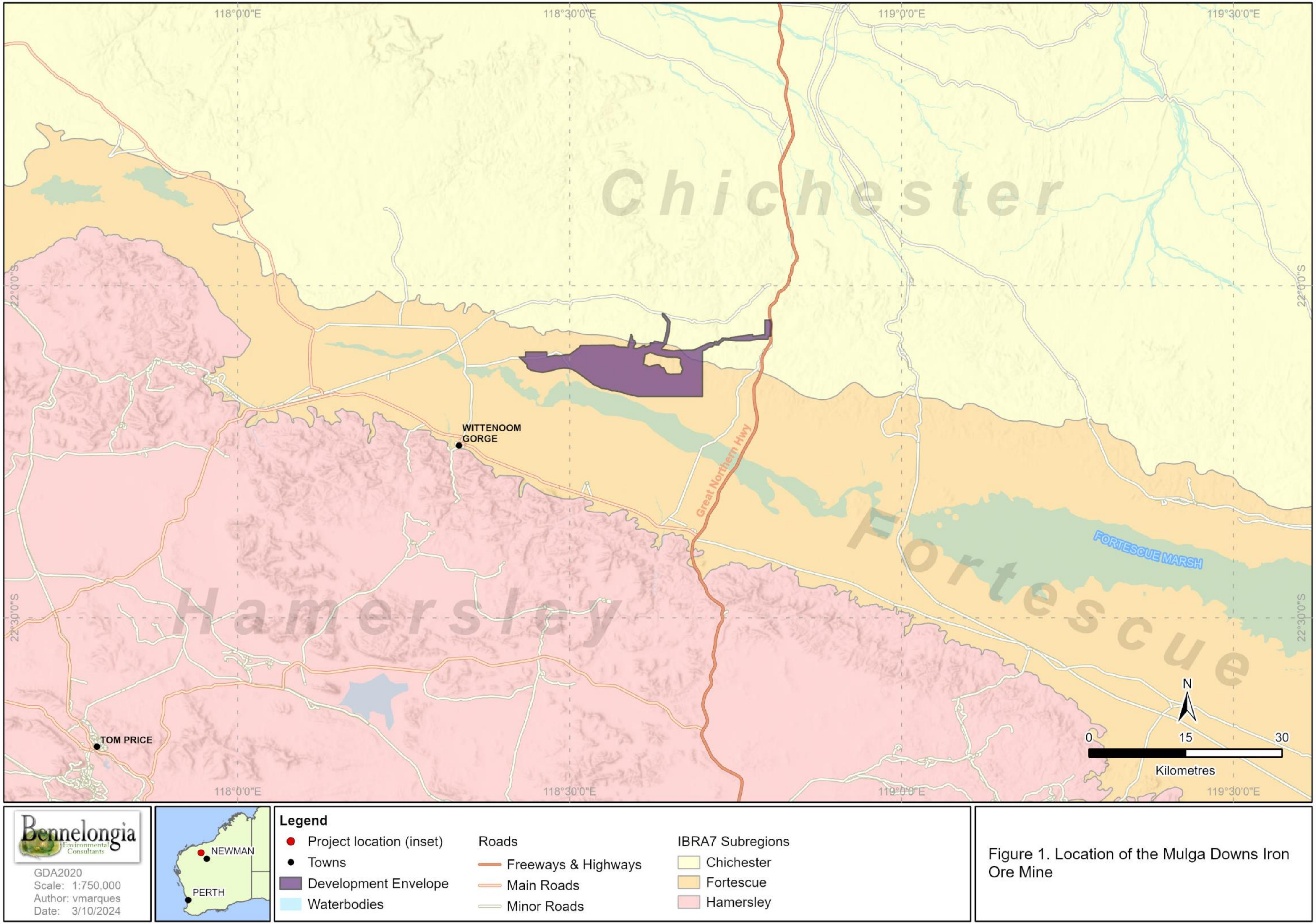
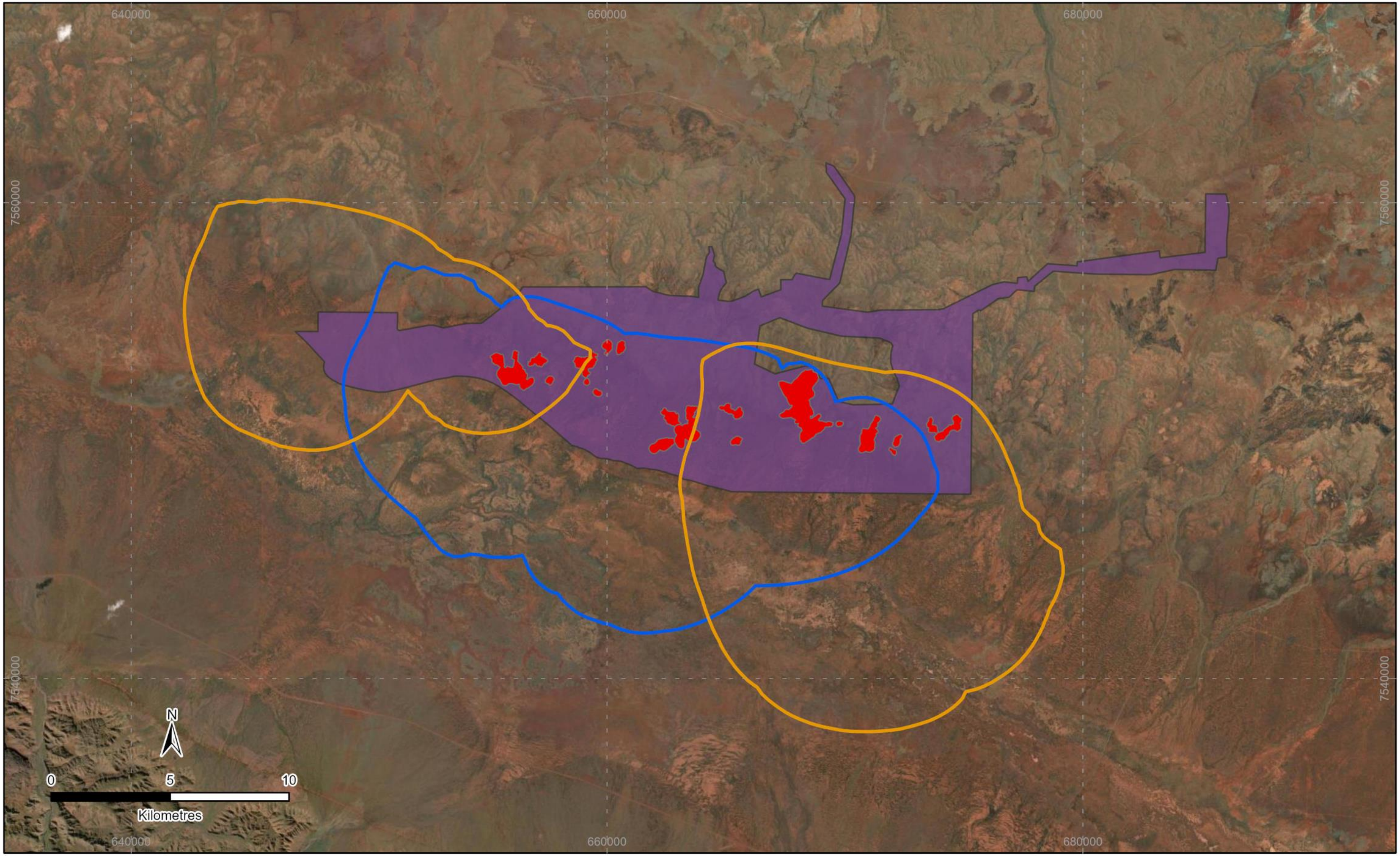


Figure 1. Location of the Mulga Downs Iron Ore Mine



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GDA2020 MGA Zone 50
Scale: 1:200,000
Author: vmarques
Date: 7/10/2024

Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Cumulative 1m Mounding Contours
- Cumulative 2m Drawdown Contour

Figure 2. Proposed impact footprint and development envelope associated with the MDIOM

between small-range and wider-ranges subterranean species. Given that species with small ranges are more vulnerable to extinction following habitat degradation than wider ranging species (Ponder and Colgan 2002), it follows that subterranean taxa with smaller ranges than almost all terrestrial species, are highly susceptible to anthropogenic threats such as large-scale mine excavation and groundwater abstraction.

Subterranean species that are restricted to below-ground environments throughout their life cycles are referred to as troglobites and stygobites, while species that move to the surface during one life stage (or have surface populations in the case of some stygofauna) are referred to as troglophiles and stygophiles. Most troglophiles and stygophiles found in the broad landscape are as dependent on subterranean habitat for survival as troglobites and stygobites (Trajano and Carvalho 2017); there is not graduated dependence on subterranean habitats. The species that use subterranean (and surface) habitats facultatively are referred to as trogloxenes and stygoxenes and usually have large ranges because of substantial surface occurrences.

1.1.1. Subterranean Fauna in the Pilbara

Understanding of the subterranean fauna in the Pilbara has progressed immensely since the late 1990s (early knowledge is summarised by Humphreys 1999; Eberhard *et al.* 2005), in large part due to extensive surveys undertaken to assess the potential impacts of mining on these animals. It is well established that the richness and diversity of subterranean fauna is closely linked to geology because subterranean animals can only colonise areas with appropriate underground spaces in which they can live. Geologies in the Pilbara supporting rich troglofauna communities include mineralised or weathered iron formations, calcrete, alluvium and, sometimes, mafic volcanic rocks. Stygofauna communities are usually richest in alluvial and calcrete aquifers, especially within palaeochannels, although they may also be found in fractured rock of iron formations, especially detrital and channel iron, and granitic greenstone terranes (Halse 2018a).

The dependence of subterranean species on occurrence of underground voids, fractures and interstitial spaces means the richness of both stygofauna and troglofauna collected can vary over distances of less than a kilometre according to the frequency of voids and fractures or the proportion of interstitial spaces. Furthermore, whether individual holes yield animals from habitat containing rich subterranean fauna communities depends on whether the holes intersect voids, fractures of extensive interstitial spaces, which occupy only a very small proportion of the subterranean matrix (Halse et a. 2018a; Howarth and Moldovan 2018). Thus, it is common for more than 50% of holes in rich habitat not to yield subterranean animals even after repeated sampling (Halse 2018b).

1.2. Conservation Framework

Native flora and fauna in Western Australia are protected by both State and Commonwealth legislation. At the national level, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally important flora, fauna and ecological communities. However, while the threatened fauna lists of the EPBC Act contain some subterranean species, they currently place little emphasis on this group of animals.

The legal framework for protection of flora and fauna at the state level in Western Australia is the *Biodiversity Conservation Act 2016* (BC Act). Most protection is provided for species listed under the BC Act as 'threatened' and this list includes many subterranean species. In addition to the list of threatened species under the BC Act, the Department of Biodiversity, Conservation and Attractions (DBCA) maintains a list of priority species that are of conservation importance but, for various reasons, do not meet the criteria for listing as threatened under the BC Act. This list also contains some subterranean species.

Both the EPBC and BC Acts provide frameworks for the protection of threatened ecological communities (TECs). Within Western Australia, DBCA also informally recognises communities of potential conservation concern, but for which there is not enough information to support listing, as priority ecological communities (PECs). The list of TECs and PECs recognised under the BC Act and by DBCA is larger than the EPBC Act TEC list and has much greater focus on subterranean communities.

2. SURVEY METHODOLOGY

This report covers the results of the surveys for HPPL at the MDIOM and surrounds between 2009 and 2024. It also includes results of a small amount of earlier sampling undertaken in the MDIOM by the Western Australian Museum and DBCA for research purposes (Halse *et al*. 2014).

2.1. Sampling Methods

The approach to, and methods used in, all surveys for HPPL conform with the latest guidance provided by the Environmental Protection Authority (EPA 2016a,b, 2021). Surveys from 2019-2024 were conducted under Regulation 27 licences BA27000090 and BA27000599. Methods used in 2009-2014 surveys were also conducted under licences under the earlier *Wildlife Conservation Act 1950* (EPA 2007).

2.2. Sampling effort

Surveys for HPPL were conducted in two time periods, with much of the impact area sampling occurring in 2009-2014 and targeted impact and reference area sampling occurring in 2019-2023. Full accounts of the 2009-2014 survey effort and methods are provided by ecologia (2011), Phoenix (2013) and Bennelongia (2014).

Approximately 151 stygofauna and 315 troglofauna samples were collected between 2009 and 2014, with the exact number varying according to how sample effort was calculated in the different surveys (Table 1, Figure 3). Stygofauna sampling effort was lower than troglofauna effort in 2009-2014 partly because early sampling designs assumed mining would be restricted to above the water table. Stygofauna sampling effort was greater between 2019 and 2024, with 421 stygofauna samples and 321 troglofauna samples collected (Table 2, Figure 4). Altogether, 1208 subterranean fauna samples were collected to make the MDIOM and surrounds an intensively sampled area.

Table 1. Sample effort for subterranean fauna within the MDIOM in 2009-2014.

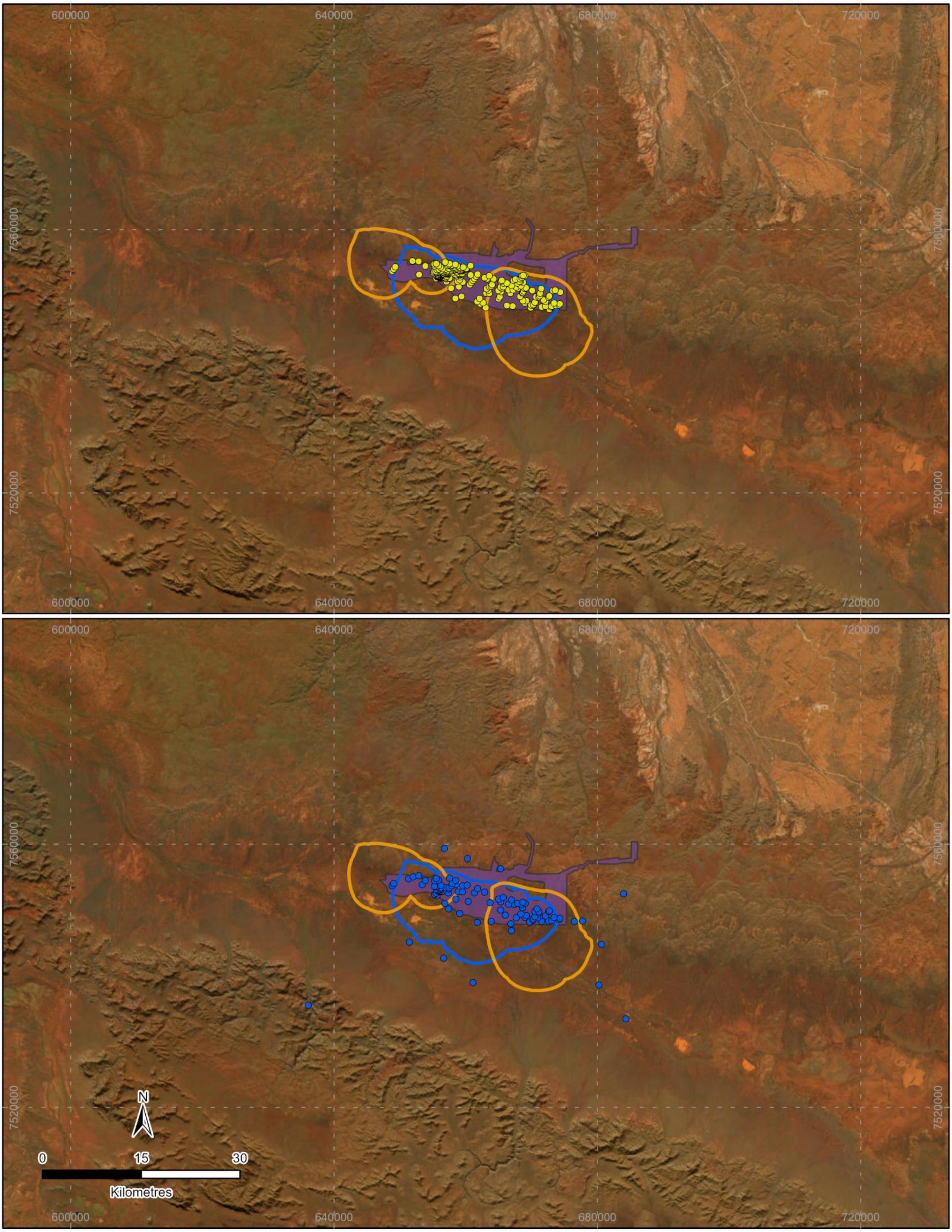
Fauna type	Method	2009-2010 Ecologia	2011-2012 Phoenix	2014 Bennelongia	Total
Stygofauna	Net	-	106	37	151
	Karaman-Chappuis	-	8	-	
Troglofauna	Scrape	68	122	119	315*
	Single Trap	-	120	77	
	Double Trap	97	-	24	
	Banana Trap	-	4	-	

*For calculation of effort, a single troglofauna sample unit comprises a hole being scraped and trapped during one visit.

Table 2: Survey effort at the MDIOM by Bennelongia in 2019-2024.

Fauna type	Method	2019	2020	2022			2023		2024	Total
		Aug	Jan	Mar	Jul	Nov	Nov	Dec	Jan	
Stygofauna	Net-haul	40	79	71	71	31	37	53	30	421
	Bou Rouche^		9							
Troglofauna	Scrape	60	60	25	25	19	136			321*
	Trap 1	58	55	25	25	18	136			
	Trap 2	1				2	38			

^Bou-Rouche includes Karaman- Chappuis samples; * For calculation of effort, a single troglofauna sample unit comprises a hole being scraped and trapped during one visit.



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Author: vmarques
Date: 7/10/2024

Legend

- Development Envelope
- Cumulative 1m Mounding Contours
- Cumulative 2m Drawdown Contour

2009-2014 Survey sites

- Troglofauna
- Stygofauna

Figure 3. Subterranean fauna survey sites at the MDIOM and surrounds, 2009-2014

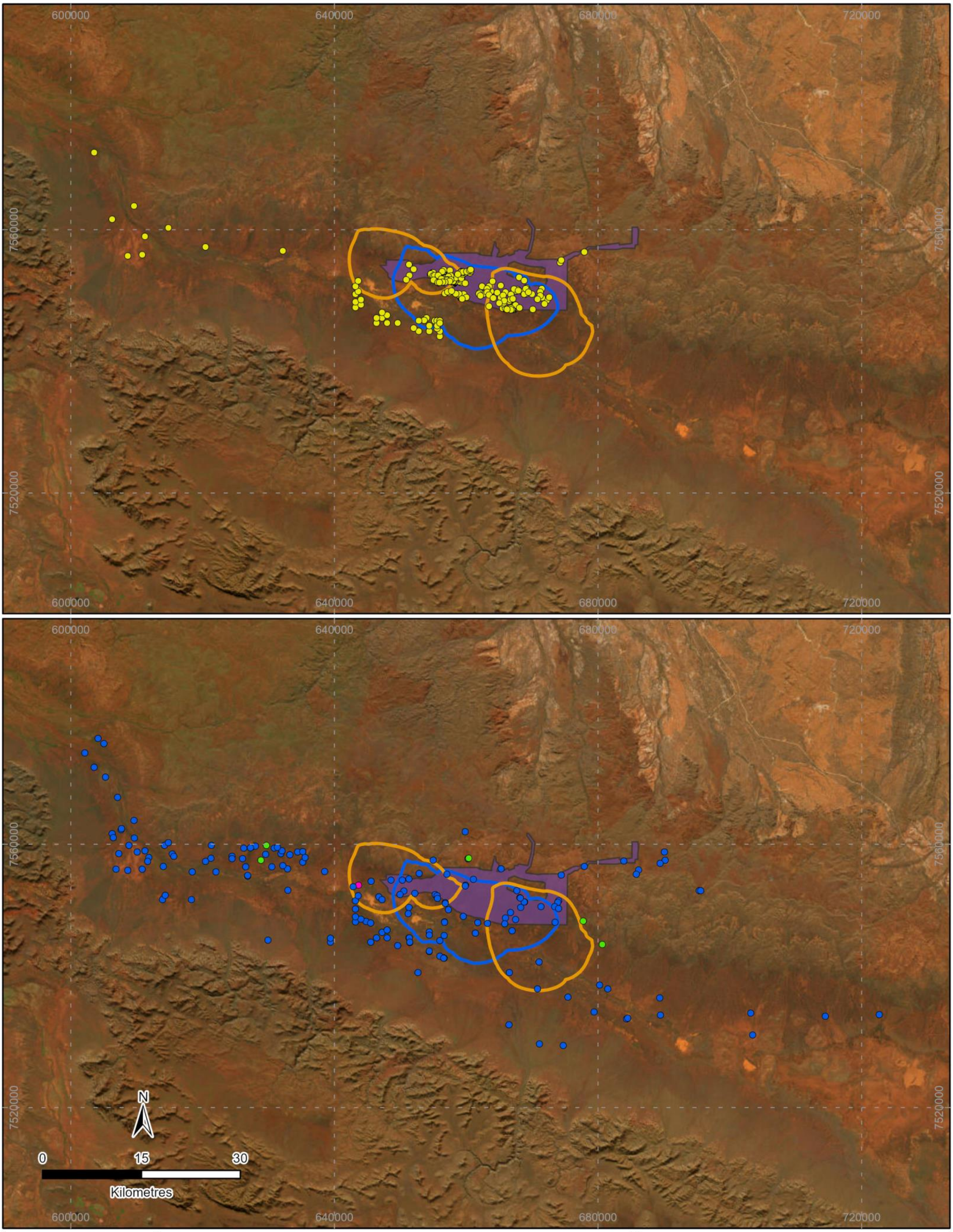


Figure 4. Subterranean fauna survey sites at the MDIOM and surrounds, 2019-2024

2.3. Sampling Methods

2.3.1. Water Quality

In situ water quality data were collected from each bore where stygofauna samples were collected. A plastic bailer was used to collect a sample from the top metre of groundwater. This water was transferred to a plastic container and pH, temperature and electrical conductivity (EC) were measured using a TPS WP-81 water meter. Readings were allowed to stabilise before measuring. A full list of water physico-chemistry results can be found in Appendix 1.

2.3.2. Stygofauna Sampling

Stygofauna was collected from bores with slotted casing or, more commonly, from uncased drillholes that intercepted the water table. At each site a small, weighted plankton net was lowered to the bottom of the hole and then agitated vigorously to stir benthic and epibenthic fauna into the water column where animals were captured as the net was slowly retrieved. Six separate net hauls were made (three with 50 µm mesh net and three with 150 µm mesh net). The contents of the net were transferred to cold 100% ethanol for preservation after each haul. Contamination between sites was avoided by washing the nets between each hole.

As requested by the Department of Water and Environmental Regulation, a small number of hyporheic samples were collected from shallow groundwater under creeks. Halse et al. (2002) showed that some stygofauna species typical of deep aquifers in the Pilbara may be collected in up-welling hyporheic zones of creek pools. Sampling was done using either Bou-Rouche or Karaman-Chappuis techniques. With Bou-Rouche sampling, a spigot was hammered into the creek bed until it intersected the underlying groundwater and then water was pumped through a 50 µm stygofauna net for 30 minutes. The contents of the net were transferred to 100% ethanol for preservation. With Karaman-Chappuis sampling, a small hole was dug beside the creek until groundwater was intersected. Groundwater was bailed out of the hole with a bucket and, after elutriation, was poured through a 50 µm stygofauna net. The contents of the net were transferred to cold 100% ethanol for preservation.

2.3.3. Troglofauna Sampling

Troglofauna samples in 2019-2024 were collected from uncased exploration drillholes using two different sampling techniques: scraping and trapping. These techniques provide two complementary sub-samples that were each treated as 0.5 of a sample when calculating sample effort (Halse and Pearson 2014).

Scraping occurred prior to trapping. In each scraping event, a troglofauna net with a weighted ring net of 150 µm mesh, and a diameter approximately 60% of the hole diameter, was lowered to the bottom of a hole or to the water table and subsequently scraped back to the surface at least four times. In each of these scrapes a different section of the wall of the hole was targeted (e.g., north, south, east and west) to maximize the number of animals retrieved. On return to the surface, the contents of each scrape were immediately transferred into cold 100% ethanol for preservation of animals in the sample and their DNA.

Trapping occurred after scraping. Cylindrical traps made of PVC (270 x 70 mm) with holes drilled on the sides to allow entry of troglofauna were baited with microwaved leaf litter. The functions of microwaving were to sterilise the litter and thus prevent anthropogenic spread of animals, and to speed up the litter breakdown process. Traps were lowered on nylon cord to the end of the hole or a few metres above the water table. Traps were left inside the drillholes for eight or nine weeks. During that period, the holes were closed off at the surface to minimise ingress of surface animals. When traps were retrieved, their contents were transferred to a zip-lock bag.

2.4. Laboratory Processing

All samples were freighted to the Bennelongia laboratory for sorting and identification.

2.4.1. Stygofauna

Net haul, Karaman-Chappuis and Bou Rouche samples in ethanol were washed and elutriated prior to being sieved through 53, 90 and 250 µm mesh sizes to separate animals (and detritus) into discrete class sizes to improve searching efficiency. The samples were then sorted under dissecting microscopes and all stygofaunal animals were picked out for later identification.

2.4.2. Troglofauna

Preserved scrape samples were washed and elutriated prior to being sieved through 53, 90 and 250 µm mesh sizes to separate animals (and detritus) into discrete class sizes to improve searching efficiency. The samples were then sorted under dissecting microscopes and all troglofaunal animals were picked out for later identification. In some groups, such as diplurans and pauropods, separation of surface and troglofaunal animals occurred at the species identification stage. All mites and collembolans were treated as surface species following Western Australian Museum advice (EPA 2007), although some species are troglofauna.

Leaf litter retrieved from traps was processed in Tullgren funnels under halogen lamps for 72 hours, during which time the light and heat drives animals downwards and towards a vial containing 100% ethanol as a preservative. Litter was checked after removal from the funnels to ensure no invertebrates remained. Samples in the vials of ethanol from the Tullgren funnels were then screened under a dissecting microscope and all troglofaunal animals were picked out for later identification.

2.4.3. Morphological Identification

All subterranean animals were initially identified morphologically under dissecting microscopes or, after dissection, under compound microscopes with differential interference contrast lighting. Identifications were made using published, unpublished, and informal taxonomic keys, as well as species descriptions in the scientific literature. In the identification process, most animals were identified to undescribed species. These undescribed species were assigned voucher code names. Selected representative animals of most voucher code species were lodged with the Western Australian Museum. In some cases, the life stage, sex, or condition of specimens made it impossible to carry out identification to the species level and identification was to a higher taxonomic level.

The use of voucher names for species is widespread in subterranean fauna reports because subterranean survey in Western Australia has been conducted intensively for only the last 25 years in Western Australia, the fauna is rich and Guzik *et al*. (2001) estimated that only 10% of species are described. Voucher names are useful for tracing of species across the species lists of different areas and projects and when determining species ranges. Sometimes, especially when species are relatively wide-ranging or multiple consultants work on the same project (such as the MDIOM), multiple voucher names may be applied to the same species. Thus, use of voucher codes without cross-referencing to other studies can create confusion. As much as possible the multiple names applied to single species in this report have been reconciled with names/codes used by other consultants at the MDIOM and elsewhere. This was not always possible in relation to the ecologia (2011) and Phoenix (2012) surveys and so there is minor uncertainty about the number of species recorded at the MDIOM, which is quantified later in the report. Recent moves towards public lodgement of DNA sequences and voucher specimens of species collected are expected to facilitate uniform identifications in future (Gibson *et al*. 2019).

2.4.4. DNA Analysis

Genomic sequencing of 273 animals (177 stygofauna and 96 troglofauna) collected during the 2019-2024 survey was used to identify juvenile or damaged animals, confirm morphological identifications or to compare MDIOM animals with those from elsewhere in the Pilbara. Methods of Qiagen (2006) were followed. A more detailed description can be found in Appendix 3a.

2.4.5. Sampling Completeness

The proportions of stygofauna and troglofauna species in the relevant impact areas for each group were assessed using EstimateS (Colwell 2009) and all survey data. The calculations were based on samples as described in sections 3.3 and 3.4; in particular troglofauna samples comprised both trapping and scraping. Only data from impact areas were used and Chao2, ICE, Jack1 and Jack 2 algorithms were used to estimate the total numbers of species.

2.5. Personnel Involved

Details of the staff involved in surveys from 2009 to 2014 are provided in ecologia (2011), Phoenix (2012) and Bennelongia (2014). The qualifications and experience of Bennelongia staff involved in each component of the 2019-2024 surveys are shown in Table 3.

Table 3: Personnel involved in the 2019-2024 surveys and their qualifications.

Task	Personnel	Qualifications/Experience
Fieldwork	Jim Cocking	B.Sc. Grad. Dip., 23 years relevant experience
	Louis Masarei	B.Sc., 2 years relevant experience
	Ella Carstens	B.Sc., 2 years relevant experience
	Jaxon Haines	B.Sc., 2 years relevant experience
	Adam Barnard	B.Sc. (Hons), 2 years relevant experience
	Sam Chidgzey	B.Sc., 1 year releveant experience
Sample sorting	Heather McLetchie	B.Sc. (Hons)
	Melanie McGellin	B.Sc. (Hons)
	Melita Pennifold	B.Sc. (Hons)
	Mike Scanlon	B.Sc. (Hons)
	Adam Barnard	B.Sc. (Hons)
	Ella Carstens	B.Sc.
	Jaxon Haines	B.Sc.
	Jessica Tacey	B.Sc.
	Jim Cocking	B.Sc. Grad. Dip.
	Will Fleming	B.Sc. (Hons)
Species identification	Jane McRae (most invertebrates)	30 years of identification experience at Australian Museum, British Museum, DBCA
	Stuart Halse (ostracods)	B.Sc. (Hons) Ph.D.
DNA analysis	Melanie McGellin	B.Sc. (Hons)
	Heather McLetchie	B.Sc. (Hons)
	Veera Haslam	B.Sc. (Hons) Ph.D.
	Daniel White	B.Sc. M.Sc. Ph.D.
Mapping	Vitor Marques	B.Sc. Dip. Lab. Tech.
Reporting	Stuart Halse	B.Sc. (Hons) Ph.D.
	Vitor Marques	B.Sc. Dip. Lab. Tech.
	Huon Clarke	B.Sc. (Hons) Ph.D.

3. RESULTS

The MDIOM supports rich subterranean fauna communities. The species lists in Table 4 and Table 5 cover the results of all sampling done in the MDIOM, with species identifications made morphologically but supported by DNA analyses in the 2019-2024 surveys. As mentioned in section 2.4.3, the lack of formal species descriptions, use of voucher names and evolving ideas of what constitutes separate species, especially as a result of increasing use of DNA analyses, mean the total number of species collected has a small amount of uncertainty. Comments in Table 4 and Table 5 highlight the species names that may be duplicates or represent multiple species but the error in the estimate of species collected is small compared with the overall number of species recorded and the underestimate of true species richness in the MDIOM (see sections 3.2 and 3.3).

3.1. Water Quality

Groundwater quality at the Project can be summarised as mostly fresh. Measurements of electrical conductivity ranged from 64.2 µS/cm to 18,000 µS/cm, with 95% of readings being <10,000 µS/cm. Measurements of pH ranged between 3.65 and 8.64. Only two pH readings were below 5 and initially it was believed that these low readings were data errors. Closer inspection showed the measurements were from the same bore (MDPZ7455), taken approximately 12 months apart, suggesting this site actually has low pH. Groundwater temperature was about 30ºC. A complete list of water quality data can be located at Appendix 1.

3.2. Stygofauna

In total, 12,045 specimens of at least 150 stygofauna species have been collected from the MDIOM (Table 4). We use 150 as the number of stygofauna species collected throughout the report but up to six species in Table 4 may be duplicate names and two worm species, at least, may comprise multiple species. Invertebrate groups represented at the MDIOM include copepods (45 species), ostracods (31 species), amphipods (23 species), annelid worms (19 species), syncarids (18 species), rotifers (five species), isopods (three species), mites (three species), spelaeogriphacids (one species), flatworms (one species) and nematode worms (treated as a single species but together with flatworms and rotifers not assessed in environmental impact assessments; EPA 2016).

The most frequently collected species was *Diacyclops humphreysi* s.l., which was collected 127 times (1,691 animals). The type locality of *Diacyclops humphreysi* is at Cape Range (Pesce and de Laurentiis 1996) and genetic analysis by Bennelongia and others indicates *Diacyclops humphreysi* s.l. comprises several locally widespread, cryptic species but the taxonomy of the lineage and distributions of the constituent species remain to be formalised and defined.

3.3. Troglofauna

In total, 1,743 animals notionally belonging to at least 86 species have been collected from the MDIOM and surrounding area (Table 5). We use 86 as the number of troglofauna species collected throughout the report but it is possible, albeit unlikely, that as many as 15 species in the Table 5 list may be represented by more than one name. Groups represented in the surveys include diplurans (13 species), isopods (nine species), beetles (eight species), pauropods (eight species), pseudoscorpions (eight species), silverfish (seven species), true bugs (six species), schizomids (five species), centipedes (four species), palpigrads (four species), cockroaches (four species), spiders (three species), symphylans (three species), millipedes (two species), and flies (one species).

The most frequently collected troglofauna species at the MDIOM was the cosmopolitan millipede *Lophoturus madecassus*, which was collected 100 times (1081 specimens). The second most collected species is the isopod *Troglarmadillo* sp. B54, which was represented by 209 specimens from 10 drillholes. This species was collected from both inside and outside potential impact areas and has a known linear range of approximately 16.5 km. Other species with big linear ranges are the fly *Allopnyxia* sp. B01 (Pilbara-wide), beetles *Ptinella* sp. B01 and Coleoptera sp. B07 (Pilbara-wide and 190, respectively), the bugs Cixiidae sp. B02 and Meenoplidae sp. SOLOMON 1 (Pilbara-wide and 93 km), the pauropods Pauropodiae sp. B01 s.l. Pauropodidae BPU089 and BPU090 (Pilbara-wide, 61.8 and 32 km) and centipede *Cormocephalus pyropygus* (140 km) (Table 5).

Table 4. Stygofauna collected from the MDIOM and surrounds.
Identifications highlighted in blue do not contribute to the species total because the specimens probably belong to another species in the table. Species highlighted in grey are probably conspecific with another species in the list.
Reference indicates species known only from outside the impact area.

