

Yandi Operations Subterranean Fauna Survey Report

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Short-Range Endemics | Subterranean Fauna

Waterbirds | Wetlands



Yandi Operations Subterranean Fauna Survey Report

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EXECUTIVE SUMMARY

BHP manages the iron ore mine known as Yandi Operations, which lies 100 km north-east of Newman in the Pilbara. BHP proposes to expand mining at Yandi Operations to include the Yandi E8 pit area (the Project) and other nearby developments. Recognising the potential for the Project and other developments to affect subterranean animal communities, BHP commissioned Bennelongia Environmental Consultants to document subterranean fauna values in a Survey Area comprising Yandi Operations (tenement M270SA) and the adjacent Upper Munjina area (tenement M270SA). This report presents the results of both a desktop review of subterranean fauna records in a 100 x 100 km area around Yandi Operations (referred to as the Study Area) and a subsequent field survey of subterranean fauna at the Survey Area itself.

The desktop review collated subterranean fauna records from the databases of the Western Australian Museum, Bennelongia and BHP. Across these databases, 4,941 records of 44,513 individual stygofauna specimens and 6,614 records of 19,355 individual troglofauna specimens were returned. While the number of species is probably inflated by overlapping taxonomy in surveys by different consultants, such that multiple names were used for the same species, the results clearly indicate the Study Area supports a rich and relatively well-sampled subterranean fauna.

As part of the desktop results, 98 records of stygofauna (at least 30 species) and 70 records of troglofauna (at least 28 species) were retrieved from within the Survey Area. Nearly all of these species have also been recorded outside the Survey Area in the wider Study Area or beyond. At the time of the desktop review (June 2023), two stygofauna species in the desktop results were known only from the Survey Area: the haplotaxid annelids Naididae sp. N02 and Naididae sp. N07. One troglofauna species *Draculoides* 'sp. Koodaideri/Yandi' appears to be known only from the Survey Area, although its status is uncertain.

A three-round stygofauna field survey program was undertaken in the Survey Area during 9-11 May 2022, 13-15 September 2022 and 7-9 March 2023. Fifty-nine samples were collected from 27 holes. Concurrently with stygofauna sampling, a three-round troglofauna survey program was undertaken, with 60 samples collected from 37 drill holes in the Survey Area. Each troglofauna sample comprised the results of two techniques: scraping and trapping. Thirty-eight stygofauna and troglofauna specimens from the survey were sequenced to improve the level of identification.

During the stygofauna field survey, 1,171 stygofauna specimens belonging to at least 35 species were collected. Of these, five species are currently known only from the Survey Area. An additional two species recorded in the desktop review are known only from the Survey Area, so that in total seven stygofauna species are known only from the Survey Area. Species have been placed in two groups according to the likelihood of them possibly being restricted to the Survey Area. For six species, it is considered to be unclear whether their ranges extend outside the Survey Area (see below):

- 1. The haplotaxid annelid Naididae sp. N02 collected as a singleton from hole WB3YJ001.
- 2. The haplotaxid annelid Naididae sp. N07 also collected as a singleton from WB3YJ001.
- 3. The copepod *Dussartcyclops* 2222 `BCY095` collected as eight specimens collected from YE2029R and YC3601R.
- 4. The copepod Parastenocaris `BHA343` collected as a singleton from YE2070R.
- 5. The ostracod *Candonopsis* `BOS1831` collected as five specimens from YW3907DG.

6. The syncarid *Pilbaranella* `BSY372` collected as nine specimens from YC3601R. One species is considered likely to have occurrence outside the Survey Area:

7. The copepod *Elaphoidella* `BHA342` collected as 19 specimens from YE2070R and HYE1512.



During the troglofauna field survey, 94 specimens attributable to at least 34 species were collected. Thirteen of these species are currently known only from the Survey Area. Species have been placed in three groups according to the likelihood of them possibly being restricted to the Survey Area. Six species are considered to be possibly restricted to the Survey Area (see below):

- 1. The beetle Hesperanillus `BCO247` collected as a singleton by scraping from YE2045R.
- 2. The pauropod Pauropodidae `BPU114` collected from YW3951DG.
- 3. The pseudoscorpion Indohya `BPS274` collected by scraping as a singleton from YC0023RD.
- 4. The silverfish *Trinemura* `BZY105, collected by trapping from YC0020R and scraping from YC0025R.
- 5. The symphylan Symphylella `BSYM120` collected as a singleton from YC3615R.

6. The symphylan Symphylella `BSYM121` collected as a singleton by scraping from YW3914D.

For five species, it is considered to be unclear whether their ranges extend outside the Survey Area:

- 7. The centipede *Cryptops* `BSCOL091` collected from two drill holes, YE2029R and YE2033R.
- 8. The centipede Cryptops `BSCOL111` collected from YW3955DG.
- 9. The millipede Trigoniulidae `BDI075' collected from YC0020R and YE2055R.
- 10. The millipede Trigoniulidae `BDI079` collected as a singleton from YE2033R.
- 11. The symphylan *Hanseniella* sp., collected as one animal from YE2061R.

12. The schizomid *Draculoides* 'sp. Koodaideri/Yandi' collected from two holes 110 m apart. One species is considered likely to have occurrence outside the Survey Area:

13. The millipede Haplodesmidae `BDI080`, collected as a singleton in a trap from YE2020R.

A combination of habitat mapping and further survey and specimen collection may assist in defining the distributions of the above stygofauna and troglofauna species known only from the Survey Area but low abundance of many species, lack of ecological data for the species and variability of ranges within a genus means uncertainty is likely to persist for some species.



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1. INTRODUCTION

1.1. Project Summary

BHP manages the iron ore mine known as Yandi Operations, which lies 100 km north-east of Newman in the Pilbara. BHP proposes to expand mining at Yandi Operations to include the Yandi E8 pit area (the Project) and other nearby developments. Recognising the potential for the Project and other developments to affect subterranean animal communities, BHP commissioned Bennelongia Environmental Consultants to document subterranean fauna values in a Survey Area comprising Yandi Operations (tenement M270SA) and the adjacent Upper Munjina area (tenement M270SA). This report presents the results of both a desktop review of subterranean fauna records in a 100 x 100 km area around Yandi Operations (referred to as the Study Area) and a subsequent field survey of subterranean fauna at the Survey Area itself.

In accordance with established guidelines (EPA 2016a, 2021), the objectives of this report are:

- To collate existing records of subterranean animals from the Survey Area and a wider desktop search area around it (the Study Area) to determine the types of subterranean fauna present in the sub-region and Survey Area itself. Results from the Study Area place the fauna of the Survey Area into local and regional contexts (EPA 2021).;
- To undertake a three-phase survey to provide additional, more detailed information about the subterranean fauna species in the Survey Area than available from simply searching existing records;
- To provide distributional information about the subterranean species recorded to date only in the Survey Area.

1.2. Subterranean Fauna Framework

The term subterranean fauna refers to animals living essentially full-time underground. Subterranean animals are divided into two types: stygofauna are aquatic animals that live below ground in water, while troglofauna are air-breathing animals that live underground and require very high humidity (Gibson *et al.* 2019). Stygofauna inhabit vugs, fissures, and interstitial spaces in groundwater aquifers, especially those in alluvium and calcretes. Troglofauna inhabit similar (albeit slightly larger) spaces above the water table.

Subterranean species share several convergent adaptations to life underground where it is dark and resources are limited. These include worm-shaped bodies, elongated chemosensory apparatus, loss of wings, transition towards K-selected breeding strategies, and the loss of skin colouration and eyes (Gibert and Deharveng 2002). Western Australia supports a particularly rich subterranean fauna outside caves, with estimates of more than 4,000 species of stygofauna and troglofauna, 90% of which remain to be described (Guzik *et al.* 2011; Halse 2018a). Almost all subterranean animals in Western Australia are invertebrates, but fishes (Whitely 1945) and one snake (Aplin 1998) have also been recorded. Most subterranean species are microscopc but contribute substantially to biodiversity and ecosystem function, for example by moderating groundwater quality (Hose and Stumpp 2019).

1.2.1. Distribution

Subterranean animals tend to have limited distributions. Most stygofauna species exhibit short range endemism (SRE), having substantially smaller ranges than Harvey's (2002) SRE criterion of 10,000 km² (Cooper *et al.* 2007; Cooper *et al.* 2002; Eberhard *et al.* 2009). The ranges of troglofauna have yet to be investigated in detail but are mostly even more restricted than those of stygofauna, with many species having linear ranges less than 10 km (Halse and Pearson 2014; Lamoreux 2004). Given that species with small ranges are more vulnerable to extinction following habitat degradation than wider ranging species, it follows that subterranean taxa are highly susceptible to anthropogenic threats, particularly large-scale excavation and groundwater abstraction (Halse 2018a; Ponder and Colgan 2002).



The distribution of subterranean animals is largely determined by prevailing lithology. In most situation in Western Australia, subterranean animals probably occupy spaces only a few millimetres in width (Halse 2018a, b; Halse *et al.* 2018). The key characteristics of the habitats used by subterranean species are the occurrence of suitable space spaces (e.g. interstices in alluvium, screen, and voids; vugs, cavities, and fissures in consolided geologies) and that the spaces are well connected laterally and vertically. Lateral connectivity facilitates dispersal of animals, while vertical connectivity to the surface is crucial for delivering carbon and other nutrients to subterranean ecosystems (Korbel and Hose 2011). Connectivity may be disrupted by a range of factors, including dykes, fractures and folding, major landscape features, and unfavourable chemistry. Temporal variation in population density does not appear to be linked with either climate or weather (Halse 2018b; Halse *et al.* 2018; WABSI 2021).

1.2.2. Stygofauna

Most stygofauna species in Western Australia are crustaceans, particularly ostracods and copepods, although other groups such as worms and beetles are sometimes abundant (DEC 2009; DPAW 2022; Matthews *et al.* 2019). The most productive known stygofauna habitats are saturated alluvial and calcrete aquifers associated with palaeochannel deposits, but stygofauna also inhabit karstic limestones, hyporheic zones, groundwater-fed springs, and aquifers in some iron formations, especially channel iron (Halse 2018b; Hyde *et al.* 2018). Stygofauna are rarely abundant where depth to the water table is more than 30 m below ground level (Halse 2018a; Halse and Pearson 2014). Aquifers with higher transmissivity are more likely to host stygofauna than aquifers with lower transmissivity (Maurice and Bloomfield 2012). Stygofauna mostly occur in fresh to hyposaline water (Halse *et al.* 2014; Humphreys *et al.* 2009), but can occur in higher salinities (Bennelongia 2016; Reeves *et al.* 2007; Watts and Humphreys 2006).

1.2.3. Troglofauna

Western Australia appears to be almost unique for its diverse and widespread troglofauna outside caves (Halse and Pearson 2014). The Western Australian troglofauna comprises mostly arthropods, with a variety of isopods, insects, spiders, pseudoscorpions, and millipedes, centipedes, and their allies also represented. Troglofauna are particularly likely to occur in weathered or mineralised iron formations, alluvium or colluvium in valley-fill areas (including areas of karstic calcrete), and fractured sandstone (Halse 2018a). Troglofauna typically require relative humidity close to 100% (Howarth 1983).

1.3. Conservation legislation

Native flora and fauna in Western Australia are protected at both State and Commonwealth levels. At the state level, the *Biodiversity Conservation Act 2016* (BC Act) provides a legal framework for protection of species, particularly for species listed by the Minister for the Environment as threatened. In addition to the formal list of threatened species under the BC Act, the Department of Biodiversity, Conservation and Attractions (DBCA) also maintains a list of priority fauna species that are of conservation importance but, for various reasons, do not meet the criteria for listing as threatened. At the national level, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna and ecological communities.

Both the EPBC and BC Acts provide frameworks for the protection of threatened ecological communities (TECs), where an ecological community is defined as a naturally occurring group of plants, animals and other organisms interacting in unique habitat (with the unique habitat created by the combination of the species and their landscape setting; DEC 2013). Communities occupying a small or threatened habitat are classified as threatened ecological communities (TECs) under the BC Act and the EPBC Act. Within Western Australia, DBCA also informally recognises communities of potential conservation concern, but for which there is little information, as priority ecological communities (PECs). The list of TECs recognised under the BC Act is larger than the EPBC Act list and has much greater focus on subterranean communities.



2. CHARACTERISTICS OF THE SURVEY AREA

2.1. IBRA Region

The Survey Area falls within the Hamersley subregion of the Pilbara bioregion, according to the recognised bioregionalisation of Australia (Figure 1; DCCEEW 2021). The Hamersley subregion is characterised as mountainous, comprising Proterozoic sedimentary ranges and plateaus, with gorges of basalt, shale, and dolerite.

2.2. Climate

The climate in the Central Pilbara is semi-arid to arid with a hot summer from October-April and a mild winter from May-September (Bureau of Meteorology 2023). Mean monthly maxima and minima are highest in January (39.0°C and 25.3°C respectively) and lowest in July (22.3°C and 8.1°C respectively). Monthly rainfall peaks in February (80.1 mm) and is lowest in October (3.9 mm). Evaporation (3000 mm/yr) greatly exceeds rainfall (300 mm/yr), with groundwater recharge mostly associated with cyclonic rainfall (Johnson and Wright 2001).

2.3. Topography

Relatively steep ranges lie north and south of the Survey Area, running approximately east-west with complex topology (ranging from 700-1000 mAHD). Terrain is relatively flat in the Survey Area itself, with elevation in the Survey Area ranging from 550 mAHD in the southeast to 650 mAHD in the northwest. Most of the Survey Area falls between 550-600 mAHD.

2.4. Geology

The Survey Area lies entirely within the upper Hamersley Group (Figure 2), a metamorphic formation dominated by banded iron formation (BIF), with chert, mudstone, siltstone, rhyolite, and numerous dolerite sills also present (Johnson and Wright 2001). Surface geology comprises primarily exposed rock, with alluvium and colluvium along drainage lines (Figure 3 and Figure 4). The Yandicoogina Palaeovalley overlaps with several parts of the Survey Area (Figure 3) and connects to the north-east with the much larger Robe Palaeovalley.

2.5. Surface Hydrology

Surface water in the Survey Area drains to Marillana Creek (Golder 2015), which empties into Weeli Wolli Creek and then into the Fortescue Valley. Occurrence of surface water is dependent on rainfall, and flow in Marillana Creek is ephemeral (Golder 2015). The Yandicoogina Palaeovalley, which underlies much of the Survey Area, is mostly remote from Marillana Creek (Golder 2015). While there is a broad correlation in the Pilbara between drainage systems and shallow groundwater (Mokany *et al.* 2019), the water resources of streambeds and regional aquifers are usually poorly connected. This is reflected in the minimal overlap of stygofauna species in the communities inhabiting streambeds and adjacent aquifers (Halse *et al.* 2002).

2.6. Hydrogeology

Three types of aquifer occur in the Central Pilbara: unconsolidated sedimentary aquifers, fractured-rock aquifers, and chemically deposited aquifers (Johnson and Wright 2001). Unconsolidated sedimentary aquifers of alluvium and/or colluvium in palaeovalleys are up to 200 m thick and comprise interbedded sequences of clay, sand, and gravel.

Chemically deposited aquifers of calcrete and pisolitic limonite occur within palaeodrainages; calcrete aquifers are more karstic than pisolitic limonite aquifers in channel-iron deposit (CID), which nevertheless have well developed porosity. Water in chemically deposited aquifers is typically fresh to brackish (Johnson and Wright 2001). The pisolitic limonite aquifer in the Survey Area is >80 km long, 50 m wide, and up to 90 m thick (Gardiner 2003; Johnson and Wright 2001). Throughflow in the aquifer is estimated









at 2.5-3 ML/d, and salinity is fresh, ranging from 380-920 μ S/cm (Gardiner 2003; Johnson and Wright 2001). Depth to groundwater in the Survey Area ranges from 4-53 m, with a mean of 33.1 m (Appendix 1).

3. METHODS

3.1. Desktop Review Methods

The desktop review combined four sources of information using geographical information system (GIS) mapping:

- 1. Information about Survey Area boundaries and Project activity was supplied by BHP.
- 2. Boundaries of TECs and PECs were provided by DBCA and the Department of Mines, Industry Regulation, and Safety.
- 3. Information on geology and surface regolith was provided by the Department of Mines and Petroleum and BHP.
- 4. Records of subterranean animal occurrence in the vicinity of the project were obtained from searching the Western Australia Museum (WAM) and Bennelongia databases, with additional records supplied by BHP.
 - Searches were made of selected sections of the WAM database (Table 1) for a 100 x 100 km area Survey Area covering 10,000 km² centred around the Survey Area (vertices at 22.2434407, 118.5713024 and -23.1472305, 119.5418509). Each record from the Survey Area was assigned to a category of 'Stygofauna,' 'Troglofauna,' 'Short Range Endemic,' or 'Other.' Categories were determing using explicit information in the database, or by inference using sampling technique, habitat information, collector information, literature, and phylogenetic placement.
 - The same process was applied to the Bennelongia database.
 - Additional records were supplied by BHP.
 - For each recognized taxon, the number of records (i.e. the number of times the taxon was found) and the number of individuals collected (i.e. how many were found in each record) were collated.

Table 1. Searches requisitioned from the databases of the Western Australian Museum.

The search area covered an area of four square degrees (vertices at -21.720746, 118.093229 and -23.720746, 120.093229).

Database	Date of receipt
Hexapods (including insects)	19 August 2022
Chelicerates (including arachnids) and myriapods	27 January 2023
Crustaceans	19 August 2022
Molluscs	22 March 2023

The above sources of information sources were combined in order to assess the presence or likely presence of subterranean fauna, using accumulated knowledge of subterranean fauna and their habitats and distributions in Western Australia (e.g. Karanovic 2006; Eberhard *et al.* 2009; Halse 2018; Mokany et al. 2019; Abrams *et al.*2020). Analysis and mapping were undertaken using ArcGIS Pro v2.9.

Data returned in the desktop search represent multiple surveys at multiple sites in the vicinity of the Survey Area. Considering that most subterranean species have highly localised distributions (Bennelongia 2015; Mokany *et al.* 2017), only surveys immediately neighbouring the Survey Area (<5 km) are considered in detail. There are four such surveys:



- 1. Bennelongia (2012), "Yandi stygofauna continuation of monitoring program." This report deals with ongoing monitoring of subterranean fauna at Yandi.
- 2. Biota (2015), "Yandi operations stygofauna data consolidation 2003-2014." This report summarises long-term survey at Yandi.
- 3. Bennelongia (2018), "Ministers North subterranean fauna survey." This report deals with a basic subterranean fauna survey at Ministers North, 5 km south of Yandi.
- 4. Bennelongia (2021), "Ministers North targeted troglofauna survey." This report deals a targeted troglofauna survey at Ministers North.

The results of these surveys are presented in Section 4.1.3.

3.2. Field Survey Methods

3.2.1. Stygofauna Sampling

A three-round stygofauna sampling program collected 59 samples from 27 drill holes in the Survey Area in 2022-2023 (Figure 5; Table 2). Thirteen holes were sampled in all three rounds, seven were sampled twice and seven holes were sampled one time only, mostly as a result of access issues or holes collapsing during the sampling program. Sampling methods endorsed by EPA (2016, 2018, 2021) were used. Details of holes sampled are provided in Appendix 1.

Each stygofauna sample comprised six hauls using a weighted plankton net at a bore, three using 50- μ m mesh and three using 150- μ m mesh. During each haul, the net was lowered to the bottom of the hole and oscillated vertically to agitate the benthos, increasing the likelihood of collecting benthic species, and then slowly retrieved. Contents of the net were transferred to a 125-ml polycarbonate vial after each haul, flushed with bore water to reduce fine sediment content, preserved in 100% ethanol, and refrigerated at 4 °C. Nets were washed between holes to prevent site-to-site contamination.