Higher Order	Species	No. of Animals	Collected from			Restricted to Impact	Known Linear Range	Comments
			Drawdown	Mounding	Reference			
Platyhelminthes	Platyhelminthes sp.	1	✓	·	·		Not Assessed	
Turbellaria	Turbellaria sp.	3	·	·	✓		Not Assessed	
Microturbellaria	Microturbellaria sp.	2	·	✓	✓		Not Assessed	
Nematoda	Nematoda spp.	298	✓	✓	✓		Not Assessed	
Rotifera			·	·	·			
Bdelloidea	Bdelloidea sp.	2	✓	✓	✓		Not Assessed	
	Bdelloidea sp. 2:2	32	✓	✓	✓		Not Assessed	
	Bdelloidea sp. 3:2	18	·	✓	✓		Not Assessed	
Monogononta			·	·	·			
Ploima			·	·	·			
Lecanidae			·	·	·			
Lecane	*Lecane leontina*	1	·	·	✓		Not Assessed	
	Lecane papuana	10	·	✓	·		Not Assessed	
Notommatidae			·	·	·			
Cephalodella	*Cephalodella* cf. *catellina* (PSW)	2	·	·	✓		Not Assessed	
Annelida			·	·	·			
Aphanoneura			·	·	·			
Aeolosomatidae	Aeolosomatidae sp.	1	✓	✓	·			
Aeolosoma	*Aeolosoma* sp.	67	✓	✓	✓	Unknown		
Clitellata	Oligochaeta sp.	120	✓	✓	·			
Tubificida			·	·	·			
Enchytraeidae	Enchytraeidae sp.	3	✓	✓	·			
	Enchytraeidae `2 bundle` s.l. (short sclero 2 per seg)	1	·	·	✓		Widespread	
	Enchytraeidae `2 bundle` s.l. (short sclero 4 per seg)	249	✓	✓	·	No	Widespread	
	Enchytraeidae `3 bundle` s.l. (short sclero)	558	✓	✓	✓	No	Widespread	These are same but E. '3 bundle' s.l. (short sclero) may contain additional species
	Enchytraeidae sp. E06-01	82	✓	✓	✓	No	104 km	
	Enchytraeidae `BOL081` (2 bundle long thin)	8	✓	✓	✓	No	62 km	
Achaeta	*Achaeta* sp.	6	✓	✓	·	Yes	16 km	
Enchytraeus	*Enchytraeus* sp. AP PSS1 s.l.	5	·	✓	·	No	Widespread	Morphological lineage
	Enchytraeus sp. AP PSS2 s.l.	3	·	✓	·	No	Widespread	Morphological lineage
	Enchytraeus sp. Ench7	27	✓	✓	✓	No	202 km	
Naididae	Tubificinae sp.	7	✓	✓	✓			
	Tubificinae `stygo type 1A`	1	·	·	✓	No	Widespread in WA	
Dero	*Dero* (*Dero*) *nivea*	1	·	·	✓	No	Cosmopolitan	
	Dero furcata	2	·	·	✓	No	Cosmopolitan	
Pristina	*Pristina aequiseta*	16	·	✓	✓	No	Cosmopolitan	
	Pristina longiseta	241	✓	✓	✓	No	Cosmopolitan	
Phreodrilidae	Phreodrilidae sp. AP SVC s.l.	232	✓	✓	✓	No	Widespread in Pilbara	
	Phreodrilidae sp. AP DVC s.l.	13	✓	✓	✓	No	Widespread in Pilbara	These are same but Phreodrilidae sp. AP DVC s.l. may contain additional species
Phreodrilus	*Phreodrilus peniculus*	2	✓	✓	✓	No	Widespread in Pilbara	

Higher Order	Species	No. of Animals	Collected from			Restricted to Impact	Known Linear Range	Comments
			Drawdown	Mounding	Reference			
Polychaeta			·	·	·			
Phyllodocida			·	·	·			
Nereididae			·	·	·			
Namanereis	*Namanereis* `BPOL001`	1	·	·	✓	No	Singleton	
Arthropoda			·	·	·			
Arachnida			·	·	·			
Trombidiformes			·	·	·			
Halacaridae	Halacaridae `BAR137`	34	✓	✓	✓	No	36 km	
Mideopsidae			·	·	·			
Guineaxonopsis	*Guineaxonopsis* `BAC011`	6	·	·	✓		Single site	
	Guineaxonopsis sp. B03 (S01 group)	2	✓	✓	·	Yes	20 km	
Ostracoda	Ostracoda sp.	43	✓	✓	✓			Few species identifications prior to 2014
Podocopida			·	·	·			
Candonidae	Candonidae `BOS1376`	3	✓	·	✓	No	44 km	
	Candonidae `BOS1878`	9	·	·	✓	No	0.9 km	
Areacandona	*Areacandona* `BOS1381`	2	✓	✓	·	Yes	7 km	Similarities to *Areacandona clementia*
	Areacandona `BOS1438`	81	✓	·	✓	No	90 km	
	Areacandona `BOS1441`	34	✓	·	✓	No	69 km	
	Areacandona `BOS1864`	4	·	·	✓		4.4 km	
	Areacandona `BOS1874`	26	·	·	✓		95 km	
	Areacandona arteria	2	✓	·	·	No	500 km	
	Areacandona brookanthana	2	✓	✓	·	No	242 km	
	Areacandona mulgae	200	✓	✓	✓	No	323 km	
	Areacandona quasilepte	71	·	·	✓		175 km	
Candonopsis	*Candonopsis* sp.	1	·	·	✓			
	Candonopsis dedeckkeri	7	·	·	✓		208 km	
	Candonopsis tenuis	10	✓	✓	✓	No	Australia-wide	
Deminutiocandona	*Deminutiocandona ?cf quasimica*	2	✓	✓	✓	No	23 km	Possibly Karanovic's *D.* cf. *quasimica*
Humphreyscandona	*Humphreyscandona* `BOS1379`	48	✓	·	·	No	50 km	
	Humphreyscandona `BOS1439`	1	·	·	✓	No	Singleton	
	Humphreyscandona `BOS1714`	11	✓	✓	✓	No	14 km	
	Humphreyscandona `BOS387`	328	✓	·	✓	No	120 km	
	Humphreyscandona waldockae	108	✓	·	✓	No	356 km	
Meridiescandona	*Meridiescandona* `BOS297`	4	✓	✓	✓	No	37 km	
Cyprididae	Cyprididae sp.	8	✓	✓	✓			
	Cyprinopsinae sp.	1	✓	✓	·			
Bennelongia	*Bennelongia tirigie*	10	·	✓	·	No	195 km	
Cypretta	*Cypretta* sp.	137	✓	✓	✓			
	Cypretta seurati	714	✓	✓	✓	No	Pilbara-wide	
Cypridopsis	*Cypridopsis* sp.	5	✓	·	·			
	Cypridopsis `BOS666`	155	✓	✓	✓	No	North-west WA	
Cyprinotus	*Cyprinotus kimberleyensis*	153	✓	✓	✓	No	Circum-tropical	
Riocypris	*Riocypris fitzroyi*	39	✓	✓	✓	No	North-west WA	

Higher Order	Species	No. of Animals	Collected from Drawdown	Collected from Mounding	Collected from Reference	Restricted to Impact	Known Linear Range	Comments
Sarscypridopsis	*Sarscypridopsis* sp.	3	✓	✓	·			
	Sarscypridopsis ochracea	29	✓	✓	✓	No	Pilbara-wide	
Stenocypris	*Stenocypris major*	104	✓	·	✓	No	Cosmopolitan	
Strandesia	*Strandesia* `466`	16	·	·	✓	No	North-west WA	
Ilyocyprididae			·	·	·			
Ilyocypris	*Ilyocypris australiensis*	1	·	✓	·	No	WA	
Limnocytheridae			·	·	·			
Gomphodella	*Gomphodella pilbarensis*	44	·	·	✓		183 km	
Limnocythere	*Limnocythere* sp.	1	·	·	✓			
	Limnocythere stationis	37	✓	✓	✓	No	Pilbara-wide	Could also be referred to as *L. dorsosicula*
Maxillopoda			·	·	·			
Cyclopoida	Cyclopoida sp.	5	✓	✓	✓			
Cyclopidae	Cyclopidae sp.	5	✓	·	✓			
Australocyclops	*Australocyclops similis*	65	✓	✓	·	No	Pilbara-wide	
Diacyclops	*Diacyclops* sp.	9	✓	·	✓			
	Diacyclops cockingi	19	✓	·	✓	No	Pilbara-wide	
	Diacyclops einslei	31	✓	·	✓	No	Pilbara-wide	
	Diacyclops humphreysi s.l.	1691	✓	✓	✓	No	Species complex	Local representative of complex is widespread
	Diacyclops reidae	1	✓	·	·	No	160 km	
	Diacyclops scanloni	424	✓	✓	✓	No	Pilbara-wide	
	Diacyclops sobeprolatus	83	✓	✓	✓	No	Pilbara-wide	
Dussartcyclops	*Dussartcyclops* sp. B11	40	✓	✓	✓	No	48.3 km	
Mesocyclops	*Mesocyclops* sp.	35	✓	✓	✓			
	Mesocyclops `BCY098`	213	✓	✓	✓	No	40 km	
	Mesocyclops brooksi	22	·	✓	✓	No	Australia-wide	
	Mesocyclops notius	118	✓	·	✓	No	Northern Australia	
Microcyclops	*Microcyclops varicans*	251	✓	✓	✓	No	Cosmopolitan	
Orbuscyclops	*Orbuscyclops westaustraliensis*	10	✓	✓	✓	No	Pilbara-wide	
Paracyclops	*Paracyclops* nr *chiltoni* (PSW)	1	·	✓	·	No	290 km	
Pescecyclops	*Pescecyclops pilbaricus*	41	✓	✓	·	No	Pilbara-wide	
Pilbaracyclops	*Pilbaracyclops* sp. B03 (nr *frustratio*)	11	✓	✓	✓	No	Pilbara-wide	
Thermocyclops	*Thermocyclops* sp.	19	·	·	✓			
	Thermocyclops `BCY102`	17	·	·	✓		Single site	
	Thermocyclops aberrans	114	·	·	✓		Pilbara-wide	
	Thermocyclops decipiens	100	·	·	✓		Pilbara-wide	
	Thermocyclops sp. B04	30	·	·	✓		Single site	
Tropocyclops	*Tropocyclops prasinus*	16	·	✓	·	No	170 km	
Harpacticoida	Harpacticoida sp.	2	·	✓	✓			
Ameiridae	Ameiridae sp.	2	✓	·	✓			
Abnitocrella	*Abnitocrella* `BHA274` (nr *eberhardi*)	35	✓	·	✓	No	37 km	
	Abnitocrella eberhardi	307	✓	✓	✓	No	110 km	
Megastygonitocrella	*Megastygonitocrella* sp. B04	149	✓	✓	✓	No	120 km	
	Megastygonitocrella trispinosa	3	·	·	✓	No	Pilbara-wide	

Higher Order	Species	No. of Animals	Collected from Drawdown	Collected from Mounding	Collected from Reference	Restricted to Impact	Known Linear Range	Comments
	Megastygonitocrella unispinosa	2	✓	✓	·	No	Pilbara-wide	
Nitokra	*Nitokra* `BHA275`	13	✓	✓	✓	No	27 km	
Novanitocrella	*Novanitocrella* `BHA338`	2	·	·	✓	No	Single site	
Canthocamptidae	Canthocamptidae sp. B03	46	✓	✓	✓	No	87.1 km	
Attheyella	*Attheyella australica*	15	✓	✓	·	No	Australia-wide	
Australocamptus	*Australocamptus hamondi*	1	·	·	✓	No	Inland WA	
Elaphoidella	*Elaphoidella humphreysi*	17	·	·	✓	No	Pilbara-wide	
	Elaphoidella sp. B02	8	✓	✓	✓	No	72 km	
Ectinosomatidae			·	·	·			
Rangabradya	*Rangabradya* sp. S01	4	·	·	✓	No	Single site	
Miraciidae			·	·	·			
nr *Schizopera*	nr *Schizopera* `BHA337`	3	·	·	✓	No	Single site	
Schizopera	*Schizopera* `BHA277`	1	✓	·	·	Yes	Singleton	
	Schizopera `BHA336`	1	·	·	✓	No	Singleton	
Parastenocarididae	Parastenocarididae sp.	10	✓	✓	✓			
Dussartstenocaris	*Dussartstenocaris* sp.	1	✓	✓	·			
	Dussartstenocaris `BHA335`	2	✓	·	·	Yes	Single site	May be synonymous
	Dussartstenocaris sp. B01	65	✓	✓	✓	No	53 km	
	Dussartstenocaris sp. nov. B03 (PIL)	1	·	·	✓	No	93 km	
Parastenocaris	*Parastenocaris* sp.	16	·	·	✓			
	Parastenocaris `BHA276`	81	✓	·	✓	No	12 km	
	Parastenocaris `BHA334`	12	·	·	✓	No	4.1 km	
	Parastenocaris jane	55	·	·	✓	No	Pilbara-wide	
	Parastenocaris sp. B18	7	✓	✓	✓	No	16 km	
	Parastenocaris sp. B29	138	✓	✓	✓	No	51 km	
Malacostraca			·	·	·			
Syncarida			·	·	·			
Bathynellidae	Bathynellidae sp.	10	✓	✓	✓	Unknown		
	Bathynellidae `BSY246`	1	·	·	✓	No	Singleton	
	Bathynellidae `DeGrey`	2	·	·	✓	No	247 km	Identification wrong, may be other species in list
Pilbaranella	*Pilbaranella* sp.	3	✓	✓	✓			
	Pilbaranella `BSY377`	2	·	·	✓	No	Single site	
	Pilbaranella `BSY378`	1	·	·	✓	No	Singleton	
	Pilbaranella `BSY380`	2	·	·	✓	No	Single site	
	Pilbaranella `MH1`	3	✓	✓	·	Yes	16 km	
	Pilbaranella `MH2`	3	✓	✓	·	Yes	Single site	
	Pilbaranella sp. B18	1	✓	✓	·	Yes	Singleton	
Parabathynellidae	Parabathynellidae sp.	1	✓	✓	·			
Atopobathynella	*Atopobathynella* sp. B09 (Parabathynellidae `MH1`)	10	✓	✓	·	Yes	3 km	
Billibathynella	*Billibathynella* `BSY238`	1	·	·	✓	No	Singleton	
	Billibathynella `BSY244`	1	✓	·	·	Yes	Singleton	
	Billibathynella sp. B08	75	✓	✓	✓	No	59 km	
	Billibathynella sp. B10	2	✓	✓	✓	No	36.8 km	

Higher Order	Species	No. of Animals	Collected from Drawdown	Collected from Mounding	Collected from Reference	Restricted to Impact	Known Linear Range	Comments
Brevisomabathynella	*Brevisomabathynella* `BSY233`	1	✓	·	·	Yes	Singleton	
	Brevisomabathynella `BSY247`	4	·	·	✓	No	Single site	
Hexabathynella	*Hexabathynella* `BSY234`	5	·	·	✓	No	23.5 km	
nr *Billibathynella*	nr *Billibathynella* `MH2` (Parabathynellidae `MH2`)	5	✓	✓	·	Yes	18 km	
Parabathynellidae	Parabathynellidae `MH3`	2	✓	✓	·	Yes	Single site	
Amphipoda			·	·	·			
Bogidiellidae			·	·	·			
Bogidiella	*Bogidiella* sp.	1	·	·	✓			
	Bogidiella `BAM183`	6	✓	·	✓	No	50 km	
	Bogidiella `BAM221`	1	·	·	✓	No	Singleton	
Eriopisidae			·	·	·			
Nedsia	*Nedsia* sp.	1	·	·	✓			
	Nedsia hurlberti grp	25	·	·	✓	No	30 km	New species
Pilbarana	*Pilbarana* sp. B07 (=Melitidae SOLOMON 2)	5	·	·	✓	No	144 km	
Neoniphargidae			·	·	·			
	Neoniphargidae `BAM176`	17	✓	✓	✓	No	12 km	
	Neoniphargidae `BAM229`	2	·	·	✓	No	Single site	
Paramelitidae	Paramelitidae sp.	8	✓	✓	✓	Unknown		
	Paramelitidae `BAM244`	3	·	·	✓	No	Single site	
	Paramelitidae sp. B14	6	·	✓	·	No	9 km	
	Paramelitidae sp. B42	1	·	·	✓	No	24.4 km	
	Paramelitidae sp. B46	17	·	·	✓	No	35 km	
	Paramelitidae sp. S02	26	·	·	✓	No	245 km	Almost certainly same species
	Paramelitidae sp. B47	912	✓	✓	✓	No	74 km	
	Paramelitidae sp. B48	187	✓	✓	✓	No	49 km	Almost certainly same species
	Paramelitidae `MH1` (AMP026)	79	✓	✓	✓	No	39 km	
Chydaekata	*Chydaekata* `BAM180`	102	✓	·	✓	No	11 km	
Maarrka	*Maarrka* sp.	1	·	·	✓			
	Maarrka `BAM182`	3	✓	·	·	Yes	Single site	
	Maarrka `BAM185`	1	·	·	✓	No	Singleton	
	Maarrka `BAM222`	1	·	·	✓	No	Singleton	
Molina	*Molina* `BAM217`	18	·	·	✓	No	25 km	
Paramelitidae Genus 2	Paramelitidae Genus 2 sp.	5	✓	·	·	Unknown		
	Paramelitidae Genus 2 `BAM181`	698	✓	✓	✓	No	76 km	
	Paramelitidae Genus 2 `BAM211`	45	✓	·	✓	No	51.5 km	
Pilbarus	*Pilbarus millsi* s.l.	2	·	·	✓	No	Central Pilbara	Almost certainly same species
	Pilbarus millsi subsp. `BAM154`	317	✓	✓	✓	No	87 km	
Isopoda			·	·	·			
Microcerberidae	Microcerberidae `BIS389`	23	·	·	✓	No	35 km	
Tainisopidae			·	·	·			
Pygolabis	*Pygolabis* `BIS563`	1	·	·	✓	No	Singleton	
	Pygolabis `MH1`	27	✓	·	✓	No	29 km	
Spelaeogriphacea			·	·	·			

Higher Order	Species	No. of Animals	Collected from Drawdown	Collected from Mounding	Collected from Reference	Restricted to Impact	Known Linear Range	Comments
Spelaeogriphidae			·	·	·			
Mangkurtu	*Mangkurtu* `BSPE004`	74	·	·	✓	No	14 km	

Table 5. Troglofauna collected from the MDIOM and surrounds.
Identifications highlighted in blue do not contribute to the species total because the specimens probably belong to another species in the table. Species highlighted in grey are probably conspecific with another species in the list.
Reference indicates species known only from outside the impact area.

Higher Order	Species	No. of Animals	Collected from			Restricted to Impact	Known Linear Range	Comments
			Pit	Mounding	Reference			
Arthropoda			·	·	·			
Arachnida			·	·	·			
Pseudoscorpiones			·	·	·			
Chthoniidae			·	·	·			
Austrochthonius	*Austrochthonius* `BPS257`	1	✓	✓	·	Yes	Singleton	
Tyrannochthonius	*Tyrannochthonius* sp.	1	·	·	✓			
	Tyrannochthonius `BPS229`	3	·	✓	·	Yes	11 km	
	Tyrannochthonius `MH1`	4	✓	✓	✓	No	10 km	May be synonymous with another *Tyrannochthonius* species, ranges overlap
	Tyrannochthonius sp. B35	2	✓	✓	·	Yes	11 km	
Hyidae			·	·	·			
Indohya	*Indohya* sp.	1	✓	✓	·			
	Indohya ?`PSE002`	3	·	·	✓	No	Single site	
Olpiidae	Olpiidae `BPS565`	1	·	·	✓	No	Singleton	
Linnaeolpium	*Linnaeolpium* `BPS502`	1	·	✓	·	Yes	Singleton	*Linnaeolpium* `BPS502` is probably synonymous with *Linnaeolpium* sp. B03
	Linnaeolpium sp. B03	1	·	·	✓	No	Singleton	
Palpigradi	Palpigradi sp.	6	✓	✓	✓			
	Palpigradi sp. B18	2	✓	✓	·	Yes	4 km	Very likely same species
	Palpigradi `MH1`	2	✓	✓	·	Yes	0.3 km	
	Palpigradi `MH2`	1	·	✓	·	Yes	Singleton	Very likely same species
	Palpigradi `BPAL053`	1	·	✓	·	Yes	Singleton	
Schizomida			·	·	·			
Hubbardiidae			·	·	·			
Draculoides	*Draculoides* sp.	2	·	✓	✓			
	Draculoides `BSC028`	3	·	✓	·	Yes	Single site	
	Draculoides `BSC029`	1	·	·	✓	No	Singleton	
	Draculoides `BSC118`	4	·	·	✓	No	7.5 km	
	Draculoides `MH2`	1	·	✓	·	Yes	Singleton	
	Draculoides `SCH084-DNA`	2	✓	✓	·	Yes	1.2 km	
Araneae			·	·	·			
Gnaphosidae	Gnaphosidae sp. B03	1	✓	✓	·	Yes	Singleton	
Symphytognathidae			·	·	·			
Anapistula	*Anapistula* `MH1`	4	✓	✓	✓	No	15 km	
Trochanteriidae	Trochanteriidae sp.	1	·	·	✓	No	Singleton	
	Trochanteriidae sp. B01	1	·	✓	·	Yes	Singleton	
Malacostraca			·	·	·			
Isopoda			·	·	·			
Armadillidae			·	·	·			
Buddelundia	*Buddelundia* sp. B57	10	✓	✓	·	Yes	4.5 km	
Troglarmadillo	*Troglarmadillo* sp.	4	✓	✓	✓			
	Troglarmadillo `BIS392`	13	·	✓	·	Yes	Single site	
	Troglarmadillo `BIS562`	3	·	✓	·	Yes	Single site	
	Troglarmadillo `MH1`	1	✓	✓	·	Yes	Singleton	
	Troglarmadillo sp. B04	1	·	✓	·	Yes	Singleton	
	Troglarmadillo sp. B05	1	·	✓	·	Yes	Singleton	
	Troglarmadillo sp. B54	209	✓	✓	✓	No	16.5 km	One of these species is probably *Troglarmadillo* `MH1`
	Troglarmadillo sp. B55	3	✓	✓	✓	No	7 km	
Philosciidae			·	·	·			
nr *Andricophiloscia*	nr *Andricophiloscia* sp. B18	1	·	✓	·	Yes	Singleton	
Chilopoda			·	·	·			
Scolopendrida			·	·	·			

Higher Order	Species	No. of Animals	Collected from			Restricted to Impact	Known Linear Range	Comments
			Pit	Mounding	Reference			
Cryptopidae			·	·	·			
Cryptops	*Cryptops* sp.	1	·	·	✓			
	Cryptops \`MH1\` (=DNA05)	2	·	✓	·	Yes	12 km	*Cryptops* \`MH1\` (=DNA05) or 'MH2' may be *Cryptops* sp. B42
	Cryptops \`MH2\`	4	·	✓	✓	No	15.5 km	
	Cryptops sp. B42	1	·	✓	·	Yes	Singleton	
	Cryptops sp. B41	1	·	✓	·	Yes	Singleton	
Scolopendridae			·	·	·			
Cormocephalus	*Cormocephalus pyropygus*	3	·	✓	·	No	140 km	
Diplopoda			·	·	·			
Polydesmida			·	·	·			
Haplodesmidae	Haplodesmidae \`Helix-DIHAP001\`	3	·	✓	·	No	425 km	
Polyxenida			·	·	·			
Lophoproctidae			·	·	·			
Lophoturus	*Lophoturus madecassus*	1081	✓	✓	✓	No	Widespread species	
Pauropoda	Pauropoda sp.	2	·	✓	·			
Tetramerocerata			·	·	·			
Pauropodidae	Pauropodidae \`BPU098\`	3	·	·	✓	No	Single site	
	Pauropodidae \`BPU110\`	1	·	·	✓	No	Singleton	
	Pauropodidae \`BPU089\`	3	·	✓	✓	No	61.8 km	Relationships of BPU089' and 'BPU090' 'MH1', 'MH2' is unclear, there is some range overlap
	Pauropodidae \`BPU090\`	12	✓	✓	✓	No	32 km	
	Pauropodidae \`MH1\`	1	✓	✓	·	Yes	Singleton	
	Pauropodidae \`MH2\`	3	✓	✓	·	Yes	18 km	
	Pauropodidae \`MH3\`	2	✓	✓	·	Yes	15 km	
	Pauropodidae sp. B01 s.l.	2	·	✓	·	No	Widespread in Pilbara	
Symphyla			·	·	·			
Cephalostigmata			·	·	·			
Scolopendrellidae			·	·	·			
Symphylella	*Symphylella* sp.	2	·	✓	·			
	Symphylella sp. B20	3	✓	✓	·	Yes	10 km	
Scutigerellidae			·	·	·			
Hanseniella	*Hanseniella* sp.	1	·	✓	·			
	Hanseniella \`BSYM117\`	1	·	·	✓	No	Singleton	*Hanseniella* \`BSYM117\`may be synonymous with *Hanseniella* \`MH1\`
	Hanseniella \`MH1\`	4	·	✓	·	Yes	3 km	
Entognatha			·	·	·			
Diplura	Diplura sp.	1	·	✓	·			
Campodeidae	Campodeidae \`BDP216\`	1	✓	·	·	Yes	Singleton	Campodeidae \`BDP216\` may be synonymous with Campodeidae sp. B10
	Campodeidae sp. B10	1	·	·	✓	No	Singleton	
Japygidae	Japygidae sp.	9	✓	✓	✓			
	Japygidae \`BDP214\`	2	·	·	✓	No	1.8 km	
	Japygidae \`BDP213\`	2	·	✓	·	Yes	6.2 km	
	Japygidae \`MH1\`	2	✓	✓	·	Yes	13.5 km	Relationship of Japygidae \`BDP213\` to other species is unclear but may be either 'MH1' or 'MH2'
	Japygidae \`MH2\`	2	·	✓	✓	No	11 km	
Parajapygidae	Parajapygidae sp.	1	✓	✓	·			
	Parajapygidae \`MH1\`	4	✓	✓	✓	No	3.2 km	Parajapygidae \`MH1\` and Parajapygidae sp. B30 very likely synonymous
	Parajapygidae sp. B30	1	✓	✓	·	Yes	Singleton	
Parajapyx	*Parajapyx* \`BDP217\`	1	✓	✓	·	Yes	Singleton	
Projapygidae	Projapygidae \`BDP215\`	1	·	·	✓	No	Singleton	
	Projapygidae \`BDP182\`	1	✓	✓	·	Yes	Singleton	Relationship between Projapygidae \`BDP182\` and sp. B18 to Projapygidae \`MH1\` is unclear
	Projapygidae sp. B18	1	·	·	✓	No	Singleton	
	Projapygidae \`MH1\`	3	✓	✓	·	Yes	17 km	
Insecta			·	·	·			
Zygentoma			·	·	·			

Higher Order	Species	No. of Animals	Collected from			Restricted to Impact	Known Linear Range	Comments
			Pit	Mounding	Reference			
Nicoletiidae	Atelurinae `MH1` (=B20)	10	✓	✓	✓	No	14 km	
Trinemura	*Trinemura* sp.	4	✓	✓	✓			
	Trinemura `BZY102`	2	✓	·	·	Yes	4.5 km	
	Trinemura `BZY114`	2	·	·	✓	No	Single site	
	Trinemura `MH1`	12	✓	✓	✓	No	19 km	Likely to represent two species, although alignment is uncertain because of range overlap
	Trinemura `MH2`	7	✓	✓	✓	No	8.5 km	
	Trinemura sp. B28	12	✓	✓	✓	No	16 km	
	Trinemura sp. WAM `ZYGS005`	16	✓	✓	✓	No	9 km	
Blattodea			·	·	·			
Nocticolidae			·	·	·			
Nocticola	*Nocticola* sp.	12	✓	✓	✓			
	Nocticola `BBL043`(quartermainei gp)	5	·	·	✓	No	5 km, likely >200 km	Ewart et al. suggest lineages in *quartermainei* group represent one species
	Nocticola `BLA008`	11	✓	✓	·	Yes	15.5 km	
	Nocticola `MH1` (=B34)	44	✓	✓	✓	No	16 km	
	Nocticola `OES11`	2	·	·	✓	No	275 km	
Hemiptera			·	·	·			
Cixiidae	Cixiidae sp. B02	2	·	✓	·	No	Widespread in Pilbara	
Meenoplidae	Meenoplidae sp.	6	✓	✓	✓			
	Meenoplidae sp. SOLOMON 1	1	·	✓	·	No	93 km	
	Meenoplidae sp. WAM-PHAC001/H-HEM003	41	✓	✓	·	No	450 km	
Phaconeura	*Phaconeura* sp.	1	✓	✓	·			
	Phaconeura `BHE035`	3	·	✓	·	No	172 km	
	Phaconeura `BHE036`	1	·	✓	·	Yes	Singleton	
	Phaconeura sp. WAM `PHAC002`	2	✓	✓	·	No	95 km	
Coleoptera	Coleoptera `BCO207`	15	✓	✓	·	Yes	3 km	
	Coleoptera sp. B07	3	✓	✓	✓	No	190 km	
Carabidae			·	·	·			
Gracilanillus	*Gracilanillus* `BCO176`	2	·	✓	·	Yes	3 km	
Magnanillus	*Magnanillus* `BCO175` (nr *quartermainei*)	10	✓	✓	✓	No	19 km	
Curculionidae	Cryptorhynchinae sp. B18	6	·	✓	·	Yes	8 km	
Curculionidae Genus 1	Curculionidae Genus 1 sp. B12	11	✓	✓	✓	No	17 km	
Endomychidae			·	·	·			
Holoparamecus	*Holoparamecus* `BCO208`	1	·	·	✓	No	Singleton	
Ptiliidae			·	·	·			
Ptinella	*Ptinella* sp. B01 (=MC)	2	·	·	✓	No	Widespread in Pilbara	
Diptera			·	·	·			
Sciaridae			·	·	·			
Allopnyxia	*Allopnyxia* sp. B01	20	·	✓	✓	No	Widespread in Pilbara	

3.4. Genomic Analysis

Sequences from 64 of the 274 specimens analysed aligned with existing sequences, thus representing previously collected species (Appendix 3). Sequences from a further 92 specimens could not be matched with existing sequences. The remaining 158 specimens failed to produce a usable sequence, representing a success rate of only 57%. This low sequencing success reflects that many of the specimens needing genetic confirmation of identifications to extend species ranges were either (1) collected in 2014, (2) damaged or incomplete, or (3) very small microcrustaceans. It is difficult to obtain DNA sequences from such animals, especially old and damaged ones. The results of DNA analyses are incorporated into Tables 4 and 5.

3.5. Sampling completeness

Using results of only stygofauna samples, EstimateS analyses suggested that between 61 and 72% of the stygofauna species in the groundwater drawdown and mounding areas have been collected (Appendix 4). However, the continuing increase of algorithm estimates with increasing sample size suggests the estimates may be low (Colwell 2009).

Using only troglofaunal samples, and ignoring the small amount of by-catch in stygofauna samples, EstimateS analyses suggested that between 56 and 66% of the troglofaunal species in the mine pits and groundwater mounding have been collected (Appendix 5). At this level of completeness most algorithms underestimate the total number of species and overestimate completeness of sampling (Colwell 2009).

3.5.1. Restricted Stygofauna

Fourteen stygofauna species are currently only known from areas with predicted groundwater drawdown of ≥2 m and/or ≥1 m groundwater mounding (Table 6, Appendix 6). There are no potential duplicate species names in this list. Five stygofauna species are known only from the area of ≥2 m groundwater drawdown and nine species are known only from areas of drawdown and groundwater mounding ≥1 m.

Ranges of stygofauna species are very variable, even when known stygophiles (with potential for surface dispersal) are excluded. When stygophiles are included, nearly half of the species recorded at MDIOM have linear ranges >70 km (Figure 5). Despite the known ranges of most species expanding as the

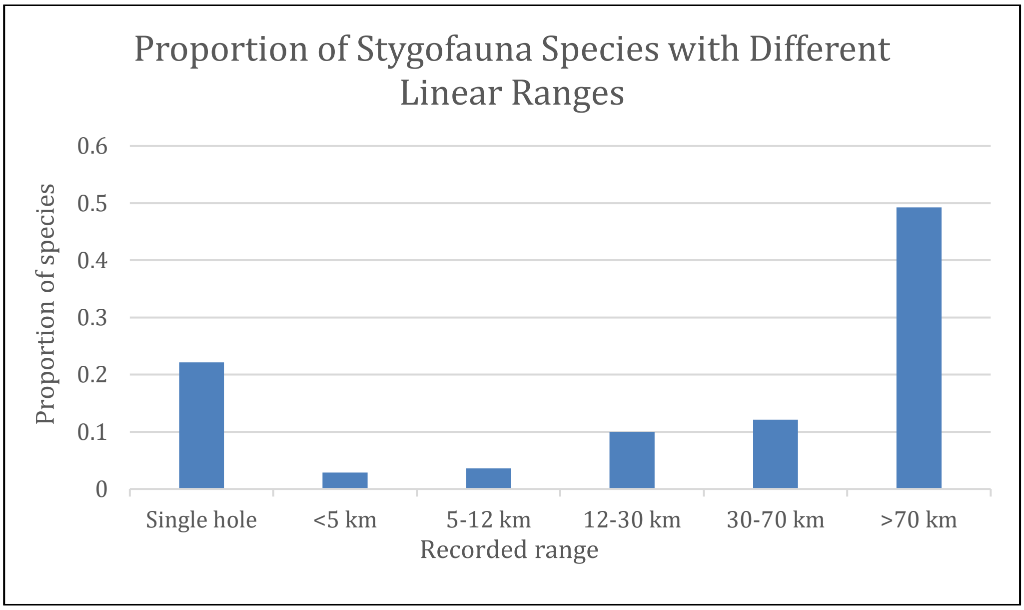


Figure 5. Known linear ranges of stygofauna species occurring at MDIOM.

amount of sampling increases, it would still be expected from Figure 5 that most species known only from single sites at the MDIOM have linear ranges of <30 km. This is supported by the surveys of Halse *et a*l. (2024), who found that species known from multiple sites, but a single sub-region (there are 11 of these in the Pilbara), have an average linear range of 29 km.

Further evidence that a substantial proportion of the species known only from areas of groundwater disturbance are likely to have relatively small ranges comes from 57% these species being collected from single holes on one or more dates compared with 18% of all stygofauna species (Table 6). While species abundance affects the number of holes from which a species is collected, species range is also important with small range species being more likely to be collected at single sites (Eberhard *et a*l. 2009).

Information about likely ranges of the 14 stygofauna species known only from impact areas, based on information for related species, is provided below. Collection locations are shown in Appendix 6.