In situ water quality parameters (temperature, electrical conductivity, and pH) were measured in each bore using a WP 81 field meter. Standing water level and total depth of hole were also measured using a Solinst water level meter. Contents of the net hauls were returned to the laboratory in Perth for processing.

3.2.2. Troglofauna Sampling

Concurrently with stygofauna sampling, a three-round troglofauna sampling program collected 60 samples from 37 drill holes in the Survey Area (Figure 6; Table 2). Nine holes were sampled in all three rounds, five were sampled twice and 23 holes were sampled one time only. Holes that did not yield on first sampling were mostly replaces by other holes to in an affort to maximise trapping success. Sampling typically used two complementary techniques: scraping and trapping (Halse and Pearson 2014). In this case, one scrape and two traps were collected from each hole, except for two holes where only one trap was set (see Appendix 2). When calculating troglofauna sampling effort, scraping and trapping each represent 0.5 of a sample irrespective of the number of traps used. The reason for treating scraping and trapping as sub-samples is that troglofauna yields are low and diverse methods are required to collect a moderately comprehensive sample (Halse and Pearson 2014).

In the first round, scrapes were taken from, and traps set, in 20 holes from 9-11 May 2022; traps were retrieved on 5 July 2022. In the second round, scrapes were collected and traps set in 20 holes from 13-15 September 2022; traps were retrieved on 15 November 2022. In the third round, scrapes were collected and traps set in 20 holes from 7-9 March 2023; traps were retrieved on 1-2 May 2023. Details of holes sampled are provided in Appendix 2.

Scraping uses a weighted net of $150-\mu m$ mesh and an upper diameter approximately 60% of that of the drill hole to scape troglofauna from the wall of the drill hole. The net is lowered to the bottom of the hole or to the water table and then scraped back to the surface at least four times. In each of these

scrapes, where possible, a different section of the wall of the hole is targeted (e.g., north, south) to maximise the number of animals collected. After each haul, net contents are transferred to a 125-ml vial with 100% ethanol to preserve the sample and refrigerated at a 4 °C. Samples are returned to the laboratory in Perth for processing.

After scraping has been completed at a drill hole, two traps are set at different depths, one deep (near the bottom of the hole) and one midway between the bottom trap and surface. Trapping uses cylindrical PVC (270 mm x 70 mm) with holes on the sides to allow troglofauna to enter traps baited with microwaved leaf litter. Traps were lowered on nylon cord into the hole. Traps are left in place for approximately eight weeks for troglofauna to colonise them. During this period, the holes are sealed off at the surface to minimise entry of surface animals into the traps. After retrieving the traps, the bait and the animals present were transferred to a zip-lock bag and transported to the laboratory in Perth for processing.

Table 2. Number of samples collected across the three rounds of survey. Some drill holes were visited in all three rounds, some in two rounds and some only once (Appendices 1 & 2).

Sampling round	Date	Samples collected for stygofauna	Samples collected for troglofauna
Round 1	09-11/05/2022	20	20
Round 2	13-15/09/2022	20	20
Round 3	07-09/03/2023	19	20
Total		59	60

3.2.3. Laboratory Processing

In the laboratory, samples were elutriated to separate out heavy sediment particles and sieved into size fractions using 250-, 90-, and 53-µm screens. Samples were sorted under a dissecting microscope and, where necessary, dissected and examined under a differential interference contrast compound microscope. Specimens were identified to species level where possible by morphology andgenetically where possible. Morphological identifications used available keys and the characters typically viewed as important in the relevant taxonomic group. Most subterranean species in Western Australia remain undescribed and undescribed species were assigned unique 'B codes' by Bennelongia staff (e.g. *Cryptops* `BSCOL091`). When specimens were badly damaged, juvenile, or of the nondiagnostic sex and could not be identified to species they were classified to the lowest level possible. These specimens carry the miscellaneous designation 'sp.'

3.2.4. Molecular Methods

Thirty-eight specimens from the survey (18 stygofauna and 20 troglofauna) were sequenced to further taxonomic investigation. For all samples, DNA was extracted using a Qiagen DNeasy Blood & Tissue kit (Qiagen 2006). For smaller animals, such as copepods, whole animals were used for DNA extraction. For larger animals, such as diplurans, legs and or body parts (e.g. sections of the abdomen) were used for DNA extraction. Elute volumes varied from 50 μ L to 100 μ L depending on the age, condition, and quantity of material available.

Primer combinations used for PCR amplifications were LCO1490:HCO2198, C1J1718:HCO2198, and LCO1490:HCOoutout, targeting the COI region of the mitochondrial genome (Folmer *et al.* 1994). PCR products were sequenced using dual-direction Sanger sequencing carried out by the Australian Genome Research Facility (AGRF). The returned sequences were edited and aligned manually in Geneious (version 2022.2.2; Kearse *et al.* 2012).



Tamura-Nei genetic distances were measured as uncorrected *p*-distances (total percentage of nucleotide differences between squares). Sequences on GenBank and in grey literature were included in the phylogenetic analysis to provide a framework for assessing intra- and interspecific variation. Personnel involved in all stages of the survey are listed in Table 3.

3.2.5. Distributions of Species Collected

After all animals collected in the survey had final identifications, the distribution of each species was checked against all available distributional information (Bennelongia database, records from the WAM search, and grey and scientific literature). For each species, an indication of the likelihood of the species being restricted to the Survey Area is provided in the Discussion. This likelihood is based on the known distribution of the species in question; the known distribution(s) of its closest relatives; and the likely availability of suitable habitat for that species in and beyond the Survey Area.

3.2.6. Personnel

Table 3. Bennelongia personnel involved in survey and the generation of this report. Fieldwork was undertaken under Regulation 27 licence BA27000108-5. Licence holder: Mike Scanlon.

Role	Name	Qualifications/Experience
Fieldwork	Jim Cocking (lead; rounds 1-3)	B.Sc., Grad. Dip. Sc. Over 25 years of experience conducting field survey of subterranean and other invertebrate animals.
	Adam Barnard (round 2)	B.Sc. (Hons). 1 year experience.
	Jaxon Haines (rounds 1 & 3)	B.Sc. 1 year experience.
	Vitor Marques (round 3)	B.Sc. 3 years experience.
	Sam Chidgzey (round 1)	B.Sc. 1 year experience.
Sample sorting	Ella Carstens	B.Sc.
	Georgia Rice	B.Sc.
	Grant Pearson	Ass. Dip. Rec. Over 30 years of experience sampling and identifying subterranean and other invertebrate animals.
	Heather McLetchie	B.Sc. (Hons).
	Jaxon Haines	B.Sc.
	Melanie McGellin	B.Sc. (Hons).
	Melita Pennifold	BSc. (Hons). Over 25 years of research and taxonomic identification experience.
Species identification	Jane McRae	Over 30 years of identification experience at the Australian Museum, British Museum, DBCA, and Bennelongia. Author of 14 taxonomic papers and 9 papers on species inventory/ecology.
	Melita Pennifold	BSc. (Hons). Over 25 years of research and taxonomic identification experience.
Molecular identification	Heather McLetchie (extraction of molecular material and analysis of sequences)	B.Sc. (Hons). Over 15 years of experience extracting and analysis molecular information from invertebrate animals.
	Monique Moroney (extraction of molecular material)	B.Sc. (Hons).
	Daniel White (analysis of sequences)	B.Sc. (Hons), M.Sc., Ph.D.
Mapping	Robin Hare	B.Sc. (Hons), Ph.D.
Reporting	Robin Hare (drafting)	B.Sc. (Hons), Ph.D.
	Stuart Halse (review)	B.Sc. (Hons), Ph.D. Over 40 years of survey design and analysis experience, >20 years subterranean fauna experience.



















3.2.7. Survey Limitations

There are no limitations to the survey that significantly affect results beyond the general issues associated with subterranean fauna: (1) most species are not formally described and distributions are incompletely known; (2) sampling documents species occurrence and distribution inefficiently because of low abundance; and (3) relationship between mapped habitat and distribution of individual species is often uncertain because of lack of information about species' habitat preferences and relatively coarse geological information.

A high level of resolution was achieved identifications, which were mostly first done morphologically and then supported with genetic analysis based on the CO1 gene. The integrative approach to identification used here, employing both morphology and genetics overcomes some of the oversplitting of species that occurs when CO1 alone is used for species delimitation (Engel et al. 2021). Only 11 stygofauna specimens (0.1% of animals) were not identified to species level. For troglofauna, 40 specimens (20% of animals) could not be identified to species but most of these were juvenile animals very likely to be another species identified in the Survey Area. Assuming that is the case, only eight specimens belonging to four species (4% of troglofauna animals) were not identified to a level (i.e. species) that allows comparison with results of other surveys. Samples contained single specimens that were juvenile or damaged.

Field sampling effort conformed with recommendations of EPA (2021), with three rounds of sampling undertaken, of which two were in the wet season.

4. RESULTS

4.1. Desktop Review

Both listed ecological communities and a large number of subterranean species are known to occur in the 100 x 100 km search area around the Survey Area.

4.1.1. Threatened and Priority Ecological Communities

The Ethel Gorge Aquifer Stygobiont TEC occurs 90 km south-east of the Survey Area (Figure 7) and is considered critically endangered (DBCA 2023b). The stygofaunal assemblage inhabits an alluvium and calcrete aquifer mostly upstream of Ethel Gorge (Bennelongia 2013).

The Weeli Wolli Spring PEC, the buffer zone of which reaches 7.9 km south-east of the Survey Area (Figure 7), has been flagged as being of sub-regional significance (Kendrick and McKenzie 2001) and is considered a Priority 1 PEC (DBCA 2023a). The spring and creekline host a "relatively high diversity of stygofauna and this is probably attributed to the large-scale calcrete and alluvial aquifer system associated with the creek." Threats to the stygofauna component of this community include dewatering and re-injection.

4.1.2. Records from Database Searches

Stygofauna

Across the three databases searched (WAM, Bennelongia, BHP), there are 4,942 records of 44,514 individual stygofauna specimens in the Study Area (Appendix 3; Figure 8). The majority of records (4,035 or 81.6%) and individuals (37,098 or 83.3%) were arthropods, of which nearly all were crustaceans. Among crustaceans, amphipods contributed 1,565 records of 9,827 individuals; copepods contributed 1,203 records of 17,336 individuals; ostracods contributed 615 records of 6,301 individuals; isopods contributed 282 records of 1,109 individuals; and syncarids contributed 204 records of 1,112 individuals.





Other than arthropods, the best represented phylum was Annelida with 663 records (13.4% of the total) of 4,860 specimens (10.9%). Smaller numbers of nematodes, platyhelminths, rotifers, molluscs, and tardigrades were recovered.

Database records from the Study Area fauna include records of at least 30 species of stygofauna collected within the Survey Area (Table 4). Two of these were known only from the Survey Area at the time the desktop review was conducted (June 2023): namrly the haplotaxid annelids Naididae sp. N02 and Naididae sp. N07, which were both collected by Subterranean Ecology from bore WB3YJ001.

Table 4. Stygofauna records from the Survey Area found during the desktop search.

No. records indicates the number of times the species has been collected. No. individuals indicates the total number of specimens collected. Orange highlighting indicates that a species known only from the Survey Area. Grey highlighting indicates higher-order classifications and that species distribution cannot be estimated.

Identification	No.	No.	Survey
	records	individuals	Area only
Annelida	14	49	
Aphanoneura	1	1	
Aeolosomatidae	1	1	
Aeolosoma sp. 1 (PSS)	1	1	No
Clitellata	13	48	
Enchytraeida	7	37	
Enchytraeidae	7	37	
Enchytraeidae `2 bundle` s.l. (long thin 2 per	1	3	No
seg)			
Enchytraeidae `2 bundle` s.l. (short sclero 4	4	32	No
per seg)			
Enchytraeidae `3 bundle` s.l. (short sclero)	2	2	No
Haplotaxida	6	11	
Naididae	3	6	
Naididae sp. N02	1	1	Yes
Naididae sp. N07	1	1	Yes
Pristina longiseta	1	4	No
Phreodrilidae	1	1	
Phreodrilidae sp. AP SVC s.l.	1	1	No
Tubificidae	2	4	
Tubificidae `stygo type 1A`	1	3	No
Tubificidae `stygo type 5`	1	1	No
Arthropoda	84	891	
Crustacea	84	891	
Malacostraca	26	276	
Amphipoda	16	225	
Paramelitidae	16	225	
Chydaekata sp.	1	1	
Paramelitidae Genus 2 sp. B02	12	217	No
Paramelitidae sp. B16	1	2	No
Paramelitidae sp. B26 (Helix-AMP018)	2	5	No
Bathynellacea (Syncarida)	9	36	



Identification	No. records	No. individuals	Survey Area only
Bathynellidae	2	9	
Pilbaranella sp.	2	9	
Parabathynellidae	7	27	
Atopobathynella sp. B07	4	24	No
nr Billibathynella sp.	1	1	
nr <i>Billibathynella</i> sp. B02 (=Parabathynellidae sp. S03)	2	2	No
Isopoda	1	15	
Tainisopidae	1	15	
Pygolabis weeliwolli	1	15	No
Maxillopoda	40	225	
Cyclopoida	34	214	
Cyclopidae	34	214	
Diacyclops `BCY059` (humphreysi s.l.)	7	32	No
Diacyclops cockingi	2	40	No
Diacyclops humphreysi	10	51	No
Microcyclops varicans	12	75	No
Pescecyclops sp. B01 (nr pilbaricus)	2	15	No
Thermocyclops aberrans	1	1	No
Harpacticoida	6	11	
Canthocamptidae	1	2	
Canthocamptidae sp. B02	1	2	No
Parastenocarididae	5	9	
Parastenocaris jane	4	8	No
Parastenocaris sp.	1	1	
Ostracoda	18	390	
Ostracoda sp.	8	42	
Podocopida	10	348	
Candonidae	10	348	
Candonidae sp.	3	4	
Candoninae sp.	1	3	
Meridiescandona facies (PSS) s.l.	3	311	No
Meridiescandona lucerna s.l.	2	22	No
Meridiescandona marillanae	1	8	No
Grand Total	98	940	



Troglofauna

Across the three databases searched (WAM, Bennelongia, BHP), 6,618 records of 19,366 individual troglofauna specimens were returned from the Study Area (Appendix 4; Figure 9). Of these, two records of 51 specimens were molluscs; the remainder were arthropods.

The most commonly recorded group was Hexapoda (3,858 records of 12,115 individuals; 58.3% and 62.6% of all animals, respectively). The class Entognatha contributed 537 records of 1,319 individuals, including representatives from Collembola and the dipluran families Japygidae, Projapygidae, Parajapygidae, and Campodeidae; the remainder of hexapod records were insects, predominantly Blattodea (cockroaches), but Diptera (flies), Coleoptera (beetles), Hemiptera (true bugs), and other insect orders were also represented.

After Hexapoda, the most abundant subphylum was Chelicerata with 1,848 records (27.9% of total) of 4,745 individuals (24.5% of total). Schizomids dominated among the chelicerates, but mites (usually excluded from consideration as troglofauna in Western Australia), spiders, pseudoscorpions, palpigrads, and opilionids were also present. All four classes of Myriapoda (Chilopoda, Diplopoda, Pauropoda, and Symphyla) were recorded, with Diplopoda (millipedes) being the most commonly collected. The final subphylum represented was Crustacea, with 291 records of 509 specimens of isopod.

The database records contain at least 28 species of troglofauna that have been collected from the Survey Area (Table 5). One of these species, the schizomid *Draculoides* 'sp. Koodaideri/Yandi', appeared to be known only from the Survey Area at the time the desktop search was conducted (June 2023).

Table 5. Troglofauna records from the Survey Area found during the desktop search.

No. records indicates the number of times the species has been collected. No. individuals indicates the total number of specimens collected. Orange highlighting indicates that a species known only from the Survey Area. Grey highlighting indicates higher-order classifications whose distribution cannot be estimated.

Identification	No.	No.	Survey Area only
Arthropoda	70	162	Alea Olly
Chelicerata	15	18	
Arachnida	15	18	
Araneae	3	5	
Araneomorphae sp.	1	1	
Oonopidae	1	1	
Prethopalpus sp.	1	1	
Symphytognathidae	1	3	
Anapistula sp.	1	3	
Schizomida	12	13	
Hubbardiidae	12	13	
Draculoides `SCH030`/`SCH107-DNA`	3	3	No
Draculoides `sp. Koodaideri/Yandi`	3	3	Yes?
Draculoides sp.	6	7	
Crustacea	3	9	
Malacostraca	3	9	
Isopoda	3	9	
lsopoda sp.	3	9	
Hexapoda	38	94	
Entognatha	1	1	



Identification	No.	No.	Survey
Diplura	1	1	Area Only
	1	1	
Japygidae sp	1	1	
Insecta	37	93	
Blattodea	17	28	
Nocticolidae	17	28	
Nocticola `BBL038` (cockingi s.l.)	1	1	No
Nocticola quartermainei s.l.	2	4	No
Nocticola sp.	13	22	-
Nocticola sp. B36 (cockingi s.l.)	1	1	No
Coleoptera	6	17	
Coleoptera sp. B07/B09	2	2	No
Curculionidae	1	1	
Cryptorhynchinae sp. B20 (=sp. MA)	1	1	No
Ptiliidae	2	13	-
Ptinella sp. B01 (=MC)	2	13	No
Staphylinidae	1	1	
Staphylinidae sp.	1	1	
Diptera	5	38	
Sciaridae	5	38	
Allopnyxia sp. B01	5	38	No
Hemiptera	4	4	
Cixiidae	1	1	
Cixiidae sp. B02	1	1	No
Meenoplidae	2	2	
Phaconeura sp.	2	2	
Reduviidae	1	1	
Ploiaria sp.	1	1	
Hymenoptera	2	3	
Formicidae	2	3	
Formicidae sp.	2	3	
Zygentoma	3	3	
Nicoletiidae	3	3	
Dodecastyla sp. B02 (=Atelurodes sp. S02)	1	1	No
Trinemura sp.	2	2	
Myriapoda	14	41	
Chilopoda	1	1	
Scolopendrida	1	1	
Cryptopidae	1	1	
Cryptops sp.	1	1	
Diplopoda	5	22	
Polyxenida	5	22	
Lophoproctidae	5	22	
Lophoturus madecassus	5	22	No
Pauropoda	4	14	
Pauropoda sp.	1	1	
Tetramerocerata	3	13	
Pauropodidae	3	13	



Identification	No. records	No. individuals	Survey Area only
Pauropodidae `BPU076`	1	1	No
Pauropodidae sp. B04 (Decapauropus tenuis?)	1	1	No
Pauropodidae sp. B14	1	9	No
Symphyla	3	3	
Cephalostigmata	3	3	
Scolopendrellidae	3	3	
Symphylella sp.	3	3	
Grand Total	70	162	

4.1.3. Previous Surveys

Previous collecting around the Survey Area has yielded a diverse and abundant stygofauna (Bennelongia 2012; Biota 2015). Surveys conducted by Biota (2015) in 2003-2014 identified 13 species collected as single records of one of more animals (i.e. collected from one bore only on one date). Most of these were were theoretically of potential conservation significance based on information available in 2015. Biota (2015) concluded, however, based on the broad and abundant distributions of other species collected from Yandi that the singleton nature of these 13 species was probably an artefact of sampling rather than a reflection of limited distributions. Of the 13 singletons, all but four species now known From more records. Of the four species still known as singletons, none is known from the present Survey Area:

- 1. The water mite "*Albia* sp. B1" has since been reclassified to *Recifella* sp. P1 (nr *umala*) (PSW), a species widespread in the Pilbara.
- 2. The water mite *Limnesia* sp. B03 is still known as a singleton.
- 3. The copepod listed as *Australocamptus* sp. nov. (Biota 2015) has insufficient taxonomic information to search for further records.
- 4. The copepod *Mesocyclops* sp. indet. (Biota 2015) has insufficient taxonomic information to search for further records.
- 5. The copepod *Parastenocaris* sp. B9 (now sp. B09) is still known as a singleton.
- 6. The syncarid *Atopobathynella* sp. B07 is known from seven records spanning hundreds of metres.
- 7. The syncarid *Billibathynella* sp. B02 (now nr *Billibathynella* sp. B02 (=Parabathynellidae sp. B03)) is known from 29 records spanning a linear distance of hundreds of metres.
- 8. The syncarid *Billibathynella* sp. B03 is now considered the same species as nr *Billibatyhnella* sp. B02 (=Parabathynellidae sp. B03), above.
- 9. The syncarid *Chilibathynella*? sp. B06 is now considered the same species as nr *Billibathynella* sp. B02 (=Parabathynellidae sp. B03), above.
- 10. The syncarid *Notobathynella* sp. (Biota 2015) has insufficient taxonomic information to search for further records.
- 11. The annelid Phreodrilidae sp. indet. (Biota 2015) has insufficient taxonomic information to search for further records.
- 12. The ostracod *Candonopsis* ? n. sp. indet. (Biota 2015) has insufficient taxonomic information to search for further records.
- 13. The ostracod identified as "New genus sp. BOS333" (Biota 2015), now named Candonidae `BOS333`, is still known as a singleton.

Among 17 species considered by Bennelongia (2012) to have ranges restricted to the area surveyed, four stygofauna species were considered ecologically significant, all having been collected and assigned



codes by Subterranean Ecology (2010a). None of these four species is known from within the present Survey Area (Figure 8):

- 1. The copepod *Elaphoidella* sp. S02, reported as *Elaphoidella* sp. S2 in Subterranean Ecology (2010a) and Bennelongia (2012). This animal was collected once (Nov 2009); no subsequent records of it are known from the Bennelongia, BHP, or WAM data.
- 2. The syncarid *Atopobathynella* sp. S02, reported as *Atopobathynella* sp. S2 in Subterranean Ecology (2010a) and Bennelongia (2012), was collected four times (Jul and Oct 2008; Feb and Nov 2009) from a single locality (GPS coordinates identical for all collections).
- 3. The ostracod *Notacandona* `quasiboultoni`. A single collection of five individuals in July 2008 (Subterranean Ecology 2010a) remains the only record in the databases.
- 4. The annelid worm Haplotaxidae sp. S01, reported as Haplotaxidae sp. S1 in Subterranean Ecology (2010a) and Bennelongia (2012). The collection in October 2008 of a single individual remains the only known record.

Previous surveys by Bennelongia (2018) at Ministers North, augmenting work by Subterranean Ecology (2010b), collected at least seven stygofauna species and at least 39 troglofauna species. This number represents a relatively rich troglofauna community. Of the seven stygofauna species, none was of conservation concern. Of the 39 troglofauna species, 31 were unknown prior to their collection during this survey and thus have known distributions restricted to the Ministers North tenement. Some associations were observed between troglofauna collections and three geologies: BIF-shale units, Canga, and pisolite.

Bennelongia (2021) carried out subsequent targeted survey to determine the distributions of two troglofaunal arthropods, Palpigradi sp. B24 and *Hanseniella* sp. B43-DNA. Neither species was recovered in the targeted survey, suggesting the animals occur in low abundance. Details of previous surveys are summarised in Table 6.

Overall, the subterranean communities reported by Bennelongia (2018, 2021) at Ministers North are substantially different in composition to those found in the desktop search for the Survey Area, presumably due to differences in the habitat types available. Four species have been collected both in the Survey Area and at Ministers North:

- 1. The copepod Diacyclops humphreysi (stygofauna), distributed throughout the Pilbara.
- 2. The cockroach *Nocticola* sp. B36 (*cockingi* s.l.), only known from Ministers North and the Survey Area. Known linear range approximately 15 km.
- 3. The beetle Coleoptera sp. B07/B09. Known linear range approximately 130 km.
- 4. The silverfish *Dodecastyla* sp. B02 (=*Ateluroides* sp. S02), distributed throughout the Pilbara.

Among the four species found at both sites, three are relatively widespread in the Pilbara. One species, the cockroach *Nocticola* sp. B36 (*cockingi* s.l.), is known only from Ministers North and the Survey Area.



Table 6. Previous surveys within 5 km of the Survey Area.

	Bennelongia (2012)	Biota (2015)	Bennelongia (2018) building on Subterranean Ecology (2010b)	Bennelongia (2021)
Survey type	Monitoring (stygofauna)	Baseline (stygofauna)	Baseline	Targeted (troglofauna)
Date(s)	May-June 2011 Aug 2011 Feb 2012	13 phases from 2003-2014 (see Table 4.1 in Biota 2015)	2009-2010 (Subterranean Ecology) 2017-2018 (Bennelongia)	Nov 2020 (scraping and traps set) Feb 2021 (traps retrieved)
Sample effort	102 (42 bores)	18-44 (stygofauna) per phase (see Table 4.2 in Biota 2015)	56 (stygofauna) 234 (troglofauna)	39.5 (39 scrapes and 50 traps in 40 holes)
Areas sampled	Yandi (62 samples) Munjina/Upper Marillana (40 samples)	Yandi	Ministers North	Ministers North
Methods	Net hauls (stygofauna)	Net hauls (stygofauna)	Net hauls (stygofauna) Trapping and scraping (troglofauna)	Trapping and scraping (troglofafuna)
Distance from survey area	0 km	0 km	5 km	5 km






4.2. Survey Results

4.2.1. Molecular Results

Of the 39 specimens selected for DNA work (18 stygofauna and 21 troglofauna), sequencing was successful for 30 and the identifications of 16 specimens were updated, usually by providing a species level identification of young or damaged animals (Table 7). The final identifications following molecular analysis are used in subsequent reporting of results and in the Discussion.

4.2.2. Stygofauna

In total, 1,171 stygofauna specimens were collected during the survey (Figure 10; Table 8) attributable to at least 35 species. Copepods were the most diverse and abundant stygofauna group (at least 12 species and 597 specimens); amphipods, annelids, ostracods, syncarids, roundworms, and one species of isopod were also collected. Five stygofauna species are known only from the Survey Area (Figure 10):

- 1. The ostracod *Candonopsis* `BOS1831`, five specimens collected from YW3907DG. Morphologically the species does not match any of the described species in the genus, and molecular analysis supported the establishment of a new species code for these specimens.
- 2. The syncarid *Pilbaranella* `BSY372`, nine specimens collected from YC3601R, once in round 1 (11 May 2022) and once in round 3 (9 March 2023). Morhology and molecular analysis supported the establishment of a new species code for these specimens.
- 3. The copepod *Dussartcyclops* 2222 `BCY095`, eight specimens collected from YE2029R and YC3601R.
- 4. The copepod *Elaphoidella* `BHA342`, 19 specimens collected from YE2070R and HYE1512S.
- 5. The copepod *Parastenocaris* `BHA343`, collected as a singleton from YE2070R. Morphological examination supported the establishment of a new species code.

4.2.3. Troglofauna

In total, 194 troglofauna specimens attributable to at least 33 species were collected during the survey (Figure 11; Table 9). Two of these species belong to Formicidae (ants), a group not considered relevant to discussion of conservation values; however, the species in question may be truly troglobitic and so are included for completeness.

Millipedes constituted the most abundant troglofauna group (four species; 42 specimens), but araneomorph spiders, beetles, centipedes, cockroaches, diplurans, dipterans, hemipterans, pauropods, pseudoscorpions, schizomids, silverfishes, and symphylans were also collected. Of the troglofauna species collected, 12 are known only from the Survey Area (Figure 11):

- 1. The beetle *Hesperanillus* `BCO247`, collected as a singleton by scraping from YE2045R. Molecular sequencing of the specimen was unsuccessful, so identification was based on morphology only.
- 2. The centipede *Cryptops* `BSCOL091`, collected as bycatch during stygofauna net hauling from two drill holes, YE2029R and YE2033R, 600 m apart. Sequencing confirmed that both specimens belong to the same species, and morphology and the level of divergence from previously known specimens supported the establishment of a new species code.
- 3. The centipede *Cryptops* `BSCOL111`, collected as a singleton in a trap from YW3955DG. Sequencing suggested the species has not been collected previously and a new code was created.
- 4. The millipede Haplodesmidae `BDI080`, collected as a singleton in a trap from YE2020R. Molecular sequencing of the specimen was unsuccessful, so identification was based on morphology only.
- 5. The millipede Trigoniulidae `BDI075`, collected by trapping and scraping from YC0020R and by trapping from YE2055R, two holes 22 km apart. Molecular analysis of two of the 12 specimens supported the establishment of a new species code.



- 6. The millipede Trigoniulidae `BDI079`, collected as a singleton as bycatch during stygofauna net hauling from YE2033R. Molecular sequencing supported the establishment of a new species code.
- 7. The pauropod Pauropodidae `BPU114`, collected as bycatch during stygofauna net hauling from YW3951DG. A new species code was established on morphological grounds.
- 8. The pseudoscorpion *Indohya* `BPS274`, collected by scraping as a singleton from YC0023RD. A new species code was established on morphological grounds.
- 9. The silverfish *Trinemura* `BZY105`, collected by trapping from YC0020R and scraping from YC0025R, two drill holes 500 m apart. Both specimens were sequenced; this and morphology supported the establishment of a new species code.
- 10. The symphylan *Hanseniella* sp., collected as a singleton in a scrape from YE061R. Sequencing failed and the animal was too young to enable morphological identification beyond genus. The current record lies within the range of the widespread *Hanseniella* sp. B14, which appears to be a troglophile (linear range 220 km). It is perhaps more likely that *Hanseniella* sp. is a different species.
- 11. The symphylan *Symphylella* `BSYM120`, a singleton collected as bycatch during stygofauna net hauling from YC3615R. Morphology and molecular analysis supported the establishment of a new species code.
- 12. The symphylan *Symphylella* `BSYM121`, a singleton collected by scraping from YW3914D. Morphology and molecular analysis supported the establishment of a new species code.



Table 7. Results of molecular analysis.

'Sample' describes the type of sample from which the specimen was collected. 'Spec No.' refers to the unique number assigned to that specimen in the Bennelongia database (provided for all specimens in the associated data package). A bolded species code indicates that a new code was established, i.e. species not previously recorded anywhere; if the bolding is in the first column, the new code was established during morphological identification; if the bolding is in the final column, the new code was established following molecular analysis. Blue highlighting indicates a specimen for which the molecular analysis changed the identification, aligned the specimen with previously identified species or took identification to lower level. Red highlighting indicates specimens for which sequencing was unsuccessful.

Morphological ID	Hole ID	Sample	Date	Spec No.	Comments	Final ID
Amphipoda						
Chydaekata sp.	HMJ0005	Net	8/03/2023	748960	Specimen incomplete. Best BENN hit: 100% identity to <i>Chydaekata</i> MJ1-UM1(# 650798). Best Genbank hit: 82.8% identity to <i>Chydaekata</i> <i>acuminata</i> isolate w77_51_98a (#DQ838019).	<i>Chydaekata</i> sp. MJ1- UM1
Paramelitidae Genus 2 sp. B02	YW3932D	Net	8/03/2023	747330	Similar specimens selected for sequencing to resolve ambiguous morphological assessment. Best BENN hit: 98.6% identity to Paramelitidae Genus 2 B02 (# 670833). Best Genbank hit: 91.0% identity to Paramelitidae sp. Biologic-AMPH019 voucher BMR01628 (# MT621108).	Paramelitidae Genus 2 sp. B02
Paramelitidae Genus 2 sp. B02	HYE1512	Net	14/09/2022	741966	Similar specimens selected for sequencing to resolve ambiguous morphological assessment. Sequencing unsuccessful	Paramelitidae Genus 2 sp. B02
Paramelitidae sp. B16	YW3539D	Net	15/09/2022	741990	Similar specimens selected for sequencing to resolve ambiguous morphological assessment. Best BENN hit: 99.0% identity to Cap 4 (#747102), 84.8% to Paramelitidae gen nov 1 AMP002 (# 633030) and Paramelitidae OP2 (#649891). Best Genbank hit: 83.4% identity to Paramelitidae gen. 2 sp. WAM AMPP003 (Yilgarus) voucher WAMC72438 (# MW021189)	Paramelitidae sp. B16



Morphological ID	Hole ID	Sample	Date	Spec No.	Comments	Final ID
Paramelitidae sp. B26 (Helix-AMP018)	YW3956D	Scrape	8/03/2023	746864	Similar specimens selected for sequencing to resolve ambiguous morphological assessment. Sequencing unsuccessful, but sequencing succeeded in another specimen (747102, below) and the similarity indicated updating the identification for all specimens to Paramelitidae sp. B16	Paramelitidae sp. B16
Paramelitidae sp. B26 (Helix-AMP018)	YE2088R	Scrape	7/03/2023	747102	Similar specimens selected for sequencing to resolve ambiguous morphological assessment. Best BENN hit: 99.0% identity to Cap 2 (#741990), 84.8% to Paramelitidae gen nov 1 AMP002 (# 633028). Best Genbank hit: 84.3% identity to Pilbarus sp. Biologic-AMPH001 isolate BMR00484 (# MT316778). Genetic similarity of this specimen with #741990 above resolved ambiguous morphological identification.	Paramelitidae sp. B16
Araneae						
Prethopalpus sp.	YW3956D	Scrape	8/03/2023	746862	Juvenile specimen. Best BENN hit: 96.73% to <i>Prethopalpus</i> B27 (#621023). Best Genbank hit: 87.0 % to Cf. <i>Prethopalpus</i> sp. Biologic-ARAN014 (#MT373795).	Prethopalpus sp. B27
Coleoptera						
Hesperanillus sp.	YE2045R	Scrape	9/05/2022	735775	Specimen in poor condition. Sequencing unsuccessful, possibly due to contamination	Hesperanillus `BCO247`
Chilopoda						
Cryptops `BSCOL091`	YE2029R	Net	10/05/2022	735805	Selected for sequencing because of morphological divergence. Best BENN hit: 99.1% to CAP 26 (# 746840). Best Genbank hit: 90.4% identity to Cryptopidae sp. Biologic-CHIL001 isolate BMR00489 (# MT316783)	Cryptops `BSCOL091`



Morphological ID	Hole ID	Sample	Date	Spec No.	Comments	Final ID
Cryptops `BSCOL091`	YE2033R	Net	9/03/2023	746840	Selected for sequencing because of morphological divergence. Best BENN hit: 99.1% identity to CAP 25 (# 735805). Best Genbank hit: 89.8% identity to Cryptopidae sp. Biologic-CHIL001 isolate BMR00489 (# MT316783).	Cryptops `BSCOL091`
<i>Cryptops</i> sp.	MLCK_2016_0197	Trap 2	8/03/2023		Selected for sequencing because of morphological divergence. Best Bennelongia hit Cryptops sp. (740243) 83.9%. Best GanBank hit Cryptopidae sp. (WAM) 85.8% (MZ427806), Scolopendromorphma sp. (Biologic #BMR00280) 85.5% (MT902586).	Cryptops 'BSCOL111'
Blattodea						
<i>Nocticola</i> sp. B36 (cockingi s.l.)	YC0020R	Scrape	13/09/2022	742152	Similar specimens selected for sequencing to resolve ambiguous morphological assessment. Best BENN hit: 99.8% to <i>Nocticola</i> B36 cockingi sl MN0293R (#654368); 99.6% to <i>Nocticola</i> B09 (570672). Best GenBank hit: 91.8% to <i>Nocticola</i> sp. Biologic-BLATT004 isolate BMR00485 (#MT316779)	<i>Nocticola</i> sp. B36 (cockingi s.l.)
Nocticola quartermainei s.l.	YC3633R	Trap 2	15/11/2022	743074	Similar specimens selected for sequencing to resolve ambiguous morphological assessment. Best BENN hit: 93.4% to <i>Nocticola</i> OES11 (#725218) which groups with <i>quartermainei</i> s.l., also similar genetic distance to other <i>quartermainei</i> s.l. animals. Best GenBank hit: 95.1% to <i>Nocticola</i> sp. Biologic-BLAT007 voucher BMR00410 (#MT902616)	Nocticola quartermainei s.l.
Copepoda						
Canthocamptidae sp. B02	YC3601R	Net	9/03/2023	747334	Selected for sequencing because of morphological divergence. Sequencing unsuccessful	Canthocamptidae sp. B02
Elaphoidella `BHA342`	YE2070R	Net	14/09/2022	742001	Selected for sequencing because of morphological divergence. Best BENN hit: 97.3% identity to Cap	Elaphoidella `BHA342`



Morphological ID	Hole ID	Sample	Date	Spec No.	Comments	Final ID
					19 (#742638). 77.9% identity to Canthocamptidae B02 (# 649511). Best Genbank hit: 79.8% identity to <i>Hexanauplia</i> sp. voucher 446_Cop010 (# OL437962). New morphological ID retained.	
Elaphoidella `BHA342`	HYE1512S	Net	9/03/2023	747022	Selected for sequencing because of morphological divergence. Best BENN hit: 97.3% identity to Cap 17 (#741996). 77.9% identity to Canthocamptidae B02 (# 649511). Best Genbank hit: 80.2% identity to <i>Australocamptus hamondi</i> isolate BMR01447 (# OR129804).	Elaphoidella `BHA342`
Parastenocaris sp.	YE2085R	Net	14/09/2022	741996	Damaged specimen. Sequencing unsuccessful	Parastenocaris sp.
Parastenocaris jane	YE2070R	Net	14/09/2022	742638	Damaged specimen. Sequencing unsuccessful	Parastenocaris jane
Diplura						
Japygidae sp.	YW3933D	Trap 2	1/05/2023	749102	Juvenile specimen. Best BENN hit: 92.5% to Japygidae BDP155 (#590180). 38 km away at Rhodes Ridge Best Genbank hit: 86.5% to Japygidae sp. WAM DPLJ005 voucher WAME98666 (#MW021234)	Japygidae `BDP155` (DPL002)
Hemiptera						
Phaconeura sp.	YC3623R	Scrape	10/05/2022	735843	Juvenile specimen. Sequencing unsuccessful	Phaconeura sp.
Phaconeura sp.	YC0025R	Scrape	8/03/2023	748702	Juvenile specimen. Sequencing unsuccessful	Phaconeura sp.
Diplopoda						
Dalodesmidae sp.	YE2020R	Trap 1	1/05/2023	749024	Poor taxonomic framework. Sequencing unsuccessful. Taxonomy in this group is lacking; morphological information gained subsequent to the initial classification was used to update the final identification.	Haplodesmidae `BDI080`
Trigoniulidae `BDI075`	YE2055R	Trap 1	15/11/2022	743059	Selected for sequencing because of morphological divergence. Best BENN hit: 99.2% to A28, 86.9% to	Trigoniulidae `BDl075`