Enchytraeid oligochaetes
Oligochaetes of the family Enchytraeidae are relatively unstudied, although they occur widely in surface and subterranean habitats. Data in Creuze des Chatelliers *et al*. (2009) suggest that enchytraeids represent close to 20% of stygofaunal oligochaetes, although some of these species may be better described as amphibious because many surface enchytraeids occur at the boundary of terrestrial and aquatic habitats.

Little is known about occurrence of the enchytraeid genus *Achaeta* in Australia but it is occasionally collected in subterranean and streambed sampling. Of the 21 records of *Achaeta* in the Bennelongia database, 11 were the result of stygofauna net sampling, eight from troglofauna scrape sampling (the haul net can go below the water table) and two were from hyporheic or spring habitat. This information includes the three records of *Achaeta* sp. collected from the MDIOM in December 2014 by Bennelongia. Some of the other Bennelongia records are from the Pilbara but whether any of these are conspecific with the MDIOM *Achaeta* sp. is unknown. Overall, it is likely that more enchytraeid species in the Pilbara are widespread than implied by Brown *et al*. (2009). Genetic distance information suggests the bPTP species delimitation model they used substantially oversplit species. However, whether *Achaeta* sp. has a linear range >16 km is unknown (Table 6).

Water mites
Hydracarina is a term covering many families of aquatic mites. Hydracarina account for more than half of the 80 stygobitic invertebrates recorded from Poland (Dumnicka and Galas 2017). In contrast, Halse (2018b) estimated they account for only 3% of the Pilbara stygofauna species and there is relatively little focus on their ecology in Australia.

The single species of water mite known only from the areas of groundwater disturbance is *Guineaxonopsis* sp. B03 (S01 group). It has a known linear range of 20 km. Based on morphology, four other species are informally recognised in the SO1 group. Two of the carefully examined SO1 group species are single records and the other two have linear ranges of 4.6 and 30 km (Bennelongia data). *Guineaxonopsis* 'BAC011' also occurs at a single site outside impact areas at MDIOM. The only other species-level stygofaunal *Guineaxonopsis* with multiple records in the Bennelongia database has a linear range of 1.1 km. The above information makes the likely range of *Guineaxonopsis* sp. B03 (S01 group) unclear, despite some identifications in the past (probably confusing multiple species) that suggesting stygofaunal *Guineaxonopsis* have wide ranges.

Ostracods
The Pilbara supports a globally significant radiation of candonid ostracods (Karanovic 2007). One of the most common genera is *Areacacandona*, which mainly occurs in the north-western half of the Pilbara (Reeves *et al*. 2007). Halse et al. (2014) found that almost without exception stygobitic ostracods (all *Areacandona* are stygobitic) are restricted to single sub-catchments. More recent data, including that

from MDIOM surveys, suggest large ranges among candonids are more common than implied by Halse *et al*. (2014) (see Table 6).

Areacandona 'BOS1381' was collected from two sites 7 km apart in 2011 and 2019. While *Areacandona* 'BOS1381' has some similarities with *A. clementia*, which occurs near the mouth of the Fortescue River 270 km from *A*. 'BOS1381', they are considered to be different species. The true linear range of *Areacandona* 'BOS1381' is unknown and difficult to estimate.

Syncarids

Two families of syncarids occur in groundwater in Western Australia: Bathynellidae and Parabathynellidae. Both have been shown to have mostly very small linear ranges, often only a few kilometres although emerging information suggests that a small proportion of species in both families have ranges of tens of kilometres (Perina *et al*. 2018, 2024).

Existing data show that one of the five species of Parabathynellidae known only from the areas of groundwater disturbance has a moderate linear range (nr *Billibathynella* `MH2` (Parabathynellidae `MH2`) = 18 km) and suggest the other four species known from single sites are likely to have small ranges of a few kilometres (*Atopobathynella* sp. B09 (Parabathynellidae `MH1`) = 3 km; *Billibathynella* `BSY244`, *Brevisomabathynella* `BSY233 and Parabathynellidae `MH3`) (Table 6; Figure 2 of Appendix 6).

The pattern is similar for three species of Bathynellidae known only from the areas of groundwater disturbance. *Pilbaranella* `MH1' has a range of 16 km, while *Pilbaranella* `MH2` and *Pilbaranella* sp. B18 are known from single sites and may have ranges of a few kilometres (Table 6; Figure 2 of Appendix 6).

Amphipods

Amphipod species were considered by Halse *et al*. (2014) to have catchment sized ranges. While this seems to be true for the genus *Nedsia* in the family Eriosopidae (King *et al*. 2022), unpublished genetic work suggests that many species of Paramelitidae, which is the most speciose amphipod genus in the Pilbara (King *et al*. 2024) and common in the MDIOM, have smaller ranges.

The single species of paramelitid amphipod known only from the areas of groundwater disturbance, *Maarrka* 'BAM182', was collected in 2020 and 2022 from the same bore (Table 6; Figure 2 of Appendix 6). While there is considerable uncertainty, the results of Finston *et al*. (2011) suggest *Maarrka* 'BAM182' is likely to have a linear range of tens of kilometres.

Harpacticoid copepods

Although various invertebrate classifications are used, the term Harpacticoida is usually taken to refer to an order of copepods containing more then 50 families. The other major orders are Calanoida and Cyclopoida. As a group, harpacticoid species tend to have small ranges, with genetics suggesting that many morphological lineages contain multiple species (Karanovic and Cooper 2011).

Both species of harpacticoid known only from areas of groundwater disturbance at the MDIOM were collected from single holes (Table 6; Figure 2 of Appendix 6). *Dussartstenocaris* `BHA335`, which belongs to the family Parastenocarididae, belongs to a genus with many species in the Pilbara or further east. The mean linear range of the five species with multiple records is 35 km but the pattern of ranges (0.6 to 90 km) and occurrence of six species known from single sites (including *Dussartstenocaris* `BHA335`) suggest there may be a bimodal distribution of ranges. *Dussartstenocaris* sp. B01, which occurs at the MDIOM north of *Dussartstenocaris* `BHA335`, has a linear range of 53 km. *Dussartstenocaris* sp. nov. B03 (PIL), the entire range of which is north of the MDIOM, has a range of 93 km. It appears likely that the failure to collect *Dussartstenocaris* `BHA335` more widely reflects it having a small range.

The other harpacticoid species, *Schizopera* `BHA277`, belongs to the family Miraciidae and is represented by many species in the Pilbara or further east. The mean linear range of the seven species with multiple records is 6.8 km, with four of the species having known ranges of 0.6 km or less. An additional 15 species are known from single sites. Thus, *Schizopera* `BHA277` would be expected to have a range of only a few kilometres. Another species at the MDION, *Schizopera* `BHA366`, is known from a single site outside impact areas, highlighting the mostly small ranges of Pilbara *Schizopera* species.

Table 6. Stygofauna species known only from planned areas of groundwater drawdown and mounding, holes in which collected, impact types and known linear ranges of the species.
See Appendix 6 for maps of known species locations.

Species	Hole	Impact Type	Known range
Achaeta sp.	MD2971	Drawdown	3 times, 16 km
	MD3394	Both impacts	
	MD0901	Both impacts	
Areacandona `BOS1381`	Robinsons Well	Drawdown	2 times, 7 km
	MD0462	Both impacts	
Atopobathynella sp. B09 (Parabathynellidae `MH1`)	md_kar7	Both impacts	3 times, 3 km
	MD0429		
Billibathynella `BSY244`	MDWB0037	Drawdown	3 times, single site
Brevisomabathynella `BSY233`	MDWB0038	Drawdown	Singleton
Dussartstenocaris `BHA335`	MDWB0038	Drawdown	Singleton
Guineaxonopsis sp. B03 (S01 group)	Hesters Bore	Both impacts	2 times, 20 km
	MD0429		
Maarrka `BAM182`	MDCMB09	Drawdown	2 times, same site renamed
	MDWB0038		
nr *Billibathynella* `MH2` (Parabathynellidae `MH2`)	md_kar6	Both impacts	5 times, 18 km
	MD0396		
	MD0509		
	MD0533		
	MD0562		
Parabathynellidae `MH3`	MD0525	Both impacts	Singleton
Pilbaranella `MH1`	md_kar6	Both impacts	3 times, 16 km
	MD0499		
	MD0577		
Pilbaranella `MH2`	MD0462	Both impacts	Singleton
Pilbaranella sp. B18	MD0974	Both impacts	Singleton
Schizopera `BHA277`	MDPZ7458C	Drawdown	Singleton

3.5.2. Restricted Troglofauna

Up to 41 species of troglofauna are known only from within proposed mine pits and areas of predicted groundwater mounding ≥1 m (Table 7, Appendix 7). Up to 16 of these species may be duplicate names rather than distinct species. Three pairs of names (e.g. *Cryptops* 'MH1' (=DNA05) and *Cryptops* sp. B42) will each still represent a single restricted species if conspecific and a fourth is most likely to do so (Projapygidae 'BDP182' and Projapygidae 'MH1'). The other eight species will have wider distributions than the impact areas if there is conspecificity. Thus, it may be concluded that the number of troglofauna species known only from the proposed mine pits and areas of predicted groundwater mounding is somewhere between 29 and 41. The likelihood of conspecificity varies from high for Parajapygidae sp. B30 and *Linnaeolpium* `BPS502` to quite uncertain for Campodeidae 'BDP216' (Table 7). In many cases where identifications by Phoenix (MH codes) and Bennelongia (range of codes starting with B) could not be reconciled, it is likely there will be two names for the one species but which species are likely to be conspecific was not always apparent (e.g. Pauropodidae `MH1` and 'MH2' and Pauropodidae 'BPU089 and 'BPU090') (Table 7). This high level of uncertainty is a result of much of the impact area sampling being done between 2009 and 2014, with difficulty comparing many of the animals collected in the early surveys with those from the later ones (most of the early Phoenix material was not available for comparison).

The distributions of individual troglofauna species known only from impact areas are shown in Appendix 7. Fifty-two per cent of these species were collected from only one hole, compared with 39% of all troglofauna species (Table 5). While further sampling must eventually show that species collected from single holes have larger ranges than currently recorded, it would be expected that the true range of most of these species is small. It can be seen from Figure 5 that few troglofauna species have linear ranges >30 km and many have much smaller ranges. The average currently known linear range of 'restricted' species with multiple records is 8 km, which is a large range relative to the size of proposed mine pits but small relative to the area of groundwater mounding (Figure 2).

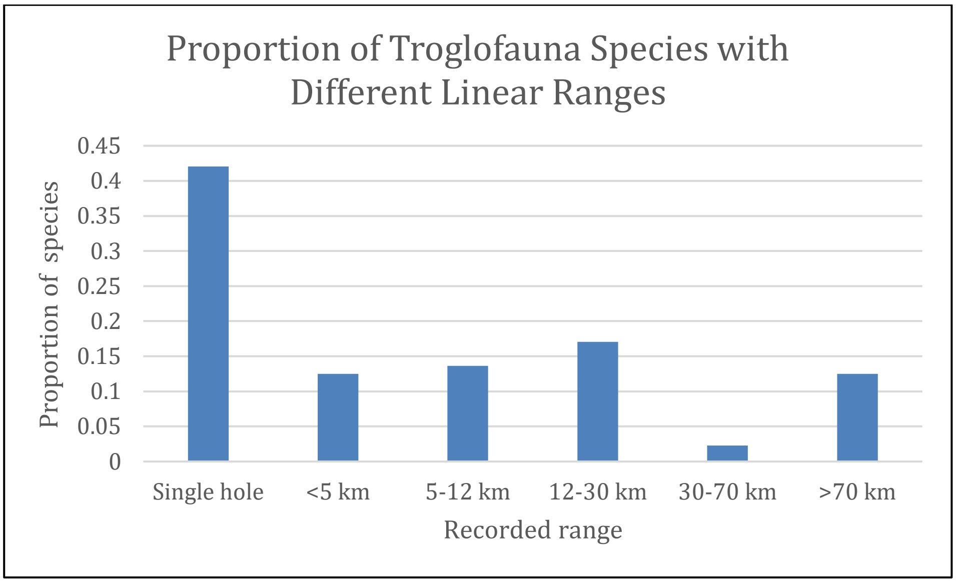


Figure 6. Known linear ranges of troglofauna species occurring at MDIOM.

Twenty-two (53%) of the restricted troglofauna are known only from areas of ≥1 m groundwater mounding, two (5%) are known only from mine pits and 18 species (42%) are affected by both impacts.

Information about likely ranges of groups containing the 41 species of troglofauna known only from within proposed mine pits and areas of predicted groundwater mounding ≥1 m is provided below. Collection locations of species are shown in Appendix 7.

Pseudoscorpions

Three species belonging to the family Chthoniidae (*Austrochthonius* 'BPS257', *Tyrannochthonius* sp. B35 and *T.* 'BPS229') and one species in the family Olpiidae are known only from areas of mine pits or mounding. Harvey (2002) regarded very few pseudoscorpions, other than some troglobitic species, as short-range endemics (range <10,000 km^2). Re-calculating to linear ranges, the data used by Halse and Pearson (2014) suggested the median range of troglofaunal pseudoscorpions collected at three or more sites is approximately 5 km.

Species with large ranges usually have some morphological characteristics indicative of being troglophiles, enabling the likelihood of a large range to established during identification. None of the

Table 7. Troglofauna species known only from planned mine pits and areas of groundwater mounding, holes and geologies in which collected known linear ranges of species.

See Appendix 7 for maps of known species locations. Orange highlighting indicates habitat mapping suggested prospective habitat was absent where these species collected. Impact types.

Species	Hole Name	Upper Calcrete	Undiff. Sediment	CID / Pisolite	Mineral. BIF	Impact Type	Comments
Austrochthonius `BPS257`	MD3207		✓		✓	Both	Singleton
Buddelundia sp. B57	MD3028			✓		Mounding	4 times, 4.5 km
	MD3087			✓		Mounding	
	MD3771				✓	Both	
	MDRC2104		✓			Mounding	
Campodeidae `BDP216`	MD3980		✓	✓	✓	Mine pit	Singleton, may be same as sp. B10
Coleoptera 'BCO207'	MD1545		✓			Both	5 times, 3 km
	MD1796		✓	✓		Mounding	
	MD1813		✓			Mounding	
	MD3809		✓	✓		Both	
Cryptops 'MH1' (=DNA05)	MD0525			✓	✓	Mounding	2 times, 12 km; may be *Cryptops* sp. B42
	MD4821		✓			Mounding	
Cryptops sp. B42	MD0298			✓		Mounding	Singleton
Cryptops sp. B41	MD0974		✓	✓		Mounding	Singleton
Cryptorhynchinae sp. B18	MD0225					Mounding	2 times, 8 km
	MD3094		✓	✓		Mounding	
Draculoides `BSC028`	MD3683					Mounding	Singleton
Draculoides `MH2`	MD0525			✓	✓	Mounding	Singleton
Draculoides `SCH084-DNA`	MD0408		✓	✓	✓	Both	2 times, 1.2 km
	MD6444		✓			Mounding	
Gnaphosidae sp. B03	MD2889			✓	✓	Both	Singleton
Gracilanillus `BCO176`	MD3027					Mounding	2 times, 3 km
	MD6444		✓			Mounding	
Hanseniella `MH1`	md_kar6		✓	✓		Mounding	3 times, 3 km; may be same as *Hanseniella* `BSYM117`

Species	Hole Name	Upper Calcrete	Undiff. Sediment	CID / Pisolite	Mineral. BIF	Impact Type	Comments
	MD0393			✓		Mounding	
	MD0397		✓			Mounding	
Japygidae `BDP213`	MD7642				✓	Mounding	2 times, 6.2 km; may be Japygidae 'MH1' or 'MH2'
	MD9401					Mounding	
Japygidae `MH1`	MD0266					Mounding	2 times, 13.5 km
	MD0486			✓	✓	Both	
Linnaeolpium `BPS502`	MD4757		✓			Mounding	Singleton, juvenile, probably *Linnaeolpium* sp. B03
Nocticola 'BLA008'	MD0398		✓	✓		Mounding	5 times, 15.5 km
	MD0882				✓	Mounding	
	MD4554				✓	Both	
	MD9401					Mounding	
nr *Andricophiloscia* sp. B18	MD4542				✓	Mounding	Singleton
Palpigradi `BPAL053`	MD0401		✓	✓		Mounding	Singleton, may be Palpigradi `MH2`
Palpigradi `MH2`	MD0398			✓		Mounding	Singleton
Palpigradi sp. MH1	MD0467		✓	✓		Both	2 times, 0.3 km;
	MD2038		✓	✓		Mounding	
Palpigradi sp. B18	MD0716			✓	✓	Mine pit	2 times, 4 km; may be Palpigradi 'MH1'
	MD1284				✓	Both	
Parajapygidae sp. B30	MD2094				✓	Both	Singleton, probably Parajapygidae 'MH1'
Parajapyx `BDP217`	MD3207		✓		✓	Both	Singleton
Pauropodidae `MH1`	MD0487			✓	✓	Both	Singleton
Pauropodidae `MH2`	MD0396		✓	✓		Mounding	3 times, 18 km; Pauropodidae 'MH1' and 'MH2' are distinct species but how related to Pauropodidae 'BPU089' and 'BPU090' is unclear
	MD0415		✓	✓		Mounding	
	MDH0143			✓	✓	Both	
Pauropodidae 'MH3'	MD0467		✓			Both	2 times, 15 km
	MD2038			✓		Mounding	
Phaconeura 'BHE036'	MD3805		✓	✓		Mounding	Singleton

Species	Hole Name	Upper Calcrete	Undiff. Sediment	CID / Pisolite	Mineral. BIF	Impact Type	Comments
Projapygidae `BDP182`	MD2936				✓	Both	Singleton, may be 'MH1' and/ or sp. B18
Projapygidae 'MH1'	MD0259			✓		Mounding	3 times, 17 km
	MD0397		✓			Mounding	
	MD0467			✓		Both	
Symphylella sp. B20	MD2926			✓		Both	3 times, 10 km
	MD6163		✓			Mounding	
	MDRC2367			✓	✓	Mine pit	
Trinemura `BZY102`	MD0790		✓		✓	Mine pit	2 times, 4.5 km
	MD2453				✓	Mine pit	
Trochanteriidae sp. B01	MD0635	✓	✓			Mounding	Singleton
Troglarmadillo 'BIS392'	MD0350		✓	✓		Mounding	Singleton
Troglarmadillo 'BIS562'	MDRC1351		✓			Mounding	2 times, same site
Troglarmadillo 'MH1'	MD0467			✓		Both	Singleton, probably *Troglarmadillo* sp. B54 or sp. B55
Troglarmadillo sp. B04	WF0138	✓	✓			Mounding	Singleton
Troglarmadillo sp. B05	WF0138	✓	✓			Mounding	Singleton
Tyrannochthonius `BPS229`	MD1556		✓			Mounding	2 times, 11 km
	MD4821		✓			Mounding	
Tyrannochthonius sp. B35	MD0884		✓	✓	✓	Both	2 times, 11 km
	MD3661		✓	✓	✓	Both	

three 'restricted' species from the MDIOM possess these characteristics but *Tyrannochthonius* sp. B35 and T. 'BPS229' both have larger known linear ranges than most troglofaunal pseudosccorpions (11 km). *Austrochthonius* 'BPS257' is known from a single site and, while surface olpiids are usually widespread, there is no biological basis for predicting its likely range.

Palpigrades

Most palpigrades are troglofaunal and found in caves or more widespread subterranean systems, although they also occur on the surface in soil, leaf litter and other moist situations. Only three described species occur in Australia, two of which are introduced surface species and one a troglofaunal species from the Yilgarn (Barranco and Harvey 2008). About 50 subterranean palpigrade species have been recognized in Western Australia, mostly in the Pilbara (all but one denoted by code names); other species have been collected but not identified to species level.

Only one troglofaunal species (Palpigradi sp. B01) in the Bennelongia database has a range extending outside a mining hub; most species appear to have small ranges. Halse and Pearson (2014) calculated a median linear range for four species with three or more records of about 20 km. Recent collecting suggests most species have smaller ranges than tehat. Of the four 'restricted' species at the MDIOM, Palpigradi 'BPAL053' and 'MH2' were collected from single sites, Palpigradi 'MH1' had a range of 0.3 km and Palpigradi sp. B18 a range of 4 km.

Schizomids

Most schizomids live in moist leaf litter of rainforests and vine thickets but there are many troglofaunal species in the Pilbara (Abrams *et al*. 2019). Most schizomids have small linear ranges. As with all species, range size is potentially influenced by pattern and intensity of sampling and also the way in which species have been delineated (Harms *et al*. 2018). However, in conjunction with topographical features, schizomid species may have linear ranges as small as 1 km (Harvey *et al*. 2008). The most widespread Pilbara species appear to have ranges of about 15 km (Harms *et al*. 2018).

Two of the schizomid species 'restricted' to the MDIOM (*Draculoides* 'MH2' and *D*. 'BSC028') were collected from single sites; *D*. 'SCH084-DNA' was collected from two sites with a known linear range of 1.3 km.

Spiders

At least 11 families of spiders have been recorded in the Pilbara as troglofauna. The most common families are Gnaphosidae, Linyphiidae, Oonopidae and Symphylognathidae. The taxonomy of troglofaunal spiders, like nearly all troglofauna, is poor at the genus level (although species can be distinguished from each other). Two species are currently known only from the impact areas at the MDIOM: Gnaphosidae sp. B03 and Trochanteriidae sp. B01.

Most species of gnaphosid are known from one or two records. Of the seven species known from three or more sites, only nr *Encoptarthria* sp. B01 has a large range (48 km). The median of linear range other species is 3 km. It is likely that Gnaphosidae sp. B03, which was collected at a single site, has a small range at the MDIOM. The three trochanteriid species known from the Pilbara have been recorded at only one or two sites, with Trochanteriidae sp. B01 being recorded from a single site in the impact areas at the MDIOM. An unidentified trochanteriid was collected from outside impact areas.

Isopods

There are many troglofaunal isopods in the Western Australia. There has been little taxonomic work on this group in Australia, other than the recent work of Javidkar *et al*. (2016, 2017), which has shown some troglophilic species of isopods in the Yilgarn are relatively widespread. This lack of taxonomic work has made evaluation of ranges difficult at times, even when aided by DNA analysis. Halse and Pearson (2014) calculated the median linear range of troglofaunal isopods in the Pilbara to be 1.8 km.

While a few species are troglophiles with larger ranges (usually identifiable as such morphologically), most Pilbara isopods are troglobites with ranges confined to individual mining hubs, and usually only smaller areas within these. Of the seven isopod species known only from areas of disturbance at the MDIOM, only *Buddelundia* sp. B57 was recorded at multiple sites with a linear range of 4.5 km. The five species of *Troglarmadillo* – 'BIS392', "BIS562', 'MH1', sp. Bo4 and sp. B05 – and nr Andricophiloscia sp. B18 were recorded at single sites. All seven species are likely to have small ranges.

Centipedes

The centipede genus *Cryptops* is widely recorded across the world in surface and subterranean environments (Lewis 2009). Most troglofaunal *Cryptops* species collected are represented by one or two records. The eight species represented by three or more records in the Bennelongia database have a median known linear range of 16 km (2.8-210 km, the next largest range was 22 km).

Two of the three *Cryptops* species 'restricted' to impact areas at the MDIOM (*Cryptops* sp. B41 and sp. B42) were recorded at single sites; *Cryptops* 'MH1' (=DNA05) has a known range of 12 km and may be conspecific with *Cryptops* sp. B42 (meaning just two *Cryptops* species are restricted at the MDIOM. A fourth species (*Cryptops* 'MH1'), with a range of 15.5 km, occurs outside the impact area. Comparison with related species suggests the true ranges of the restricted species are likely to be close to 20 km, although life history of individual species or habitat discontinuities may result in smaller ranges.

Pauropods

Recognition of pauropods as troglofauna is controversial because surface species are usually eyeless and colourless and there is limited capacity for these animals to develop other classic troglomorphic characters. However, they are collected frequently underground and, as with schizomids which have abundant subterranean occurrence, it is unsurprising that these forest leaf matter and soil animals have moved underground in the Pilbara. There appear to be numerous troglobitic species of pauropod in the Pilbara, as well as a few trogloxenes or troglophiles (e.g. *Decapauropus tenuis* and Pauropodidae sp. B01 s.l.) that have cosmopolitan or Pilbara-wide ranges.

Of the eight species collected at MDIOM, three were collected at singleton sites and one species (Pauropodidae sp. B01 s.l.) occurs Pilbara-wide. The other four have a median known linear range of 25 km (15-32 km). Based on a small sample, Halse and Pearson (2014) calculated the median range pf Pilbara pauropod species as 7 km; more complete records from three or more sites in the Bennelongia database (excluding MDIOM work) give a median known linear range of 16 km, which is the same as for centipedes.

Symphylans

Symphylans are another group in which it is difficult to distinguish between soil and subterranean species. However, subterranean occurrence of symphylans is well established and Halse and Pearson (2014) suggested the median linear range for Pilbara troglofaunal species is about 3 km, which is a substantial underestimate of linear ranges of species with multiple records. This often happens when converting the area calculation of Halse and Pearson (2014) to a linear range if records are distributed along a ridge rather than having a circular pattern. Examination of a larger number of records in the Bennelongia database suggests the median known linear range of species with three or more records is 10 km for *Hanseniella* species and 10.5 km for species of *Symphylella*.

The known linear ranges of both symphylans known only from impact areas at the MDIOM (3 km for *Hanseniella* 'MH1' and 10 km for *Symphylella* sp. B20)) suggest the species are likely to have more or less typical symphylan ranges.

Diplurans

Diplurans are the most speciose group of troglofauna in the Pilbara. The taxonomy of the group is well developed (Sendra *et al*. 2021) but no Australian troglofaunal species have been described (Koch 2009) other than *Cocytocampa humphreysi* in the family Campodeidae (Conde 1998). Data from the Bennelongia database for species with three or more records suggests trogofaunal diplurans have relatively large ranges. However, it is difficult to distinguish between troglobitic and troglophilic (and soil) diplurans and the median known linear ranges of species with more than three records for some families of diplurans (Japygidae 18 km, Parajapygidae 14 km, Projapygidae 12 km, Campodeidae 1 km) may be inflated by the greater likelihood of widespread troglophilic species being recorded more frequently. The 74 species of Japygidae were represented by 330 records, with linear ranges of 0.1 to 85 km calculated for 10 species (the other 64 species were recorded from only one or two sites). The 68 species of Parajapygidae were represented by 76 records with linear ranges of 3 to 54 km calculated for nine species. Linear ranges were calculated for only two of the 50 species of Projapygidae, which in total were represented by 76 records. Thus, there appears to be strong likelihood that most diplurans are troglobitic with small ranges.

Of the seven species of dipluran known only from impact areas at the MDIOM, known linear ranges are Japygidae 'BDP213' (6.2 km), Japygidae 'MH1' (13.5 km), Parajapygidae 'DBP217' and P. sp. B30 (single sites), Projapygidae 'BDP182' (single site), Projapygidae 'MH1' (17 km) and Campodeidae 'BDP216' (single site). Comparisons of material collected in early surveys and more targeted surveys was particularly difficult for diplurans and the species ranges of MDIOM species have uncertainty (Table 7).

Silverfish

Silverfish are one of the many taxonomic groups well represented in troglofauna communities of the Pilbara (Halse 2018). There have been several recent papers of the taxonomy of troglofaunal silverfish in the Pilbara that emphasis the fauna is taxonomically diverse, with small ranges (Smith *et.al*. 2012, 2021; Smith and McRae 2014, 2016). Halse and Pearson (2014) calculated the known median linear range of species with multiple records as 4 km.

The single species of silverfish known only from impact areas of the MDIOM (*Trinemura* 'BYZ102' has a known linear range of 4.5 km. While there are a small number of widespread silverfish species, *Trinemura* 'BYZ102' is likely to have a relatively small range.

Cockroaches

A rich community of subterranean cockroach species occurs in the Pilbara, with at least some troglophilic species. Nearly all species belong to the genus *Nocticola* in the family Noctocolidae, which has been subject to both taxonomic and genetic work in the Pilbara (Trotter *et al*. 2018; Ewart *et al*. 2023; Kovacs *et al*. 2024). The genetic work of Ewart *et al*. (2023) suggests genetic flow is high in troglofaunal cockroaches and many species have larger ranges than usually interpreted when interpreting cockroach genetic results (Trotter *et al*. 2018). As a consequence, it is difficult to make general comments about the ranges of troglofaunal nocticolid species.

The single species known only from the MDIOM impact areas (*Nocticola* 'BLA008') is genetically distinct and has a known linear range of 15.5 km. The species is considered to be troglobitic and unlikely to have a large range.

Hemiptera

The genus *Phaconeura* in the family Meenoplidae occurs commonly in subterranean habitats in the Pilbara. It occurs throughout northern Australia (Hoch 1990, 1993) and is the main genus of subterranean hemipterans in the Pilbara It contains a small number of widespread troglophilic species (the taxonomic boundaries of most of these are still unclear) but most species are troglobitic. Records from the Bennelongia database suggest the median known linear range of troglofaunal *Phaconeura* species in the Pilbara is 18 km (range 1 -430 km).

Phaconeura 'BHE036', the only troglofaunal hemipteran species 'restricted' to the MDIOM impact areas, is known from a single site. Little can be said about its distribution. The multiple collections and wider occurrence of other four meenoplid species at the MDIOM (Table 7) suggest they are troglophilic, whereas the single record of *Phaconeura* 'BHE036' suggests it is probably troglobitic with a smaller range.

Beetles
Seven families of beetles have been recorded in the Pilbara, with species descriptions of some carabids (Baeher 2014a,b; Baehr and Main 2016; Giachino *et al*. 2021). One of the more common families is weevils (Curculionidae), with the weevil subfamily Cryptohynchinae being represented by records of 27 troglofaunal species, five of which are known from three of more sites with ranges varying from 1 to 18 km (median 4 km). Another common family is ground beetles (Carabidae), which contains groups that have speciated extensively below ground around the world. The genus *Gracilanillus* is currently represented in the Pilbara by 15 species, of which six have been collected at three or more sites with ranges of 3 to 92 km (median 17 km).

Of the two beetle species known only from impact areas of the MDIOM, Cryptorhynchinae sp. B18 was collected at two sites 8 km apart and *Gracilanillus* 'BCO176' was collected at two sites 3 km apart. Cryptorhynchid species are usually more widespread than *Gracilanillus* species, although both groups contain some species with small ranges.

4. DISCUSSION

4.1. Stygofauna Habitat Characterisation

Detailed modelling of stygofauna habitat at the MDIOM was not available for this report but the Robe palaeovalley is an extensive geological feature that roughly follows the Fortescue Valley, passes through the MDIOM and extends to the east and west of it (Figure 7). Palaeovalleys are often synonymous with the presence of stygofauna because they represent old drainage lines and contain extensive bodies of alluvium, thus providing suitable habitat for stygofauna species.

A hydrogeological assessment of the MDIOM and surrounding area by AQ2 (2023b) demonstrated that the groundwater within it is mostly fresh or subsaline, with electrical conductivity (EC) values of purged bores being predominately below 6,000 µS/cm (although EC values up to 20,000 µS/cm were occasionally recorded). Similar salinities were reflected in holes sampled for stygofauna, in which EC values in the top metre of the water column varied between 64.2 µS/cm and 18,000 µS/cm (Appendix 1). AQ2 (2023b) recorded pH values between 7.1 and 8.3 and stygofauna sampling between 2019 and 2024 mostly recorded values between 7 to 8.6, although some pH values as low as 3.6 were recorded (Appendix 1).

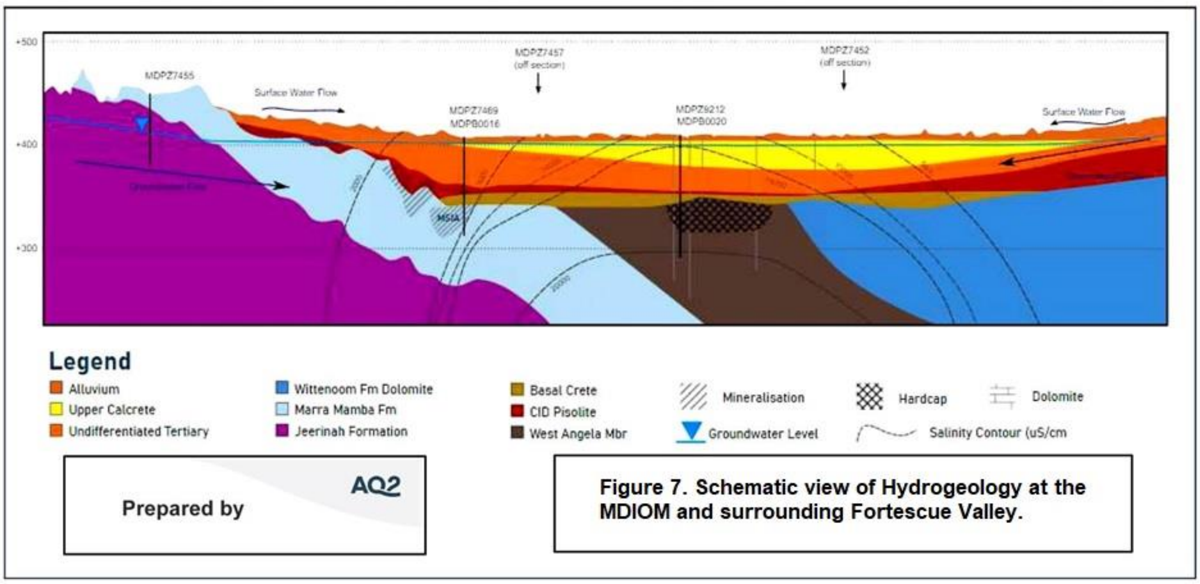


Figure 7. Schematic view of Hydrogeology at the MDIOM and surrounding Fortescue Valley.

In a schematic overview of the hydrogeology of the MDIOM and its surrounds, AQ2 (2023b) identified three geologies below the water table at the MDIOM and wider Fortescue Valley (Figure 7). The uppermost geology is a band of Upper Calcrete. The aquifer in this geology would be expected to be Highly Likely Habitat for stygofauna and to support some species that are restricted to the geological unit or to a strong carbonate signal in water chemistry (Humphreys 1999, 2001; Halse 2018a). Below this is up to 30 m of undifferentiated Tertiary Detritals, and the aquifer in this geology would be expected to provide Likely Habitat for stygofauna. A layer of CID / Pisolite occurs below the undifferentiated Tertiary Detritals which would also be expected to provide Possible Habitat for stygofauna, although in the middle of the valley it is at a depth where low carbon and nutrient inputs are likely to prevent many species occurring (Halse 2018a).

AS is the case in all hydrogeological settings, minor variations in geology and water chemistry (most obviously salinity) at local spatial and vertical scales, as well as the possible occurrence of faults, dolerite dykes and other features affecting groundwater flow, will affect stygofauna occurrence and the connectivity of habitat.

4.2. Troglofauna Habitat Characterisation

The geological units identified by AQ2 (2024) as existing above the water table at the MDIOM and, therefore, available for troglofauna, are shown Table 8. The modelling of troglofauna habitat is discussed further below.

4.2.1. Alluvium

The uppermost layer at the MDIOM and surrounds comprises Quaternary deposits of alluvium and colluvium (Figure 8), which are characterised by unconsolidated silt, sand and gravel. Since the unit has a clay dominant matrix with low potential for porosity, it is considered to be Unlikely Habitat for troglofauna at the MDIOM (AQ2 2024).

4.2.2. Upper Calcrete

Calcretes often contain subterranean vugs and voids and, while more commonly associated with the presence of stygofauna (below the water table), are highly prospective for troglofauna if karstic (Eberhard and Howarth 2021). Modelling conducted by AQ2 indicates a large section of Upper Calcrete exists in the vicinity of the MDIOM, intersecting both eastern and western areas of mounding (Figure 9). The unit is modelled to exist from the western side of proposed pits, and extend south, covering much of the low-lying areas of the Fortescue Valley, and west towards the Mulga West tenement. Upper Calcrete has a high degree of primary porosity and as a result has been determined to be Likely Habitat for troglofauna (AQ2 2023). As with all habitat types, many troglofauna species in calcrete are likely to have ranges smaller than the calcrete itself (e.g. Eberhard and Howarth 2021).

4.2.3. Undifferentiated Sediments

Although this unit commonly contain abundant subterranean spaces suitable for troglofauna, survey records from the Pilbara to date suggest that not all troglofauna groups utilise undifferentiated sediments (Halse 2018a). Although a section is present to the south, the unit runs east to west through the MDIOM, extending continuously along the slopes of the Chichester Range (Figure 10).

The assessment by AQ2 (2023a) suggests that while undifferentiated sediments are porous in nature, clay has infilled a lot of the available subterranean spaces and prevents, for the most part, use of this geology by troglofauna. However, there are areas of lower clay content where animals may be found, and undifferentiated sediments are considered to be Possible Habitat for troglofauna in areas where clay content is relatively low.

4.2.4. Channel Iron Deposit (CID) / Pisolite

Troglofauna is commonly collected in CID, which is usually highly porous because of a high degree of sorting, open cementation and post-depositional dissolution. CID is generally widespread in the Pilbara and occurs continuously over the Project area. Although less extensive, the geology has a distribution similar to undifferentiated sediments whereby a band of CID / Pisolite runs east-west through the northern part of the MDIOM and most pits (Figure 11). There is a parallel section of CID south of the MDIOM.

Due to the vuggy nature of the CID and the high porosity of pisolites, the AQ2 (2024) assessment determined that this unit is Likely Habitat for troglofauna.

4.2.5. Jerrinah

The Jerrinah Formation extends across the north of the MDIOM in a relatively thin band through the Chichester Ranges (Figure 12). The only troglofauna impact areas intersected by Jeerinah Formation are the northern edges of both areas of groundwater mounding.

The Jerrinah Formation is dominated by shales, which exhibit a low primary porosity and lack the subterranean spaces troglofauna require. As a result, the determination made by AQ2 (2024) was that this geological unit was not suitable for troglofauna and is therefore considered to be Non-Habitat.

4.2.6. Mineralised Marra Mamba

Weathered or mineralised Banded Iron Formation (BIF) is widespread in the central Pilbara and known to be prospective habitat for troglofauna because it contains subterranean spaces (Morris 1983) suitable for habitation by troglofauna. Mineralised Marra Mamba, comprising mineralised/hydrated BIF, occurs in patches within the MDIOM (Figure 13). Consisting of many isolated or poorly connected pockets, the areas of BIF are closely associated with (although often larger than) the planned mine pits.

AQ2 (2024) regards this geological unit as Likely Habitat for troglofauna.

4.2.7. Shaley / Unmineralised Marra Mamba

Unaltered Marra Mamba runs in an east-west direction through the MDIOM and intersects most mine pits (Figure 14). This geological unit extends outside of the defined impact areas both to the east and west of the MDIOM.

While vugs and voids are possible down to the base of oxidation in this unit, according to AQ2 (2024), it is unlikely owing to the shale content and minimal enhanced porosity. As a result, the Shaley/Unmineralised Marra Mamba is considered to be Unlikely Habitat for troglofauna.

Table 8. Above-water table geological units at and surrounding the MDIOM as modelled by AQ2 (2024).

<table>
<tr><th>Habitat Stratigraphy</th><th>Lithology/Member</th><th>Stratigraphy</th><th>Habitat Probability</th></tr>
<tr><td>Alluvium</td><td>Alluvium</td><td>Recent Alluvium / Colluvium</td><td>Unlikely Habitat</td></tr>
<tr><td>Upper Calcrete</td><td>Upper Calcrete</td><td rowspan="3">Tertiary Detritals</td><td>Likely Habitat</td></tr>
<tr><td>Undifferentiated Sediments</td><td>Undifferentiated Sediments</td><td>Possible Habitat</td></tr>
<tr><td>Channel Iron Deposit (CID) / Pisolite</td><td>CID / Pisolites</td><td>Likely Habitat</td></tr>
<tr><td>Jeerinah</td><td>Jeerinah Shale</td><td>Jeerinah Formation</td><td>Non-Habitat</td></tr>
<tr><td>Mineralised Marra Mamba</td><td>Mineralised / Hydrated BIF</td><td>Marra Mamba Formation</td><td>Likely Habitat</td></tr>
<tr><td rowspan="4">Shaley / Unmineralised Marra Mamba</td><td>Undifferentiated</td><td rowspan="4">Marra Mamba Formation</td><td rowspan="4">Unlikely Habitat</td></tr>
<tr><td>Nammuldi Member</td></tr>
<tr><td>NacLeod Member</td></tr>
<tr><td>Mt Newman Member</td></tr>
</table>

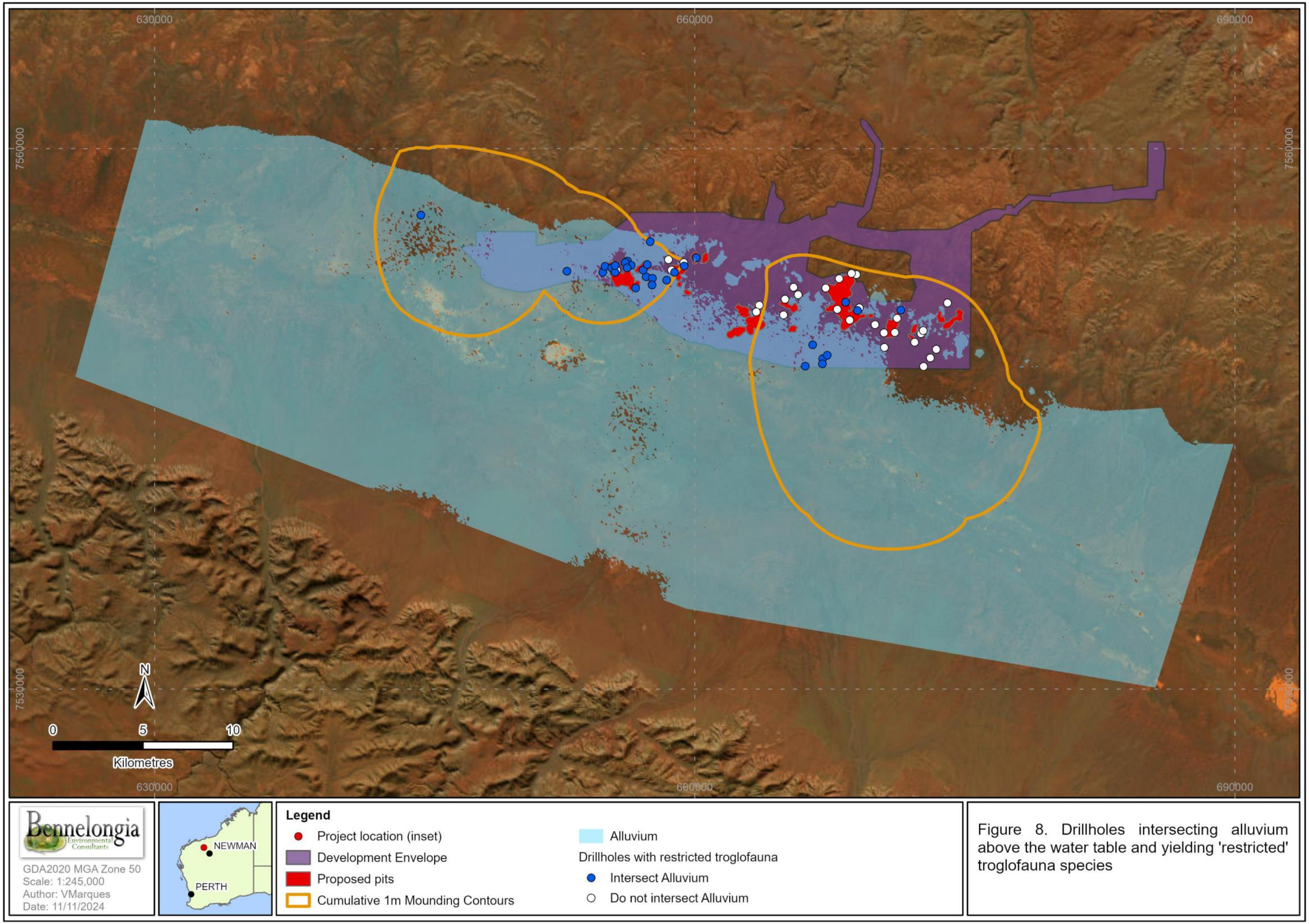
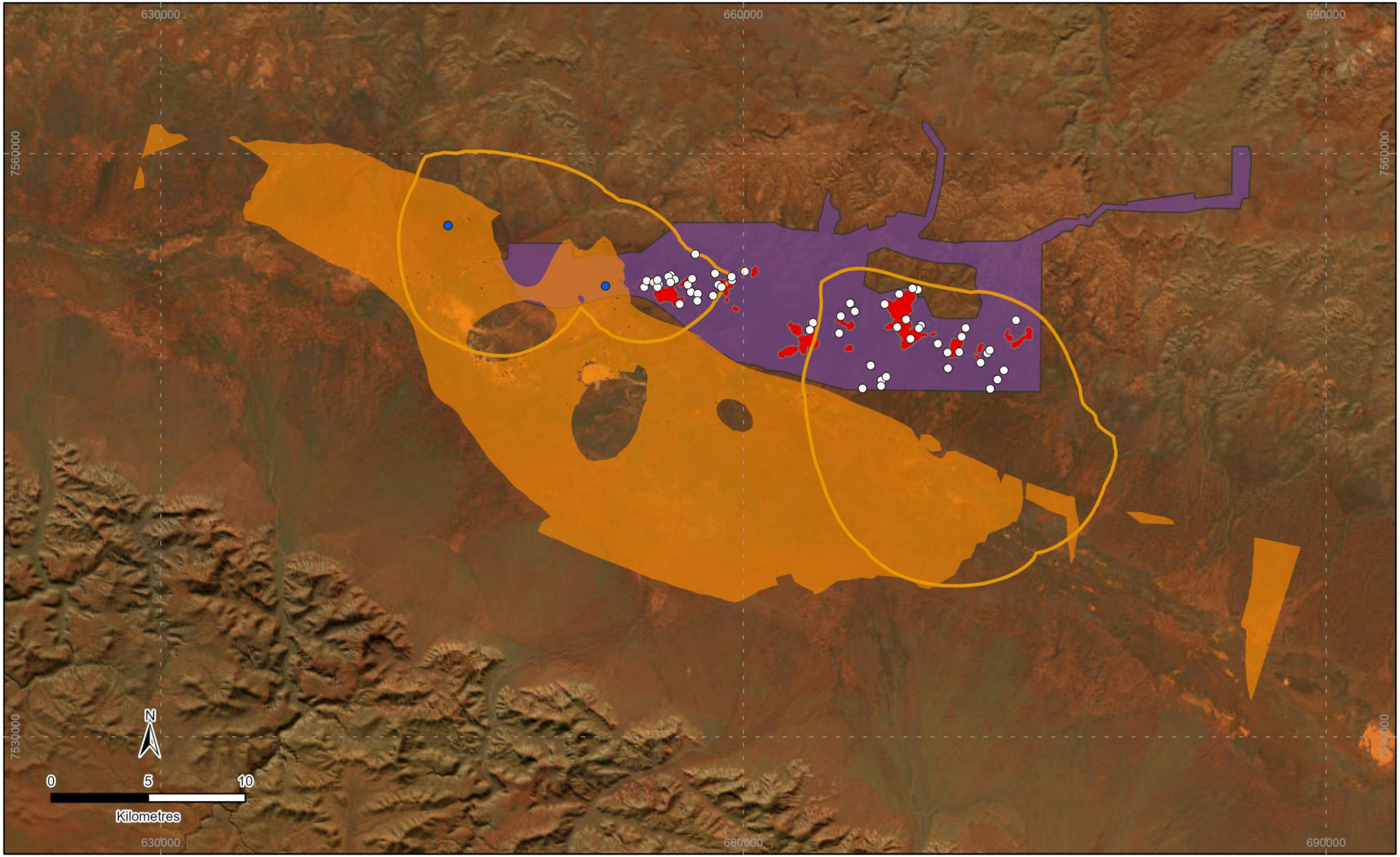


Figure 8. Drillholes intersecting alluvium above the water table and yielding 'restricted' troglofauna species



Bennelongia Environmental Consultants

GDA2020 MGA Zone 50
Scale: 1:245,000
Author: VMarques
Date: 11/11/2024

Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Cumulative 1m Mounding Contours
- Upper Calcrete

Drillholes with restricted troglofauna

- Intersect Upper Calcrete
- Do not intersect Upper Calcrete

Figure 9. Drillholes intersecting upper calcrete above the water table and yielding 'restricted' troglofauna species

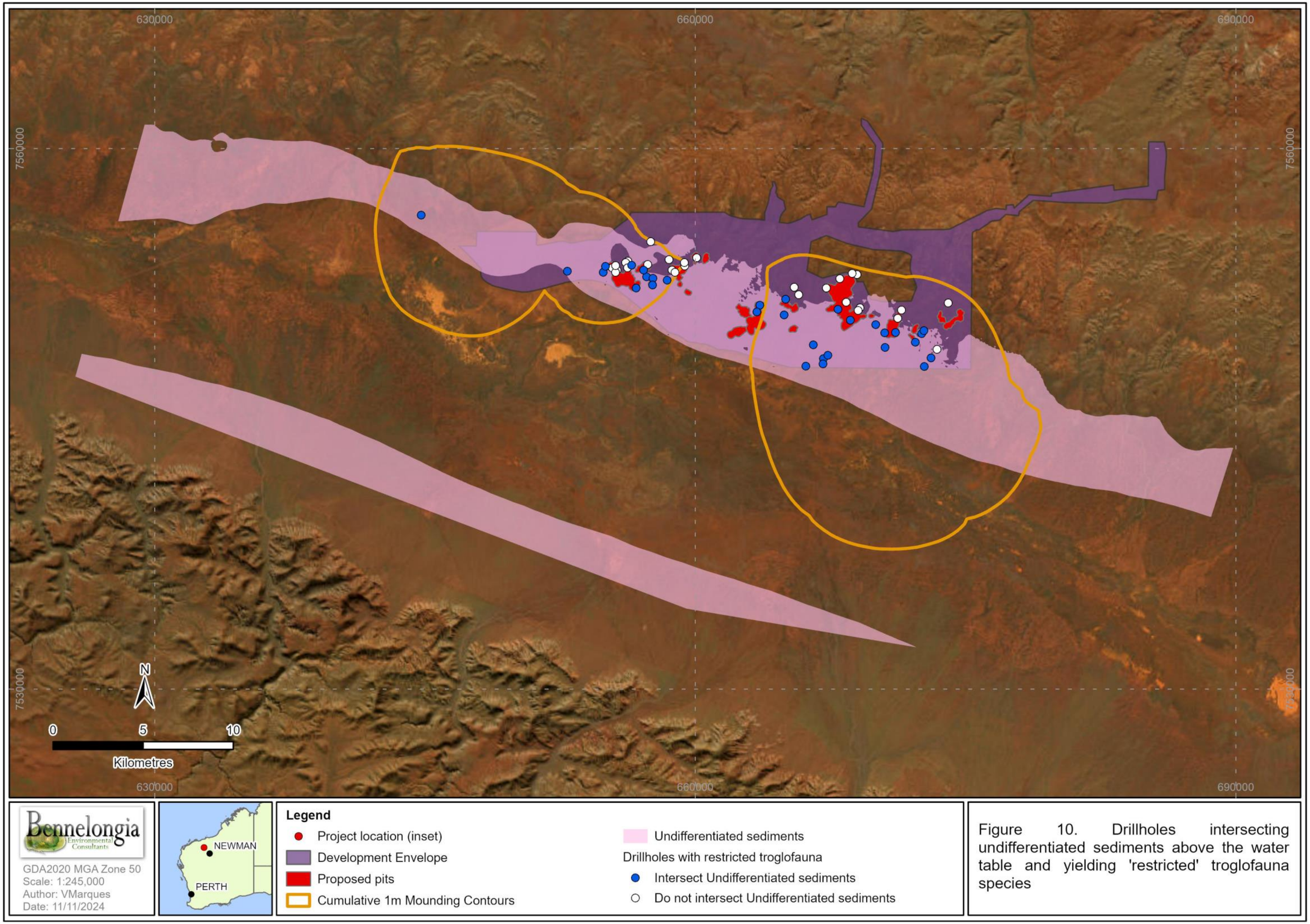
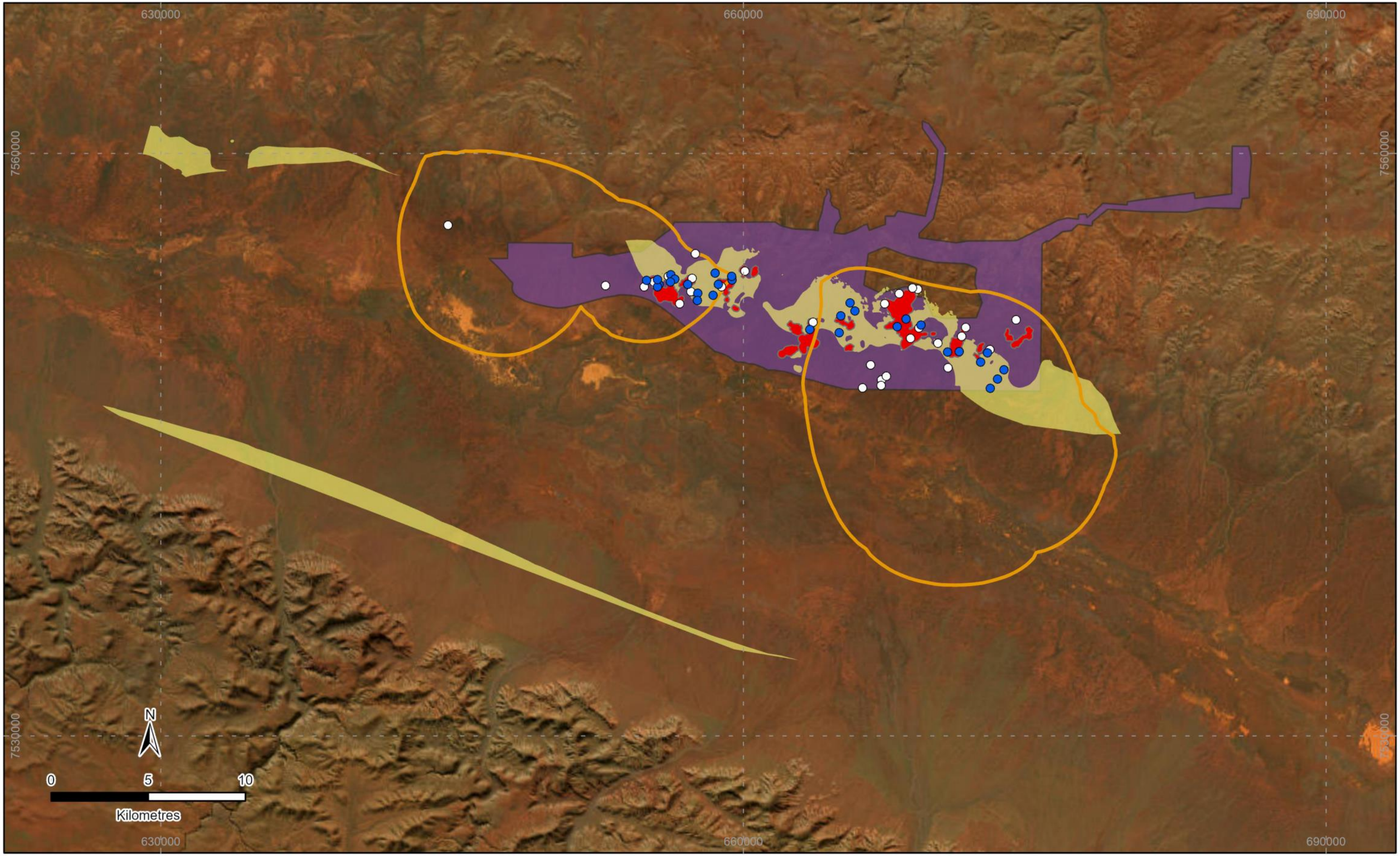


Figure 10. Drillholes intersecting undifferentiated sediments above the water table and yielding 'restricted' troglofauna species



Bennelongia Environmental Consultants

GDA2020 MGA Zone 50
Scale: 1:245,000
Author: VMarques
Date: 11/11/2024

NEWMAN
PERTH

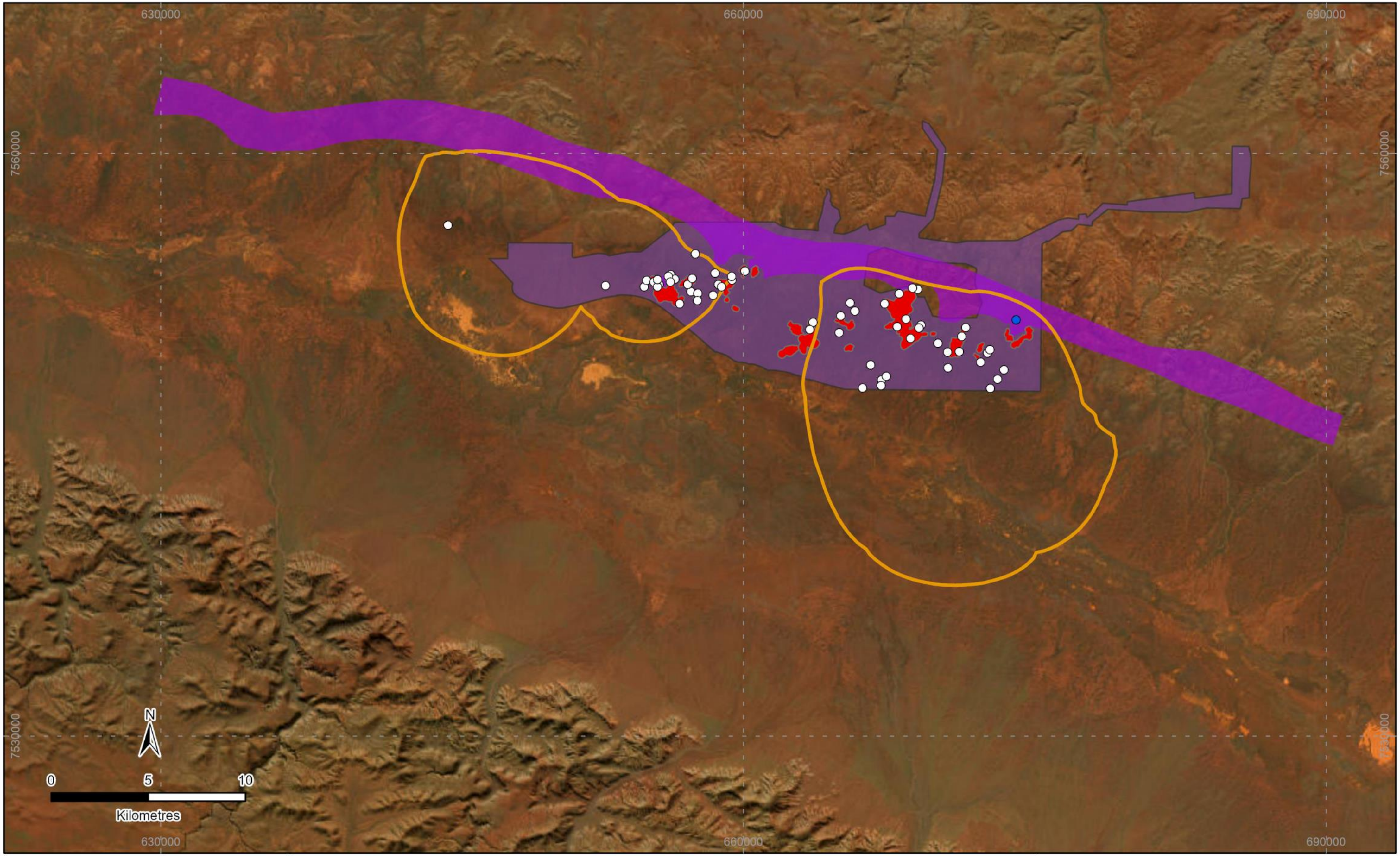
Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Cumulative 1m Mounding Contours
- CID / Pisolite

Drillholes with restricted troglofauna

- Intersect CID / Pisolite
- Do not intersect CID / Pisolite

Figure 11. Drillholes intersecting CID / Pisolite above the water table and yielding 'restricted' troglofauna species



Bennelongia Environmental Consultants

GDA2020 MGA Zone 50
Scale: 1:245,000
Author: VMarques
Date: 11/11/2024

NEWMAN
PERTH

Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Cumulative 1m Mounding Contours
- Jeerinah

Drillholes with restricted troglofauna

- Intersect Jeerinah
- Do not intersect Jeerinah

Figure 12. Drillholes intersecting Jeerinah above the water table and yielding 'restricted' troglofauna species

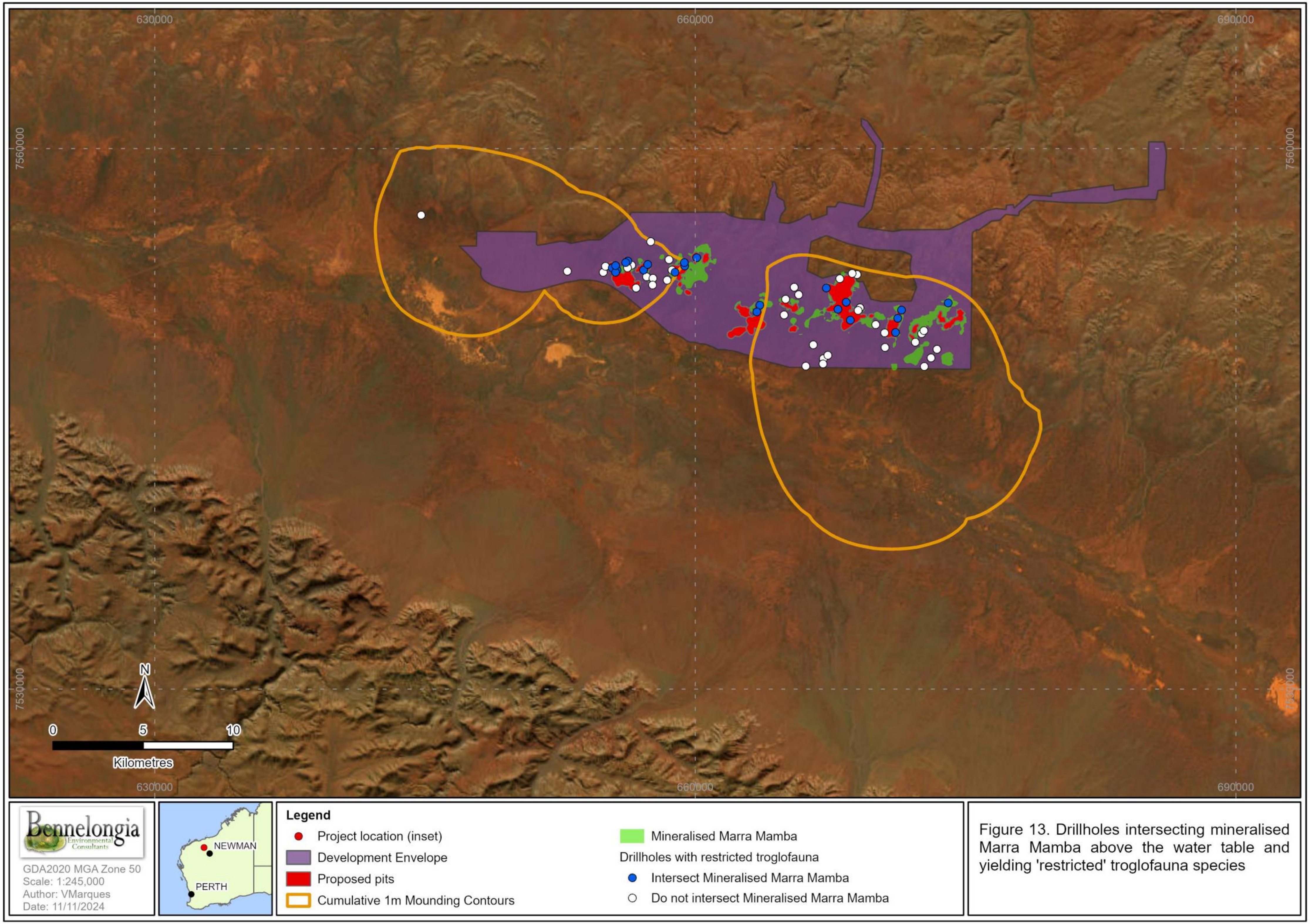
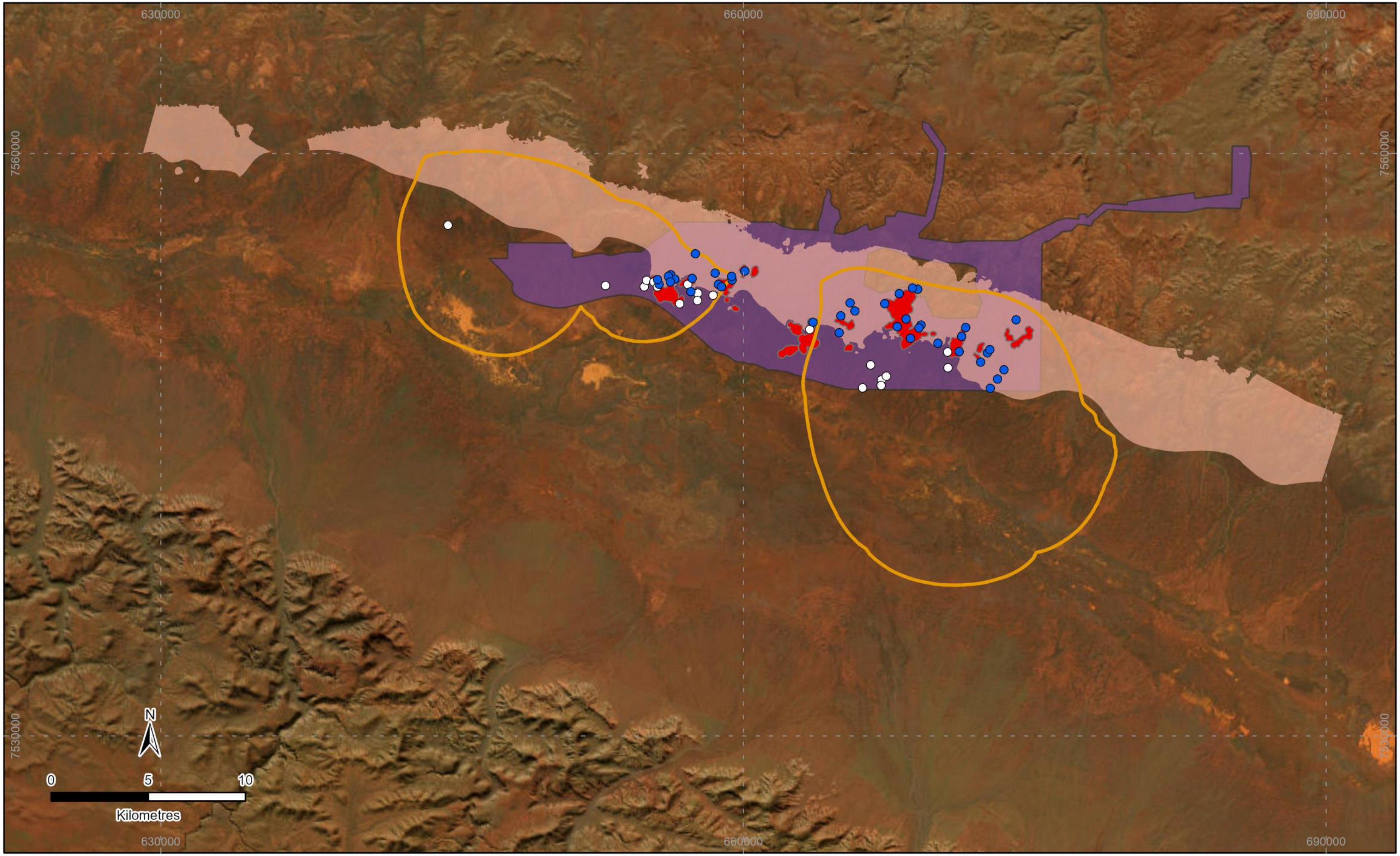


Figure 13. Drillholes intersecting mineralised Marra Mamba above the water table and yielding 'restricted' troglofauna species



Bennelongia Environmental Consultants

GDA2020 MGA Zone 50
Scale: 1:245,000
Author: VMarques
Date: 11/11/2024

NEWMAN
PERTH

Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Cumulative 1m Mounding Contours
- Shaley / Unmineralised Marra Mamba

Drillholes with restricted troglofauna

- Intersect Shaley / Unmineralised Marra Mamba
- Do not intersect Shaley / Unmineralised Marra Mamba

Figure 14. Drillholes intersecting shaley / unmineralised Marra Mamba above the water table and yielding 'restricted' troglofauna species

4.2.8. Overall Habitat

When considering the combined potential and likely habitat at the MDIOM (Table 8), there appears to be suitable habitat for troglofauna throughout the MDIOM, which is reflected by the occurrence of various troglofauna species across the area. Any generalist troglofauna species that can occur in any or most geologies are likely to be widespread at the mine pit scale. However, there may be few species able to use all of the available geologies. Species that occur in only one type of geology, especially BIF and Upper Calcrete, may have quite small ranges that are constrained by the extent of these habitat types. Furthermore, many troglofauna species in apparently continuous habitat have much smaller ranges than the extent of this habitat, whether as a result of fine-scale barriers or because of intrinsic species characteristics (Trotter *et al*. 2017; Harms *et al*. 2018).