Morphological ID	Hole ID	Sample	Date	Spec No.	Comments	Final ID
					B29. Best Genbank hit: 81.4% to <i>Pseudotibiozus</i> cerasopus (#NC_062681)	
Trigoniulidae `BDI075`	YC0020R	Trap 2	15/11/2022	743129	Selected for sequencing because of morphological divergence. Best BENN hit: 79.6% to <i>Austrostrophus stictopygus</i> (#704662). 87.7% to CAP 29 (#746839). Best Genbank hit: 82.2 % to <i>Pseudotibiozus cerasopus</i> (#NC_062681).	Trigoniulidae `BDl075`
Trigoniulidae sp.	YE2033R	Net	9/03/2023	746839	Selected for sequencing because of morphological divergence. Best BENN hit: 77.7% to <i>Austrostrophus stictopygus</i> (#747867). 87.7% to CAP 28 (#743059). Best Genbank hit: 85% to <i>Atelomastix bamfordi</i> (#KC689881).	Trigoniulidae `BDl079`
Ostracoda						
Candonopsis sp.	YW3907DG	Net	8/03/2023	746983	Morphology of carapace did not match described species in the genus. Best BENN hit: 78.0% to <i>Areacandona</i> BOS387 (#626269), and 78.0% to A36. Best GenBank hit: 82.8% to Candonidae sp. Biologic-OSTR028 isolate BMR02927 (#ON661017)	Candonopsis `BOS1831`
Meridiescandona lucerna	HYE1512S	Net	9/03/2023	747019	Selected for sequencing to improve database resolution for the genus. Best BENN hit: 96.0% to <i>Meridiescandona lucerna</i> (#593095). Best GenBank hit: 99.5% to <i>Meridiescandona</i> sp. Biologic- OSTR074 isolate BMR06183 (#OR366846). NB. No <i>M. facies</i> sequence available for comparison	Meridiescandona lucerna
Meridiescandona lucerna	YW3540D	Net	11/05/2022	736435	Damaged specimen. Best BENN hit: 95.3% to <i>Meridiescandona lucerna</i> (#593095). Best GenBank hit: 95.9% to <i>Meridiescandona</i> sp. Biologic- OSTR074 isolate BMR06183 (#OR366846).	Meridiescandona lucerna
Schizomida						



Morphological ID	Hole ID	Sample	Date	Spec No.	Comments	Final ID
Draculoides `SCH030`/`SCH107- DNA`	YC3637R	Trap 2	15/11/2022	743230	Male specimen. Best BENN hit: 93.2% identity to Draculoides BSC036 SCH030 complex (# 652643). Best Genbank hit: 95.1% identity to Draculoides sp. SCH071 voucher WAMT133716 (#MN020150). Less similar to Draculoides sp. SCH107 voucher WAMT133716 (#MN020365) - 92.6%	Draculoides `SCH071`
Zygenotoma						
Trinemura sp.	YC0020R	Trap 2	5/07/2022	738145	Juvenile specimen. Best BENN hit: 87.6% to <i>Trinemura</i> B32 (#662788). 100% to CAP 35 (#748700). Best Genbank hit: 83.7% to <i>Trinemura</i> <i>cundalinae</i> voucher gbs001631 (#MW377896)	Trinemura `BZY105`
<i>Trinemura</i> sp.	YC0025R	Scrape	8/03/2023	748700	Male specimen. Best BENN hit: 88.0% to <i>Trinemura</i> B32 (#662788). 100% to CAP 34 (#747338). Best Genbank hit: 83.2% to <i>Trinemura cundalinae</i> voucher gbs001631 (#MW377896)	Trinemura `BZY105`
Symphyla						
Hanseniella sp.	YE2061R	Scrape	7/03/2023	748695	Poor condition. Sequencing unsuccessful	<i>Hanseniella</i> sp.
Symphylella sp.	YC3615R	Net	11/05/2022	735837	Juvenile specimen. Best BENN hit: 84.9% to <i>Symphylella</i> sp. (#725611). 86.8% to CAP 11 (#746877). Best Genbank hit: 86.0 % to Symphyla sp. DNA10 voucher WAMT136325 (#MW621119)	Symphylella `BSYM120`
Symphylella sp.	YW3914D	Scrape	8/03/2023	746877	Juvenile specimen. Best BENN hit: 84.2% to Symphylella BSYM114 (#743260). 86.8% to CAP 10 (#742152). Best Genbank hit: 85.9 % to Symphyla sp. DNA07 voucher WAMT126854 (#MW621055)	Symphylella `BSYM121`
Symphylella sp.	YW3951DG	Net	8/03/2023	747367	Poor condition. Sequencing unsuccessful	Symphylella sp.
Syncarida						
Atopobathynella sp. B07	YW3907DG	Net	8/03/2023	746985	Incomplete specimen. Best BENN hit: 95.5% identity to Cap 32 (#746985). 86.1% identity to <i>Atopobathynella</i> BSY184 (# 673413). Best Genbank	Atopobathynella sp. B07



Morphological ID	Hole ID	Sample	Date	Spec No.	Comments	Final ID
					hit: 93.3% identity to <i>Atopobathynella</i> sp. Biologic- PBAT019 (# OR366852).	
Atopobathynella sp. B07	YC3601R	Net	9/03/2023	747336	Incomplete specimen. Best BENN hit: 95.5% identity to Cap 31 (#735824). 86.8% identity to <i>Atopobathynella</i> BSY184 (# 673413). Best Genbank hit: 91.9% identity to <i>Atopobathynella</i> sp. Biologic- PBAT019 (#OR366852).	<i>Atopobathynella</i> sp. B07
Pilbaranella sp.	YC3601R	Net	11/05/2022	735824	Poor condition. Best BENN hit: 78.9% to <i>Pilbaranella</i> B15 (#626305 and #665738). 100% to CAP 33 (# 747338). Best Genbank hit: 81.6% to Bathynellidae sp. 3C (#JX286475)	Pilbaranella `BSY372`
Pilbaranella sp.	YC3601R	Net	9/03/2023	747338	Poor condition. Best BENN hit: 78.9% to <i>Pilbaranella</i> B15 (#626305 and #665738). 100% to CAP 30 (#746839). Best Genbank hit: 79.3% to <i>Munida gregaria</i> (NC_030255)	Pilbaranella `BSY372`

118*55'0"E	119°0'0"E	IN9'SO'E	19 100'E Environmental Consultants GCS GDA 1994 Author: vmarques Date: 7/02/2024
			Figure 10. Stygofauna collected during the 2022-2023 survey. Numbered boxes expanded in subsequent maps.
Chydaekata sp. Maarrka weeliwollii Diacyclops cockingi Limnocythere dorsosicula Chydaekata sp. MJ1-UM1 Deminutiocandona murrayi Billbathynella "BSY187-DNA" Paramelitidae Genus 2 sp. B02 Diacyclops "BCY059" (humphreysi sl.)	Pandicoogina		Vandi tenement Survey area Palaeovalleys Orill hole sampled Stygofauna Species known only from the Survey Area
Soogeneratives 118°55'0'E	119°00°Е	119°50°E	SURVEY AREA PERTH 19100'E

Yandicoogina

Paramelitidae Genus 2 sp. B02 Enchytraeidae `3 bundle` s.l. (short sclero) Enchytraeidae `2 bundle` s.l. (short sclero 4 per seg)

Paramelitidae sp. B16 Thermocyclops aberrans Diacyclops 'BCY059' (humphreysi s.l.) Enchytraeidae '2 bundle' s.l. (short sclero 4 per seg)

Candonopsis BOS1831

Microcyclops varicans Atopobathynella sp. B07 Phreodrilidae sp. AP SVC s.l. Diacyclops "BCY059" (humphreysi s.l.)

0.5

Chydaekata sp. Meridiescandona lucerna Paramelitidae Genus 2 sp. B02 Diacyclops `BCY059` (humphreysi s.l.) Enchytraeidae `2 bundle` s.l. (short sclero 4 per seg)

> Meridiescandona lucerna Paramelitidae Genus 2 sp. B02

> > Paramelitidae Genus 2 sp. B02

Paramelitidae Genus 2 sp. B02 Diacyclops 'BCY059' (humphreysi s.l.)

Paramelitidae Genus 2 sp. B02 Diacyclops 'BCY059' (humphreysi s.l.) Microcyclops varicans

Paramelitidae Genus 2 sp. B02 Diacyclops 'BCY059' (humphreysi s.l.)

Microcyclops varicans Paramelitidae Genus 2 sp. 802

Pristina longiseta

Enchytraeidae `2 bundle` s.l. (long thin 2 per seg) Enchytraeidae `2 bundle` s.l. (short sclero 4 per seg) enus 2 sp. B02

Species known only from the Survey Area

Bennelongia

GCS GDA 1994 Author: vmarques

Date: 3/04/2024

Figure 10.1. Stygofauna collected during the

2022-2023 survey. Detail

Yandi tenement

Survey area

Palaeovalleys Drill hole sampled

Stygofauna

1 of 4.

Legend

*



Kilometres

0.25

N

Yandicoogina

Enchytraeidae '3 bundle' s.l. (short sclero)

Microcyclops varicans Atopobathynella sp. B07 Meridiescandona lucerna Paramelitidae Genus 2 sp. B02 Diacyclops 'BCY059' (humphreysi s.l.)

0.1

Kilometres

0.2

Darwinulidae sp. Parastenocaris sp. Microcyclops varicans Aeolosoma sp. 1 (PSS) Tubificidae 'stygo type 1A' Meridiescandona marillana Enchytraeidae '3 bundle' s.l. (short sclero)

Paramelitidae sp. B16 Microcyclops varicans Meridiescandona lucerna Diacyclops 'BCY059' (humphreysi s.l.) Enchytraeidae '2 bundle' s.l. (short sclero 4 per seg)



Parastenocaris jane

collected during the 2022-2023 survey. Detail 2 of 4.

Bennelongia

GCS GDA 1994 Author: vmarques

Date: 3/04/2024

Figure 10.2. Stygofauna

Legend Yandi tenement

Survey area

Palaeovalleys

Drill hole sampled

Stygofauna *

Enchytraeidae `3 bundle` s.l. (short sclero)

Microcyclops varicans

Yandicoogina

0.2

N

0.1

Kilometres

Pilbaranella `BSY372` Dussartcyclops 2222, `BCY095` Diacyclops cockingi Diacyclops 'BCY059' (humphreysi s.l.)

Limnocythere dorsosicula

Diacyclops cockingi Pygolabis weeliwolli Notacandona boultoni

Microcyclops varicans Atopobathynella sp. B07 Canthocamptidae sp. B02 Pescecyclops sp. B01 (nr pilbaricus) Diacyclops `BCY059` (humphreysi s.l.)







110°8'40"

E



Table 8. Stygofauna species collected in 2022-2023.

No. counts the total number of individuals collected. A check in the DNA column indicates at least one specimen was sequenced molecularly. Grey highlighting indicates specimens from that row probably belong to identified species in another row. Orange highlighting indicates new species known only from the Survey Area. Registration for animals currently deposited at WAM are provided.

Identification	No.	Hole ID(s)	WAM	DNA	Comments
Nematoda	2				
Nematoda spp.	2	YE2033R			Species likely to be widespread,
		YE2041R			not included in environmental
					impact assessment.
Aphaneura	1				-
Aeolosoma sp. 1 (PSS)	1	YC1035D			Widespread in northern Western
					Australia.
Oligochaeta	71				
Enchytraeidae `2 bundle` s.l. (long thin 2	3	YW3902D	V12024		Widespread in Western Australia.
per seg)					Probably amphibious.
Enchytraeidae `2 bundle` s.l. (short sclero	36	YW3902D	V12023		Widespread in Western Australia.
4 per seg)		YW3909D			Probably amphibious.
		YW3933DYW3951DG			
		YW3539D			
		YE2047R			
Enchytraeidae `3 bundle` s.l. (short	26	YC1035D			Widespread in Western Australia.
sclero)		YC1047D			Probably amphibious.
		YC3606R			
		YE2045R			
		YE2061R			
		YW3933D			
Phreodrilidae sp. AP DVC s.l.	21	YE2014R	V12026		Widespread in Western Australia.
		YE2033R	V12027		
		HYE1507			
		HYE1531			
		HYE1513			
Phreodrilidae sp. AP SVC s.l.	6	YE2029R			Widespread in Western Australia.





Identification	No.	Hole ID(s)	WAM	DNA	Comments
		HYE1512S			
		YW3907DG			
Pristina longiseta	4	YW3902D	V12025		Cosmopolitan.
Tubificidae `stygo type 1A`	3	YC1035D	V12028		Widespread in Western Australia.
Copepoda	605				
Canthocamptidae sp. B01	1	YE2041R			Known distribution of ca. 110 km ² ; linear distribution 17 km.
Canthocamptidae sp. B02	2	YC3601R		X	Known distribution of ca. 10,000 km ² ; linear distribution 230 km. Morphologically identifiable, but referred for sequencing because of minor morphological divergence and to provide a referent for future samples. Sequencing unsuccessful. Morphological identification retained.
<i>Diacyclops</i> `BCY059` (humphreysi s.l.)	295	YC3601R YC3631R YE2011R YE2014R YE2020R YE2030R YE2033R YE2045R YE2045R YE2047R YE2055R YE2061R YE2070R YE2072R YE2088R HYE1507	C82041		Known distribution of ca. 670 km²; linear distribution 50 km.





Identification	No.	Hole ID(s)	WAM	DNA	Comments
		HYE1512			
		HYE1512S			
		HMJ0005			
		YW3539D			
		YW3540D			
		YW3909D			
		YW3907DG			
		YW3922D			
		YW3913D			
		YW3960D			
		YW3951DG			
Diacyclops cockingi	145	YC3611R	C82040		Widespread in Pilbara.
		YC3631R			
		YE2033R			
		YE2045R			
		YE2055R			
		HYE1512			
		HYE1512S			
		HMJ0005			
Diacyclops sobeprolatus	5	YE2011R			Widespread in Pilbara.
		YE2020R			
		HYE1531			
Diacyclops sp.	2	YE2072R			
Dussartcyclops 2222 `BCY095`	8	YC3601R	C82042		Known linear distribution 10 km.
		YE2029R			Known only from the Survey Area.
Elaphoidella `BHA342`	19	YE2070R		Х	Known linear distribution 620 m.
		HYE1512S			Known only from the Survey Area.
					Morphology and molecular
					analysis of two specimens
					supported the recognition of a
					new species.





Identification	No.	Hole ID(s)	WAM	DNA	Comments
Microcyclops varicans	77	YC3601R	C82045		Cosmopolitan.
		YC3615R			
		HYE1507			
		YW3907DG			
		YW3914D			
		YW3922D			
		YW3539D			
		YC1035D			
		YW3540D			
Parastenocaris `BHA343`	1	YE2070R			New species and B code. Assigned
					based on morphological
					divergence. Known only from the
					Survey Area.
Parastenocaris jane	3	YW3540D		X	Widespread in Pilbara.
		YE2070R			
Parastenocaris sp.	4	YE2085R		X	Sequencing unsuccessful.
		YC1035D			
Pescecyclops sp. B01 (nr pilbaricus)	29	YC3601R	C82048		Widespread in Pilbara.
		YE2070R			
	-	HYE1512S			
Thermocyclops aberrans	6	YE2070R			Widespread in northern Western
		YE2088R			Australia.
		HYE1512S			
		YW3909D			
Ostracoda	153				
Candonopsis 'BOS1831'	5	YW3907DG		Х	New species and B code. Assigned
					based on morphological and
					molecular divergence. Known only
					from the Survey Area.



Identification	No.	Hole ID(s)	WAM	DNA	Comments
Darwinulidae sp.	1	YC1035D	C82051		Higher order, but a discrete species as it is the only darwinulid in the survey.
Deminutiocandona murrayi	19	HMJ0005	C82039		Widespread in Pilbara.
Limnocythere dorsosicula	7	YC3622R HMJ0005			Widespread in Australia.
Meridiescandona lucerna82046	120	HYE1512S YW3907DG YW3932D YW3951DG YW3539D YC1035D YW3540D	C82044	Х	Known distribution of ca. 10,300 km ² ; linear distribution 280 km. Two specimens sequenced, supporting morphological identification.
Notacandona boultoni	1	YC3611R	C82046		Known distribution of ca. 820 km ² ; linear distribution 47 km.
Syncarida	38				
Atopobathynella sp. B07	25	YC3601R YE2070R YW3907DG YW3540D	C82036	Х	Known distribution of ca. 220 km ² ; linear distribution 28 km. Sequencing of two specimens supported morphological identification.
Billibathynella `BSY187-DNA`	4	HMJ0005			Known distribution of ca. 300 km ² ; linear distribution 46 km.
Pilbaranella `BSY372`	9	YC3601R	C82049	X	New species and B code. Assigned based on morphology and molecular divergence (two specimens sequenced). Known only from the Survey Area.
Amphipoda	242				





Identification	No.	Hole ID(s)	WAM	DNA	Comments
<i>Chydaekata</i> sp.	2	HMJ0005 YW3951DG			Likely to be <i>Chydaekata</i> sp. MJ1- UM1.
<i>Chydaekata</i> sp. MJ1-UM1	6	HMJ0005	C83038	X	Known distribution of ca. 60 km ² ; linear distribution 14 km. Molecular analysis of one specimen matched it with this pre- existing species code; the identification of all specimens was updated from <i>Chydaekata</i> sp. to <i>C</i> . sp. MJ1-UM1.
Maarrka weeliwollii	1	HMJ0005	C85043		Known distribution of ca. 3,400 km ² ; linear distribution 90 km.
Paramelitidae Genus 2 sp. B02	223	HYE1512 HYE1512S HMJ0005 YW3933D YW3914D YW3932D YW3922D YW3913D YW3957D YW3960D YW3951DG YW3540D	C82047	X	Known distribution of ca. 4,000 km ² ; linear distribution 85 km. Two specimens sequenced; one failed, the other matched the morphological identification. Morphological identification retained for all specimens.
Paramelitidae sp. B16	10	YE2088R YW3909D YW3956D YW3539D	C82052	X	Known distribution of ca. 900 km ² ; linear distribution 53 km. Three specimens sequenced; one failed; the other two supported the morphological identification, which was subsequently retained for all specimens.



Identification	No.	Hole ID(s)	WAM	DNA	Comments
Isopoda	39				
Pygolabis weeliwolli	39	YC3611R HYE1512S	C82050		Known distribution of ca. 10,700 km ² ; linear distribution 265 km.
Grand Total	1,171				













 Table 9. Troglofauna species collected in 2022-2023.

No. counts the total number of individuals collected. A check in the DNA column indicates at least one specimen was sequenced molecularly. Grey highlighting indicates specimens from that row probably belong to identified species in another row. Orange highlighting indicates new species known only from the Survey Area. Registration for animals currently deposited at WA are provided.

Identification	No.	Hole ID(s)	WAM	DNA	Comments
Araneae	5				
Anapistula sp.	4	YE2014R YW3951DG	T162929		Could not be identified to species level morphologically; species status unclear but may be <i>Anapistula</i> sp. S01, which occurs at Ministers North.
Prethopalpus sp. B27	1	YW3956D		Х	Collected in this survey and from Lambs Creek. Known linear range 21 km. Identified morphologically as <i>Prethopalpus</i> sp.; sequencing matched the specimen with <i>P</i> . sp. B27.
Schizomida	13				
Draculoides `SCH030`/`SCH107-DNA`	5	YE2033R YC0020R	T162925 T162927		Known linear range 11.5 km.
Draculoides `SCH071`	1	YC3637R		Х	Matched genetically with WAM species. Known linear range 16 km.
Draculoides sp.	7	YW3922D YC0020R YC0023RD YC0025R			Mostly juvenile, probably belonging to other species listed here. Two adult females in too poor condition for sequencing.
Pseudoscorpion	1				
Indohya `BPS274`	1	YC0023RD	T162922		New species and B code. Distribution unknown.
Chilopoda	3				
Cryptops `BSCOL091`	2	YE2029R YE2033R		Х	New species and B code. Known linear range 300 m. Both specimens sequenced, supporting common identity.
Cryptops 'BSC111'	1	MLCK_2016_0197	T162931		Morphology and sequencing species is not C. 'BSCOL091'. Treated as new species and assigned B code.
Diplopoda	42				



Identification	No.	Hole ID(s)	WAM	DNA	Comments
Haplodesmidae `BDI080`	1	YE2020R		Х	New species and B code. Distribution unknown. Sequencing unsuccessful.
Lophoturus madecassus	28	YC3633R YE2011R YE2030R YW3957D YW3960D YC0023RD			Widespread (Australia plus).
Trigoniulidae `BDI075`	12	YE2055R YC0020R	T162923 T162924	Х	New species and B code. Known linear range 11 km. Molecular analysis of two specimens supported recognition of new species.
Trigoniulidae `BDI079`	1	YE2033R	T162928	Х	New species and B code. Distribution unknown. Genetics supported recognition of new species.
Pauropoda	15				
Decapauropus tenuis	1	YC1035D			Known distribution of ca. 4,500 km ² ; known linear range 100 km.
Pauropoda sp.	1	YW3955DG			Specimen too small (and juvenile) for either morphological or molecular identification. Probably one of other species listed.
Pauropodidae `BPU076`	1	YC1035D			Collected during this survey and from Marillana. Known linear range 26 km.
Pauropodidae `BPU114`	3	YW3951DG	T162930 T162925		New species and B code. Distribution unknown.
Pauropodidae sp. B14	9	YC3607R	T162926		Known distribution of ca. 220 km ² ; known linear range 41 km.
Symphyla	4				
Hanseniella sp.	1	YE2061R		Х	Higher order identification; distribution unknown. Sequencing unsuccessful.
Symphylella `BSYM120`	1	YC3615R	T162921	Х	New species and B code. Distribution unknown. Molecular analysis supported recognition of a new species and B code.



Identification	No.	Hole ID(s)	WAM	DNA	Comments
Symphylella `BSYM121`	1	YW3914D		Х	New species and B code. Distribution unknown. Molecular analysis supported recognition of a new species and B code.
Symphylella sp.	1	YW3951DG		Х	Sequencing unsuccessful. Likely to be <i>Symphylella</i> `BSYM121`.
Diplura	1				
Japygidae `BDP155` (DPL002)	1	YW3933D	1109541	Х	Known distribution of ca. 1,800 km ² ; known linear range 95 km. Genetics supported morphological identification.
Zygentoma	3				
Dodecastyla sp. B02 (=Atelurodes sp. S02)	1	YC0025R	I109534		Widespread in northern Western Australia.
Trinemura `BZY105`	2	YC0025R YC0020R	1109537	х	New species and B code. Known linear range 250 m. Both specimens sequenced, supporting recognition of a new species and B code.
Blattodea	28				
Nocticola quartermainei s.l.	4	YC0023RD YC3633R	1109539	X	Widespread in northern Western Australia. One specimen sequenced, supported morphological identification, which was retained for the other specimens.
<i>Nocticola</i> sp. B36 (cockingi s.l.)	2	YC0020R YW3951DG	1109538	X	Known distribution of ca. 100 km ² ; known linear range 15 km. One specimen sequenced, supported morphological identification, which was retained for the other specimen.
Hemiptera	3				
Cixiidae sp. B02	1	YC0025R			Widespread in Western Australia.
Phaconeura sp.	2	YC3623R YC0025R		X	Higher order identification; distribution unknown. Both specimens sequenced unsuccessfully. May be a new species or the widespread Phaconeura sp. B02 or B03, or locally widespread 'BHE030' or 'BHE032'.
Coleoptera	18				
Coleoptera sp. B07/B09	2	YW3951DG YW3955DG	1109543		Collected across the central Pilbara. Known linear range 130 km.



Identification	No.	Hole ID(s)	WAM	DNA	Comments
Cryptorhynchinae sp. B20 (=sp. MA)	1	YC3623R	I109536		Known linear range 18 km.
Hesperanillus `BCO247`	1	YE2045R	1109535	Х	New species and B code. Distribution unknown. Sequencing unsuccessful; morphological ID retained.
Ptinella sp. B01 (=MC)	13	YW3957D YW3914D	1109542		Widespread in Pilbara.
Staphylinidae sp.	1	YW3951DG			Higher order; distribution unknown. Only head of animal collected; unsuitable for genetics. May belong to the genus <i>Tripectenopus</i> (Britton 1974). Staphylinids are present fairly commonly in the area (Appendix 4).
Diptera	40				
<i>Allopnyxia</i> sp. B01	40	YW3914D YE2030R YW3933D YW3922D YW3955DG YW3951DG	1109540		Widespread in Western Australia.
Other (Formicidae)	18				
Yavnella `voldemort`	3	HYM0049 YW3955DG			Not considered by EPA but included for completeness. Identification provided by Dr Mark Wong (UWA).
Leptanilla swani	15	YE2011R YE2020R			Not considered by EPA but included for completeness. Identification provided by Dr Mark Wong (UWA).
Grand Total	194				



5. DISCUSSION

5.1. Desktop Review

The desktop search results indicate that significant communities of stygofauna and troglofauna exist in the desktop search area. Stygofauna and troglofauna records tend to be associated with palaeovalleys, with stygofauna more central in the valley and troglofauna on the slopes (Mokany *et al.* 2019). For example, there are many subterranean records on the southern margin of the Robe Palaeovalley, and many others associated with connected palaeovalleys such as Yandicoogina.

Among the results of the desktop review of species in the wider Survey Area, two stygofauna species and one troglofaunal species known only from the Survey Area were recovered:

- 1. The haplotaxid annelid Naididae sp. N02.
- 2. The haplotaxid annelid Naididae sp. N07.
- 3. The schizomid Draculoides 'sp. Koodaideri/Yandi'.

These three species listed above are discussed in more detail in Sections 5.3.1 and 5.3.2.

Many of the stygofaunal groups represented in wider Survey Area contain species that are of conservation significance in the Pilbara. Crustacean amphipods, isopods, syncarids, copepods (especially harpacticoids) and ostracods all contain some species with local distributions (Eberhard et al. 2009; Halse et al. 2014). In northern Australia phreodrilid annelids are restricted to groundwater and the group appears to contain multiple species with restricted ranges (Brown *et al.* 2015; Pinder and Brinkhurst 1997).

There are also groups of conservation significance among the troglofaunal records for the Survey Area, particularly among the more speciose groupings (oonopid spiders, pseudoscorpions, schizomids, isopods, cockroaches, and silverfish).

Two important caveats are relevant when considering the desktop review. First, the subterranean fauna records are unlikely to represent all species present in the Survey Aea. Second, the species lists associated with the records is likely to contain multiple names for some species (see Appendices 3 and 4). Parts of the Survey Area have been surveyed many times by different consultancies and researchers, with group largely using its own naming system. The true number of phreodrilid species collected in the Survey Area, for example, is probably much less than the 14 indicated in Appendix 3.

5.2. Field Survey

The survey collected 1,171 stygofauna specimens attributable to at least 35 species, a relatively rich assemblage. Most of the species collected have distributions ranging beyond the Survey Area, but five species are known only from the Survey Area (see Section 5.3.1 below). The survey also collected 194 troglofauna specimens attributable to at least 34 species, a relatively rich assemblage.

5.3. Species Known Only from the Survey Area

5.3.1. Stygofauna

About 70% of the subterranean fauna species have distributions that are known to extend beyond the Survey Area.Other species are currently known only from the Survey Area, probably mainly because they occur at low abundance and so are collected infrequently, which makes it difficult to document ther full species ranges. Limited access to holes for sampling outside the Survey Area also makes it difficult to show wider occurrences.



Seven stygofauna species are currently known only from the Survey Area (Figure 12.1):

- 1. The haplotaxid annelid Naididae sp. N02 was collected as a singleton by Subterranean Ecology (2010a) from bore WB3YJ001. Species in this family have ranges varyng from highly localised to regionally widespread, which makes it difficult to infer distribution. This is compounded by the animal being collected more than 10 years ago, with little information available about its habitat or the basis of the identification.
- 2. The haplotaxid annelid Naididae sp. N07, collected as a singleton by Subterranean Ecology (2020a) also from bore WB3YJ001. As with Naididae sp. N02, it is difficult to estimate the potential distribution of this species for the reasons outlined above.
- 3. The copepod *Dussartcyclops* 2222 `BCY095`, represented by eight specimens collected from YE2029R and YC3601R. Using the taxonomy of Karanovic (2006), cyclopoid copepods in the Pilbara are mostly widepread, with ranges usually covering multiple sub-regions (Halse *et al.* 2014). Genetic analyses using only the CO1 gene have often suggested smaller ranges but there is growing evidence that this may sometimes split true species (Hamilton et al. 2014; Klimov et al. 2019). Accordingly, the likely range of *Dussartcyclops* 2222 `BCY095` is unclear.
- 4. The copepod *Elaphoidella* `BHA342`, 19 specimens collected during this survey from YE2070R and HYE1512. Harpacticoid copepods in the north-west tend to have small ranges. The three records of *Elaphoidella* `BHA342` (from two drill holes) are 600 m apart. Ranges for species of *Elaphoidella* in the Pilbara with at least three records vary from Pilbara-wide (*E. humphreysi*) to 13 km (*E.* sp. 'B05') and it is likely *Elaphoidella* `BHA342` occurs outside the Survey Area.
- 5. The copepod *Parastenocaris* `BHA343`, collected as a singleton during this survey from bore YE2070R. Other than *Parastenocaris jane*, most species of *Parastenocaris* in the Pilbara have small linear ranges (varying from 0.2 to 24 km for species collected from three or more holes). The likelihood of *Parastenocaris* `BHA343` occurring outside the Survey Area is unclear.
- 6. The ostracod *Candonopsis* 'BOS1831', five specimens collected during this survey from YW3907DG. The known distributions of most *Candonopsis* species in Western Australia are small, although of *Candonopsis tenuis* and *C. pilbarae* are widespread (with the former sometimes often occurring in streambeds and having an Australia-wide range). Whether *Candonopsis* 'BOS1831 is restricted to the Survey Area is unclear.
- 7. The syncarid *Pilbaranella* `BSY372`, nine specimens collected during this survey from YC3601R in round 1 (11 May 2022) and round 3 (9 March 2023). Syncarids in northern Western Australia have variable distributions. Described species of *Pilbaranella* near Newman have linear ranges varying from 12-42 km; other species in the Fortescue Valley have ranges varying from single sites to 40 km (Perina et al. 2018, 2019. Whether *Pilbaranella* `BSY372` is likely to be restricted to the Survey Area is unclear.

5.3.2. Troglofauna

Thirteen troglofauna species are currently known only from the Survey Area (Figure 12.2):

- 1. The beetle *Hesperanillus* `BCO247`, collected as a singleton by scraping from YE2045R. Other carabids tend to have small ranges (often known from a single site, up to several hundred square kilometres). No members of this genus were recovered in the desktop search, suggesting the species may be restricted to the Survey Area or its vicinity.
- 2. The centipede *Cryptops* `BSCOL091`, collected from two drill holes, YE2029R and YE2033R. The two specimens in the survey were collected 600 m apart. Other undescribed species of *Cryptops* are known from few specimens each with ranges from hundreds of metres up to tens of kilometres. Whether this species is likely to be restricted to the Survey Area is uncertain.







- 3. The centipede *Cryptops* `BSCOL111` was collected from YW3955DG, which is 13 km from the records of *Cryptops* `BSCOL091`. Although an incomplete specimen, *C*. `BSCOL111` has morphologic differences from *Cryptops* `BSCOL091` and represent a different species. Whether it is found outside the Survey Area is unknown.
- 4. The millipede Haplodesmidae `BDI080`, collected as a singleton in a trap from YE2020R. There are no described troglofaunal haplodesmids in Western Australia but the only undescribed species with more than three records has a linear range of at least 425 km. The one additional genetically confirmed species is a singleton. While there is uncertainty, the range of Haplodesmidae `BDI080` probably extends beyond the Survey Area.
- 5. The millipede Trigoniulidae `BDI075`, collected by trapping and scraping from YC0020R and by trapping from YE2055R, which are 11 km apart. Although both collection points fall within the Survey Area, the distance between them suggests that the species' preferred habitat is large and continuous. The species' range may therefore extend beyond the Survey Area but this is uncertain.
- 6. The millipede Trigoniulidae `BDI079`, collected as a singleton from YE2033R. Other troglofaunal trigoniulids with at least three records tend to have linear ranges from1 km up to the 11 km for Trigoniulidae `BDI075` as discussed above.
- 7. The pauropod Pauropodidae `BPU114`, collected from YW3951DG. Undescribed troglofaunal pauropods tend to have linear ranges of a few kilometres (Halse and Pearson 2014), suggesting this species may not occur outside the Survey Area.
- 8. The pseudoscorpion *Indohya* `BPS274`, collected by scraping as a singleton from YC0023RD. Ranges of undescribed species in this genus tend to be low; relatively well-sampled species have linear ranges in the low hundreds of metres.
- 9. The silverfish *Trinemura* `BZY105`, collected by trapping from YC0020R and scraping from YC0025R; these two drill holes are 250 m apart. *Trinemura* specie are consistly collected from few holes at single locations, suggesting they have restricted ranges.
- 10. The symphylan *Hanseniella* sp., collected as one animal from YE2061R. While surface symphylans appear to be widespread (Scheller 2011), this is not the case for most troglofaunal species other than *Decapauropus tenuis*, which is a more or less global species often found in subterranean habitats. Many other species are known from few records at single locations, while the linear ranges of 19 species with at least three records vary from 0.5-55 km (median 6 km). Whether *Hanseniella* sp. is likely to be restricted to the Survey Area is uncertain.
- 11. The symphylan *Symphylella* `BSYM120`, collected as a singleton from YC3615R. Molecular techniques suggest a large number of highly localised species in this genus occur.
- 12. The symphylan *Symphylella* `BSYM121`, collected as a singleton by scraping from YW3914D. Another specimen of *Symphylella* that could not be identified to species level (DNA failed) was collected from YW3951DG located 260 m hole from where *Symphylella* BSYM121 was collected. These taxa may be the same. Molecular techniques suggest a large number of highly localised species occur in this genus occur.
- 13. The schizomid *Draculoides* 'sp. Koodaideri/Yandi', collected as three specimens from two holes 110 m apart by Biota. Animals were sequenced by Helix in 2016 with WAM registration numbers T139298 and T139300. Many species of *Draculoides* in the Pilbara have been described and most have restricted ranges (e.g. Abrams et al. 2020) and *Draculoides* 'sp. Koodaideri/Yandi' may be restricted to the Survey Area. However, there is some uncertainty about how this species aligns with more recent identifications.

In addition to the troglofauna species species above, ants (Formicidae) belonging to two genera with strong subterranean affinities (*Leptanilla* and *Yavnella*) were collected. In fact the are likely to contain truly troglofaunal species (especially in the case of *Leptanilla*), and these results are included for completeness.


5.4. Summary and Conclusions

Desktop assessment indicates the presence of highly suitable habitat for subterranean fauna in and around the Survey Area, as evidenced by a high diversity and abundance of subterranean records in the desktop search area. A three-round baseline survey of subterranean values characterised this diversity in the Survey Area specifically, collecting at least 35 species of stygofauna and at least 33 species of troglofauna.

Seven stygofauna species are known only from the Survey Area. Species have been placed in twogroups according to the likelihood of them possibly being restricted to the Survey Area. For six species, it is considered to be unclear whether their ranges extend outside the Survey Area (see below):

- 1. The haplotaxid annelid Naididae sp. N02 collected as a singleton from hole WB3YJ001.
- 2. The haplotaxid annelid Naididae sp. N07 also collected as a singleton from WB3YJ001.
- 3. The copepod *Dussartcyclops* 2222 `BCY095` collected as eight specimens collected from YE2029R and YC3601R.
- 4. The copepod Parastenocaris `BHA343` collected as a singleton from YE2070R.
- 5. The ostracod *Candonopsis* `BOS1831` collected as five specimens from YW3907DG.
- 6. The syncarid *Pilbaranella* `BSY372` collected as nine specimens from YC3601R.

One species is considered likely to have occurrence outside the Survey Area:

7. The copepod *Elaphoidella* `BHA342` collected as 19 specimens from YE2070R and HYE1512.

Thirteen troglofaunal species are known only from the Survey Area. Six species are considered to be possibly restricted to the Survey Area (see below):

- 1. The beetle Hesperanillus `BCO247` collected as a singleton by scraping from YE2045R.
- 2. The pauropod Pauropodidae `BPU114` collected from YW3951DG.
- 3. The pseudoscorpion Indohya `BPS274` collected by scraping as a singleton from YC0023RD.
- 4. The silverfish *Trinemura* `BZY105, collected by trapping from YC0020R and scraping from YC0025R.
- 5. The symphylan *Symphylella* `BSYM120` collected as a singleton from YC3615R.

6. The symphylan *Symphylella* `BSYM121` collected as a singleton by scraping from YW3914D. For five species, it is considered to be unclear whether their ranges extend outside the Survey Area:

- 7. The centipede *Cryptops* `BSCOL091` collected from two drill holes, YE2029R and YE2033R.
- 8. The centipede Cryptops 'BSCOL111', collected from YW3955DG.
- 9. The millipede Trigoniulidae `BDI075' collected from YC0020R and YE2055R.
- 10. The millipede Trigoniulidae `BDI079` collected as a singleton from YE2033R.
- 11. The symphylan Hanseniella sp., collected as one animal from YE2061R.
- 12. The schizomid Draculoides 'sp. Koodaideri/Yandi' collected from two holes 110 m apart.

One species is considered likely to have occurrence outside the Survey Area:

13. The millipede Haplodesmidae `BDI080`, collected as a singleton in a trap from YE2020R.

A combination of habitat mapping and further survey and specimen collection may assist in defining the distributions of the above stygofauna and troglofauna species known only from the Survey Area but low abundance of many species, lack of ecological data for the species and variability of ranges within a genus means uncertainty is likely to persist for some species.