It should also be noted that there were three drillholes within troglofauna impact areas that contained troglofauna but did not intersect any prospective habitat according to the modelling. Two of the species in these holes, the 'restricted' beetle *Gracilanillus* `BCO176` (hole MD3027) and symphylan *Hanseniella* `MH1` (MD0393), were also collected in other holes with prospective geologies (Table 7). The dipluran Campodeidae sp. B10 was collected only from hole MD0693. The occurrence of these species outside modelled prospective habitat illustrates that while habitat models give very useful information about the distribution of habitats, they may contain anomalies that result in prospective habitats not being modelled as such (or vice versa).

5. SUMMARY

While in general the number of species recorded at a project is strongly affected by sampling, which has been high at the MDIOM and surrounds, the area contains richer subterranean communities than known from elsewhere in the Pilbara (Clark *et al.* 2021; Mokany *et al*. 2019) and supports numbers of stygofauna species, in particular, that would be considered globally significant (Culver *et al*. 2021). Sampling at the MDIOM yielded at least 150 species of stygofauna. For comparison, other areas important for stygofauna in the Pilbara include Ethel Gorge (a PEC with 78 species of stygofauna; Bennelongia 2015) and the coastal plain at the mouth of the Robe valley (58 species; Clark *et al*. 2021). Sampling at the MDIOM yielded at least 86 species of troglofauna. By comparison, Mesas A, B and C in the Robe Valley have yielded 65 troglofauna species (Clark *et al*. 2021) and Mining Area C in the central Hamersley Range has yielded 115 species of troglofauna, albeit with 380% more sampling effort than at the MDIOM in the latter case.

Among the 150 stygofauna species collected from the groundwater impact areas of the MDIOM and surrounding undisturbed areas, the groups represented are copepods (45 species), ostracods (31 species), amphipods (23 species), annelid worms (19 species), syncarids (18 species), rotifers (five species), isopods (three species), mites (three species), spelaeogriphacids (one species), flatworms (one species) and nematode worms (treated as a single species). Of these, 14 species are currently known only from the defined impact areas of ≥2 m drawdown and ≥1 m mounding associated with reinjection at the MDIOM. None of these species is likely to have been recorded under two names.

Fifty-seven per cent of restricted stygofauna species are known from single sites. The linear ranges obtained by sampling at the MDIOM are mostly small and in broad agreement with the ranges provided by other surveys. Use of surrogates, including habitat and the ranges of related species, is recommended by the EPA in place of additional sampling as a means of estimating likely ranges of singleton species. While detailed habitat characterisation was not available at the time of reporting, range information for related species is available.

Among the 86 troglofauna species collected from the MDIOM and surrounding area, the groups represented are diplurans (13 species), isopods (nine species), beetles (eight species), pauropods (eight species), pseudoscorpions (eight species), silverfish (seven species), true bugs (six species), schizomids (five species), centipedes (four species), palpigrads (four species), cockroaches (four species), spiders (three species), symphylans (three species), millipedes (two species), and flies (one species). Up to 41 species of these species are known only from within proposed mine pits and areas of predicted groundwater mounding ≥1 m, including 16 species that may be represented by two names. The number of troglofauna species known only from the proposed mine pits and areas of predicted groundwater mounding is somewhere between 29 and 41.

Fifty-two per cent of restricted troglofauna species are known from single sites. The linear ranges obtained by sampling at the MDIOM are mostly small and in broad agreement with the ranges provided by other surveys. The habitat characterisation done by AQ2 suggests that if troglofauna species at the MDIOM occupy single broad geological units, then the species in BIF and calcrete most likely have small ranges because of the small areas of these geologies above the water table. More generally, all troglobitic species tend to have small ranges that are driven by their biology or various types of barriers within individual geological units.

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Appendix 1. Bores and drillholes sampled for stygofauna in 2019-2024.

Hole ID	Latitude	Longitude	Collection date	Temp	EC µS/cm	pH	Sample type
Stygofauna							
md_hyp1	-22.07645	118.5544	21/02/2020	26.3	64.2	8.02	Bou Rouche
md_hyp4	-22.11486	118.39313	21/02/2020	29.9	217	8.28	Bou Rouche
md_kar2	-22.19283	118.75217	20/02/2020	31.4	350	7.97	Bou Rouche
md_kar3	-22.16136	118.72364	20/02/2020	32	100	7.78	Bou Rouche
md_hyp1	-22.07645	118.5544	21/02/2020	26.3	64.2	8.02	Karaman-Chappuis
md_hyp2	-22.06153	118.25659	22/02/2020	29	117	8.22	Karaman-Chappuis
md_hyp3	-22.08168	118.24879	23/02/2020	32.9	81	8.19	Karaman-Chappuis
md_kar2	-22.19283	118.75217	20/02/2020	31.4	350	7.97	Karaman-Chappuis
md_kar3	-22.16136	118.72364	20/02/2020	32	100	7.78	Karaman-Chappuis
1475	-21.92333	118.01706	2/02/2020	33.4	2570	7.69	Net
Astas Bore	-22.0639	118.27288	23/02/2020	25.6	991.3	7.09	Net
BC02	-22.084	118.3104	22/02/2020	28.3	1353	7.55	Net
Bernies Bore	-22.28864	118.83936	6/03/2022	(blank)	(blank)	(blank)	Net
Blowout Bore	-22.09072	118.26512	23/02/2020	27.5	5920	7.36	Net
Boundary Bore	-22.10314	118.22962	23/02/2020	29	10700	7.43	Net
Boundary Well	-22.10402	118.22984	23/02/2020	30.9	440.2	7.62	Net
Browns Bore	-22.21403	118.51956	10/08/2019	24.6	3500	8.08	Net
Browns Bore	-22.21403	118.51956	2/02/2020	33.1	3770	7.78	Net
Browns Well	-22.21381	118.51934	5/03/2022	32.3	3000	7.84	Net
Browns Well	-22.21381	118.51934	21/07/2022	27.2	3430	7.73	Net
Calamina Bore	-22.19277	118.46867	10/08/2019	23.2	2740	7.29	Net
Calamina Bore	-22.19277	118.46867	21/02/2020	27.9	428.2	7.74	Net
Calamina Well	-22.19293	118.46868	21/02/2020	29.6	2620	8.1	Net
Calamina Well	-22.19293	118.46868	5/03/2022	28.7	2090	7.04	Net
Calamina Well	-22.19293	118.46868	21/07/2022	29.3	1124	7.26	Net
Company	-22.33045	118.66157	3/02/2020	31.2	763.5	7.67	Net
Ebathacalby bore	-22.24846	118.74882	12/08/2019	32.1	7870	7.39	Net
Ebathacalby bore	-22.24846	118.74882	20/02/2020	27.7	9870	7.04	Net
Farwicks Well	-22.07617	118.84329	11/03/2022	33	2310	6.83	Net
Farwicks Well	-22.07617	118.84329	25/07/2022	25.2	3050	6.84	Net
FV0001R	-22.28565	118.74147	20/02/2020	(blank)	(blank)	(blank)	Net
Garden Bore	-22.31429	118.97498	6/03/2022	30.8	1949	7.95	Net
Garden Bore	-22.31429	118.97498	24/07/2022	26.9	2310	8.05	Net
Hesters Bore	-22.10588	118.46698	9/08/2019	28.3	1242	6.99	Net
Hesters Bore	-22.10588	118.46698	1/02/2020	34	1158	6.26	Net

Hole ID	Latitude	Longitude	Collection date	Temp	EC µS/cm	pH	Sample type
Horaces Well	-22.07958	118.50221	21/02/2020	30.5	586.3	7.82	Net
Horraces Bore	-22.07974	118.502	7/03/2022	29.8	1060	8.08	Net
Horraces Bore	-22.07974	118.502	22/07/2022	19.6	1355	7.49	Net
Kardardarrie Well	-22.28766	119.08178	6/03/2022	31.2	7870	7.87	Net
Maddina Well	-22.21778	118.65944	12/08/2019	23.5	3930	8.05	Net
Maddina Well	-22.21778	118.65944	3/02/2020	29.5	6870	7.75	Net
Maddina Well	-22.21778	118.65944	6/03/2022	26.8	5220	7.69	Net
Maddina Well	-22.21778	118.65944	22/07/2022	30	5930	7.39	Net
Malay Bore	-22.16679	118.41104	21/02/2020	29.3	2080	7.44	Net
Malay Well	-22.16661	118.41101	10/08/2019	27.5	2071	7.52	Net
Malay Well	-22.16661	118.41101	21/02/2020	29.9	2380	8.02	Net
Marnamoonah Well	-22.12303	118.28915	13/08/2019	20.6	5940	8.04	Net
Marnamoonah Well	-22.12303	118.28915	23/02/2020	29.9	5210	7.51	Net
MB19KRP0011-5	-22.23442	118.48158	21/07/2022	29.1	1398	7.21	Net
MD5047	-22.1226	118.45935	1/02/2020	34.1	1270	6.67	Net
MD5359	-22.17596	118.43557	22/11/2022	27.7	4410	6.81	Net
MD5368	-22.13657	118.38866	23/11/2022	27.3	2360	6.26	Net
MD5382	-22.06883	118.27984	22/02/2020	28.4	913.2	6.96	Net
MD5455	-22.06375	118.23521	23/02/2020	(blank)	(blank)	(blank)	Net
MD5461	-22.06565	118.2236	23/02/2020	30.7	2910	6.86	Net
MD5733	-22.07246	118.27792	22/02/2020	27.8	1143	7.06	Net
MD5830	-22.18677	118.43555	22/07/2022	26.8	2420	7.39	Net
MD5830	-22.18677	118.43555	22/11/2022		2330	6.72	Net
MD5832	-22.17965	118.42778	22/11/2022	28.2	3330	6.81	Net
MD5835	-22.1869	118.42009	22/11/2022	30	1799	5.99	Net
MD5838	-22.12936	118.39229	22/07/2022	29.8	3500	7.43	Net
MD5838	-22.12936	118.39229	23/11/2022	27.8	4440	6.47	Net
MD5844	-22.14746	118.38866	23/11/2022	26.4	2580	6.18	Net
MD5922	-22.13562	118.63747	23/07/2022	27.4	1486	6.04	Net
MD6143	-22.16011	118.62443	3/02/2020	32	1157	7.13	Net
MD6605	-22.06531	118.26818	22/02/2020	29.5	1359	6.72	Net
MD6946	-22.07417	118.29149	22/02/2020	27.1	1555	7.23	Net
MD7062	-22.16182	118.39652	22/07/2022	28.4	2340	7.34	Net
MD7062	-22.16182	118.39652	23/11/2022	27	2410	5.86	Net
MD7063	-22.16545	118.38873	23/11/2022	28.7	1737	6.35	Net
MD7064	-22.15831	118.38879	23/11/2022	28.9	1855	6.6	Net
MD7301	-22.13044	118.63099	11/03/2022	(blank)	(blank)	(blank)	Net
MD7308	-22.12982	118.6302	11/03/2022	(blank)	(blank)	(blank)	Net
MD7636	-22.13574	118.68583	12/03/2022	(blank)	(blank)	(blank)	Net
MD7640	-22.1417	118.68144	12/03/2022	(blank)	(blank)	(blank)	Net

Hole ID	Latitude	Longitude	Collection date	Temp	EC µS/cm	pH	Sample type
MD7640	-22.1417	118.68144	23/07/2022	30.4	1837	5.57	Net
MD7642	-22.1335	118.68745	12/03/2022	(blank)	(blank)	(blank)	Net
MD7642	-22.1335	118.68745	23/07/2022	29.6	392	6.16	Net
MD7642	-22.1335	118.68745	22/11/2022	27.3	770	6.86	Net
MD7715	-22.14453	118.68751	12/03/2022	(blank)	(blank)	(blank)	Net
MD8402	-22.11384	118.55023	11/03/2022	29.6	480.8	5.52	Net
MD8402	-22.11384	118.55023	24/07/2022	25	474	5.31	Net
MD8403	-22.11463	118.54977	11/03/2022	28.4	447.3	6.08	Net
MD8403	-22.11463	118.54977	24/07/2022	21.7	382.5	5.91	Net
MD9171	-22.13579	118.63699	23/07/2022	(blank)	(blank)	(blank)	Net
MD9183	-22.13557	118.63655	23/07/2022	27.6	1077	6.61	Net
MDCMB09	-22.1832	118.51933	2/02/2020	34.1	11700	7.5	Net
MDPB0007	-22.12837	118.50856	24/02/2020	29.6	891.2	7.81	Net
MDPB0011	-22.12567	118.47573	21/02/2020	30.3	883.3	7.81	Net
MDPB0013	-22.16561	118.58277	20/02/2020	31.5	5080	7.15	Net
MDPB0013B	-22.16562	118.58277	2/02/2020	29.2	4900	7.4	Net
MDPB0013B	-22.16562	118.58277	5/03/2022	32.4	4230	7.29	Net
MDPB0013B	-22.16562	118.58277	22/07/2022	30.8	5110	7.35	Net
MDPB0014	-22.1647	118.51997	2/02/2020	30	5050	7.34	Net
MDPB0015	-22.18651	118.46784	5/03/2022	30	5650	7.48	Net
MDPB0015	-22.18651	118.46784	21/07/2022	28.9	7300	7.77	Net
MDPZ2475	-22.12692	118.50548	1/02/2020	28	1218	5.99	Net
MDPZ5018	-22.05254	118.03157	9/03/2022	(blank)	703.8	7.57	Net
MDPZ5018	-22.05254	118.03157	20/07/2022	28.3	865.8	7.15	Net
MDPZ5110	-22.06509	118.2332	8/03/2022	29.6	695	6.97	Net
MDPZ5110	-22.06509	118.2332	20/07/2022	28.3	232.5	6.77	Net
MDPZ5110	-22.06509	118.2332	23/11/2022	28.1	338.2	5.89	Net
MDPZ5296	-22.04155	118.04315	9/03/2022	31	3340	7	Net
MDPZ5296	-22.04155	118.04315	20/07/2022	25.9	4260	6.89	Net
MDPZ5339	-21.96941	118.01942	9/03/2022	(blank)	1979	7.36	Net
MDPZ5339	-21.96941	118.01942	20/07/2022	28.3	2450	6.8	Net
MDPZ5355	-22.18258	118.49755	5/03/2022	30.6	9170	7.36	Net
MDPZ5355	-22.18258	118.49755	21/07/2022	24.6	12600	7.4	Net
MDPZ7449C	-22.13202	118.50928	10/08/2019	27.3	5760	6.42	Net
MDPZ7450C	-22.12552	118.47588	10/08/2019	25.3	689.7	7.22	Net
MDPZ7450C	-22.12552	118.47588	21/02/2020	30.1	969.8	7.64	Net
MDPZ7451S	-22.14486	118.46721	10/08/2019	23.3	2870	7.19	Net
MDPZ7452C	-22.18642	118.46804	12/08/2019	25.6	6910	7.28	Net
MDPZ7453S	-22.15357	118.46606	10/08/2019	24.9	15600	7.13	Net
MDPZ7454A	-22.09876	118.52246	9/08/2019	29	667	6.19	Net
MDPZ7454A	-22.09876	118.52246	20/02/2020	28.4	827.1	6.29	Net
MDPZ7455	-22.1054	118.56169	11/08/2019	30.2	1152	3.89	Net
MDPZ7455	-22.1054	118.56169	19/02/2020	27.9	1289	3.65	Net

Hole ID	Latitude	Longitude	Collection date	Temp	EC µS/cm	pH	Sample type
MDPZ7456C	-22.16615	118.60837	11/08/2019	26	3280	7.19	Net
MDPZ7456C	-22.16615	118.60837	3/02/2020	31.6	3420	7.34	Net
MDPZ7457C	-22.16448	118.51969	10/08/2019	27.3	6140	6.75	Net
MDPZ7457C	-22.16448	118.51969	2/02/2020	29.6	6130	7.31	Net
MDPZ7458C	-22.18322	118.51934	11/08/2019	21.2	14100	7.7	Net
MDPZ7458C	-22.18322	118.51934	2/02/2020	30.6	12100	7.32	Net
MDPZ7459	-22.10765	118.45695	9/08/2019	27.5	608.4	7.18	Net
MDPZ7459	-22.10765	118.45695	21/02/2020	29.9	594.5	7.54	Net
MDPZ7460C	-22.16564	118.58278	11/08/2019	28.4	4510	6.83	Net
MDPZ7460C	-22.16564	118.58278	20/02/2020	30.3	4470	7.03	Net
MDPZ7461	-22.21138	118.51356	21/07/2022	28.4	4560	7.05	Net
MDPZ7462C	-22.1648	118.40442	10/08/2019	28.5	2970	7.33	Net
MDPZ7463	-22.11706	118.38506	10/08/2019	28.9	4010	7.15	Net
MDPZ7463	-22.11706	118.38506	21/02/2020	29.6	4140	7.1	Net
MDPZ7464	-22.12716	118.45359	11/08/2019	24.8	1474	6.83	Net
MDPZ7464	-22.12716	118.45359	1/02/2020	34.4	2050	6.91	Net
MDPZ7466	-22.14197	118.66127	11/08/2019	28.8	333	5.68	Net
MDPZ7466	-22.14197	118.66127	20/02/2020	30.1	320.6	5.86	Net
MDPZ7467	-22.12018	118.62555	11/08/2019	28.4	1386	6.42	Net
MDPZ7467	-22.12018	118.62555	20/02/2020	28.8	1733	6.24	Net
MDPZ7467	-22.12018	118.62555	7/03/2022	35.6	1127	6.31	Net
MDPZ7468C	-22.13453	118.42729	10/08/2019	29.4	9890	7.12	Net
MDPZ7468C	-22.13453	118.42729	24/02/2020	28.6	10500	7.04	Net
MDPZ7469C	-22.14771	118.52541	12/08/2019	27.2	2900	7.87	Net
MDPZ7469C	-22.14771	118.52541	30/01/2020	31.4	2790	6.35	Net
MDPZ7470C	-22.17934	118.56521	11/08/2019	23.9	5130	7.62	Net
MDPZ7474	-22.09818	118.69077	7/03/2022	36.8	1411	6.65	Net
MDPZ7474	-22.09818	118.69077	23/07/2022	26.9	1890	6.64	Net
MDPZ7474	-22.09818	118.69077	22/11/2022	28.7	1871	6.14	Net
MDPZ7475	-22.08629	118.7248	25/07/2022	24.6	868.1	6.72	Net
MDPZ7475	-22.08629	118.7248	22/11/2022	28.3	815.7	6.36	Net
MDPZ7476	-22.06485	118.84209	12/03/2022	32.4	1321	7.17	Net
MDPZ7476	-22.06485	118.84209	25/07/2022	25.1	1452	7.01	Net
MDPZ7478	-22.0779	118.78223	12/03/2022	29.2	1070	6.87	Net
MDPZ7478	-22.0779	118.78223	25/07/2022	25.2	1040	6.71	Net
MDPZ9211	-22.18971	118.51322	22/07/2022	23	9610	7.22	Net
MDPZ9212S	-22.17819	118.49744	5/03/2022	31.7	10600	7.33	Net
MDPZ9212S	-22.17819	118.49744	21/07/2022	23.8	15900	7.33	Net
MDPZ9213	-22.19736	118.45132	5/03/2022	29.5	1751	7.19	Net
MDPZ9213	-22.19736	118.45132	21/07/2022	27	2074	7.29	Net
MDPZ9218	-22.09847	118.18303	8/03/2022	31.7	4040	6.83	Net
MDPZ9218	-22.09847	118.18303	19/07/2022	28.1	4090	6.81	Net
MDPZ9220	-22.07199	118.06662	8/03/2022	34	1209	7.33	Net

Hole ID	Latitude	Longitude	Collection date	Temp	EC µS/cm	pH	Sample type
MDPZ9220	-22.07199	118.06662	19/07/2022	28.8	1524	6.71	Net
MDUNK01	-22.20484	118.49774	13/08/2019	32	2030	8.18	Net
MDWB0011	-22.07727	118.55315	10/08/2019	23.3	3330	6.33	Net
MDWB0011	-22.07727	118.55315	21/02/2020	28.2	3010	7.07	Net
MDWB0011	-22.07727	118.55315	7/03/2022	30.1	2390	6.41	Net
MDWB0011	-22.07727	118.55315	23/07/2022	25.5	3210	6.44	Net
MDWB0013	-22.09068	118.602	20/02/2020	28.8	861	6.77	Net
MDWB0013	-22.09068	118.602	7/03/2022	30.2	798.5	6.86	Net
MDWB0013	-22.09068	118.602	23/07/2022	46	817.7	7.3	Net
MDWB0017	-22.09625	118.80098	7/03/2022	38.4	1270	6.98	Net
MDWB0017	-22.09625	118.80098	19/05/2022	26.2	1720	6.82	Net
MDWB0017	-22.09625	118.80098	25/07/2022	25.4	1961	7	Net
MDWB0023	-22.07427	118.1185	8/03/2022	33.9	4200	7.1	Net
MDWB0023	-22.07427	118.1185	19/07/2022	28.7	6420	6.7	Net
MDWB0025	-22.06276	118.24081	8/03/2022	29.3	415.9	6.6	Net
MDWB0025	-22.06276	118.24081	20/07/2022	29.1	455.9	6.29	Net
MDWB0026	-22.07035	118.07827	8/03/2022	34.9	2040	7.19	Net
MDWB0026	-22.07035	118.07827	19/07/2022	30.6	2690	7.03	Net
MDWB0027	-22.09134	118.10538	8/03/2022	32.2	1489	7.22	Net
MDWB0027	-22.09134	118.10538	19/07/2022	29.1	1974	7.37	Net
MDWB0027	-22.09134	118.10538	24/11/2022	29.4	1816	6.78	Net
MDWB0028	-22.06311	118.0549	8/03/2022	36.7	1317	7.47	Net
MDWB0028	-22.06311	118.0549	19/07/2022	29.7	1710	6.79	Net
MDWB0028	-22.06311	118.0549	24/11/2022	29.6	1688	7.12	Net
MDWB0029	-22.08467	118.08236	8/03/2022	33	1079	7.42	Net
MDWB0029	-22.08467	118.08236	19/07/2022	28.6	1259	6.77	Net
MDWB0029	-22.08467	118.08236	24/11/2022	28.7	1171	7.5	Net
MDWB0030	-22.09574	118.07451	8/03/2022	33.4	725.2	7.21	Net
MDWB0030	-22.09574	118.07451	19/07/2022	28.3	864.5	6.67	Net
MDWB0030	-22.09574	118.07451	24/11/2022	29.1	829.5	6.9	Net
MDWB0031	-22.07431	118.03953	24/11/2022	29.4	501.5	7.02	Net
MDWB0032	-22.09732	118.05307	24/11/2022	29.2	429.5	6.88	Net
MDWB0033	-22.09798	118.4818	21/02/2020	29.6	1323	8.36	Net
MDWB0034	-22.14343	118.63168	20/02/2020	28.8	152	6.3	Net
MDWB0035	-22.10748	118.44051	21/02/2020	29.9	1407	8.04	Net
MDWB0036	-22.15654	118.54722	24/02/2020	29.7	3790	7.24	Net
MDWB0037	-22.16502	118.51969	5/03/2022	31.2	3850	7.41	Net
MDWB0037	-22.16502	118.51969	21/07/2022	28	4940	7.41	Net
MDWB0038	-22.18318	118.51932	21/07/2022	29.1	12000	7.27	Net
MDWB0040	-22.09733	118.0531	24/11/2022	29.1	511.9	6.66	Net
MDWB0041	-22.0957	118.03573	24/11/2022	29.6	480.9	6.94	Net
MDWB0042	-22.04024	118.04365	9/03/2022	30.7	1465	7.02	Net
MDWB0042	-22.04024	118.04365	20/07/2022	25.9	1670	7.03	Net

Hole ID	Latitude	Longitude	Collection date	Temp	EC µS/cm	pH	Sample type
MDWB0042	-22.04024	118.04365	23/11/2022	29.8	1765	6.57	Net
MDWB0043	-22.02881	118.06189	9/03/2022	31	3110	6.75	Net
MDWB0043	-22.02881	118.06189	20/07/2022	25.5	4030	6.5	Net
MDWB0043	-22.02881	118.06189	23/11/2022	29.1	3860	6.08	Net
MDWB0044	-22.0473	118.02956	9/03/2022	(blank)	743.2	7.51	Net
MDWB0044	-22.0473	118.02956	20/07/2022	27.8	745.4	7.09	Net
MDWB0044	-22.0473	118.02956	23/11/2022	30.8	723.7	6.96	Net
MDWB0046	-21.9971	118.03752	9/03/2022	(blank)	3680	7.36	Net
MDWB0046	-21.9971	118.03752	20/07/2022	27.7	4720	7.11	Net
MDWB0048	-21.95598	118.0028	9/03/2022	(blank)	3920	7.34	Net
MDWB0048	-21.95598	118.0028	20/07/2022	31	5330	6.81	Net
MDWB0048	-21.95598	118.0028	23/11/2022	29.8	5100	6.75	Net
MDWB0053	-22.06387	118.27288	8/03/2022	28.4	839.5	6.53	Net
MDWB0053	-22.06387	118.27288	20/07/2022	28.7	946.5	7.05	Net
MDWB0053	-22.06387	118.27288	23/11/2022	29	949.3	5.66	Net
MDWB0054	-22.08896	118.28096	22/02/2020	28.8	8090	7.02	Net
MDWB0056	-22.08024	118.20625	8/03/2022	30.7	3220	7.13	Net
MDWB0056	-22.08024	118.20625	19/07/2022	28	4050	6.66	Net
MDWB0057	-22.08411	118.16752	8/03/2022	34.7	2270	7.31	Net
MDWB0057	-22.08411	118.16752	19/07/2022	29.2	3020	7.02	Net
MDWB0057	-22.08411	118.16752	24/11/2022	28.5	2990	7.26	Net
MDWB0058	-22.07725	118.12088	8/03/2022	32.3	3360	7	Net
MDWB0058	-22.07725	118.12088	19/07/2022	29.9	4550	6.62	Net
MDWB0058	-22.07725	118.12088	24/11/2022	28.8	4430	6.92	Net
MDWB5068	-22.05876	118.11254	8/03/2022	33.6	1376	7.32	Net
MDWB5068	-22.05876	118.11254	19/07/2022	28.7	2200	6.6	Net
MDWB5068	-22.05876	118.11254	24/11/2022	29.4	1950	6.28	Net
MDWB5069	-22.09076	118.26512	23/11/2022	30	5580	6.37	Net
MDWF0013	-22.09071	118.60199	11/08/2019	27.1	880.5	7.03	Net
Mountain Well	-22.33226	118.69645	3/02/2020	32.7	913.6	7.51	Net
Murrays Bore	-22.13906	118.52052	12/03/2022	28.3	6020	7.96	Net
Murrays Bore	-22.13906	118.52052	19/05/2022	21.1	6890	7.38	Net
Murrays Bore	-22.13906	118.52052	21/07/2022	24.1	7040	7.6	Net
Murrays Well	-22.13783	118.5208	11/08/2019	16.7	7490	7.84	Net
Murrays Well	-22.13783	118.5208	1/02/2020	32	7430	7.75	Net
MWUNK1	-22.20491	118.49776	21/07/2022	26	2160	7.43	Net
Nine Inch Bore	-22.07752	118.31351	22/02/2020	30.6	1774	7.84	Net
No 3 Well	-22.17551	118.61952	5/03/2022	33.4	3290	7.65	Net
No 3 Well	-22.17551	118.61952	22/07/2022	25.8	4080	7.42	Net
No. 3 Well	-22.17552	118.61949	11/08/2019	20.9	4350	7.27	Net
No. 3 Well	-22.17552	118.61949	3/02/2020	31.3	4660	7.88	Net
Old Station Bore	-22.13103	118.42261	10/08/2019	29.2	3580	8.06	Net

Hole ID	Latitude	Longitude	Collection date	Temp	EC µS/cm	pH	Sample type
Old Station Bore	-22.13103	118.42261	24/02/2020	28.2	8970	7.23	Net
One Tank Well	-22.26561	118.7025	12/08/2019	26.2	3360	8.15	Net
One Tank Well	-22.26561	118.7025	3/02/2020	36.4	3040	7.56	Net
Pipally Well	-22.23311	118.6158	12/08/2019	26	3710	8.06	Net
Pipally Well	-22.23311	118.6158	3/02/2020	28.3	4000	7.61	Net
Pipally Well	-22.23311	118.6158	5/03/2022	33.7	3110	7.44	Net
Pipally Well	-22.23311	118.6158	22/07/2022	28	3470	7.14	Net
Robinsons Well	-22.1646	118.56882	11/08/2019	17.7	3990	7.6	Net
Robinsons Well	-22.1646	118.56882	24/02/2020	29.8	3840	7.5	Net
Robinsons Well	-22.1646	118.56882	5/03/2022	32.7	3130	7.6	Net
Robinsons Well	-22.1646	118.56882	22/07/2022	24.2	3800	7.46	Net
Salt Well	-22.295	118.78944	12/08/2019	21	14100	8.29	Net
Salt Well	-22.295	118.78944	20/02/2020	29.5	14300	7.69	Net
Salt Well	-22.29356	118.79082	6/03/2022	30.2	12500	8.21	Net
Salt Well	-22.29356	118.79082	24/07/2022	18.7	18000	8.06	Net
Silver Grass Well	-22.25505	118.6575	12/08/2019	25.9	2300	7.95	Net
Silver Grass Well	-22.25505	118.6575	3/02/2020	27.6	2500	7.85	Net
The 39th	-22.074	118.25601	23/02/2020	29.4	1005	8	Net
The Pools	-21.91651	118.00812	2/02/2020	33.5	4480	7.09	Net
Thieves Well	-22.28447	119.16095	6/03/2022	33.9	5970	7.83	Net
Thieves Well	-22.28447	119.16095	24/07/2022	31.1	6390	8.64	Net
Tuckanoona Well	-22.26505	118.838	12/08/2019	27	2710	7.77	Net
Tuckanoona Well	-22.26505	118.838	6/03/2022	30.8	2320	7.7	Net
Tuckanoona Well	-22.26505	118.838	24/07/2022	23.4	2840	7.82	Net
Two Day Bore	-22.04018	118.54912	7/03/2022	28.8	1305	8.12	Net
Two Day Bore	-22.04018	118.54912	23/07/2022	23.2	1539	7.32	Net
Two Day Well	-22.04015	118.54915	21/02/2020	28.6	1218	7.49	Net
Two Mile Bore	-22.10938	118.41124	21/02/2020	29.6	1090	7.94	Net
Two Mile Well	-22.10943	118.41112	13/08/2019	25.1	3650	8.21	Net
Two Mile Well	-22.10943	118.41112	21/02/2020	30.3	3760	8.28	Net
UNK1	-21.93675	117.98881	9/03/2022	(blank)	2670	7.36	Net
UNK1	-21.93675	117.98881	20/07/2022	30.4	3390	6.91	Net
UNK2	-21.91654	118.00812	9/03/2022	(blank)	3430	7.25	Net
UNK2	-21.91654	118.00812	20/07/2022	30.8	4620	6.87	Net
UNK3	-22.16298	118.68217	11/03/2022	(blank)	(blank)	(blank)	Net
UNK3	-22.16298	118.68217	19/05/2022	26.3	1239	6.45	Net
UNK3	-22.16298	118.68217	23/07/2022	(blank)	(blank)	(blank)	Net
UNK4	-22.1173	118.89636	11/03/2022	31.2	1254	7.21	Net
UNK4	-22.1173	118.89636	25/07/2022	25.7	1346	7.16	Net

Hole ID	Latitude	Longitude	Collection date	Temp	EC µS/cm	pH	Sample type
UNK5	-22.11745	118.89354	11/03/2022	30.7	1081	7.2	Net
UNK5	-22.11745	118.89354	25/07/2022	27.4	1126	7.19	Net
UNK6	-22.15807	118.60948	20/05/2022	26.3	2054	7.95	Net
UNK7	-22.15034	118.61692	20/05/2022	26	457.1	6.36	Net
Unknown 5	-22.21322	118.51851	2/02/2020	33.7	3530	7.6	Net
Unknown Bore 6	-22.25368	118.76083	20/02/2020	29.6	10300	7.26	Net
Unknown Bore 9	-22.1932	118.41132	21/02/2020	30.1	1795	7.21	Net
Walshes Well	-22.28475	118.97184	10/03/2022	38.7	3110	7.33	Net
Walshes Well	-22.28475	118.97184	24/07/2022	24.6	4240	7.55	Net
WB18 ARP007	-22.19158	118.26019	23/02/2020	27.1	905.6	6.91	Net
WB18KRP0004	-22.30438	118.61598	3/02/2020	31.6	1168	7.07	Net
WF0188	-22.06951	118.31036	22/02/2020	27.7	651.3	6.43	Net
WF0190	-22.07048	118.30267	22/02/2020	27.2	1216	6.5	Net
Windemurra Well	-22.09653	118.34278	21/02/2020	27.5	2790	7.87	Net
Wittenoom Bore 2	-22.18813	118.35209	21/02/2020	29.7	884.2	7.66	Net
Wittenoom Reservoir No. 1	-22.19328	118.35221	21/02/2020	30.1	1005	7.25	Net

Appendix 2. Drillholes sampled for troglofauna in 2019-2024.