6. REFERENCES

- Abrams, K.M., Huey, J.A., Hillyer, M.J., Didham, R.K., and Harvey, M.S. (2020) A systematic revision of Draculoides (Schizomida: Hubbardiidae) of the Pilbara, Western Australia, Part I: the Western Pilbara. *Zootaxa* **4864**. doi. 10.11646/zootaxa.4864.1.1.
- Aplin, K.P. (1998) Three new blindsnakes (Squamata, Typhlopidae) from north western Australia. *Records* of the Western Australian Museum **19**: 1-12.
- Bennelongia (2012) Yandi stygofauna continuation of monitoring program. Bennelongia Pty Ltd, Report 2012/153, Jolimont, WA, 9 pp.
- Bennelongia (2013) Characterisation and mapping of Ethel Gorge aquifer stygobiont threatened ecological community. Bennelongia Pty Ltd, Report 2013/201, Jolimont, WA, 39 pp.
- Bennelongia (2015) Strategic Environmental Assessment: Description of Regional Subterranean Fauna. Bennelongia Environmental Consultants, 2015/202, Jolimont, WA, 68 pp.
- Bennelongia (2016) Gruyere Gold Project: Borefields Stygofauna Assessment. Bennelongia Pty Ltd, Report 2016/279, Jolimont, WA, 40 pp.
- Bennelongia (2018) Ministers North subterranean fauna survey. Bennelongia Environmental Consultants, 326, Jolimont, WA, 42 pp.
- Bennelongia (2021) Ministers North targeted troglofauna survey. Bennelongia Pty Ltd, Jolimont, WA, 16 pp.
- Biota (2015) Yandi operations stygofauna data consolidation 2003-2014. Biota Environmental Sciences Pty Ltd, 102 pp.
- Britton, E.B. (1974) *Tripectenopus occultus* sp. n., an eyeless beetle (Coleoptera: Staphylinidae) from a Western Australian cave. *Journal of the Australian Entomological Society* **19**: 85-87.
- Brown, L., Finston, T., Humphreys, G., Eberhard, S., and Pinder, A. (2015) Groundwater oligochaetes show complex genetic patterns of distribution in the Pilbara region of Western Australia. *Invertebrate Systematics* **29**(5): 405-420.
- Bureau of Meteorology (2023) Bureau of Meteorology, Climate Statistics for Australian Locations. Commonwealth of Australia, retrieved 2023.
- Cooper, S.J.B., Bradbury, J.H., Saint, K.M., Leys, R., Austin, A.D., and Humphreys, W.F. (2007) Subterranean archipelago in the Australian arid zone: mitochondrial DNA phylogeography of amphipods from central Western Australia. *Molecular Ecology* **16**: 1533-1544.
- Cooper, S.J.B., Hinze, S., Leys, R., Watts, C.H.S., and Humphreys, W.F. (2002) Islands under the desert: molecular systematics and evolutionary origins of stygobitic water beetles (Coleoptera: Dytiscidae) from central Western Australia. *Invertebrate Systematics* **16**: 589-598.
- DBCA (2023a) Priority ecological communities list. DBCA, Perth. <u>https://www.dbca.wa.gov.au/wildlife-and-ecological-communities</u>, retrieved
- DBCA (2023b) Threatened ecological community list 2023. DBCA, Perth. <u>https://www.dbca.wa.gov.au/wildlife-and-ecosystems/threatened-ecological-communities,</u> retrieved
- DCCEEW (2021) Australia's bioregions (IBRA) Version 7 (Subregions). Department of Climate Change, Energy, the Environment and Water,
- DEC (2009) Priority Ecological Communities for Western Australia. Department of Environment and Conservation, Species and Communities Branch, 17 pp.
- DEC (2013) Definitions, categories and criteria for threatened and priority ecological communities. Government of Western Australia, Perth.
- DPAW (2022) Priority Ecological Communities for Western Australia Version 34 (21 December 2022). Species and Communities Program, Department of Biodiversity, Conservation and Attractions, <u>https://www.dpaw.wa.gov.au/images/Priority%20Ecological%20Communities%20list.pdf,</u> retrieved May 2023.



- Eberhard, S.M., Halse, S.A., Williams, M.R., Scanlon, M.D., Cocking, J., and Barron, H.J. (2009) Exploring the relationship between sampling efficiency and short-range endemism for groundwater fauna in the Pilbara region, Western Australia. *Freshwater Biology* **54**: 885–901.
- Engel, M.S., Ceriaco, L.M.P., Daniel, G.M. et al. (2021). The taxonomic impediment: a shoertage of taxonomists, not the lack of technical approaches. *Zoological Journal of the Linnean Society* **193**: 381-387.
- EPA (2016) Technical Guidance Subterranean fauna survey. Environmental Protection Authority, Perth, WA, 24 pp.
- EPA (2018) Environmental Factor Guideline Subterranean Fauna. Environmental Protection Authority, Perth, WA. https://environmentonline.dwer.wa.gov.au/article/?code=KA-01031.
- EPA (2021) Technical guidance Subterranean fauna surveys for environmental impact assessment. Environmental Protection Authority, Perth, WA, 35 pp.
- Folmer, O., Black, M., Hoeh, W., Lutz, R., and Vrijenhoek, R. (1994) DNA primers for amplification of mitochondrial cytochrome c ocidase subunit I from diverse metazoan invertebrates. *Molecular Marine Biology and Biotechnology* 3: 294-299.
- Gardiner, S.J. (2003) Impacts of mining and mine closure on water quality and the nature of the shallow aquifer, Yandi Iron Ore Mine. Master of Science, Curtin University of Technology, Perth
- Gibert, J., and Deharveng, L. (2002) Subterranean ecosystems: a truncated functional biodiversity. *BioScience* **52**: 473-481.
- Gibson, L., Humphreys, W.F., Harvey, M., Hyder, B., and Winzer, A. (2019) Shedding light on the hidden world of subterranean fauna: A transdisciplinary research approach. *Sci Total Environ* **684**: 381-389.
- Golder (2015) Ecohydrological conceptualisation of the Marillana Creek region. Golder Associates Pty Ltd, West Perth, 149 pp.
- Guzik, M.T., Austin, A.D., Cooper, S.J.B., *et al.* (2011) Is the Australian subterranean fauna uniquely diverse? *Invertebrate Systematics* **24**(5): 407-418.
- Halse, S.A., 2018a. Research in calcrete and other deep subterranean habitats outside caves. In: OT Moldovan, L Kovac and S Halse (Eds.), Cave ecology. Springer nature, Cham, Switzerland, pp. 415-434.
- Halse, S.A., 2018b. Subterranean fauna of the arid zone. In: H Lambers (Ed.), On the ecology of Australia's arid zone. Springer Nature, Cham, Switzerland, pp. 388.
- Halse, S.A., Curran, M.K., Carroll, T., and Barnett, B. (2018) What does sampling tell us about the ecology of troglofauna? *ARPHA Conference Abstracts* **1**.
- Halse, S.A., and Pearson, G.B. (2014) Troglofauna in the vadose zone: comparison of scraping and trapping results and sampling adequacy. *Subterranean Biology* **13**: 17-34.
- Halse, S.A., Scanlon, M.D., and Cocking, J.S., 2002. Do springs provide a window to the groundwater fauna of the Australian arid zone? In: D Yinfoo (Ed.), Balancing the Groundwater Budget: Proceedings of an International Groundwater Conference, Darwin 2002. International Association of Hydrogeologists, Darwin, pp. 1-12.
- Halse, S.A., Scanlon, M.D., Cocking, J.S., Barron, H.J., Richardson, J.B., and Eberhard, S.M. (2014) Pilbara stygofauna: deep groundwater of an arid landscape contains globally significant radiation of biodiversity. *Records of the Western Australian Museum* **Supplement 78**: 443-483.
- Hamilton, C.A., Hendrixson, B.E., Brewer, M.S., and Bond, J.E. (2014) An evaluation of sampling effects on multiple DNA barcoding methods leads to an integrative approach for delimiting species: A case study of the North American tarantula genus Aphonopelma (Araneae, Mygalomorphae, Theraphosidae). *Molecular Phylogenetics and Evolution* **71**, 79-93.
- Harvey, M.S. (2002) Short-range endemism amongst the Australian fauna: some examples from nonmarine environments. *Invertebrate Systematics* **16**(4): 555-570.
- Hose, G.C., and Stumpp, C. (2019) Architects of the underworld: bioturbation by groundwater invertebrates influences aquifer hydraulic properties. *Aquatic Sciences* **81**(1): 20.



Howarth, F.G. (1983) Ecology of cave arthropods. Annual Review of Entomology 28(1): 365-389.

- Humphreys, W.F., Watts, C.H.S., Cooper, S.J.B., and Leijs, R. (2009) Groundwater estuaries of salt lakes: buried pools of endemic biodiversity on the western plateau, Australia. *Hydrobiologia* **626**(1): 79-95.
- Hyde, J., Cooper, S.J.B., Humphreys, W.F., Austin, A.D., and Munguia, P. (2018) Diversity patterns of subterranean invertebrate fauna in calcretes of the Yilgarn Region, Western Australia. *Marine and Freshwater Research* **69**(1): 114-121.
- Johnson, S.L., and Wright, A.H. (2001) Central Pilbara Groundwater Study. Hydrogeological Record Series. Water and Rivers Commission Resource Science Division, Report HG 8, East Perth, WA, 124 pp.
- Karanovic, T. (2006) Subterranean copepods (Crustacea, Copepoda) from the Pilbara region in Western Australia. *Records of the Western Australian Museum Supplement* **70**: 1-239.
- Kearse, M., Moir, R., Wilson, A., *et al.* (2012) Geneious Basic: an integrated and extendable desktop software platform for the organization and analysis of sequence data. *Bioinformatics* **28**: 1647-1649.
- Kendrick, P., and McKenzie, N., 2001. Pilbara 1 (PIL1 Chichester subregion), A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002, pp. 547-558.
- Klimov, P.B., Skoracki, M., and Bochkov, A.V. (2019) Cox1 barcoding versus multilocus species delimitation: validation of two mite species with contrasting effective population sizes. *Parasites & Vectors* **12**, 8.
- Korbel, K., and Hose, G. (2011) A tiered framework for assessing groundwater ecosystem health. *Hydrobiologia* **661**(1): 329-349.
- Lamoreux, J. (2004) Stygobites are more wide-ranging than troglobites. *Journal of Cave and Karst Studies* **66**: 18-19.
- Matthews, E.F., Abrams, K.M., Cooper, S.J.B., Huey, J.A., Hillyer, M.J., Humphreys, W.F., Austin, A.D., and Guzik, M.T. (2019) Scratching the surface of subterranean biodiversity: molecular analysis reveals a diverse and previously unknown fauna of Parabathynellidae (Crustacea: Bathynellacea) from the Pilbara, Western Australia. *Molecular Phylogenetics and Evolution*: 106643.
- Maurice, L., and Bloomfield, J. (2012) Stygobitic Invertebrates in Groundwater A Review from a Hydrogeological Perspective. *Freshwater Reviews* **5**(1): 51-71.
- Mokany, K., Harwood, T.D., Halse, S.A., and Ferrier, S. (2019) Riddles in the dark: assessing diversity patterns for cryptic subterranean fauna of the Pilbara. *Diversity & Distribution*: 25: 240-254.
- Perina, G., Camacho, A.I., Huey, J., Horwitz, P., and Koenders, A. (2018) Understanding subterranean variability: the first genus of Bathynellidae (Bathynellacea, Crustacea) from Western Australia described through a morphological and multigene approach. *Invertebrate Systematics* **32**, 423-447.
- Perina, G., Camacho, A.I., Huey, J., Horwitz, P., and Koenders, A. (2019) New Bathynellidae (Crustacea) taxa and their relationships in the Fortescue catchment aquifers of the Pilbara region, Western Australia. *Systematics and Biodiversity* **17**, 148-164.
- Pesce, G.L., de Laurentiis, P., and Humphreys, W.F. (1996) Copepods from ground waters of Western Australia. I. The genera *Metacyclops, Mesocyclops, Microcyclops* and *Apocyclops* (Crustacea: Copepoda: Cyclopidae). *Records of the Western Australian Museum* **18**: 67-76.
- Pinder, A.M., and Brinkhurst, R.O. (1997) Review of the Phreodrilidae (Annelida: Oligochaeta: Tubificida) of Australia. *Invertebrate Taxonomy* **11**: 443-523.
- Ponder, W.F., and Colgan, D.J. (2002) What makes a narrow-range taxon? Insights from Australian freshwater snails. *Invertebrate Systematics* **16**: 571-582.
- Qiagen (2006) 'DNeasy blood & tissue handbook.' In (Qiagen) Available at <u>https://www.qiagen.com/au/resources/resourcedetail?id=6b09dfb8-6319-464d-996c-</u> <u>79e8c7045a50&lang=en</u>
- Reeves, J.M., De Deckker, P., and Halse, S.A. (2007) Groundwater ostracods from the arid Pilbara region of northwestern Australia: distribution and water chemistry. *Hydrobiologia* **585**(1): 99-118.



- Subterranean Ecology (2010a) BHP Billiton Iron Ore Regional Subterranean Fauna Study Yandi Stygofauna Monitoring. Subterranean Ecology Pty Ltd, Stirling, WA, 80 pp.
- Subterranean Ecology (2010b) Pilbara Regional Subterranean Fauna Survey Area C North Mining Area -Ministers North. Subterranean Ecology Pty Ltd, Report No. 2010/18, Stirling, WA, 84 pp.
- WABSI (2021) Optimising species detection: subterranean fauna survey review project. WABSI, Perth, WA, 56 pp.
- Watts, C.H.S., and Humphreys, W.F. (2006) Twenty-six new Dytiscidae (Coleoptera) of the genera Limbodessus Guignot and Nirripirti Watts & Humphreys, from underground waters in Australia. *Transactions of the Royal Society of Australia* **130**(1): 123-185.
- Whitely, P.G. (1945) New sharks and fishes from Western Australia. Part 2. Australian Zoologist 11: 1-45.



Appendix 1. Drill holes and dates of sampling for stygofauna during the field survey.

SWL: standing water level (m). EOH: end of hole (m). Temp: temperature (° C). EC: electrical conductivity (μ S/cm; 1 μ S/cm = 0.64 mg/L TDS). All drillholes were sampled with six net hauls.

Drill hole ID	Latitude	Longitude	Date	SWL	Temp	EC	рΗ	Comments
YC3601R	-22.7135	119.0998	11/05/2022	22.28	23.5	1998	6.39	
YC3601R	-22.7135	119.0998	15/09/2022	21.77	23.7	306.3	7.2	
YC3601R	-22.7135	119.0998	9/03/2023	22.45	27.1	286.3	6.56	
YC3607R	-22.7119	119.0984	11/05/2022	30.25	23.3	1136	6.38	
YC3607R	-22.7119	119.0984	15/09/2022	29.78	24.8	486.9	6.63	
YC3611R	-22.7113	119.1002	10/05/2022	46.3	24	457.5	6.26	
YC3615R	-22.7113	119.098	11/05/2022	27.24	26	1208	5.97	
YC3615R	-22.7113	119.098	14/09/2022	27.14	25.7	1017	6.02	
YC3615R	-22.7113	119.098	9/03/2023	27.27	29.7	1256	6.39	
YC3622R	-22.711	119.0999	15/09/2022	50.03	32.9	561.6	6.3	
YC3622R	-22.711	119.0999	9/03/2023	52.31	28.4	710	6.06	
YC3631R	-22.7105	119.0999	10/05/2022	52.05	24.5	575.4	6.11	
YC3631R	-22.7105	119.0999	15/09/2022	53.44	23.8	514.2	6.7	
YE2029R	-22.7889	119.1551	10/05/2022	21.16	23.7	865.8	6.54	
YE2029R	-22.7889	119.1551	14/09/2022	21.1	27	935.7	7.33	
YE2029R	-22.7889	119.1551	9/03/2023	21.12	27.7	971	6.68	
YE2033R	-22.7917	119.155	10/05/2022	35.9	25.6	600.9	6.61	
YE2033R	-22.7917	119.155	14/09/2022	35.9	24.8	808.9	6.95	
YE2033R	-22.7917	119.155	9/03/2023	36.52	27.1	863	6.8	
YE2041R	-22.7905	119.1543	10/05/2022	45.09	27.2	816.2	6.53	
YE2041R	-22.7905	119.1543	14/09/2022	46.14	24.1	836.9	6.96	
YE2041R	-22.7905	119.1543	9/03/2023	45.52	28.6	864	6.76	
YE2070R	-22.79	119.1511	10/05/2022	41.66	25.7	805.3	6.76	
YE2070R	-22.79	119.1511	14/09/2022	42.52	27.7	379.5	6.94	
YE2070R	-22.79	119.1511	9/03/2023	41.79	29.1	796	6.66	
YE2085R	-22.7895	119.1498	10/05/2022	44.44	25.8	811.6	6.78	



Drill hole ID	Latitude	Longitude	Date	SWL	Temp	EC	рН	Comments
YE2085R	-22.7895	119.1498	14/09/2022	44.34	20.4	965.1	6.97	
YE2085R	-22.7895	119.1498	9/03/2023	43.7	30.1	494	6.81	
HYE1508	-22.79	119.1496	10/05/2022	44.04	26.3	852.5	6.65	
HYE1508	-22.79	119.1496	14/09/2022	44.78	26.8	842.6	6.96	
HYE1508	-22.79	119.1496	9/03/2023	44.25	29.5	916	6.92	
HYE1507	-22.7911	119.1523	10/05/2022	40.62	23.8	827	7.39	
HYE1507	-22.7911	119.1523	14/09/2022	43.96				Obstruction in bore just above water table; unable to collect sample
HYE1507	-22.7911	119.1523	9/03/2023	42.07				Obstruction in bore just above water table; unable to collect sample
HYE1531	-22.7891	119.1458	10/05/2022	45.64	22.4	936	6.63	
HYE1531	-22.7891	119.1458	14/09/2022	45.93	27.5	880.8	7.05	
HYE1512	-22.7858	119.1474	10/05/2022	5.5	23.7	954.4	6.94	
HYE1512	-22.7858	119.1474	14/09/2022	5.66	25	951.1	7.48	
HYE1512	-22.7858	119.1474	9/03/2023	6.1	28.3	1008	7.17	
HYE1511	-22.7858	119.1472	9/03/2023	6.03	28.4	1128	7.05	
HYE1513	-22.7889	119.1569	10/05/2022	31.64	24.3	940.9	7	
HYE1513	-22.7889	119.1569	14/09/2022	31.64	25.2	860.3	7.01	
HYE1513	-22.7889	119.1569	9/03/2023	32.2	27.3	604.6	6.84	
HMJ0005	-22.6782	118.879	11/05/2022	10.06	24	1616	7.66	
HMJ0005	-22.6782	118.879	15/09/2022	10.12	26.6	1855	7.18	
HMJ0005	-22.6782	118.879	8/03/2023	10.4	27.1	2156	7.2	
HYM0049	-22.7384	119.033	8/03/2023	40.28	27.6	1194	7	
YW3907DG	-22.7415	119.037	8/03/2023	41.43	28.5	921	6.96	
YW3902D	-22.7411	119.0383	8/03/2023	51.15	27.9	974	6.96	
YW3932D	-22.7409	119.0401	8/03/2023	51.52	29.5	778	6.9	
YW3951DG	-22.7398	119.0418	8/03/2023	30.12	28.4	1370	6.91	
YW3539D	-22.7253	119.0648	11/05/2022	4.67	28	468.7	6.9	
YW3539D	-22.7253	119.0648	15/09/2022	5.46	28.4	507.2	7.44	
YC1035D	-22.7249	119.0647	11/05/2022	3.63	23.8	464.8	6.97	



Drill hole ID	Latitude	Longitude	Date	SWL	Temp	EC	рН	Comments
YC1035D	-22.7249	119.0647	15/09/2022	5.32	26.2	574.8	7.39	
YW3540D	-22.7253	119.0644	11/05/2022	4.74	27.9	549.4	7.17	
YW3540D	-22.7253	119.0644	15/09/2022	5.8	27.5	725.3	7.42	
YC0022RD	-22.7065	119.0954	11/05/2022	47.09				No water chemistry; kink in pipe
YC0022RD	-22.7065	119.0954	13/09/2022	47.36				No water chemistry; kink in pipe
YC0022RD	-22.7065	119.0954	9/03/2023	47.66				No water chemistry; kink in pipe



Appendix 2. Drill holes and dates of sampling for troglofauna during the field survey.

SWL: standing water level (m). EOH: end of hole (m). Trap 1 and Trap 2 show the respective depths (mbgl) at which troglofauna traps were placed.