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
Troglofauna					
Hesters Bore	-22.10588	118.46698	24/11/2022		Scrape
Hesters Bore	-22.10588	118.46698	23/01/2023	8	Trap 1
Hesters Bore	-22.10588	118.46698	23/01/2023	10	Trap 2
MD0266	-22.13781	118.63911	30/01/2020		Scrape
MD0266	-22.13781	118.63911	6/05/2020	20	Trap 1
MD0276	-22.16152	118.62139	30/01/2020		Scrape
MD0276	-22.16152	118.62139	6/05/2020	10	Trap 1
MD0300	-22.14344	118.59704	31/01/2020		Scrape
MD0300	-22.14344	118.59704	Not collected	2	Trap 1
MD0305	-22.15077	118.59157	9/08/2019		Scrape
MD0305	-22.15077	118.59157	2/10/2019	8	Trap 1
MD0307	-22.12778	118.58988	31/01/2020		Scrape
MD0307	-22.12778	118.58988	6/05/2020	15	Trap 1
MD0314	-22.13813	118.58218	31/01/2020		Scrape
MD0314	-22.13813	118.58218	6/05/2020	12	Trap 1
MD0319	-22.14548	118.57644	31/01/2020		Scrape
MD0319	-22.14548	118.57644	6/05/2020	2	Trap 1
MD0350	-22.12366	118.53612	31/01/2020		Scrape
MD0350	-22.12366	118.53612	6/05/2020	2	Trap 1
MD0383	-22.121	118.52877	7/08/2019		Scrape
MD0383	-22.121	118.52877	3/10/2019	10	Trap 1
MD0398	-22.14898	118.67334	7/08/2019		Scrape
MD0398	-22.14898	118.67334	3/10/2019	11	Trap 1
MD0401	-22.15343	118.67001	7/08/2019		Scrape
MD0401	-22.15343	118.67001	3/10/2019	15	Trap 1
MD0405	-22.14726	118.6604	30/01/2020		Scrape
MD0405	-22.14726	118.6604	6/05/2020	1	Trap 1
MD0417	-22.15795	118.66663	7/08/2019		Scrape
MD0417	-22.15795	118.66663	3/10/2019	13	Trap 1
MD0483	-22.12082	118.50989	1/02/2020		Scrape
MD0483	-22.12082	118.50989	6/05/2020	3	Trap 1
MD0537	-22.11345	118.5273	31/01/2020		Scrape
MD0537	-22.11345	118.5273	6/05/2020	14	Trap 1
MD0685	-22.14183	118.52963	9/08/2019		Scrape
MD0685	-22.14183	118.52963	2/10/2019	3	Trap 1
MD0689	-22.14548	118.5411	30/01/2020		Scrape
MD0689	-22.14548	118.5411	6/05/2020	6	Trap 1
MD0690	-22.14691	118.54004	30/01/2020		Scrape
MD0690	-22.14691	118.54004	6/05/2020	3	Trap 1
MD0701	-22.1504	118.55156	9/08/2019		Scrape
MD0701	-22.1504	118.55156	2/10/2019	4	Trap 1

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
MD0725	-22.1498	118.66325	30/01/2020		Scrape
MD0725	-22.1498	118.66325	6/05/2020	15	Trap 1
MD0752	-22.13881	118.64061	30/01/2020		Scrape
MD0752	-22.13881	118.64061	Not collected	15	Trap 1
MD0843	-22.1296	118.51997	6/08/2019		Scrape
MD0843	-22.1296	118.51997	2/10/2019	5	Trap 1
MD0945	-22.11293	118.5181	31/01/2020		Scrape
MD0945	-22.11293	118.5181	6/05/2020	13	Trap 1
MD1082	-22.12675	118.50554	1/02/2020		Scrape
MD1082	-22.12675	118.50554	6/05/2020	3	Trap 1
MD1121	-22.1451	118.63835	30/01/2020		Scrape
MD1121	-22.1451	118.63835	6/05/2020	17	Trap 1
MD1301	-22.11507	118.55211	31/01/2020		Scrape
MD1301	-22.11507	118.55211	Not collected	17	Trap 1
MD1333	-22.14512	118.56991	9/08/2019		Scrape
MD1333	-22.14512	118.56991	3/10/2019	5	Trap 1
MD1334	-22.14361	118.57105	9/08/2019		Scrape
MD1334	-22.14361	118.57105	3/10/2019	7	Trap 1
MD1458	-22.11986	118.52601	31/01/2020		Scrape
MD1458	-22.11986	118.52601	6/05/2020	12	Trap 1
MD1545	-22.12773	118.51952	31/01/2020		Scrape
MD1545	-22.12773	118.51952	6/05/2020	5	Trap 1
MD1556	-22.12202	118.52499	7/08/2019		Scrape
MD1556	-22.12202	118.52499	2/10/2019	4	Trap 1
MD1556	-22.12202	118.52499	2/10/2019	8	Trap 2
MD1631	-22.12288	118.51956	31/01/2020		Scrape
MD1631	-22.12288	118.51956	6/05/2020	7	Trap 1
MD1763	-22.11716	118.50144	1/02/2020		Scrape
MD1763	-22.11716	118.50144	6/05/2020	6	Trap 1
MD1791	-22.11874	118.50138	1/02/2020		Scrape
MD1791	-22.11874	118.50138	6/05/2020	4	Trap 1
MD1796	-22.11692	118.50282	1/02/2020		Scrape
MD1796	-22.11692	118.50282	6/05/2020	4	Trap 1
MD1813	-22.12	118.50167	1/02/2020		Scrape
MD1813	-22.12	118.50167	6/05/2020	2	Trap 1
MD2023	-22.11598	118.51829	1/02/2020		Scrape
MD2023	-22.11598	118.51829	6/05/2020	10	Trap 1
MD2038	-22.11621	118.51699	31/01/2020		Scrape
MD2038	-22.11621	118.51699	6/05/2020	10	Trap 1
MD2040	-22.11546	118.51754	31/01/2020		Scrape
MD2040	-22.11546	118.51754	6/05/2020	10	Trap 1
MD2059	-22.11533	118.51573	31/01/2020		Scrape
MD2059	-22.11533	118.51573	6/05/2020	13	Trap 1
MD2120	-22.11772	118.51764	1/02/2020		Scrape

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
MD2120	-22.11772	118.51764	6/05/2020	9	Trap 1
MD2146	-22.12943	118.51111	1/02/2020		Scrape
MD2146	-22.12943	118.51111	6/05/2020	4	Trap 1
MD2147	-22.12981	118.51085	1/02/2020		Scrape
MD2147	-22.12981	118.51085	6/05/2020	5	Trap 1
MD2148	-22.1302	118.51057	1/02/2020		Scrape
MD2148	-22.1302	118.51057	6/05/2020	4	Trap 1
MD2149	-22.13059	118.51032	1/02/2020		Scrape
MD2149	-22.13059	118.51032	6/05/2020	3	Trap 1
MD2166	-22.13004	118.5095	6/08/2019		Scrape
MD2166	-22.13004	118.5095	2/10/2019	4	Trap 1
MD2309	-22.12716	118.50338	7/08/2019		Scrape
MD2309	-22.12716	118.50338	2/10/2019	4	Trap 1
MD2570	-22.11792	118.52425	1/02/2020		Scrape
MD2570	-22.11792	118.52425	Not collected	5	Trap 1
MD2627	-22.11879	118.49899	7/08/2019		Scrape
MD2627	-22.11879	118.49899	2/10/2019	5	Trap 1
MD2633	-22.11983	118.49884	7/08/2019		Scrape
MD2633	-22.11983	118.49884	2/10/2019	5	Trap 1
MD2926	-22.11852	118.53867	8/08/2019		Scrape
MD2926	-22.11852	118.53867	3/10/2019	12	Trap 1
MD2936	-22.11953	118.54028	8/08/2019		Scrape
MD2936	-22.11953	118.54028	3/10/2019	8	Trap 1
MD2970	-22.15067	118.54438	30/01/2020		Scrape
MD2970	-22.15067	118.54438	6/05/2020	3	Trap 1
MD2972	-22.1477	118.54657	30/01/2020		Scrape
MD2972	-22.1477	118.54657	6/05/2020	4	Trap 1
MD2973	-22.14618	118.54771	30/01/2020		Scrape
MD2973	-22.14618	118.54771	6/05/2020	6	Trap 1
MD2976	-22.1451	118.52021	29/01/2020		Scrape
MD2976	-22.1451	118.52021	6/05/2020	2	Trap 1
MD2983	-22.14415	118.52568	30/01/2020		Scrape
MD2983	-22.14415	118.52568	6/05/2020	2	Trap 1
MD2992	-22.13097	118.54958	8/08/2019		Scrape
MD2992	-22.13097	118.54958	3/10/2019	10	Trap 1
MD3014	-22.13502	118.57479	9/08/2019		Scrape
MD3014	-22.13502	118.57479	3/10/2019	4	Trap 1
MD3028	-22.13639	118.64011	30/01/2020		Scrape
MD3028	-22.13639	118.64011	6/05/2020	8	Trap 1
MD3115	-22.13505	118.5852	31/01/2020		Scrape
MD3115	-22.13505	118.5852	6/05/2020	18	Trap 1
MD3118	-22.13728	118.58356	31/01/2020		Scrape
MD3118	-22.13728	118.58356	6/05/2020	13	Trap 1
MD3162	-22.14709	118.60576	8/08/2019		Scrape

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
MD3162	-22.14709	118.60576	3/10/2019	8	Trap 1
MD3207	-22.14261	118.63492	30/01/2020		Scrape
MD3207	-22.14261	118.63492	6/05/2020	19	Trap 1
MD3257	-22.14494	118.6367	30/01/2020		Scrape
MD3257	-22.14494	118.6367	6/05/2020	15	Trap 1
MD3285	-22.15462	118.6073	8/08/2019		Scrape
MD3285	-22.15462	118.6073	3/10/2019	4	Trap 1
MD3379	-22.15191	118.65628	7/08/2019		Scrape
MD3379	-22.15191	118.65628	3/10/2019	15	Trap 1
MD3802	-22.14262	118.60908	8/08/2019		Scrape
MD3802	-22.14262	118.60908	3/10/2019	15	Trap 1
MD3805	-22.12271	118.52853	31/01/2020		Scrape
MD3805	-22.12271	118.52853	6/05/2020	8	Trap 1
MD3809	-22.12612	118.52833	7/08/2019		Scrape
MD3809	-22.12612	118.52833	3/10/2019	8	Trap 1
MD3812	-22.12839	118.52672	7/08/2019		Scrape
MD3812	-22.12839	118.52672	3/10/2019	5	Trap 1
MD3841	-22.12407	118.54397	31/01/2020		Scrape
MD3841	-22.12407	118.54397	6/05/2020	14	Trap 1
MD3842	-22.12334	118.54452	31/01/2020		Scrape
MD3842	-22.12334	118.54452	6/05/2020	15	Trap 1
MD3851	-22.11665	118.54943	31/01/2020		Scrape
MD3851	-22.11665	118.54943	6/05/2020	18	Trap 1
MD3853	-22.12608	118.54367	31/01/2020		Scrape
MD3853	-22.12608	118.54367	6/05/2020	14	Trap 1
MD3855	-22.12905	118.54147	31/01/2020		Scrape
MD3855	-22.12905	118.54147	6/05/2020	8	Trap 1
MD3874	-22.15241	118.54546	8/08/2019		Scrape
MD3874	-22.15241	118.54546	2/10/2019	4	Trap 1
MD3876	-22.14838	118.54603	30/01/2020		Scrape
MD3876	-22.14838	118.54603	6/05/2020	6	Trap 1
MD3878	-22.15138	118.54387	30/01/2020		Scrape
MD3878	-22.15138	118.54387	6/05/2020	4	Trap 1
MD3918	-22.14311	118.5241	30/01/2020		Scrape
MD3918	-22.14311	118.5241	6/05/2020	1	Trap 1
MD3937	-22.14772	118.57242	9/08/2019		Scrape
MD3937	-22.14772	118.57242	3/10/2019	5	Trap 1
MD3980	-22.13908	118.58465	8/08/2019		Scrape
MD3980	-22.13908	118.58465	2/10/2019	6	Trap 1
MD3985	-22.1428	118.5819	8/08/2019		Scrape
MD3985	-22.1428	118.5819	2/10/2019	10	Trap 1
MD4115	-22.11221	118.55742	8/08/2019		Scrape
MD4115	-22.11221	118.55742	Not collected	4	Trap 1
MD4129	-22.11303	118.55585	8/08/2019		Scrape

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
MD4129	-22.11303	118.55585	3/10/2019	20	Trap 1
MD4276	-22.14256	118.64318	8/08/2019		Scrape
MD4276	-22.14256	118.64318	3/10/2019	17	Trap 1
MD4414	-22.14685	118.58481	9/08/2019		Scrape
MD4414	-22.14685	118.58481	2/10/2019	9	Trap 1
MD4542	-22.13726	118.6624	7/08/2019		Scrape
MD4542	-22.13726	118.6624	Not collected	7	Trap 1
MD4554	-22.14144	118.6604	7/08/2019		Scrape
MD4554	-22.14144	118.6604	3/10/2019	11	Trap 1
MD4575	-22.14994	118.66001	30/01/2020		Scrape
MD4575	-22.14994	118.66001	6/05/2020	15	Trap 1
MD4597	-22.16607	118.64939	7/08/2019		Scrape
MD4597	-22.16607	118.64939	3/10/2019	7	Trap 1
MD4605	-22.12986	118.51673	7/08/2019		Scrape
MD4605	-22.12986	118.51673	2/10/2019	5	Trap 1
MD4622	-22.1264	118.5234	7/08/2019		Scrape
MD4622	-22.1264	118.5234	2/10/2019	5	Trap 1
MD4623	-22.12713	118.52286	7/08/2019		Scrape
MD4623	-22.12713	118.52286	2/10/2019	8	Trap 1
MD4646	-22.13011	118.51124	1/02/2020		Scrape
MD4646	-22.13011	118.51124	6/05/2020	4	Trap 1
MD4656	-22.13001	118.51192	6/08/2019		Scrape
MD4656	-22.13001	118.51192	2/10/2019	5	Trap 1
MD4754	-22.15295	118.61671	9/08/2019		Scrape
MD4754	-22.15295	118.61671	3/10/2019	11	Trap 1
MD4757	-22.1552	118.61507	9/08/2019		Scrape
MD4757	-22.1552	118.61507	3/10/2019	10	Trap 1
MD4800	-22.15177	118.61995	8/08/2019		Scrape
MD4800	-22.15177	118.61995	3/10/2019	7	Trap 1
MD4814	-22.16449	118.61765	8/08/2019		Scrape
MD4814	-22.16449	118.61765	3/10/2019	7	Trap 1
MD4821	-22.16032	118.62309	30/01/2020		Scrape
MD4821	-22.16032	118.62309	6/05/2020	10	Trap 1
MD4824	-22.16256	118.62144	30/01/2020		Scrape
MD4824	-22.16256	118.62144	Not collected	6	Trap 1
MD4902	-22.16365	118.63001	8/08/2019		Scrape
MD4902	-22.16365	118.63001	3/10/2019	6	Trap 1
MD4921	-22.13884	118.62714	31/01/2020		Scrape
MD4921	-22.13884	118.62714	6/05/2020	13	Trap 1
MD4969	-22.15032	118.60222	8/08/2019		Scrape
MD4969	-22.15032	118.60222	3/10/2019	10	Trap 1
MD5051	-22.12691	118.4628	7/08/2019		Scrape
MD5051	-22.12691	118.4628	2/10/2019	5	Trap 1
MD5054	-22.12107	118.46736	7/08/2019		Scrape

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
MD5054	-22.12107	118.46736	2/10/2019	6	Trap 1
MD5062	-22.1122	118.47395	7/08/2019		Scrape
MD5062	-22.1122	118.47395	2/10/2019	6	Trap 1
MD5351	-22.18248	118.51318	4/03/2022		Scrape
MD5351	-22.18248	118.51318	26/07/2022	3	Trap 1
MD5351	-22.18248	118.51318	26/07/2022		Scrape
MD5351	-22.18248	118.51318	20/09/2022	3	Trap 1
MD5352	-22.18604	118.51316	24/11/2022		Scrape
MD5352	-22.18604	118.51316	20/03/2023	4	Trap 1
MD5357	-22.18278	118.48205	4/03/2022		Scrape
MD5357	-22.18278	118.48205	26/07/2022	2	Trap 1
MD5357	-22.18278	118.48205	26/07/2022		Scrape
MD5357	-22.18278	118.48205	20/09/2022	3	Trap 1
MD5359	-22.17596	118.43557	5/03/2022		Scrape
MD5359	-22.17596	118.43557	26/07/2022	3	Trap 1
MD5359	-22.17596	118.43557	26/07/2022		Scrape
MD5359	-22.17596	118.43557	20/09/2022	3	Trap 1
MD5368	-22.13657	118.38866	4/03/2022		Scrape
MD5368	-22.13657	118.38866	26/07/2022	3	Trap 1
MD5368	-22.13657	118.38866	26/07/2022		Scrape
MD5368	-22.13657	118.38866	20/09/2022	3	Trap 1
MD5819	-22.19691	118.51337	24/11/2022		Scrape
MD5819	-22.19691	118.51337	20/03/2023	4	Trap 1
MD5820	-22.20409	118.51342	24/11/2022		Scrape
MD5820	-22.20409	118.51342	20/03/2023	3	Trap 1
MD5821	-22.1825	118.50928	4/03/2022		Scrape
MD5821	-22.1825	118.50928	26/07/2022	3	Trap 1
MD5821	-22.1825	118.50928	26/07/2022		Scrape
MD5821	-22.1825	118.50928	20/09/2022	3	Trap 1
MD5821	-22.1825	118.50928	22/11/2022		Scrape
MD5821	-22.1825	118.50928	20/03/2023	3	Trap 1
MD5823	-22.18976	118.5093	24/11/2022		Scrape
MD5823	-22.18976	118.5093	20/03/2023	4	Trap 1
MD5824	-22.19333	118.5093	24/11/2022		Scrape
MD5824	-22.19333	118.5093	Not collected	3	Trap 1
MD5825	-22.18274	118.50539	4/03/2022		Scrape
MD5825	-22.18274	118.50539	26/07/2022	3	Trap 1
MD5825	-22.18274	118.50539	26/07/2022		Scrape
MD5825	-22.18274	118.50539	20/09/2022	3	Trap 1
MD5829	-22.19349	118.47441	5/03/2022		Scrape
MD5829	-22.19349	118.47441	26/07/2022	3	Trap 1
MD5829	-22.19349	118.47441	26/07/2022		Scrape
MD5829	-22.19349	118.47441	20/09/2022	3	Trap 1
MD5830	-22.18677	118.43555	4/03/2022		Scrape

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
MD5830	-22.18677	118.43555	26/07/2022	2	Trap 1
MD5830	-22.18677	118.43555	26/07/2022		Scrape
MD5830	-22.18677	118.43555	20/09/2022	2	Trap 1
MD5831	-22.17247	118.4277	4/03/2022		Scrape
MD5831	-22.17247	118.4277	26/07/2022	3	Trap 1
MD5831	-22.17247	118.4277	26/07/2022		Scrape
MD5831	-22.17247	118.4277	20/09/2022	3	Trap 1
MD5832	-22.17965	118.42778	4/03/2022		Scrape
MD5832	-22.17965	118.42778	26/07/2022	3	Trap 1
MD5832	-22.17965	118.42778	26/07/2022		Scrape
MD5832	-22.17965	118.42778	20/09/2022	3	Trap 1
MD5834	-22.17967	118.41979	4/03/2022		Scrape
MD5834	-22.17967	118.41979	26/07/2022	4	Trap 1
MD5834	-22.17967	118.41979	26/07/2022		Scrape
MD5834	-22.17967	118.41979	20/09/2022	4	Trap 1
MD5835	-22.1869	118.42009	4/03/2022		Scrape
MD5835	-22.1869	118.42009	26/07/2022	4	Trap 1
MD5835	-22.1869	118.42009	26/07/2022		Scrape
MD5835	-22.1869	118.42009	20/09/2022	4	Trap 1
MD5838	-22.12936	118.39229	4/03/2022		Scrape
MD5838	-22.12936	118.39229	26/07/2022	4	Trap 1
MD5838	-22.12936	118.39229	26/07/2022		Scrape
MD5838	-22.12936	118.39229	20/09/2022	4	Trap 1
MD5842	-22.14379	118.39257	4/03/2022		Scrape
MD5842	-22.14379	118.39257	26/07/2022	3	Trap 1
MD5842	-22.14379	118.39257	26/07/2022		Scrape
MD5842	-22.14379	118.39257	20/09/2022	3	Trap 1
MD5844	-22.14746	118.38866	4/03/2022		Scrape
MD5844	-22.14746	118.38866	26/07/2022	2	Trap 1
MD5844	-22.14746	118.38866	26/07/2022		Scrape
MD5844	-22.14746	118.38866	20/09/2022	2	Trap 1
MD6089	-22.16239	118.58514	9/08/2019		Scrape
MD6089	-22.16239	118.58514	2/10/2019	4	Trap 1
MD6141	-22.16652	118.61736	9/08/2019		Scrape
MD6141	-22.16652	118.61736	3/10/2019	10	Trap 1
MD6153	-22.1457	118.61733	8/08/2019		Scrape
MD6153	-22.1457	118.61733	3/10/2019	12	Trap 1
MD6225	-22.1662	118.6117	8/08/2019		Scrape
MD6225	-22.1662	118.6117	3/10/2019	5	Trap 1
MD6304	-22.15779	118.60021	8/08/2019		Scrape
MD6304	-22.15779	118.60021	3/10/2019	5	Trap 1
MD6362	-22.13849	118.62148	8/08/2019		Scrape
MD6362	-22.13849	118.62148	3/10/2019	19	Trap 1
MD6388	-22.14105	118.62546	30/01/2020		Scrape

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
MD6388	-22.14105	118.62546	6/05/2020	9	Trap 1
MD6390	-22.14059	118.62815	8/08/2019		Scrape
MD6390	-22.14059	118.62815	3/10/2019	9	Trap 1
MD6444	-22.14483	118.64854	8/08/2019		Scrape
MD6444	-22.14483	118.64854	3/10/2019	11	Trap 1
MD7042	-22.18993	118.49758	4/03/2022		Scrape
MD7042	-22.18993	118.49758	26/07/2022	3	Trap 1
MD7042	-22.18993	118.49758	26/07/2022		Scrape
MD7042	-22.18993	118.49758	20/09/2022	3	Trap 1
MD7043	-22.19718	118.49763	4/03/2022		Scrape
MD7043	-22.19718	118.49763	26/07/2022	2	Trap 1
MD7043	-22.19718	118.49763	26/07/2022		Scrape
MD7043	-22.19718	118.49763	20/09/2022	2	Trap 1
MD7043	-22.19718	118.49763	22/11/2022		Scrape
MD7043	-22.19718	118.49763	20/03/2023	3	Trap 1
MD7046	-22.1972	118.48219	4/03/2022		Scrape
MD7046	-22.1972	118.48219	26/07/2022	3	Trap 1
MD7046	-22.1972	118.48219	26/07/2022		Scrape
MD7046	-22.1972	118.48219	20/09/2022	2	Trap 1
MD7048	-22.18255	118.48987	4/03/2022		Scrape
MD7048	-22.18255	118.48987	26/07/2022	3	Trap 1
MD7048	-22.18255	118.48987	26/07/2022		Scrape
MD7048	-22.18255	118.48987	20/09/2022	3	Trap 1
MD7049	-22.17905	118.49373	4/03/2022		Scrape
MD7049	-22.17905	118.49373	26/07/2022	2	Trap 1
MD7049	-22.17905	118.49373	26/07/2022		Scrape
MD7049	-22.17905	118.49373	20/09/2022	2	Trap 1
MD7051	-22.18666	118.45107	5/03/2022		Scrape
MD7051	-22.18666	118.45107	26/07/2022	4	Trap 1
MD7051	-22.18666	118.45107	26/07/2022		Scrape
MD7051	-22.18666	118.45107	20/09/2022	4	Trap 1
MD7061	-22.15461	118.39645	4/03/2022		Scrape
MD7061	-22.15461	118.39645	26/07/2022	3	Trap 1
MD7061	-22.15461	118.39645	26/07/2022		Scrape
MD7061	-22.15461	118.39645	20/09/2022	3	Trap 1
MD7062	-22.16182	118.39652	4/03/2022		Scrape
MD7062	-22.16182	118.39652	26/07/2022	4	Trap 1
MD7062	-22.16182	118.39652	26/07/2022		Scrape
MD7062	-22.16182	118.39652	20/09/2022	4	Trap 1
MD7063	-22.16545	118.38873	4/03/2022		Scrape
MD7063	-22.16545	118.38873	26/07/2022	5	Trap 1
MD7063	-22.16545	118.38873	26/07/2022		Scrape
MD7063	-22.16545	118.38873	20/09/2022	5	Trap 1
MD7064	-22.15831	118.38879	4/03/2022		Scrape

Hole ID	Latitude	Longitude	Collection date	Trap depth (m)	Sample type
MD7064	-22.15831	118.38879	26/07/2022	4	Trap 1
MD7064	-22.15831	118.38879	26/07/2022		Scrape
MD7064	-22.15831	118.38879	20/09/2022	4	Trap 1
MDH0092	-22.1252	118.51491	7/08/2019		Scrape
MDH0092	-22.1252	118.51491	2/10/2019	6	Trap 1
MDH0139	-22.12145	118.50236	7/08/2019		Scrape
MDH0139	-22.12145	118.50236	2/10/2019	6	Trap 1
MDH0146	-22.12095	118.50506	6/08/2019		Scrape
MDH0146	-22.12095	118.50506	2/10/2019	4	Trap 1
MDPZ7474	-22.09818	118.69077	22/11/2022		Scrape
MDPZ7474	-22.09818	118.69077	23/01/2023	20	Trap 1
MDPZ7475	-22.08629	118.7248	22/11/2022		Scrape
MDPZ7475	-22.08629	118.7248	23/01/2023	25	Trap 1
MDWB0026	-22.07035	118.07827	24/11/2022		Scrape
MDWB0026	-22.07035	118.07827	20/03/2023	5	Trap 1
MDWB0030	-22.09574	118.07451	24/11/2022		Scrape
MDWB0030	-22.09574	118.07451	20/03/2023	8	Trap 1
MDWB0040	-22.09733	118.0531	24/11/2022		Scrape
MDWB0040	-22.09733	118.0531	20/03/2023	10	Trap 1
MDWB0043	-22.02881	118.06189	23/11/2022		Scrape
MDWB0043	-22.02881	118.06189	20/03/2023	3	Trap 1
MDWB0044	-22.0473	118.02956	23/11/2022		Scrape
MDWB0044	-22.0473	118.02956	20/03/2023	2	Trap 1
MDWB0044	-22.0473	118.02956	20/03/2023	6	Trap 2
MDWB0048	-21.95598	118.0028	23/11/2022		Scrape
MDWB0048	-21.95598	118.0028	20/03/2023	5	Trap 1
MDWB0054	-22.08896	118.28096	23/11/2022		Scrape
MDWB0054	-22.08896	118.28096	20/03/2023	6	Trap 1
MDWB0057	-22.08411	118.16752	24/11/2022		Scrape
MDWB0057	-22.08411	118.16752	20/03/2023	5	Trap 1
MDWB5068	-22.05876	118.11254	24/11/2022		Scrape
MDWB5068	-22.05876	118.11254	20/03/2023	15	Trap 1

Appendix 3A. Genetic analysis and results.

A total of 253 animals from MDIOM were sequenced in an attempt to better understand the subterranean fauna community and species and their known distributions. A total of 166 stygofauna specimens and 87 troglofauna specimens from MDIOM were sequenced.

Depending on the size of the specimens, legs or whole animals were used for DNA extractions using a Qiagen DNeasy Blood & Tissue kit (Qiagen 2006). Elute volumes were determined by the age, condition and quantity of material. Primers combinations used for PCR amplifications were: (1) LCO1490:HCO2198, C1J1718:HCO2198, and LCO1490:HCOoutout for the MT-CO1 gene (Folmer *et al.* 1994; Schwendinger and Giribet 2005); and (2) SRN14745:SRJ14197 for the 12S gene (Simon *et al.* 2006). Next, dual-direction, sanger sequencing was undertaken for PCR products by the Australian Genome Research Facility (AGRF). The sequences returned were edited and aligned in Geneious (Kearse *et al.* 2012), where neighbour-joining phylogenetic trees were then calculated using the and 1000 bootstraps. Genetic distances (using the Tamura-Nei method) between unique sequences were measured as uncorrected p-distances (total percentage of nucleotide differences between sequences). Sequences on GenBank and in grey literature were included in phylogenetic analysis in order to provide a framework for assessing intra and interspecific variation, as well as to examine levels of differentiation among individuals within described species across their geographic ranges.

Sequencing provided genetic matches for 57 of the specimens to other specimens collected in the survey or available sequences in existing libraries (mostly for environmental assessment surveys in the Pilbara). 90 specimens did not show meaningful alignment with existing sequences (i.e. they represent different species). One hundred and six of the sequences were returned in poor quality and are therefore considered to have “failed”. This equates to a success rate of 58*, which is low. However, DNA extraction and sequencing usually fail if the material is too old, has not been preserved adequately, or the animals are in poor condition upon collection resulting in inadequate material to sequence. This applied to many of the specimens for which sequencing was attempted. The results of sequencing and genetic analysis are summarised in Appendix 3B.

Appendix 3B. Genetic analysis results for animals from the 2020-2024 survey.

Fauna	Taxon Group	Morphological Identification	Genetic Identification	Collection Site	Comments
Stygofauna	Amphipoda	*Bogidiella* \`BAM183\`	*Bogidiella* \`BAM183\`	MDWB0038	99.63% similar to above
Stygofauna	Amphipoda	*Bogidiella* \`BAM183\`	*Bogidiella* \`BAM183\`	Malay Bore	99.63% similar to above
Stygofauna	Amphipoda	*Bogidiella* \`BAM183\`	*Bogidiella* \`BAM221\`	MDWB0043	20.1% divergent from *Bogidiella* \`BAM183\`. New species
Stygofauna	Amphipoda	*Chydaekata* \`BAM180\`	*Chydaekata* \`BAM180\`	MDWB0036	10.2% divergent from Chydaekata sp. A. 99.4-99.1% similar 0.6-0.9% to other Chydaekata \`BAM180\` below
Stygofauna	Amphipoda	*Chydaekata* \`BAM180\`	*Chydaekata* \`BAM180\`	MDCMB09	As above
Stygofauna	Amphipoda	*Chydaekata* \`BAM180\`	*Chydaekata* \`BAM180\`	MDPZ7457C	As above
Stygofauna	Amphipoda	*Maarrka* \`BAM182\`	*Maarrka* \`BAM182\`	MDCMB09	19.9% and 14.5% divergent from specimens at site Unknown 5 and Maarrka sp. 1 TLF-2008. New species
Stygofauna	Amphipoda	*Maarrka* \`BAM182\`	*Maarrka* \`BAM185\`	Unknown 5	19.9% divergence from specimen at site MDCMB09. New species
Stygofauna	Amphipoda	*Maarrka* sp.	*Maarrka* \`BAM182\`	MDWB0038	99.24% match with *Maarrka* \`BAM182\`
Stygofauna	Amphipoda	*Maarrka* sp.	*Maarrka* \`BAM222\`	MD5829	Closest match is *Chydaekata* sp. A TLF-2008 which is 19.4% divergent. Animal definitely *Maarrka*. Treated as new species but probably contamination
Stygofauna	Amphipoda	*Nedsia* \`*hurlberti* group\` sp. 1 spine	*Nedsia hulberti* s.l.	MDWB0043	Matched *Nedsia hulberti s.l.* with a divergence of 0.7%
Stygofauna	Amphipoda	*Nedsia* sp.	*Nedsia hulberti* s.l. / N weelumurra	The Pools	Matched *Nedsia hulberti* s.l. with a divergence of 0.7%
Stygofauna	Amphipoda	Neoniphargidae \`BAM176\`	Neoniphargidae \`BAM176\`	MD5821	No near match
Stygofauna	Amphipoda	Neoniphargidae \`BAM176\`	Neoniphargidae \`BAM229\`	MDWB0042	Closest match is Neoniphargidae BAM176 which is 11.9% similar. Treated as separate species but may be the same
Stygofauna	Amphipoda	Neoniphargidae \`BAM176\`	Neoniphargidae \`BAM229\`	MDWB0042	100% match to above
Stygofauna	Amphipoda	Paramelitidae Genus 2 \`BAM181\`	Paramelitidae Genus 2 \`BAM181\`	MDPZ9212S	100-99.9% similar to other Paramelitidae Genus 2 \`BAM181\`
Stygofauna	Amphipoda	Paramelitidae Genus 2 \`BAM181\`	Paramelitidae Genus 2 \`BAM181\`	MDWB0037	100-99.0% similar to other Paramelitidae Genus 2 \`BAM181\`
Stygofauna	Amphipoda	Paramelitidae Genus 2 \`BAM211\`	Paramelitidae Genus 2 \`BAM211\`	MDWB0037	98.7% similar to other P. Gen. 2 \`BAM211 divergent). No other close matches with the nearest match being Paramelitidae \`MH1\` which is 17.8% divergent
Stygofauna	Amphipoda	Paramelitidae sp. B48	Paramelitidae Genus 2 \`BAM181\`	MDPZ7461	Genetic match to Paramelitidae Genus 2 \`BAM181\` sequences from Mulga East (Maddina Well and MD7046) and Mulga Downs (MDWB0037 AND MDPZ9212S). 0 - 1.5 % divergence within this group.
Stygofauna	Amphipoda	Paramelitidae sp. B48	Paramelitidae \`BAM244\`	Unknown 5	Closest match is Paramelitidae \`B46\` from MDWB0042 Mulga Downs, which is 18 % divergent. New species.
Stygofauna	Amphipoda	Paramelitidae Genus 2 sp.	Paramelitidae sp. B46	UNK1	Matched Paramelitidae sp. B46 (0.42% divergent) from the Fortescue Valley
Stygofauna	Amphipoda	Paramelitidae sp.	Paramelitidae sp. B42	MDWB0054	Closest match is Paramelitidae_B42 which is 3.1% divergent
Stygofauna	Amphipoda	Paramelitidae sp.	Paramelitidae Genus 2 \`BAM181\`	Maddina Well	Matched multiple \`BAM181\` sequences with intraspecific divergence of between 0-0.1%