Bore ID	Latitude	Longitude	Visit Date	Traps Collected	SWL	Trap 1	Trap 2
YC3602R	-22.7122	119.0996	11/05/2022	5/07/2022		8	16
YC3606R	-22.7118	119.0991	13/09/2022	15/11/2022		6	15
YC3618R	-22.7111	119.1011	10/05/2022	5/07/2022		3	5
YC3620R	-22.711	119.1009	13/09/2022	15/11/2022		13	26
YC3621R	-22.7109	119.1003	13/09/2022	15/11/2022	36	5	32
YC3623R	-22.7108	119.0995	10/05/2022	5/07/2022	48	18	40
YC3625R	-22.711	119.0974	11/05/2022	5/07/2022		8	16
YC3630R	-22.7105	119.1004	11/05/2022	5/07/2022		10	20
YC3633R	-22.7104	119.0991	13/09/2022	15/11/2022		10	20
YC3635R	-22.7107	119.0974	13/09/2022	15/11/2022		8	25
YC3636R	-22.7105	119.0969	10/05/2022	5/07/2022		4	8
YC3637R	-22.7103	119.0963	13/09/2022	15/11/2022	14	5	10
YE2010R	-22.7889	119.1564	9/05/2022	5/07/2022		8	25
YE2011R	-22.7902	119.1565	9/05/2022	5/07/2022	36	7	32
YE2011R	-22.7902	119.1565	13/09/2022	15/11/2022	36	10	30
YE2011R	-22.7902	119.1565	7/03/2023	1/05/2023	36	5	34
YE2014R	-22.7893	119.1562	13/09/2022	15/11/2022	27	5	25
YE2014R	-22.7893	119.1562	7/03/2023	1/05/2023	27	5	25
YE2020R	-22.7911	119.1558	9/05/2022	5/07/2022	30	10	28
YE2020R	-22.7911	119.1558	13/09/2022	15/11/2022	30	8	22
YE2020R	-22.7911	119.1558	7/03/2023	1/05/2023	30	5	28
YE2030R	-22.7898	119.155	9/05/2022	5/07/2022	31	6	28
YE2030R	-22.7898	119.155	13/09/2022	15/11/2022	31	6	26
YE2030R	-22.7898	119.155	7/03/2023	1/05/2023	31	5	28
YE2045R	-22.7912	119.154	9/05/2022	5/07/2022	41	12	36
YE2045R	-22.7912	119.154	13/09/2022	15/11/2022	41	5	40



Bore ID	Latitude	Longitude	Visit Date	Traps Collected	SWL	Trap 1	Trap 2
YE2045R	-22.7912	119.154	7/03/2023	1/05/2023	41	5	38
YE2047R	-22.7896	119.1535	9/05/2022	5/07/2022		5	15
YE2047R	-22.7896	119.1535	13/09/2022	15/11/2022		7	15
YE2047R	-22.7896	119.1535	7/03/2023	1/05/2023		5	15
YE2055R	-22.7909	119.1526	10/05/2022	5/07/2022		10	32
YE2055R	-22.7909	119.1526	13/09/2022	15/11/2022		10	30
YE2055R	-22.7909	119.1526	7/03/2023	1/05/2023		5	34
YE2061R	-22.7902	119.152	10/05/2022	5/07/2022	37	8	30
YE2061R	-22.7902	119.152	14/09/2022	15/11/2022	37	10	35
YE2061R	-22.7902	119.152	7/03/2023	1/05/2023	37	5	35
YE2072R	-22.7891	119.151	10/05/2022	5/07/2022		10	30
YE2072R	-22.7891	119.151	14/09/2022	15/11/2022		15	30
YE2072R	-22.7891	119.151	7/03/2023	1/05/2023		5	32
YE2087R	-22.7899	119.1494	10/05/2022	5/07/2022		12	30
YE2088R	-22.7894	119.1493	14/09/2022	15/11/2022	38	20	35
YE2088R	-22.7894	119.1493	7/03/2023	1/05/2023	38	5	35
YW3909D	-22.7408	119.0365	8/03/2023	2/05/2023		5	14
YW3933D	-22.7411	119.0397	8/03/2023	1/05/2023	41	15	38
YW3914D	-22.7414	119.0399	8/03/2023	1/05/2023	41	5	38
YW3922D	-22.7419	119.0403	8/03/2023	1/05/2023	41	5	38
YW3913D	-22.7412	119.0402	8/03/2023	1/05/2023	41	5	38
YW3956D	-22.7404	119.0405	8/03/2023	1/05/2023		6	
YW3957D	-22.7408	119.0408	8/03/2023	2/05/2023		5	12
YW3955DG	-22.7404	119.041	8/03/2023	2/05/2023		5	23
YW3960D	-22.7414	119.0414	8/03/2023	1/05/2023		4	5
YC1047D	-22.7244	119.0621	11/05/2022	5/07/2022		3	6
YC1047D	-22.7244	119.0621	15/09/2022	15/11/2022		3	5
YC0020R	-22.7065	119.0944	11/05/2022	5/07/2022		12	26
YC0020R	-22.7065	119.0944	13/09/2022	15/11/2022		5	25
YC0023RD	-22.7064	119.0959	11/05/2022	5/07/2022		15	30



Bore ID	Latitude	Longitude	Visit Date	Traps Collected	SWL	Trap 1	Trap 2
YC0023RD	-22.7064	119.0959	13/09/2022	15/11/2022		15	30
YC0025R	-22.7064	119.0969	11/05/2022	5/07/2022		5	10
YC0025R	-22.7064	119.0969	13/09/2022	15/11/2022		5	12
YC0025R	-22.7064	119.0969	8/03/2023	1/05/2023		10	



Appendix 3. Stygofauna identified in the desktop search.

No. records refers to the number of times the taxon was recorded. No. individuals refers to the number of individuals recorded across all records. Bolded values indicate higher taxonomic ranks.

Identification	No. records	No. individuals	Comments
Annelida	663	4860	
Annelida sp.	4	5	Almost certainly oligochaetes
Aphanoneura	17	58	
Aeolosomatidae	17	58	
Aeolosoma sp.	1	1	
Aeolosoma sp. 1 (PSS)	12	36	
Aeolosoma sp. 3 (PSS)	4	21	
Clitellata	641	4794	
Oligochaeta sp.	184	1110	
Enchytraeida	234	2197	Probably all amphibious, so not of conservation significance
Enchytraeidae	234	2197	
Enchytraeidae `2 bundle` s.l. (long thin 2 per seg)	1	3	
Enchytraeidae `2 bundle` s.l. (short sclero 4 per seg)	8	44	
Enchytraeidae `3 bundle` s.l. (short sclero)	5	11	
Enchytraeidae `PST1` s.l. (E06)	14	237	
Enchytraeidae sp.	131	1082	
Enchytraeidae sp. E03	1	1	
Enchytraeidae sp. E06-08	1	2	
Enchytraeidae sp. E06-09	1	1	
Enchytraeidae sp. E06-B02	1	2	
Enchytraeidae sp. E06-B03	1	5	
Enchytraeidae sp. E09	1	2	
Enchytraeidae sp. E12	1	57	



Identification	No. records	No. individuals	Comments
Enchytraeidae sp. E12-01	1	1	
Enchytraeidae sp. MA	8	44	
Enchytraeus sp. AP PSS1 s.l.	38	613	
Enchytraeus sp. AP PSS2 s.l.	21	92	
Haplotaxida	223	1487	
Haplotaxidae	1	1	
Haplotaxidae sp. S01	1	1	
Naididae	35	483	Common and widespread; not of conservation significance
Allonais ranauana	1	3	
Dero furcata	2	7	
Dero nivea	1	180	
Naididae sp.	2	7	
Naididae sp. N01	2	2	
Naididae sp. N02	1	1	
Naididae sp. N07	1	1	
Naididae sp. S03	2	9	
Pristina aequiseta	2	5	
Pristina leidyi	1	2	
Pristina longiseta	19	265	
Pristina sp.	1	1	
Phreodrilidae	154	772	True stygofauna, but not all of the species listed will
			be unique (see Discussion)
Insulodrilus lacustris s.l.	1	20	
Insulodrilus lacustris s.l. Pilbara type 2/3 (PSS)	2	4	
Insulodrilus sp.	1	21	
Phreodrilidae `BOL038` (AP SVC)	1	7	
Phreodrilidae sp.	33	173	
Phreodrilidae sp. AP DVC s.l.	56	334	
Phreodrilidae sp. AP SVC s.l.	34	149	



Identification	No. records	No. individuals	Comments
Phreodrilidae sp. P01-1	1	1	
Phreodrilidae sp. P01-2	1	1	
Phreodrilidae sp. P02	2	2	
Phreodrilidae sp. P04	5	16	
Phreodrilidae sp. P12	11	25	
Phreodrilidae sp. P19	2	2	
Phreodrilidae sp. S4	1	10	
Phreodrilus peniculus	3	7	
Tubificidae	33	231	
Ainudrilus sp.	8	71	
Ainudrilus sp. WA25 (PSS)	3	7	
Ainudrilus sp. WA26 (PSS)	3	70	
Tubificidae `stygo type 1` (imm Ainudrilus ?WA25/26) (PSS)	3	45	
Tubificidae `stygo type 1A`	2	5	
Tubificidae `stygo type 5`	4	12	
Tubificidae `WA28` (SAP)	1	1	
Tubificidae sp.	8	18	
Tubificidae sp. B09	1	2	
Polychaeta	1	3	
Phyllodocida	1	3	
Nereididae	1	3	
Namanereis pilbarensis	1	3	
Arthropoda	4035	37098	
Chelicerata	157	1368	
Arachnida	157	1368	
Acarina	66	1141	
Acarina sp.	66	1141	
Trombidiformes	91	227	
Arrenuridae	30	82	



Identification	No. records	No. individuals	Comments
Arrenurus sp.	10	21	
Arrenurus sp. B01 (sp. nov. yandi = sp. 1)	10	23	
Arrenurus sp. B02 (=BIOTA sp. 3)	3	17	
Arrenurus sp. B03 (previously sp. nov. 1 [PSS])	7	21	
Aturidae	1	1	
Axonopsella sp.	1	1	
Halacaridae	4	4	
Halacaridae sp.	2	2	
Halacaridae sp. B01	2	2	
Limnesiidae	6	11	
Limnesia sp. B01	5	10	
Limnesia sp. B03	1	1	
Mideopsidae	6	10	
Guineaxonopsis sp. B04 (S01 group)	4	7	
Guineaxonopsis sp. S01 group (PSS)	1	2	
nr Penemideopsis sp.	1	1	
Momoniidae	2	2	
Hesperomomonia humphreysi	2	2	
Piersigiidae	4	13	
nr Stygolimnochares sp. B01	4	13	
Unionicolidae	38	104	
Recifella `sp. 1`	4	4	
Recifella sp. P1 (nr umala) (PSW)	34	100	
Crustacea	3878	35730	
Malacostraca	2053	12052	
Amphipoda	1565	9827	
Amphipoda sp.	72	361	
Eriopisidae	1	1	
Nedsia sp.	1	1	
Neoniphargidae	7	87	



Identification	No. records	No. individuals	Comments
Neoniphargidae sp. B03	7	87	
Paramelitidae	1485	9378	Not all of the species listed will be unique (see Discussion)
Chydaekata `2/UWA-B`	3	12	
Chydaekata `E`	97	191	
Chydaekata `sp. OB1`	2	2	
Chydaekata `sp. S2`	1	1	
Chydaekata `UWA-C`	2	2	
Chydaekata acuminata	7	7	
Chydaekata sp.	135	572	
Chydaekata sp. B01	8	17	
Chydaekata sp. MJ1-UM1	180	1212	
Chydaekata sp. S01	2	2	
Kruptus `BAM213`	4	12	
Kruptus `Helix-AMP035`	2	6	
Maarrka ?etheli	1	1	
Maarrka `Helix-YB5`	3	3	
Maarrka etheli	2	2	
Maarrka sp.	4	14	
Maarrka sp. MA	2	2	
Maarrka sp. MJ1-UM1	25	37	
Maarrka weeliwollii	65	94	
Paramelitidae `Helix-WWA1`	32	40	
Paramelitidae `Helix-WWA2`	16	16	
Paramelitidae `Helix-WWA3`	1	1	
Paramelitidae `Helix-YB2`	1	16	
Paramelitidae `Helix-YB3`	3	7	
Paramelitidae `Helix-YB4`	2	2	
Paramelitidae `sp. 2 (DEC/PSS)`	38	236	
Paramelitidae `sp. MA-Mindy`	40	175	



Identification	No. records	No. individuals	Comments
Paramelitidae `sp. nr. 2 (DEC)`	10	40	
Paramelitidae `sp. OB1`	2	7	
Paramelitidae `sp. OB3`	3	4	
Paramelitidae `sp. S4`	2	8	
Paramelitidae `sp. S5/S6`	2	13	
Paramelitidae Genus 2 `BAM151`	1	2	
Paramelitidae Genus 2 sp.	2	3	
Paramelitidae Genus 2 sp. B01	22	107	
Paramelitidae Genus 2 sp. B02	260	1936	
Paramelitidae Genus 2 sp. B03	5	53	
Paramelitidae Genus 2 sp. B11	3	66	
Paramelitidae Genus 2 sp. B21 (=S06)	4	70	
Paramelitidae sp.	142	988	
Paramelitidae sp. 2 s.l. (PSS)	26	291	
Paramelitidae sp. 9 (PSS) s.l.	1	1	
Paramelitidae sp. B03	37	315	
Paramelitidae sp. B04	1	1	
Paramelitidae sp. B12	1	1	
Paramelitidae sp. B13	5	33	
Paramelitidae sp. B16	29	97	
Paramelitidae sp. B22	1	1	
Paramelitidae sp. B25	1	5	
Paramelitidae sp. B26 (Helix-AMP018)	50	190	
Paramelitidae sp. B47	2	13	
Paramelitidae sp. B48	2	2	
Paramelitidae sp. MJ1-UM1	135	1865	
Paramelitidae sp. MJ2-UM2-S5	15	239	
Paramelitidae sp. S02	1	26	
Paramelitidae sp. S04 (BR South)	21	87	
Paramelitidae sp. S05	5	56	



Identification	No. records	No. individuals	Comments
Paramelitidae sp. S4 (BR South)	1	100	
Paramelitidae sp. S5	1	8	
Pilbarus `sp. Biologic-AMPH001`	2	3	
Pilbarus millsi s.l.	12	65	
Bathynellacea (Syncarida)	204	1112	Not all of the species listed will be unique (see Discussion)
Bathynellacea (Syncarida) sp.	7	15	
Bathynellidae	61	180	
Atopobathynella sp.	1	1	
Atopobathynella sp. 805	3	7	
Atopobathynella sp. B31	3	18	
Bathynella `munjinensis`	2	18	
Bathynella sp.	2	3	
Bathynella sp. 1 (Weeli Wolli)	1	1	
Bathynella sp. 2 (South Flank)	1	4	
Bathynella sp. B05	2	13	
Bathynella sp. B23	1	2	
Bathynella sp. B24	2	3	
Bathynellidae `DeGrey`	1	2	
Bathynellidae `Helix-BAB018`	2	29	
Bathynellidae sp.	10	12	
Brevisomabathynella `BSY247`	1	4	
Notobathynella sp.	2	4	
Pilbaranella `sp. A`	2	2	
Pilbaranella `sp. B`	2	13	
Pilbaranella ethelensis	15	25	
Pilbaranella sp.	8	19	
Parabathynellidae	136	917	
Atopobathynella `Helix-BAP027/WA`	4	258	
Atopobathynella `sp. A Kood`	1	1	



Identification	No. records	No. individuals	Comments
Atopobathynella `sp. B Kood`	1	1	
Atopobathynella `sp. D Kood`	1	1	
Atopobathynella sp.	6	45	
Atopobathynella sp. B04	9	23	
Atopobathynella sp. B05	1	1	
Atopobathynella sp. B07	7	27	
Atopobathynella sp. MJ	3	6	
Atopobathynella sp. S02	4	8	
Billibathynella `BSY187-DNA`	6	9	
Billibathynella `sp. S1`	8	9	
Billibathynella cassidis	3	3	
Brevisomabathynella `BSY222`	2	4	
Brevisomabathynella nr pilbaraensis	1	2	
Notobathynella sp.	4	11	
Notobathynella sp. (MAC vicinity)	2	4	
nr Billibathynella sp.	7	9	
nr Billibathynella sp. B01	14	354	
nr Billibathynella sp. B02 (=Parabathynellidae sp. S03)	30	81	
nr Notobathynella sp. S01	5	21	
Parabathynellidae `sp. won1`	2	18	
Parabathynellidae sp.	4	7	
Parabathynellidae sp. (Hope Downs)	2	2	
Parabathynellidae sp. MJ	7	10	
Parabathynellidae sp. S02	2	2	
Isopoda	282	1109	
lsopoda sp.	3	12	
Microcerberidae	5	6	
Coxicerberus `sp. OB2`	1	1	
Microcerberidae sp.	2	2	
Microcerberidae sp. B01	1	2	



Identification	No. records	No. individuals	Comments
Microcerberidae sp. B03	1	1	
Philosciidae	1	25	
Philosciidae sp. MA	1	25	
Stenoniscidae	2	2	
Stenoniscidae `sp. DNA01`	2	2	
Tainisopidae	271	1064	
Pygolabis `BIS388`	1	2	
Pygolabis humphreysi	31	36	
Pygolabis sp.	25	42	
Pygolabis sp. B06 (=BIOTA yandi sp. 1)	18	62	
Pygolabis sp. MJ-UM	55	85	
Pygolabis weeliwolli	122	814	
Pygolabis? sp.	18	18	
Tainisopidae sp.	1	5	
Spelaeogriphacea	2	4	
Spelaeogriphidae	2	4	
Mangkurtu `BSPE002-DNA`	1	1	
Mangkurtu kutjarra	1	3	
Maxillopoda	1202	17335	
Copepoda sp.	28	241	
Calanoida	4	4	
Ridgewayiidae	4	4	
Stygoridgewayia sp.	1	1	Almost certainly the below species (only one has been described)
Stygoridgewayia trispinosa	3	3	
Cyclopoida	946	15389	
Cyclopoida sp.	132	3491	
Cyclopidae	814	11898	
Anzcyclops `sp. OB`	1	1	
Australocyclops similis s.l.	3	3	



Identification	No. records	No. individuals	Comments
Australoeucyclops karaytugi	7	12	
Bryocyclops sp. 1 (PSS)	1	1	
Cyclopidae sp.	1	50	
Diacyclops `BCY059` (humphreysi s.l.)	24	251	
Diacyclops cockingi	100	1381	
Diacyclops humphreysi	404	7419	
Diacyclops humphreysi humphreysi	2	2	
Diacyclops scanloni	4	94	
Diacyclops sobeprolatus	47	626	
Diacyclops sp.	12	129	
Dussartcyclops sp. B10	2	4	
Ectocyclops phaleratus	2	2	
Goniocyclops sp.	1	2	
Mesocyclops brooksi	8	81	
Mesocyclops darwini	9	177	
Mesocyclops holynskae	3	3	
Mesocyclops notius	2	20	
Mesocyclops sp.	3	5	
Metacyclops nr. pilbaricus	1	1	
Metacyclops sp.	2	13	
Microcyclops varicans	109	1056	
nr. Pilbaracyclops `sp. OB`	2	2	
Orbuscyclops westaustraliensis	2	16	
Paracyclops chiltoni	1	3	
Pescecyclops pilbaricus s.l.	10	70	
Pescecyclops sp. B01 (nr pilbaricus)	13	80	
Pilbaracyclops frustratio	3	28	
Pilbaracyclops sp. B03 (nr frustratio)	6	7	
Thermocyclops aberrans	17	327	
Thermocyclops decipiens	3	21	