Fauna	Taxon Group	Morphological Identification	Genetic Identification	Collection Site	Comments
Stygofauna	Amphipoda	Paramelitidae sp.	Paramelitidae Genus 2 `BAM181`	MD7046	Matched multiple `BAM181` sequences with intraspecific divergence of between 0-0.1%
Stygofauna	Amphipoda	Paramelitidae sp.	Paramelitidae Genus 2 `BAM211`	MD5825	Genetic match to specimen from site MDWB0037 which is 1.3% divergent. Nearest other match is Paramelitidae `MH1` which is 17.8% divergent. Different species
Stygofauna	Amphipoda	Paramelitidae sp.	Paramelitidae sp. B46	MDWB0042	Genetic match to Paramelitidae sp. B46 (0.16% divergence) and matched specimen from site UNK1 (3.1% divergent).
Stygofauna	Amphipoda	Paramelitidae Genus 2 sp. B11	Paramelitidae sp. B46	MDWB0058	Genetic match to Paramelitidae `B46` specimens from MDWB0042 Mulga Downs, Unknown site 1 Mulga Downs, and Fortescue Valley. 0.6 - 4.1 % divergence within this group.
Stygofauna	Amphipoda	Paramelitidae sp.	Pilbarus millsi s.l	MDPZ9220	Closest matches to *Pilbarus millsi*_subBAM154 and *Pilbarus* sp. I TLF-2008 at 5.6 and 6.0% respectively.
Stygofauna	Amphipoda	Paramelitidae sp.	Pilbarus millsi s.l	MDPZ9220	Closest matches to *Pilbarus millsi*_subBAM154 and *Pilbarus* sp. I TLF-2008 at 4.6 and 5.83% respectively.
Stygofauna	Amphipoda	Paramelitidae sp. B47	Paramelitidae sp. B47	MD7043	Closest match is over 40% divergent
Stygofauna	Amphipoda	Paramelitidae sp. B48	*Chydaekata* `BAM180`	Calamina Well	Matched (0-0.31% divergence) *Chydaekata* `BAM180`
Stygofauna	Amphipoda	*Pilbarana* group (PSS) s.l.	*Pilbarana* sp. B07 (=Melitidae SOLOMON 2)	UNK1	97.9-93.4% similarity to *Pilbarana* sp. B07 (=Melitidae SOLOMON 2)
Stygofauna	Amphipoda	*Pilbarana* group (PSS) s.l.	*Pilbarana* sp. B07 (=Melitidae SOLOMON 2)	UNK1	As above
Stygofauna	Amphipoda	*Pilbarana* group (PSS) s.l.	*Pilbarana* sp. B07 (=Melitidae SOLOMON 2)	UNK2	As above
Stygofauna	Amphipoda	Pilbarus `BAM175`	*Chydaekata* `BAM180`	MDPZ7461	Matched with *Chydaekata* `BAM180` which is 0.8% divergent
Stygofauna	Amphipoda	*Pilbarus* `BAM175`	*Pilbarus millsi* subsp. `BAM154`	MDWB0027	Genetic match with multiple speimens including *Pilbarus millsi* subsp. `BAM154` with a divergence of 2.7% to 7.1%
Stygofauna	Amphipoda	*Pilbarus* `BAM175`	*Pilbarus millsi* subsp. `BAM154`	MDPZ5296	Genetic match with multiple specimens including *Pilbarus millsi* subsp. `BAM154` with a divergence of 2.7-7.1%
Stygofauna	Amphipoda	*Pilbarus* `BAM175`	*Pilbarus millsi* subsp. `BAM154`	MDWB0053	As above
Stygofauna	Amphipoda	*Pilbarus* sp.	Paramelitidae `MH1`	MD7043	Matched Paramelitidae `MH1` with a divergence of 2- 2.2%
Stygofauna	Copepoda	*Abnitocrella eberhardi*	*Abnitocrella eberhardi*	MDPB0014	No close match, first sequence of *Abnitocrella eberhardi*
Stygofauna	Copepoda	*Mesocyclops* `BCY098`	*Mesocyclops* `BCY098`	md_hyp4	Nearest match from Genbank, *Mesocyclops* sp. 2 MYL-2014. New species
Stygofauna	Copepoda	*Mesocyclops brooksi*	*Mesocyclops brooksi*	MDWB0040	Matched *Mesocyclops* sp. Biologic-CYCL001 (ON930175) (0.4% divergen)t. First sequence of *M. brooksi*
Stygofauna	Copepoda	*Mesocyclops notius*	*Mesocyclops notius*	Robinsons Well	Matched *Mesocyclops* sp. Biologic-CYCL002 (MK159096) (0.7% divergent). First sequenceof *M. notius*
Stygofauna	Copepoda	Parastenocarididae sp.	*Parastenocaris* sp. B29	MDPZ7460C	Genetic match with *Parastenocaris* sp. B29 which is less than 1.53% divergent

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Stygofauna	Copepoda	Parastenocaris `BHA276`	Retain Parastenocaris `BHA276	MDPZ7469C Malay Bore	Contamination, retain morphological identification
Stygofauna	Copepoda	*Parastenocaris* sp. B18	*Parastenocaris* sp. B18	MDPZ7462C	15.3% divergent to specimen from site MD6089 and 16.9% divergent to *Parastenocaris jane*. Different species
Stygofauna	Copepoda	*Parastenocaris* sp. B29	*Parastenocaris* sp. B29	MD6089	15.3% divergent to specimen from site MDPZ7462C and 16.9% divergent to *Parastenocaris jane*. Different species
Stygofauna	Harpacticoida	*Dussartstenocaris* `BHA335`	*Dussartstenocaris* `BHA335`	MDWB0038	Nearest match is *Laophonte longicaudata*, which is 19.1% different.
Stygofauna	Copepoda	*Thermocyclops* sp.	*Thermocyclops* `BCY102`	Horraces Bore	Nearest match from GenBank is *Thermocyclops decipiens* which is 13.8% divergent. New species
Stygofauna	Cyclopoida	*Diacyclops einslei*	*Diacyclops einslei*	Calamina Bore	Narest match is 15% divergent. First available sequence of *D. einslei.*
Stygofauna	Cyclopoida	Diacyclops sobeprolatus	*Diacyclops sobeprolatus*	Calamina Bore	Closest match of CO1 sequences is *Diacyclops cockingi* (18.3% divergent). First available CO1 sequence for *D. sobeprolatus*
Stygofauna	Isopoda	Pygolabis `MH1`	Pygolabis `BIS563`	MDPZ9219	Closest match is Pygolabis MH1 which is 12% divergent. Treated as separate species but may be the same
Stygofauna	Isopoda	*Pygolabis* `MH1`	*Pygolabis* `MH1`	MDPZ7358C	Nearest genetic match is Pygolabis sp. 3 TLF-2007 which is 14.5% divergent. Different species
Stygofauna	Isopoda	*Pygolabis* sp.	*Pygolabis* `MH1`	MDPB0014	Matched *Pygolabis* `MH1` with a 1.4% difference
Stygofauna	Isopoda	*Troglarmadillo* sp. B54	*Troglarmadillo* sp. B54	MD4646	Nearest match is Troglarmadillo `BIS345` which is 18.3% divergent. First available sequence for Troglarmadillo sp. B54
Stygofauna	Oligochaeta	Enchytraeidae `2 bundle` s.l. (long thin 2 per seg)	Enchytraeidae `BOL081` (2 bundle long thin)	MD5838	Nearest match is Enchytraeidae sp. Biologic-OLIG032 (accession code ON930162) off GenBank which is 11.7% divergent. New species
Stygofauna	Oligochaeta	Enchytraeidae `2 bundle` s.l. (short sclero 4 per seg)	Enchytraeidae sp. Ench7	MD4800	Genetic match to Enchytraeidae sp. Ench7 with a divergence of 1.2%
Stygofauna	Oligochaeta	Enchytraeidae `3 bundle` s.l. (short sclero)	Enchytraeidae sp. E06-01	MD6304	Genetic match to multiple specimens including Enchytraeidae sp. E06-01 with divergences of 7.7-8.6%
Stygofauna	Oligochaeta	*Namanereis pilbarensis*	Namanereis `BPOL001`	MDPZ7461	Does not genetically match the type specimen of *Namanereis pilbarensis* from the SA museum (19.4% divergent) so has be assigned a new species
Stygofauna	Oligochaeta	Phreodrilidae sp. AP SVC s.l.	Phreodrilidae sp. AP SVC s.l.	Mountain Well	Nearest genetic match is Phreodrilidae P01-1 which is 11.6% divergent. Different species
Stygofauna	Ostracoda	*Areacandona quasilepte*	*Areacandona quasilepte*	MDP29220	Closest to Areacandona quasilepte_MDWB0043, which is 4.94% divergent
Stygofauna	Ostracoda	*Areacandona* `BOS1433`	*Areacandona* `BOS1433`	MD7048	Nearest match is *Candona candida* (MN013106) which is 16.7% divergent. New species
Stygofauna	Ostracoda	*Humphreyscandona* `BOS1602`	*Humphreyscandona* `BOS1602`	MDWB0042	No close match. New species
Stygofauna	Ostracoda	*Areacandona quasilepte*	*Areacandona quasilepte*	MDWB0043	Nearest match is *Humphreyscandona* `BOS394` which is 15.9% divergent. New species
Stygofauna	Ostracoda	Candonidae `BOS1874`	Candonidae `BOS1874`	UNKS	Closest match is I 'BOS387' which is 17.01% divergent

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Stygofauna	Ostracoda	*Cypretta seurati*	*Cypretta seurati*	Silver Grass Well	No close match. FirstAustralian '*Cypretta seurati* sequence
Stygofauna	Ostracoda	*Cypridopsis* `BOS666`	*Cypridopsis* `BOS666`	Pipally Well	Genetic match with Mexican *Cypretta maya* (MF076719) (4.5% divergent). Biologic has had similar result. New species of *Cypridosis* (not *C. vidua*)
Stygofauna	Ostracoda	*Cyprinotus kimberleyensis* s.l.	*Cyprinotus kimberleyensis* s.l.	MDPB0013B	Matches specimen form India with a divergence of 1.9%
Stygofauna	Ostracoda	*Humphreyscandona* `BOS1372`	*Humphreyscandona* `BOS1372`	Ebathacalby bore	Closest match is *Humphreyscandona* `BOS1714` which is 11.7% divergent. New species
Stygofauna	Ostracoda	*Humphreyscandona* `BOS1435`	*Humphreyscandona* `BOS1435`	Unknown 5	No close match. New species.
Stygofauna	Ostracoda	*Humphreyscandona* `BOS1602`	*Humphreyscandona* BOS387	MDP29219	Closest match is *Humphreyscandona* 'BOS387' at MDWB0042 which is 98.11% similar.
Stygofauna	Ostracoda	*Humphreyscandona* `BOS1602`	*Humphreyscandona* `BOS387`	MDNE0043	As above
Stygofauna	Ostracoda	*Humphreyscandona* `BOS1714`	*Humphreyscandona* `BOS1714`	MDPZ9212S	No close match except H. 'BOS1714' below (99.1% similar). New species
Stygofauna	Ostracoda	*Humphreyscandona* `BOS1714`	*Humphreyscandona* `BOS1714`	MDWB0038	As above
Stygofauna	Schizomida	*Draculoides* sp.	*Draculoides* `BSC118`	MD5821	Closest match, 0-2.3% divergent
Stygofauna	Spelaeogriphacea	*Mangkurtu `BSPE004`*	*Mangkurtu `BSPE004`*	MDWB0042	Nearest match is the isopod *Ligia glabrata* (MH173096) which is 16.1% divergent. New species
Stygofauna	Syncarida	Bathynellidae sp.	Bathynellidae `BSY246`	Horaces Well	Closest match is Bathynellidae `BSY200` which is 16.3% divergent
Stygofauna	Syncarida	*Billibathynella* sp.	*Billibathynella* `BSY238`	Calamina Well	Nearest Genetic match is *Billibathynella* MH2 which is 10.1% divergent. New species
Stygofauna	Syncarida	*Billibathynella* sp.	*Billibathynella* sp. B08	WF0188	Genetic match to *Billibathynella* sp. B08 which is 4.3% divergent
Stygofauna	Syncarida	Billibathynella sp. B10	Billibathynella sp. B10	MDWB0053	Closest match is *Billibathynella*_SYN001_HEOP0574 which is 18.09% divergent
Stygofauna	Syncarida	*Billibathynella* sp. B11	*Billibathynella* sp. `BSY244`	MDWB0037	Is 23.7% divergent from *Billibathynella* sp. B11. New species.
Stygofauna	Syncarida	Billibathynella sp. B11	Billibathynella sp. B08	MDWB0026	Closest match is *Billibathynella_B08_*WF0188 which is 1.8% divergent
Stygofauna	Syncarida	Billibathynella sp. B11	Billibathynella sp. B08	MDWB0026	100% match to above
Stygofauna	Syncarida	Billibathynella sp. B11	Billibathynella sp. B08	MDWB0026	100% match to above
Stygofauna	Syncarida	Billibathynella sp. B11	Billibathynella sp. B08	MDWB0026	100% match to above
Stygofauna	Syncarida	*Billibathynella* sp. B11	*Billibathynella* sp. B11	MD7063	Nearest match is *Billibathynella* sp. B08 which is 13.1% different. First sequence of *B.* sp. B11
Stygofauna	Syncarida	*Brevisomabathynella* `BSY233`	*Brevisomabathynella* `BSY233`	MDWB0038	Nearest match is *Brevisomabathynella pilbaraensis* which is 23.7% divergent. New species
Stygofauna	Syncarida	*Brevisomabathynella* `BSY234`	*Brevisomabathynella* `BSY234`	MDWB0043	Nearest match is Parabathynellidae sp. H-SPA051 (MW911294) which is 11.8% divergent. New species
Stygofauna	Syncarida	*Brevisomabathynella* sp.	*Brevisomabathynella* `BSY247`	Company	Closest match is *Brevisomabathynella pilbaraensis* which is 19.1% divergent

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Stygofauna	Syncarida	*Pilbaranella* sp.	*Pilbaranella* `BSY380`	MDWB0025	Closest match is *Pilbaranella*MH1 which is 15.6% divergent
Stygofauna	Syncarida	*Pilbaranella* sp.	*Pilbaranella* `BSY380`	MDWB0025	99.79% match to above
Troglofauna	Cephalostigmata	*Symphylella* sp.	*Symphylella* ` BSYM137`	MDRC2367	Closest match is *Symphylella* `EW BG0703`, which is 15.6 % divergent. New species.
Troglofauna	Diplura	Japygidae `BDP213`	Japygidae `BDP213`	MD9401	New species. Closest match Japygidae_BDP154_DPL002 (13.64% divergent
Troglofauna	Diplura	Japygidae `BDP214`	Japygidae `BDP214`	MDWB0065	Closest match is Indjapyx sp. Biologic-DIPL001 which is 15.38% divergent
Troglofauna	Isopoda	*Troglarmadillo* sp.	*Troglarmadillo* `BIS562`	MDRC1351	Closest matches are *Troglarmadillo* BIS345 and *Buddelundia* sp. Biologic-ISOP006 (17.7 and 17.6% similarity) .
Troglofauna	Pauropoda	Pauropodidae `BPU090`	Pauropodidae `BPU090`	MDPZ7478	Closest match is *Decapauropus* sp. HYS-2012 (15.52%)
Troglofauna	Pseudoscorpiones	*Indohya* sp.	Indohya 'BPS274'	YC0023RD	Closest match is *Indohya* BPS560 (12.38-14.22% divergence). New species
Troglofauna	Pseudoscorpiones	Olpiidae sp.	Olpiidae `BPS565`	MDRC2276	Closest match is *Austrohorus* sp. WAM T118965 which is 12.0% divergent
Troglofauna	Zygentoma	Trinemura sp.	*Trinemura* `BZY114	MDWB0017	Cloest match is *Trinemura*_B37 which is 17.1% divergent
Troglofauna	Zygentoma	Trinemura sp.	*Trinemura* `BZY114	MDWB0017	99.2% match to above
Troglofauna	Araneae	Oonopidae sp.	Oonopidae `BAR138`	MD1791	No close match. New species
Troglofauna	Blattodea	Blattidae sp.	-	MD7301	Genetics suggest surface species, removing from troglofauna list.
Troglofauna	Blattodea	*Nocticola* sp.	*Nocticola* `BLA008`	MD0398	Nearest match is *Noticola* sp. McP (OP242126) (13.2% divergent) . New species. Genetic match to specimen from MD0882
Troglofauna	Blattodea	*Nocticola* sp.	*Nocticola* `BLA008`	MD0882	As above
Troglofauna	Blattodea	Nocticola sp.	Nocticola ` BLA008`	MD0398	Genetic match to the other *Nocticola* specimens that were sequenced here (0.9 - 3 % divergence). All matched *Nocticola* `BLA008` from MD0398 and MD0882, Murray Hill (0.4 - 3 % divergence within this group).
Troglofauna	Blattodea	Nocticola sp.	Nocticola ` BLA008`	MD4554	As above
Troglofauna	Blattodea	Nocticola sp.	Nocticola ` BLA008`	MD9401	As above
Troglofauna	Blattodea	*Nocticola* sp.	*Nocticola* `OES11`	MD5821	Genetic match with numerous *Nocticola* `OES11` sequences with 6.4% to 7.8% divergence
Troglofauna	Blattodea	*Nocticola* sp.	*Nocticola* `OES11`	MD7042	Genetic match with numerous sequences in the Bennelongia database and GenBank with 6.4% to 7.8% divergence
Troglofauna	Chilipoda	*Cormocephalus pyropygus*	*Cormocephalus pyropygus*	MD1458	Genetic match with *Cormocephalus pyropygus* using the 12S gene (0.0% divergence)
Troglofauna	Chilipoda	*Cryptops* sp.	*Cryptops* `MH1` (=DNA05)	MD4821	Genetic match to *Cryptops* `MH1` (=DNA05) with divergence of 1.1%
Troglofauna	Chilipoda	*Cryptops* sp. B41	*Cryptops* sp. B41	MD0974	No close match. New species
Troglofauna	Chilipoda	*Cryptops* sp. B42	*Cryptops* sp. B42	MD0298	17.7% divergent from *Cryptops* sp. B41. Nearest match was Cryptopidae sp. WAM-CRYP003 (MZ427806) which is 15.9% divergent. Different species
Troglofauna	Coleoptera	*Coleoptera* `BCO196`	*Coleoptera* `BCO207`	MD3809	Genetic match with Coleoptera `BCO207` which is 0-0.5% divergent
Troglofauna	Coleoptera	*Coleoptera* `BCO208`	*Holoparamecus* `BCO208`	MD2970	Nearest match using 12S is *Holoparamecus* sp. CO976 (JX844940) which is 12% divergent. Different species but same genus
Troglofauna	Diplopoda	*Lophoturus madecassus*	*Lophoturus madecassus*	MD5834	Matched other *Lophoturus madecassus* with 2.9-5.6% divergence
Troglofauna	Diplopoda	Polydesmida `BDI065`	Haplodesmidae 'Helix-DIHAP001'	MD6089	Matches Haplodesmidae sp. DIHAP001 (MZ427800) and Dalodesmidae `BDI059` with a divergence of 0.1%

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Troglofauna	Diplura	Campodeidae sp.	Campodeidae `BDP216`	MD3980	Closest genetic match is Campodeidae p. B04 which is 18.4% divergent.
Troglofauna	Diplura	Japygidae sp.	Japygidae `BDP213`	MD7642	Nearest match is Japygidae `MH1` which is 12.15% divergent. New species
Troglofauna	Diplura	Japygidae sp.	Japygidae `BDP214`	MDPZ7476	Nearest match is Japygidae `BDP150` from which is 14.8% different. New species
Troglofauna	Diplura	Parajapygidae sp.	Parajapyx `BDP217`	MD3207	Closest match is Parajapygidae `BDP199` which is 21.3% divergent
Troglofauna	Diplura	Parajapygidae sp. B29	Parajapygidae 'MH1'	MD2040	Genetic match to Parajapygidae 'MH1' with a divergence of 1.6%
Troglofauna	Diplura	Projapygidae `BDP182`	Projapygidae `BDP182`	MD2936	14.3% divergent from Projapygidae `MH1`. New species
Troglofauna	Diplura	Projapygidae sp.	Projapygidae `BDP215`	MDWB0017	Nearest match is Projapygidae sp. B16, which is 16.6% different. New species
Troglofauna	Hemiptera	*Phaconeura* sp.	Meenoplidae sp. WAM-PHAC001/H-HEM003	MD4754	Genetic match with WAM species Meenoplidae sp. WAM-PHAC001/H-HEM003 (MT902533) which is 0.8% divergent
Troglofauna	Hemiptera	*Phaconeura* sp.	Meenoplidae sp. WAM-PHAC001/H-HEM003	MD3241	Genetic match with WAM species Meenoplidae sp. WAM-PHAC001/H-HEM003 (MT902533) which is 0.6% different
Troglofauna	Hemiptera	*Phaconeura* sp.	*Phaconeura* `BHE035`	MD6225	Genetic match to *Phaconeura* `BHE035` with a divergence of 12.5%
Troglofauna	Hemiptera	*Phaconeura* sp.	*Phaconeura* `BHE036`	MD3805	Nearest genetic match Meenoplidae sp. WAM-PHAC001/H-HEM003 MZ427776) which is 9.5% divergent. New species
Troglofauna	Hemiptera	*Phaconeura* sp.	*Phaconeura* sp. WAM PHAC002	MD2936	Genetic match with *Phaconeura* sp. WAM PHAC002 (accession code MW021247) which is 1.5% divergent
Troglofauna	Hemiptera	*Phaconeura* sp.	*Phaconeura* sp. WAM PHAC002	MD0398	Genetic match with *Phaconeura* sp. WAM PHAC002 (accession code MW021247) which is 1.6% different
Troglofauna	Isopoda	*Buddelundia* sp. B57	*Buddelundia* sp. B57	MD3028	Nearest genetic match is *Buddelundia* cf. *labiate* which is 19.7% divergent. New species
Troglofauna	Isopoda	*Troglarmadillo* `BIS392`	*Troglarmadillo* `BIS392`	MD0350	14.1% divergent to *Troglarmadillo* sp. B03. Different species
Troglofauna	Palpigradi	Palpigradi sp.	Palpigradi `BPAL053`	MD0401	Closest match is Palpigradi `MH1` which is 11.7% divergent. New species
Troglofauna	Palpigradi	Palpigradi sp.	Palpigradi 'MH1'	MD2038	Genetic match to Palpigradi 'MH1' with a divergence of 0.3%
Troglofauna	Pauropoda	Pauropodidae `BPU089`	Pauropodidae `BPU089`	MD4821	Nearest genetic match was Pauropodidae sp. B43 which was 13.8% divergent. New species
Troglofauna	Pauropoda	Pauropodidae `BPU090`	Pauropodidae `BPU090`	MD1545	Nearest genetic match was Pauropodidae `BPU076` which was 18.9% divergent. New species
Troglofauna	Pauropoda	Pauropodidae sp.	Pauropodidae 'BPU098'	md_kar2	Nearest genetic match was *Decapauropus biclavulus* which was 19.9% divergent. New species
Troglofauna	Pseudoscorpiones	Linnaeolpium sp.	Linnaeolpium `BPS502`	MD4757	Closest genetic match is from a blast search, *Austrohorus* sp. Biologic-PSEU021 which is 16.8% divergent
Troglofauna	Pseudoscorpiones	*Tyrannochthonius* `BPS229`	*Tyrannochthonius* `BPS229`	MD1556	Nearest match is *Tyrannochthonius* aff. Basme H-PC050 (accession code MZ425011) which is 18% divergent. New species
Troglofauna	Pseudoscorpiones	*Tyrannochthonius* sp.	*Tyrannochthonius* `BPS229`	MD4821	Nearest genetic match is 19.4% divergent. New species
Troglofauna	Pseudoscorpiones	*Tyrannochthonius* sp. B35	*Tyrannochthonius* sp. B35	MD3661	Matched other *Tyrannochthonius* sp. B35 with 2.3%-2.7% divergence
Troglofauna	Pseudoscorpiones	*Tyrannochthonius* sp. B36	*Tyrannochthonius* sp. B35	MD0884	Matched *Tyrannochthonius* sp. B35 with 2.3%-2.7% divergence
Troglofauna	Schizomida	*Draculoides* `BSC118`	*Draculoides* `BSC118`	MD5359	Genetic match with *Draculoides* sp. from site MD5821 which is 0% to 2.3% divergent. New species

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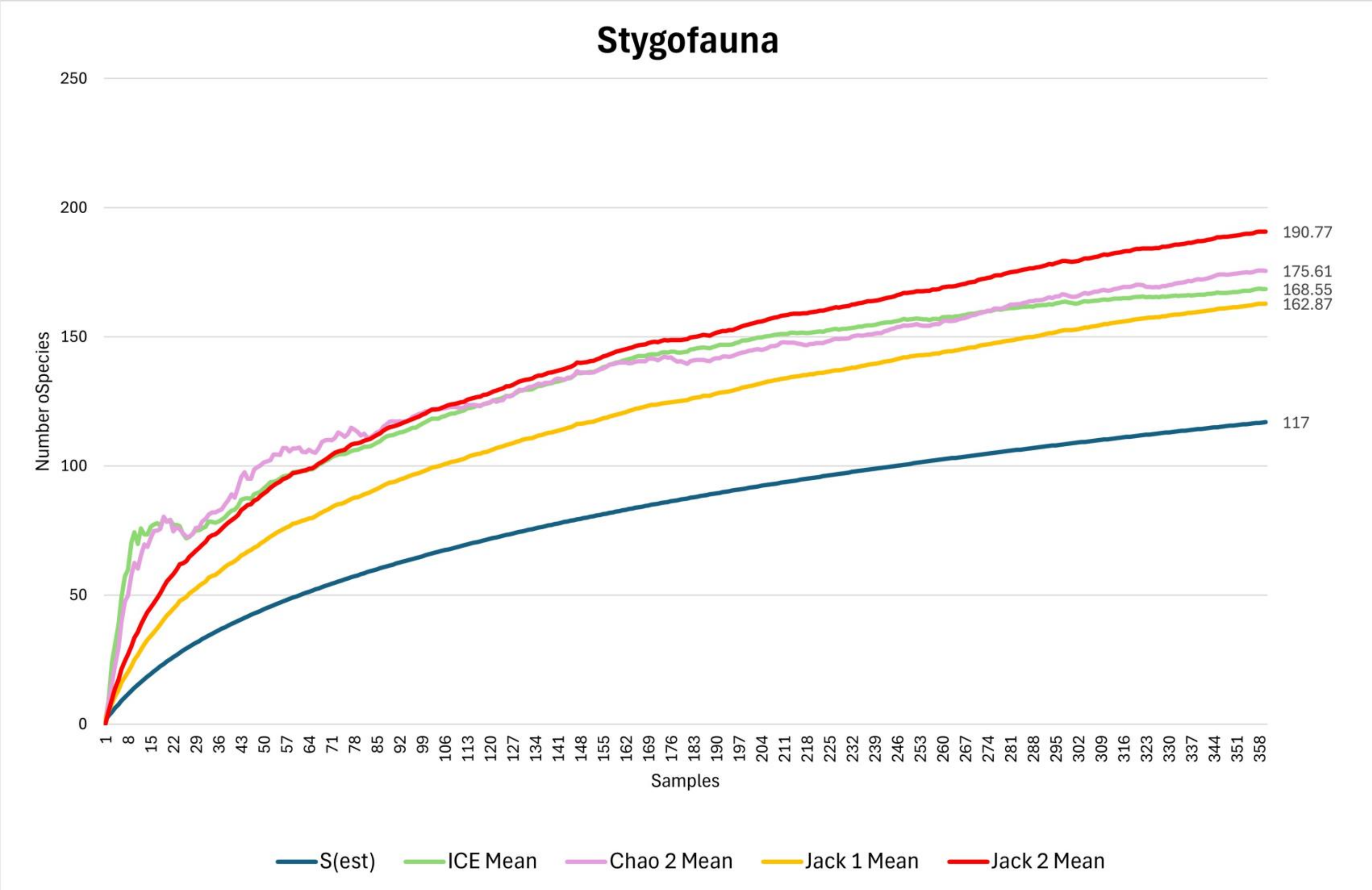
Troglofauna	Schizomida	Draculoides sp.	Draculoides `BSC118`	MD5829	Genetic match to to `Draculoides BSC118` from MD5821 and MD5359, Mulga East (1.9 to 1.8 % divergent).
Troglofauna	Schizomida	Draculoides sp.	Draculoides `SCH084-DNA`	MD6444	Genetic match to Draculoides `SCH084-DNA` from MD0408 Murrays Hill (0.18 %divergent).
Troglofauna	Symphyla	*Hanseniella* sp.	*Hanseniella* sp. `BSYM117`	MD7051	Nearest match is *Hanseniella* sp. B36-DNA which is 18.7% divergent. New species
Troglofauna	Zygentoma	Atelurinae `MH1` (=B20)	Atelurinae `MH1` (=B20)	MD0305	Nearest match is from Genbank, Atelurinae sp. Biologic-ZYG028 (accession code OP242122) which is 17.1% divergent and different species. Belongds to genus *Dodecastyla*
Troglofauna	Zygentoma	*Dodecastyla* sp.	Atelurinae `MH1` (=B20)	MD0307	Same species as animal from MD0305, 2.6% divergent.
Troglofauna	Zygentoma	*Dodecastyla* sp.	Atelurinae `MH1` (=B20)	MD3207	Genetic match to specimen from MD0305, 2.6% divergent
Troglofauna	Zygentoma	*Nicoletiinae* sp.	*Trinemura* `BZY102`	MD2453	Genetic match with specimen from site MD0790 which is 8.3% divergent. Nearest other match is *Trinemura* sp. B28 which is 11.1% divergent. Different species
Troglofauna	Zygentoma	*Nicoletiinae* sp.	*Trinemura* `BZY102`	MD0790	Genetic match with specimen from site MD2453 which is 8.3% divergent. Nearest other match is *Trinemura* sp. B28 which is 11.1% divergent. Different species
Troglofauna	Zygentoma	*Trinemura* sp.	*Trinemura* `MH1`	MDPZ7474	Genetic match to *Trinemura* `MH1` with 4.8% to 8.3% divergence.
Troglofauna	Zygentoma	*Trinemura* sp.	*Trinemura* `MH1`	MD3851	Genetic match for 12S with Trinemura `MH1` which is 4.2% divergent
Troglofauna	Zygentoma	*Trinemura* sp.	*Trinemura* sp. B28	MD2926	Genetic match with *Trinemura* sp. B28 which is 1.4% divergent
Troglofauna	Zygentoma	*Trinemura* sp.	*Trinemura* sp. WAM ZYGS005	MD2309	Blast match using 12S, *Trinemura* sp. WAM ZYGS005 which is 7.9% (accession code MW024039)
Troglofauna	Zygentoma	*Trinemura* sp.	*Trinemura* sp. WAM ZYGS005	MD3874	Blast match using 12S with multiple GenBank sequences including *Trinemura* sp. WAM ZYGS005 which is 8.5% (accession code MW024039)
Troglofauna	Zygentoma	*Trinemura* sp.	*Trinemura* sp. WAM ZYGS005	MD3812	Blast match using 12S, *Trinemura* sp. WAM ZYGS005 which is 8% (accession code MW024039)
Troglofauna	Zygentoma	*Trinemura* sp.	*Trinemura* sp. WAM ZYGS005	MD3874	Blast match using 12S, *Trinemura* sp. WAM ZYGS005 which is 7.5% (accession code MW024039)
Troglofauna	Zygentoma	*Trinemura* sp. B27	*Trinemura* sp. WAM ZYGS005	MD3841	Changed due to result of specimen from site MD1631
Troglofauna	Zygentoma	*Trinemura* sp. B27	*Trinemura* sp. WAM ZYGS005	MD1631	Genetic match to WAM specimen with divergence of less than 5%
Troglofauna	Zygentoma	*Trinemura* sp. B27	*Trinemura* sp. WAM ZYGS005	MD1631	Genetic match to WAM specimen with divergence of 5%
Troglofauna	Zygentoma	*Trinemura* sp. B28	*Trinemura* sp. B28	MD2059	Nearest genetic match is *Trinemura* HR0968 with a divergence of 17.4%. Different species

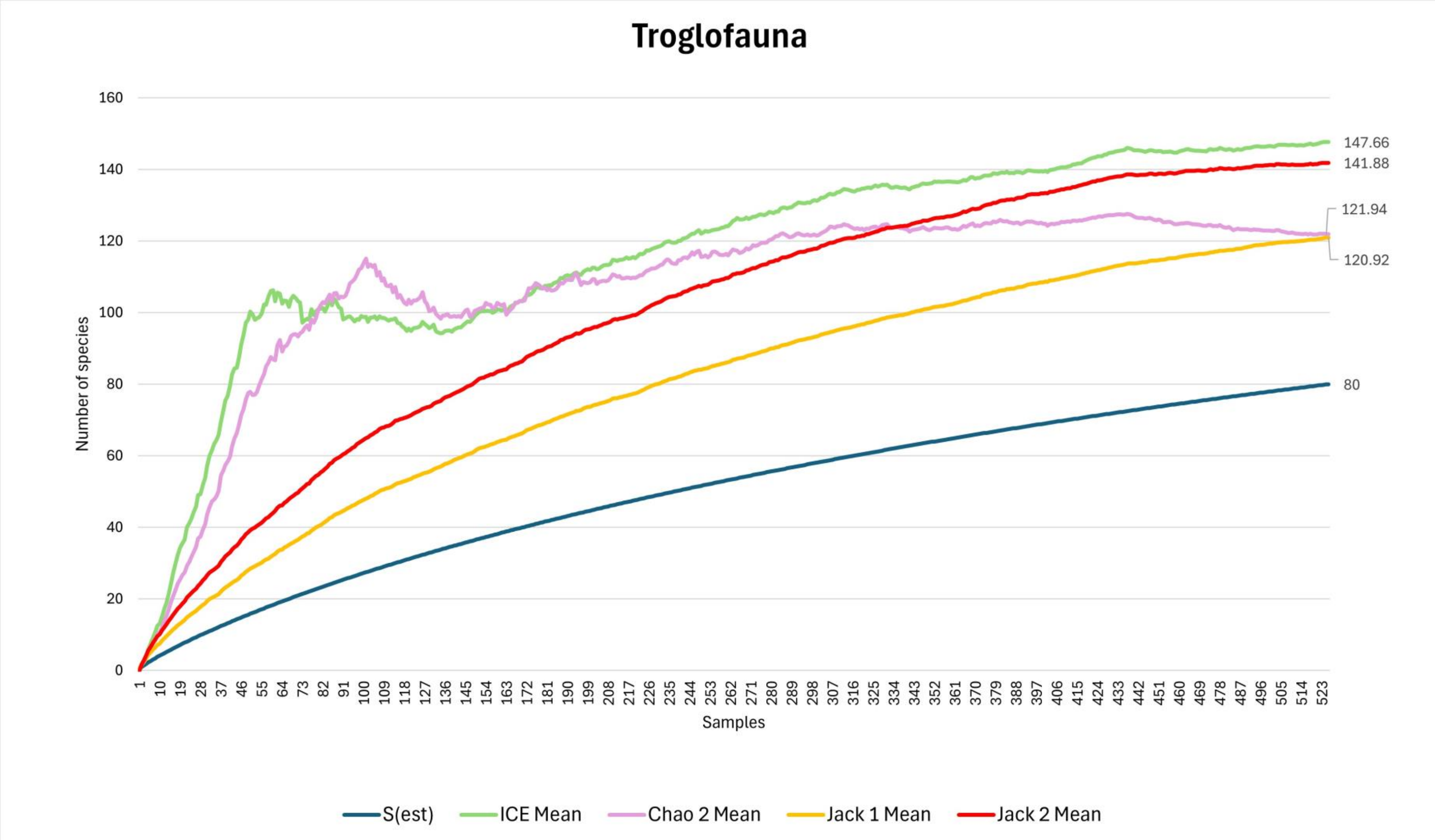
Appendix 4. Estimated number of stygofauna species in the MDIOM areas of groundwater drawdown and mounding.

S(est) line is the cumulative number of species recorded, other lines are estimates of actual number of species present (see text).

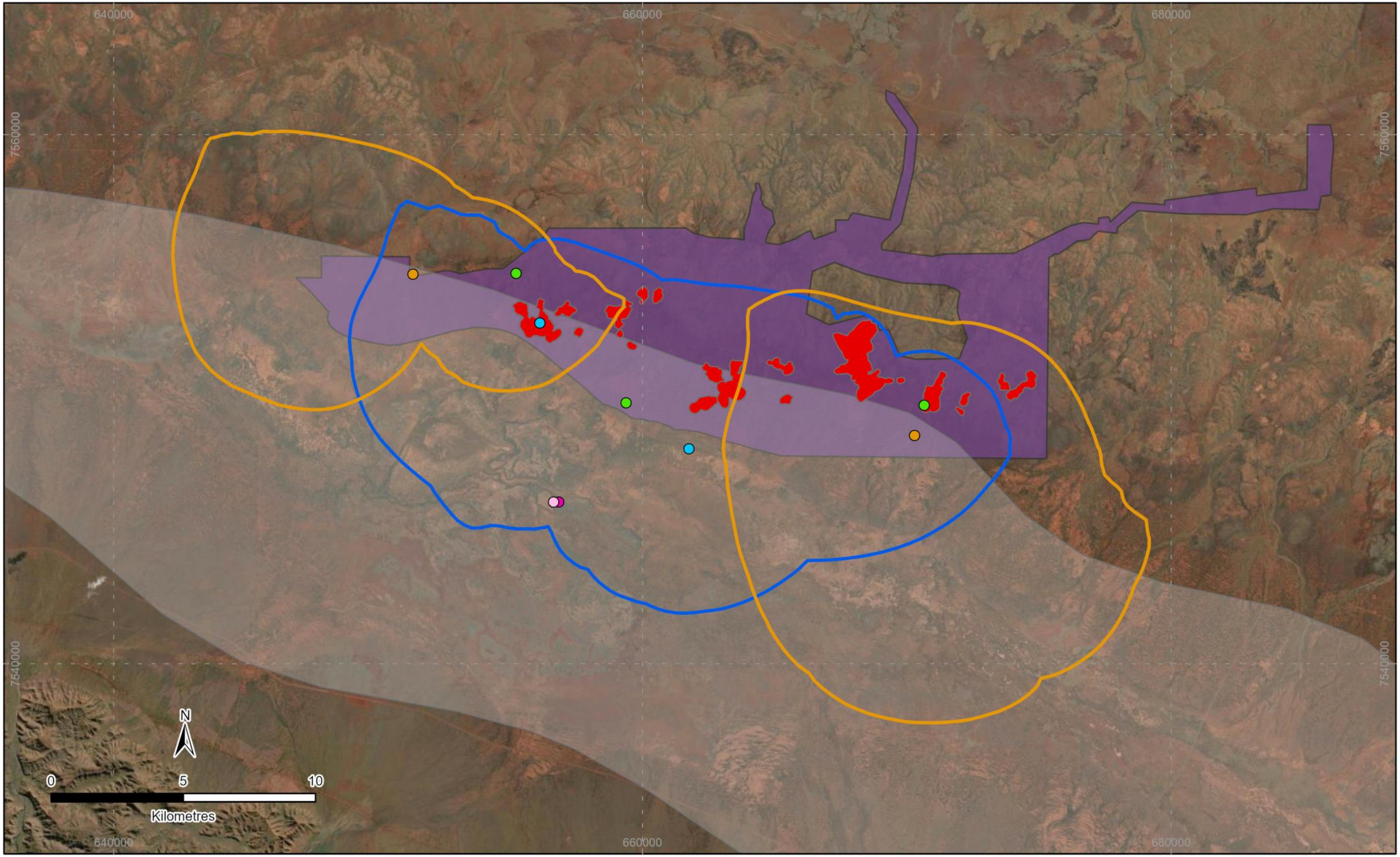


Appendix 5. Estimated number of troglofauna species in the MDIOM mine pits and areas of groundwater mounding.

S(est) line is the cumulative number of species recorded, other lines are estimates of actual number of species present (see text).



Appendix 6. Maps of restricted stygofauna species.



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GDA2020 MGA Zone 50
Scale: 1:180,000
Author: VMarques
Date: 13/11/2024

Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Cumulative 1m Mounding Contours
- Cumulative 2m Drawdown Contour
- Palaeovalleys

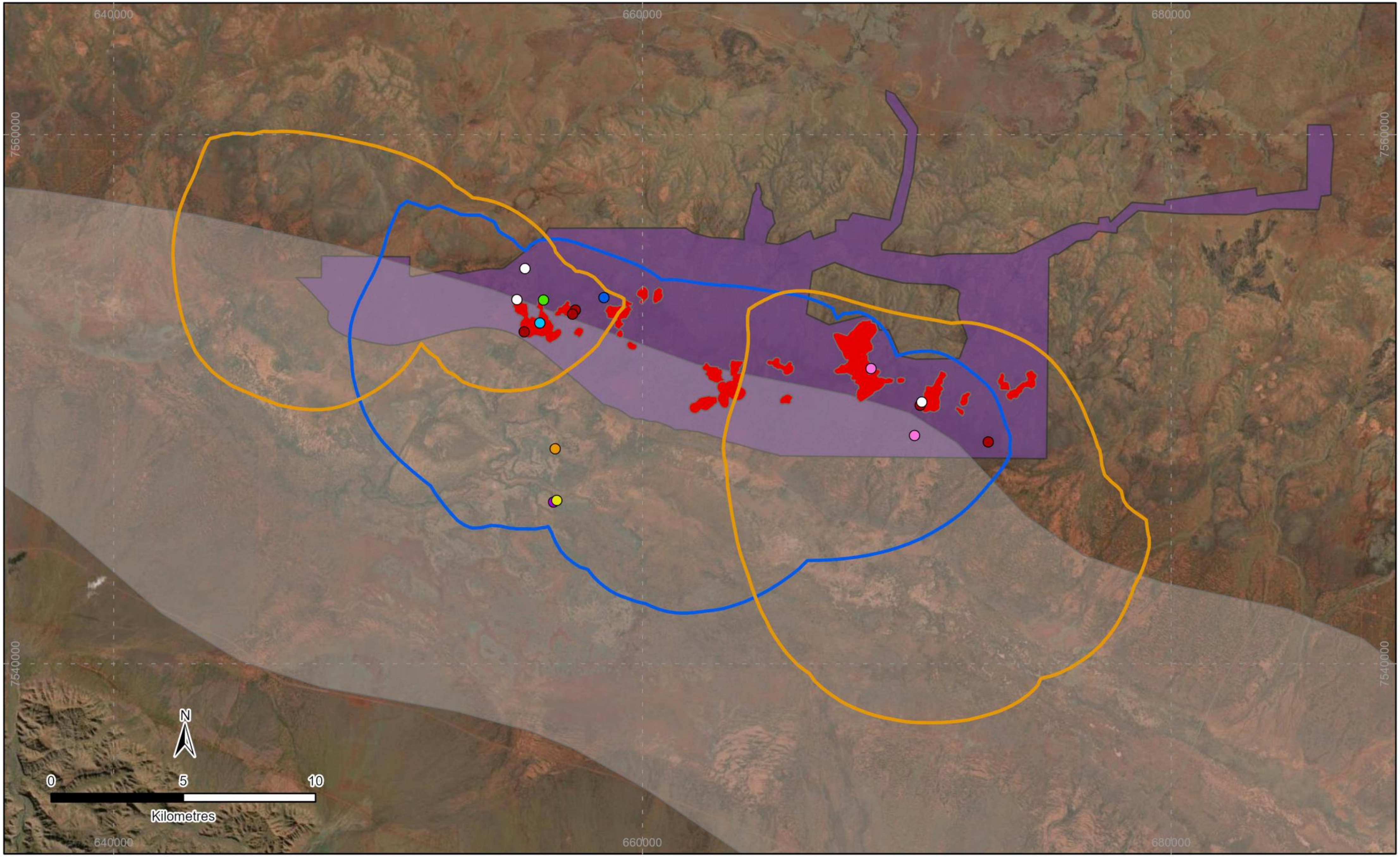
Annelid
- *Achaeta* sp.

Arachnid
- *Guineaxonopsis* sp. B03 (S01 group)

Ostracod
- *Areacandona* `BOS1381`

Harpacticoids
- *Dussartstenocaris* `BHA335`
- *Schizopera* `BHA277`

Appendix 6. Figure 1: Collection locations of annelid worms, arachnids, ostracods and harpacticoid copepods



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GDA2020 MGA Zone 50
Scale: 1:180,000
Author: VMarques
Date: 13/11/2024

Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Cumulative 1m Mounding Contours
- Cumulative 2m Drawdown Contour
- Palaeovalleys

Syncarids

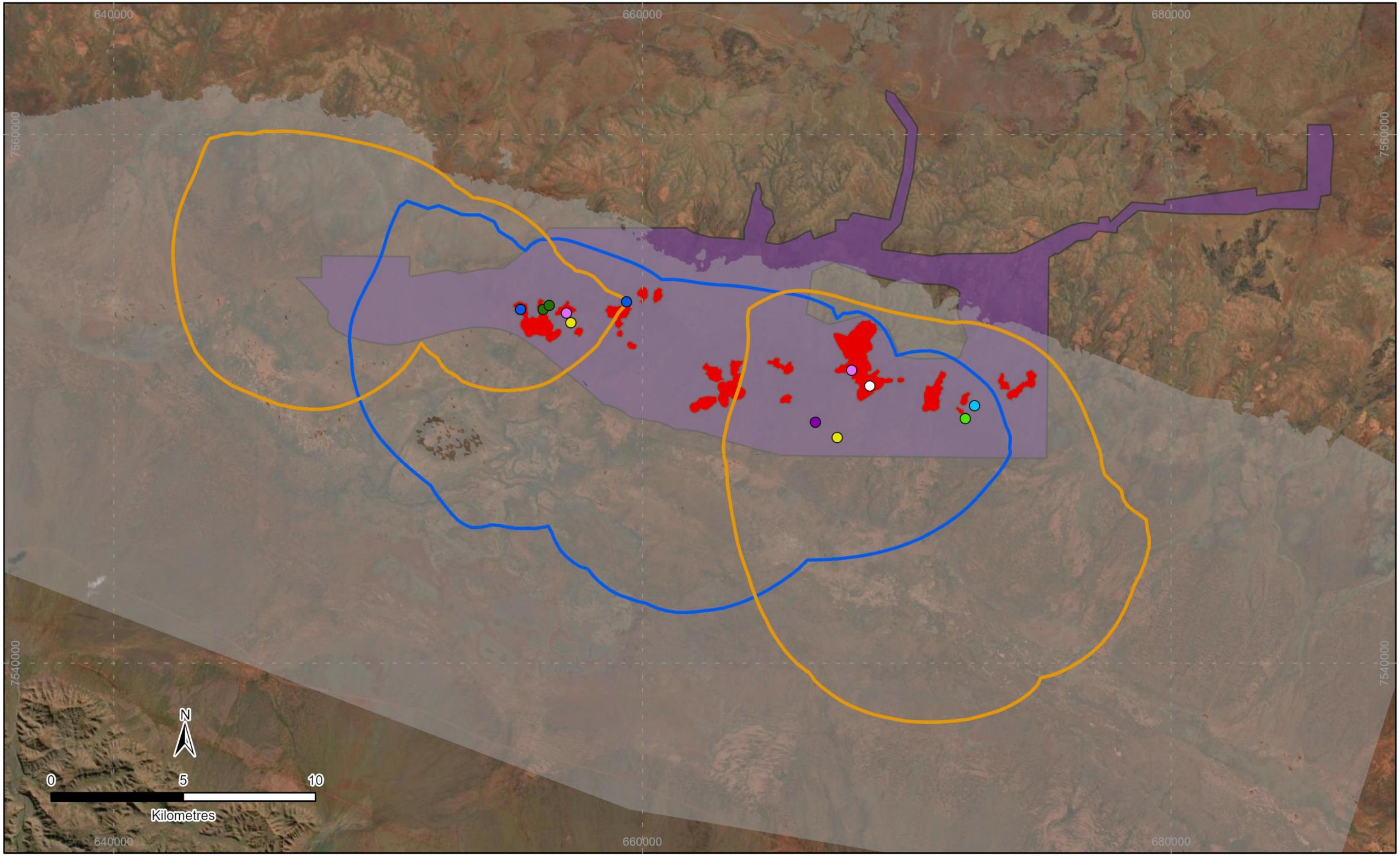
- *Atopobathynella* sp. B09 (Parabathynellidae `MH1`)
- *Billibathynella* `BSY244`
- nr *Billibathynella* `MH2` (Parabathynellidae `MH2`)
- *Brevisomabathynella* `BSY233`
- *Parabathynellidae* `MH3`
- *Pilbaranella* `MH1`
- *Pilbaranella* `MH2`
- *Pilbaranella* sp. B18

Amphipod

- *Maarrka* `BAM182`

Appendix 6. Figure 2:
Collection locations of syncarids and amphipods

Appendix 7. Maps of restricted troglofauna species.



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GDA2020 MGA Zone 50
Scale: 1:180,000
Author: VMarques
Date: 14/11/2024

NEWMAN
PERTH

Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Potential troglofauna habitat
- Cumulative 1m Mounding Contours
- Cumulative 2m Drawdown Contour

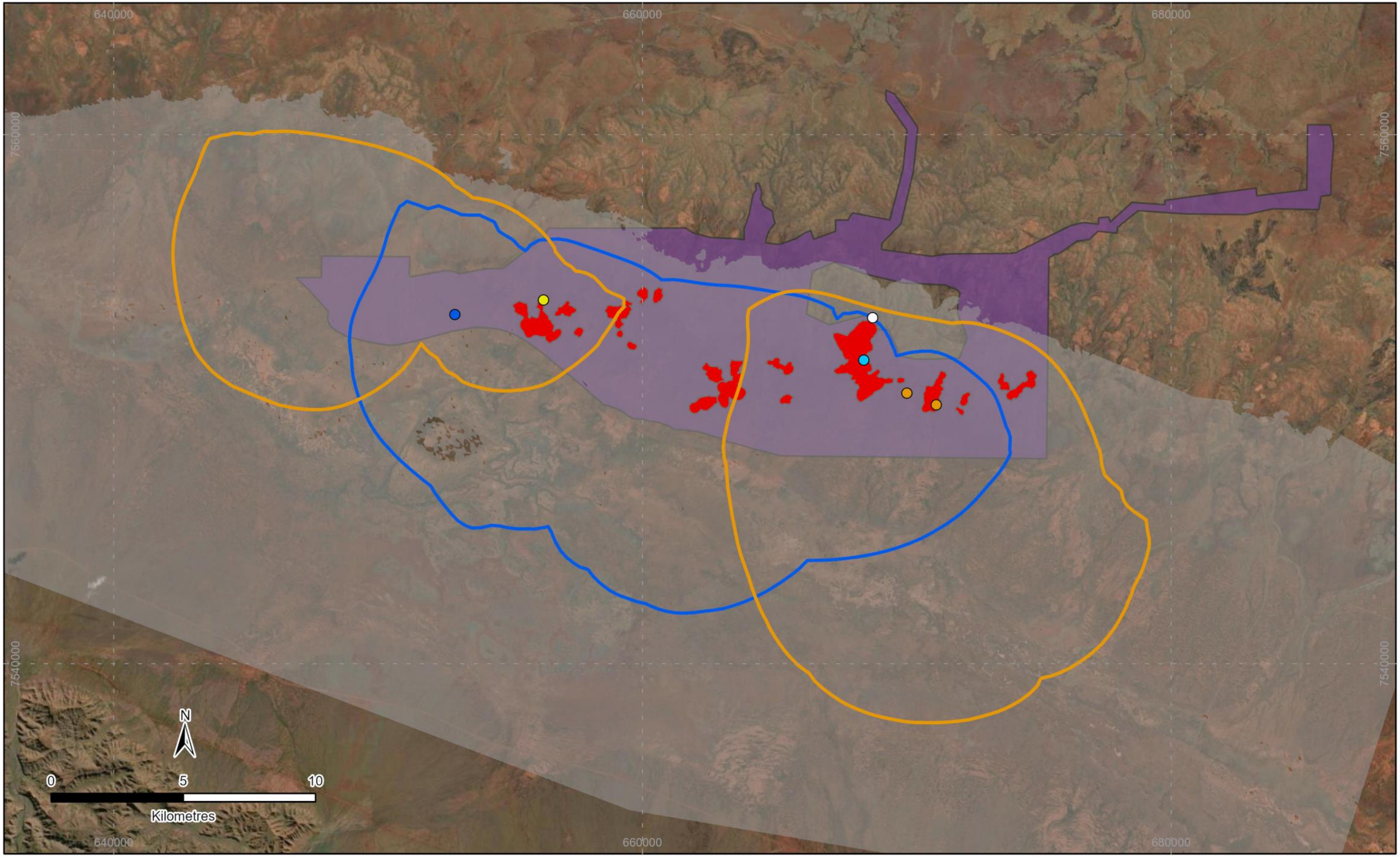
Pseudoscorpions

- *Austrochthonius* `BPS257`
- *Tyrannochthonius* `BPS229`
- *Tyrannochthonius* sp. B35
- *Linnaeolpium* `BPS502`

Palpigrads

- Palpigradi `BPAL053`
- Palpigradi `MH1`
- Palpigradi `MH2`
- Palpigradi sp. B18

Appendix 7. Figure 1:
Collection locations of pseudoscorpions and palpigrads



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Scale: 1:180,000
Author: VMarques
Date: 14/11/2024

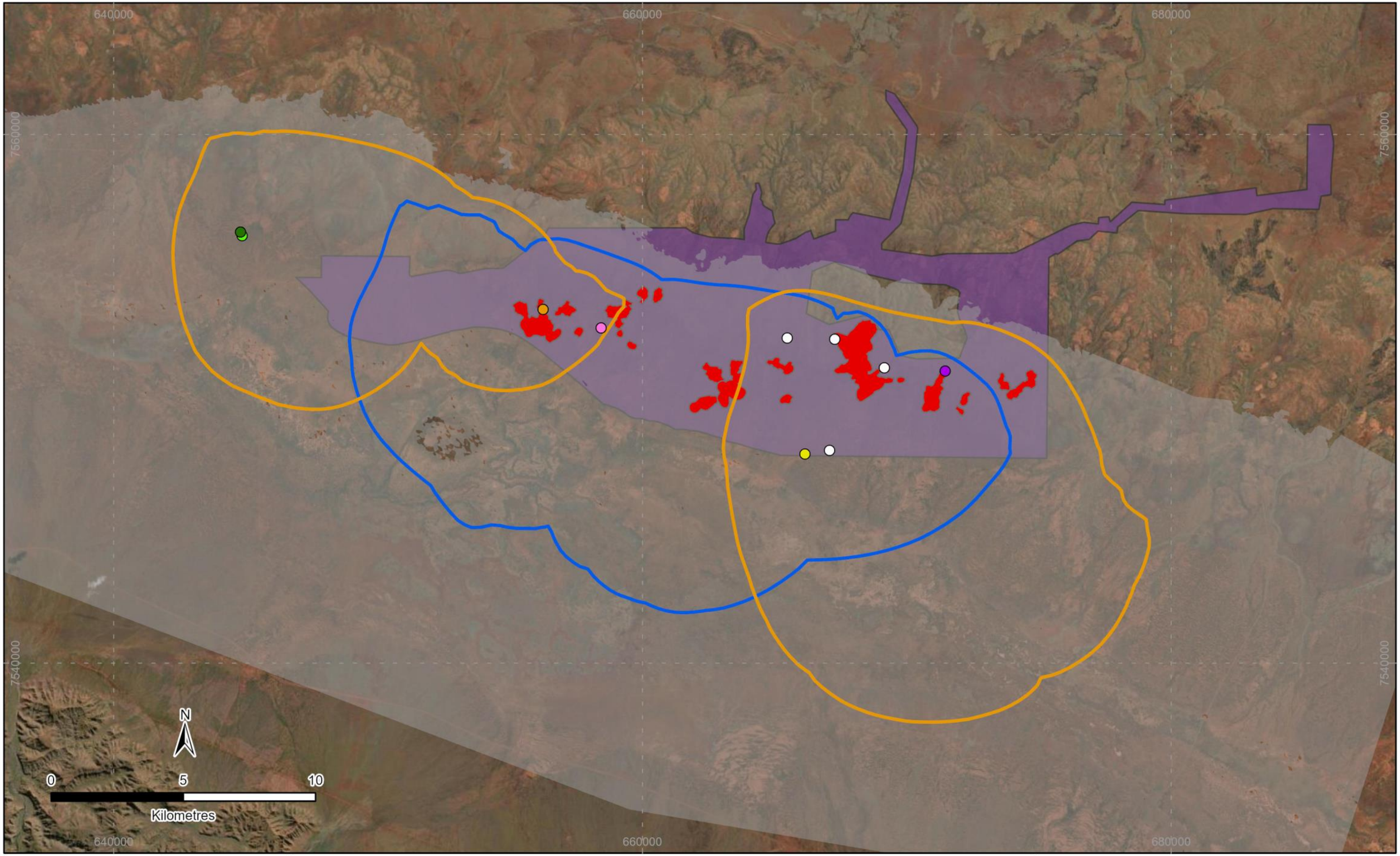
Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Potential troglofauna habitat
- Cumulative 1m Mounding Contours
- Cumulative 2m Drawdown Contour

Schizomids
- *Draculoides* `BSC028`
- *Draculoides* `MH2`
- *Draculoides* `SCH084-DNA`

Spiders
- Gnaphosidae sp. B03
- Trochanteriidae sp. B01

Appendix 7. Figure 2: Collection locations of schizomids and spiders



GDA2020 MGA Zone 50
Scale: 1:180,000
Author: VMarques
Date: 14/11/2024

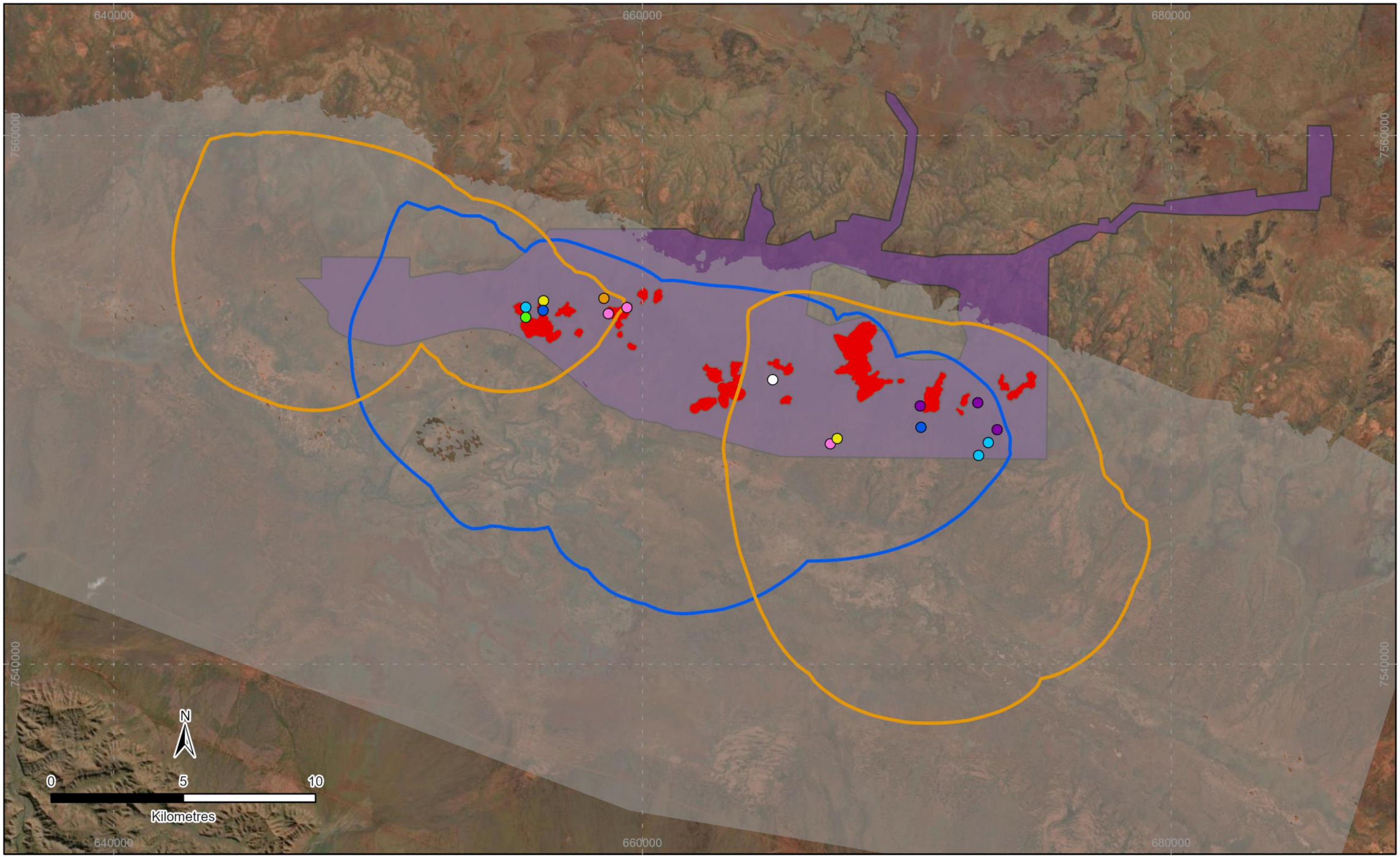
Legend

- Project location (inset)
- Development Envelope
- Proposed pits
- Potential troglofauna habitat
- Cumulative 1m Mounding Contours
- Cumulative 2m Drawdown Contour

Isopods

- *Buddelundia* sp. B57
- *Troglarmadillo* `BIS562`
- *Troglarmadillo* `MH1`
- *Troglarmadillo* sp. B04
- *Troglarmadillo* sp. B05
- *Troglarmadillo* `BIS392`
- *nr Andricophiloscia* sp. B18

Appendix 7. Figure 3:
Collection locations of isopods



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GDA2020 MGA Zone 50
Scale: 1:180,000
Author: VMarques
Date: 14/11/2024

Legend

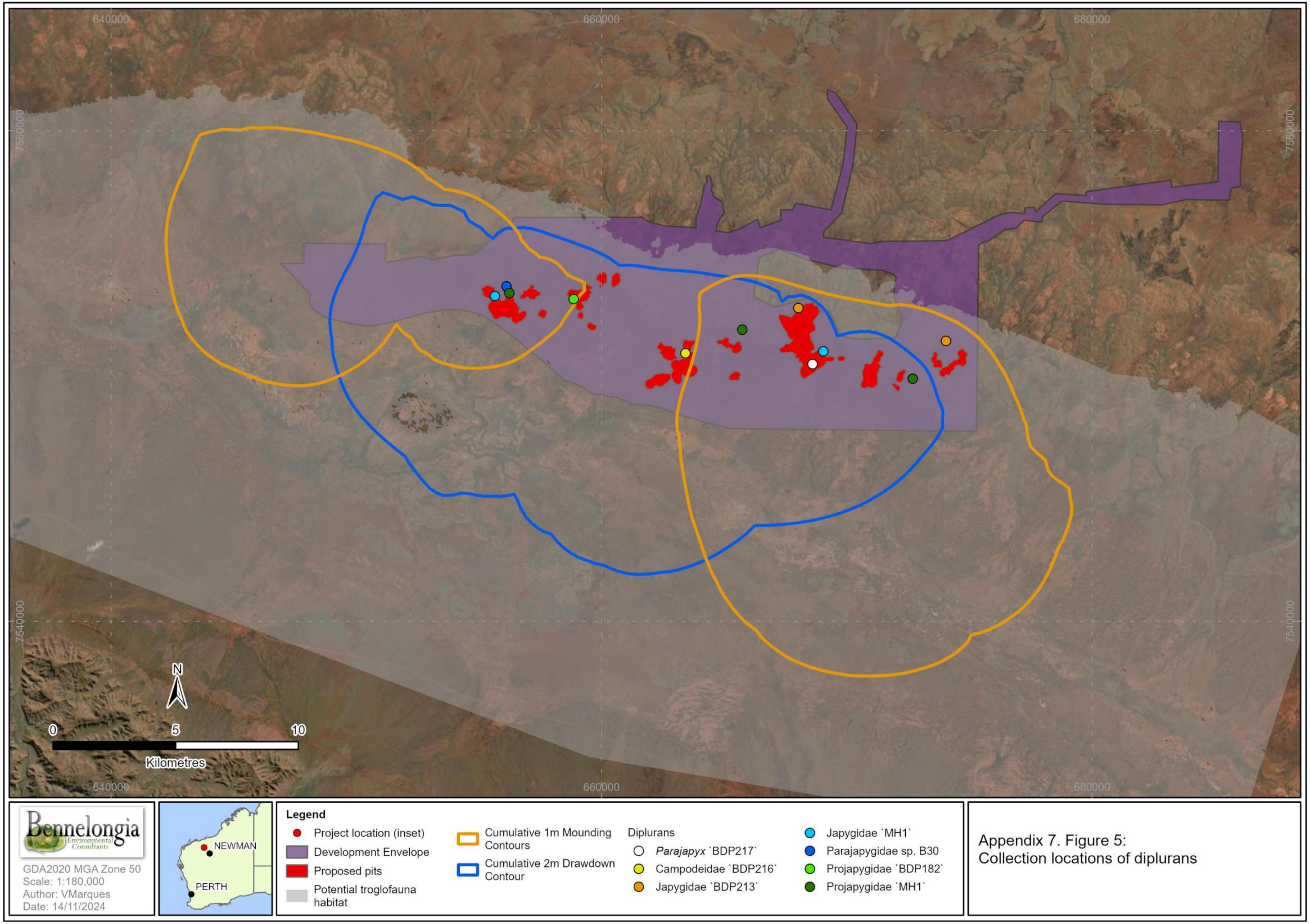
- Project location (inset)
- Development Envelope
- Proposed pits
- Potential troglofauna habitat
- Cumulative 1m Mounding Contours
- Cumulative 2m Drawdown Contour

Centipedes
- *Cryptops* sp. B42
- *Cryptops* \`MH1\` (=DNA05)
- *Cryptops* sp. B41

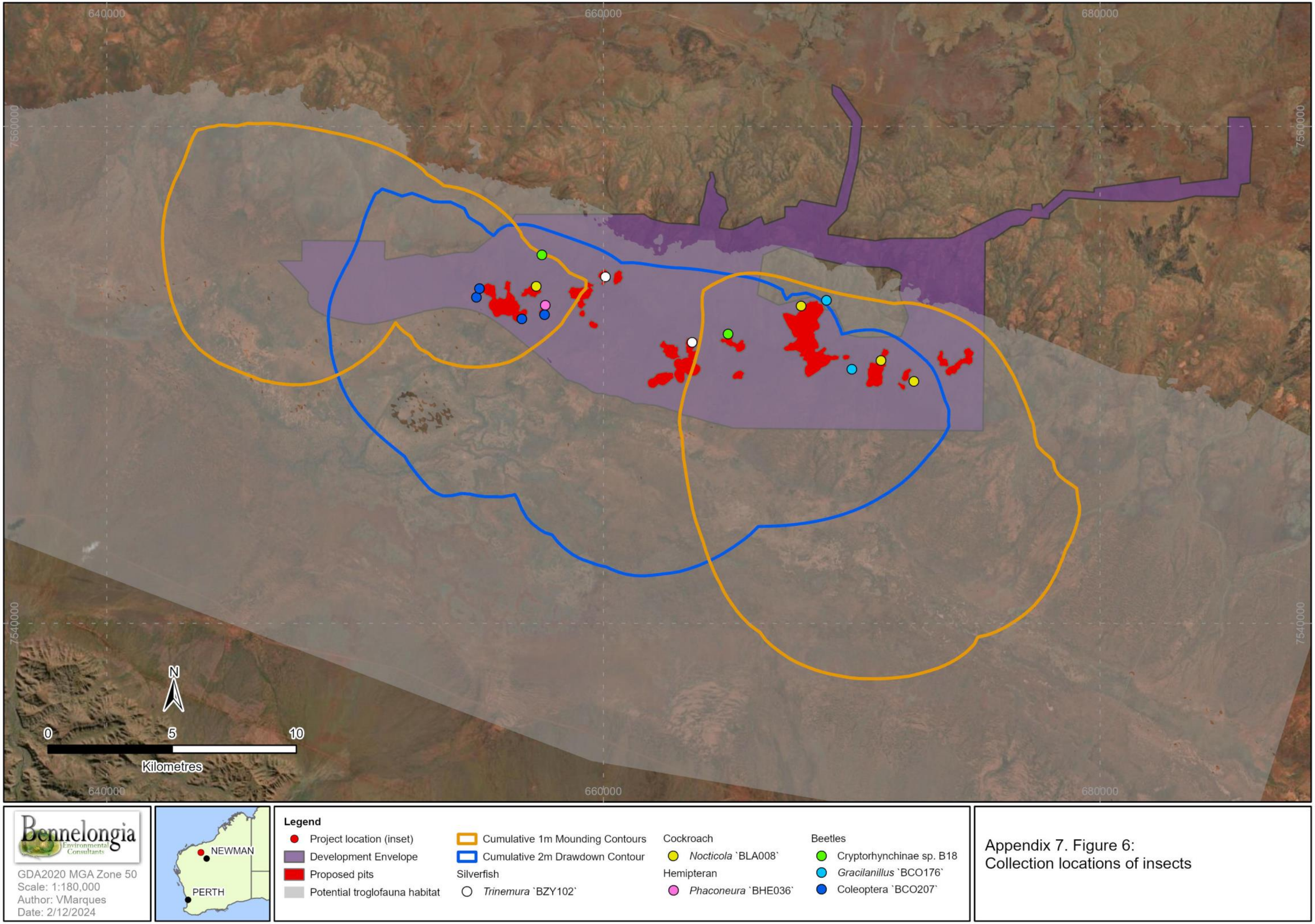
Pauropods
- Pauropodidae \`MH1\`
- Pauropodidae \`MH2\`
- Pauropodidae \`MH3\`

Symphylans
- *Symphylella* sp. B20
- *Hanseniella* \`MH1\`

Appendix 7. Figure 4: Collection locations of centipedes, pauropods and symphylans



Appendix 7. Figure 5:
Collection locations of diplurans



Appendix 7. Figure 6:
Collection locations of insects