Identification	No. records	No. individuals	Comments
Thermocyclops sp.	9	11	
Harpacticoida	224	1701	
Harpacticoida sp.	50	432	
Harpacticoida sp. 4 (PSS)	1	31	
Ameiridae	88	857	
Abnitocrella `BHA274` (nr eberhardi)	1	1	
Abnitocrella eberhardi	4	6	
Ameiridae sp.	1	1	
Gordanitocrella trajani	63	553	
Inermipes sp. 1 (PSS)	6	23	
Megastygonitocrella bispinosa	1	3	
Megastygonitocrella trispinosa	1	3	
Nitocrella karanovici	2	11	
Nitokra `BHA275`	2	7	
Nitokra `BHA340`	1	6	
Novanitocrella `BHA338`	1	2	
Parapseudoleptomesochra sp. B01	2	70	
Parapseudoleptomesochra tureei	3	171	
Canthocamptidae	37	211	
Australocamptus `sp. B06`	1	7	
Australocamptus sp.	3	27	
Australocamptus sp. B13	7	87	
Canthocamptidae sp. B01	19	68	
Canthocamptidae sp. B02	1	2	
Elaphoidella humphreysi	2	6	
Elaphoidella sp. 2 (PSS)	1	8	
Elaphoidella sp. 3 (PSS)	1	4	
Elaphoidella sp. S02	1	1	
nr Epactophanes sp. B01	1	1	
Ectinosomatidae	1	4	



Identification	No. records	No. individuals	Comments
Rangabradya sp. S01	1	4	
Miraciidae	7	12	
nr Schizopera `BHA337`	1	3	
Schizopera `BHA341`	1	1	
Schizopera sp. B02	5	8	
Parastenocarididae	40	154	
Parastenocarididae sp.	2	6	
Parastenocaris `COP001`	2	2	
Parastenocaris `outbacki`	10	103	
Parastenocaris jane	15	27	
Parastenocaris sp.	9	11	
Parastenocaris sp. 809	1	1	
Parastenocaris sp. B25	1	4	
Ostracoda	615	6301	
Ostracoda sp.	40	534	
Podocopida	575	5767	
Candonidae	454	4866	
?Candoninae sp.	1	4	
?Candonopsis williami	1	1	
?Notacandona boultoni	3	4	
Areacandona `BOS1441`	1	25	
Areacandona `BOS1669`	1	8	
Areacandona `outbacki`	13	185	
Areacandona mulgae s.l.	2	2	
Areacandona sp.	4	10	
Candonidae `BOS1183`	1	1	
Candonidae sp.	14	44	
Candonidae sp. MJ-UM1	31	170	
Candoninae sp.	1	3	
Candonopsis sp.	1	1	



Identification	No. records	No. individuals	Comments
Candonopsis tenuis	12	148	
Deminutiocandona mica	5	9	
Deminutiocandona murrayi	10	60	
Deminutiocandona sp. 1 (PSS)	1	1	
Deminutiocandona stomachosa	1	4	
Humphreyscandona `BOS1372`	3	46	
Humphreyscandona janeae	1	3	
Humphreyscandona sp.	1	20	
Humphreyscandona waldockae	6	42	
Humphreyscandona woutersi	1	1	
Kencandona harleyi	1	1	
Meridiescandona `BOS171`	5	47	
Meridiescandona `BOS399`	5	9	
Meridiescandona `cowrae` ms	1	35	
Meridiescandona facies (PSS) s.l.	129	2198	May comprise a smaller number of species see
Meridiescandona lucerna s.l.	36	411	May comprise a smaller number of species; see
Meridiescandona marillanae	25	279	Discussion
Meridiescandona sp.	11	137	
Meridiescandona sp. 1 (PSS)	1	7	
Meridiescandona sp. 3 (PSS)	1	8	
Neocandona `1` (PSS)	2	2	
Notacandona ?boultoni	1	2	
Notacandona boultoni	92	853	
Notacandona gratia	1	1	
Notacandona modesta (PSS) s.l.	14	40	
Notacandona quasiboultoni	1	5	
Notacandona sp.	1	1	
nr Notacandona sp.	1	1	
Origocandona grommike	3	8	
Pilbaracandona eberhardi	1	3	



Identification	No. records	No. individuals	Comments
Pilbaracandona rosa s.l.	2	4	
Pilbaracandona sp.	5	22	
Cyprididae	47	442	
Cypretta seurati	16	235	
Cypretta sp.	1	16	
Cyprididae `BOS1375`	4	17	
Cyprididae sp.	5	15	
Cypridopsis `BOS1401`	3	8	
Cypridopsis `BOS666`	1	12	
Cyprinopsinae sp.	1	1	
Cyprinotus kimberleyensis s.l.	3	25	
Riocypris fitzroyi	1	1	
Sarscypridopsis ochracea	3	26	
Stenocypris bolieki	3	13	
Stenocypris major	3	17	
Strandesia sp.	2	36	
Strandesia sp. 1 (PSS)	1	20	
Darwinulidae	6	23	
Darwinula stevensoni	1	2	
Darwinulidae sp.	1	10	
Vestalenula marmonieri	2	8	
Vestalenula matildae	1	2	
Vestalenula sp.	1	1	
Limnocytheridae	68	436	
Gomphodella `BOS200`	3	7	
Gomphodella `BOS334`	1	7	
Gomphodella alexanderi	16	148	
Gomphodella hirsuta	6	8	
Gomphodella sp.	5	16	
Gomphodella sp. 4 (PSS)	1	1	



Identification	No. records	No. individuals	Comments
Gomphodella yandii	33	239	
Limnocythere dorsosicula	2	9	
Limnocythere stationis	1	1	
Ostracoda?	7	41	
Ostracoda? sp.	7	41	
Mollusca	2	2	
Gastropoda	2	2	
Hypsogastropoda	2	2	
Hydrobiidae	2	2	
Hydrobiidae sp.	2	2	
Nematoda	145	940	Not considered in environmental impact assessments
Nematoda sp. 01 (rat-tailed gp) (PSS)	2	2	
Nematoda sp. 04 (PSS)	2	21	
Nematoda sp. 05 (PSS)	1	1	
Nematoda sp. 06 (PSS)	1	4	
Nematoda sp. 12 (PSS)	1	1	
Nematoda sp. 14 (PSS)	1	4	
Nematoda sp. MC	1	1	
Nematoda spp.	136	906	
Platyhelminthes	61	923	Not considered in environmental impact assessments
Platyhelminthes sp.	1	42	
Turbellaria	60	881	
Turbellaria sp.	59	880	
Microturbellaria	1	1	
Microturbellaria sp.	1	1	
Rotifera	34	665	Not considered in environmental impact assessments
Rotifera sp.	2	2	
Eurotatoria	32	663	
Bdelloidea	18	645	
Bdelloidea sp.	7	34	



Identification	No. records	No. individuals	Comments
Bdelloidea sp. 2:2	6	506	
Bdelloidea sp. 2:3	2	101	
Bdelloidea sp. 5:4	1	1	
Philodinidae	2	3	
Philodinidae sp.	1	2	
Rotaria sp.	1	1	
Monogononta	14	18	
Flosculariacea	13	15	
Filiniidae	13	15	
Filinia sp.	13	15	
Ploima	1	3	
Notommatidae	1	3	
Eosphora ehrenbergii	1	3	
Tardigrada	2	26	Not considered in environmental impact assessments
Tardigrada sp.	2	26	
Grand Total	4941	44513	



Appendix 4. Troglofauna identified in the desktop search.

No. records refers to the number of times the taxon was recorded. No. individuals refers to the number of individuals recorded across all records. Bolded values indicate higher taxonomic ranks.

Identification	No. records	No. individuals	Comments
Arthropoda	6616	19315	
Arthropoda sp.	4	4	
Chelicerata	1848	4745	
Arachnida	1848	4745	
Acarina	375	1585	
Acarina sp.	375	1585	
Araneae	265	589	
Araneae sp.	62	281	
Araneae sp. ?S5	3	3	
Araneae sp. indet.	1	1	
Araneae sp. indet. MN	3	3	
Araneae sp. S5	3	3	
Araneae sp. S7	2	2	
Araneomorphae `blind sp.`	1	1	
Araneomorphae sp.	7	7	
Opisthothelae `Aranaea sp. S5`	3	3	
Gnaphosidae	38	66	
Gnaphosidae sp.	10	10	
Gnaphosidae sp. B01	1	1	
Gnaphosidae sp. B01	1	5	
Gnaphosidae sp. MJ	1	25	
Gnaphosidae sp. S01	1	1	
Gnaphosidae sp. S03	2	2	
Gnaphosidae sp. S1	1	1	
Gnaphosidae sp. S3	2	2	



Identification	No. records	No. individuals	Comments
nr Encoptarthria sp.	5	5	
nr Encoptarthria sp. B01	13	13	
nr Encoptarthria sp. B06	1	1	
Gnaphosidae?	7	7	
Gnaphosidae? sp.	1	1	
Gnaphosidae? sp. B01	2	2	
Gnaphosidae? sp. MJ	4	4	
Linyphiidae	37	89	
Linyphiidae sp.	11	15	
Linyphiidae sp. B03 (=Araneae sp. S05)	17	39	
Linyphiidae sp. B03 (=Araneae sp. S05)	7	33	
Linyphiidae sp. S01	1	1	
Linyphiidae sp. S1	1	1	
Linyphiidae?	1	1	
Linyphiidae? `sp. S1`	1	1	
Oecobiidae	1	1	
Oecobiidae sp.	1	1	
Oonopidae	78	90	Not all of the species listed will be unique (see Discussion)
?Opopaea `blind sp.`	1	1	
?Prethopalpus sp.	1	1	
Myrmopopaea sp.	1	1	
Oonopidae sp.	2	2	
Oonopidae sp. B19-DNA	1	1	
Oonopidae sp. B6 (re-named `Prethopalpis¿ sp. B6)	2	2	
Oonopidae sp. MJ	4	4	
Opopaea sp.	1	1	
Pelicinus `BAR133`	2	2	
Pelicinus sp.	3	4	
Pelicinus sp. B02	8	8	



Identification	No. records	No. individuals	Comments
Pelicinus sp. B02	2	2	
Pelicinus sp. B05	1	1	
Prethopalpus `BAR116`	1	1	
Prethopalpus `DNA01`	4	4	
Prethopalpus `marillana`	2	2	
Prethopalpus boltoni s.s.	2	2	
Prethopalpus julianneae	1	1	
Prethopalpus maini	5	5	
Prethopalpus pearsoni	3	3	
Prethopalpus sp.	15	25	
Prethopalpus sp. (Araneae sp. S07)	1	1	
Prethopalpus sp. B03 (ex Araneomorphae/ Oonopidae	1	1	
Prothonalous en B06	2	2	
Prethonalnus sp. B00	1	1	
Prethopalpus sp. B18 (=?Araneae sp. S05)	5	6	
Prethopalpus sp. B24	1	1	
Prethopalpus sp. B27	1	1	
Prethopalpus sp. B32	2	2	
Prethopalpus sp. MA	1	1	
Prethopalpus sp. MA	1	1	
Oonopidae?	1	1	
Oonopidae? `Aranaea sp. S7`	1	1	
Pholcidae	1	10	
Pholcidae sp.	1	10	
Prodidomidae	1	1	
Molycriinae sp.	1	1	
Symphytognathidae	5	8	
Anapistula sp.	2	4	
Anapistula sp. B02	1	1	



Identification	No. records	No. individuals	Comments
Anapistula sp. S01	1	2	
Symphytognathidae sp. S1	1	1	
Theridiidae	7	8	
Theridiidae `no eyes?`	1	1	
Theridiidae sp.	6	7	
Theridiidae?	3	3	
Theridiidae? sp.	3	3	
Opiliones	24	30	
Opiliones sp.	6	10	
Opiliones sp. B02	2	2	
Opiliones sp. B02	1	1	
Opiliones sp. B03	1	2	
Assamiidae	13	14	
Assamiidae sp.	1	1	
Dampetrus sp.	2	3	
Dampetrus sp. B01 (nr isolatus)	9	9	
Dampetrus sp. B05 (nr isolatus)	1	1	
Phalangodidae	1	1	
Phalangodidae sp.	1	1	
Palpigradi	95	257	Not all of the species listed will be unique (see Discussion)
Palpigradi `MJ_UM`	1	1	
Palpigradi indet. MJ_UM	1	100	
Palpigradi sp.	30	32	
Palpigradi sp. B01	26	48	
Palpigradi sp. B04	1	1	
Palpigradi sp. B08	1	1	
Palpigradi sp. B15	1	1	
Palpigradi sp. B19	1	1	
Palpigradi sp. B23	1	1	



Identification	No. records	No. individuals	Comments
Palpigradi sp. B24	1	1	
Palpigradi sp. MA	7	9	
Palpigradi sp. MA	4	16	
Palpigradi sp. UM	1	1	
Eukoeneniidae	19	44	
?Eukoenenia sp.	1	1	
Eukoenenia `BPAL051`	1	1	
Eukoenenia `BPAL052`	1	1	
Eukoenenia `Hope Downs`	3	3	
Eukoenenia sp.	2	2	
Eukoenenia sp. S01	5	6	
Eukoenenia sp. S1	4	28	
Eukoeneniidae sp.	2	2	
Pseudoscorpiones	277	750	Not all of the species listed will be unique (see Discussion)
Pseudoscorpiones sp.	16	82	
Chernetidae	4	34	
Chernetidae sp.	4	34	
Chthoniidae	198	411	
?Tyranochthonius `PSE203`	1	1	
?Tyranochthonius `PSE204`	3	3	
Chthoniidae `Chthoniidae sp. MJ`	1	1	
Chthoniidae `Helix-PC056`	1	1	
Chthoniidae `Helix-PC057`	1	1	
Chthoniidae sp.	11	11	
Chthoniidae sp. MJ	1	1	
Lagynochthonius `Helix-PC008`	2	2	
Lagynochthonius `Helix-PC055`	1	2	
Lagynochthonius `PSE039`	47	57	
Lagynochthonius `PSE039`	1	1	



Identification	No. records	No. individuals	Comments
Lagynochthonius `PSE041`	1	1	
Lagynochthonius `PSE043`	1	1	
Lagynochthonius `PSE045`	3	4	
Lagynochthonius `PSE046`	2	125	
Lagynochthonius `PSE062`	2	2	
Lagynochthonius `PSE096`	2	2	
Lagynochthonius `PSE101`	1	1	
Lagynochthonius `PSE165`	3	4	
Lagynochthonius `sp. 2`	1	1	
Lagynochthonius `yandi`	1	1	
Lagynochthonius nr polydentatus s.l.	1	1	
Lagynochthonius sp.	15	17	
Lagynochthonius sp. B19	1	1	
Lagynochthonius sp. B20 (= sp. S04)	7	10	
Lagynochthonius sp. S03	4	5	
Lagynochthonius sp. S03	3	27	
Lagynochthonius sp. S1	3	3	
Lagynochthonius sp. S2	1	1	
Lagynochthonius sp. S3	1	1	
Lagynochthonius sp. S4	4	4	
Tyrannochthonius `DNA05`	1	2	
Tyrannochthonius `PSE046`	9	9	
Tyrannochthonius `PSE050`	8	8	
Tyrannochthonius `PSE050`	1	1	
Tyrannochthonius `PSE055`	12	12	
Tyrannochthonius `PSE066`	11	11	
Tyrannochthonius `PSE066`	2	2	
Tyrannochthonius `PSE102`	1	1	
Tyrannochthonius `sp. S4`	6	6	
Tyrannochthonius aridus	1	1	



Identification	No. records	No. individuals	Comments
Tyrannochthonius sp.	1	1	
Tyrannochthonius sp. B14	1	1	
Tyrannochthonius sp. B37	1	1	
Tyrannochthonius sp. B37	1	1	
Tyrannochthonius sp. MA	1	1	
Tyrannochthonius sp. MA	3	25	
Tyrannochthonius sp. S05	1	1	
Tyrannochthonius sp. S4	8	32	
Tyrannochthonius sp. S5	2	2	
Hyidae	30	35	
Hyidae `Helix-PH016`	1	1	
Indohya `BPS274`	1	1	
Indohya `BPS495`	2	2	
Indohya `Helix-PH015`	2	2	
Indohya `PSE005`	13	13	
Indohya `PSE147`	1	1	
Indohya `PSE179`	1	1	
Indohya `PSE186`	2	2	
Indohya sp.	2	2	
Indohya sp. B06	1	2	
Indohya sp. S2	4	8	
Olpiidae	27	186	
Beierolpium sp.	1	1	
Olpiidae `marillana`	1	1	
Olpiidae indet. UM	1	1	
Olpiidae sp.	10	159	
Olpiidae sp. MA	2	6	
Olpiidae sp. MC	2	2	
Olpiidae sp. MC	2	6	
Olpiidae sp. MJ1	4	6	



Identification	No. records	No. individuals	Comments
Olpiidae sp. MJ2	2	2	
Olpiidae sp. MJ3	2	2	
Olpiidae?	2	2	
Olpiidae? sp.	2	2	
Schizomida	812	1534	Not all of the species listed will be unique (see Discussion)
Schizomida sp.	9	108	
Hubbardiidae	803	1426	
?Draculoides `SCH012?`	1	3	
Draculoides `BHD2`	4	6	
Draculoides `BHD3`	7	7	
Draculoides `BHD4`	5	5	
Draculoides `BHD5`	3	3	
Draculoides `BSC001` (B2 gp)	5	5	
Draculoides `BSC002`	1	1	
Draculoides `BSC003` (B2 gp)	4	4	
Draculoides `BSC007` (B2 gp)	3	4	
Draculoides `BSC021` (B2 gp)	3	3	
Draculoides `BSC022` (B2 gp)	11	14	
Draculoides `BSC024`	1	1	
Draculoides `BSC025`	1	1	
Draculoides `BSC026`	1	1	
Draculoides `BSC027`	6	7	
Draculoides `BSC030` (SCH012 gp)	1	2	
Draculoides `BSC033` (B2 gp)	2	2	
Draculoides `BSC034-DNA` (B2 gp)	2	2	
Draculoides `BSC036` (SCH030 complex)	3	3	
Draculoides `BSC037`	15	19	
Draculoides `BSC039`	3	5	
Draculoides `BSC042-DNA`	4	4	



Identification	No. records	No. individuals	Comments
Draculoides `Helix-SCH025`	4	4	
Draculoides `Helix-SCH030`	8	15	
Draculoides `Helix-SCH041`	3	3	
Draculoides `Helix-SCH042`	38	47	
Draculoides `Helix-SCH043`	5	5	
Draculoides `Helix-SCH044`	3	4	
Draculoides `Helix-SCH045`	16	20	
Draculoides `Helix-SCH046`	13	14	
Draculoides `Helix-SCH047`	1	2	
Draculoides `Helix-SCH048`	1	1	
Draculoides `Helix-SCH049`	11	12	
Draculoides `Helix-SCH050`	2	2	
Draculoides `Helix-SCH051`	5	6	
Draculoides `Helix-SCH052`	5	5	
Draculoides `Helix-SCH057`	20	20	
Draculoides `Helix-SCH059/SCH060`	6	6	
Draculoides `Helix-SCH059`	1	1	
Draculoides `Helix-SCH060`	3	3	
Draculoides `Helix-SCH061`	10	10	
Draculoides `Helix-WWS1`	1	1	
Draculoides `marillana`	2	2	
Draculoides `MJ`	20	28	
Draculoides `SCH012?`	1	1	
Draculoides `SCH012`	55	75	
Draculoides `SCH012`	18	192	
Draculoides `SCH013`	24	26	
Draculoides `SCH013`	1	1	
Draculoides `SCH018` (B2 gp)	6	9	
Draculoides `SCH020`	7	10	
Draculoides `SCH021`	16	22	


Identification	No. records	No. individuals	Comments
Draculoides `SCH022`	4	4	
Draculoides `SCH022` (B2 gp)	43	57	
Draculoides `SCH023`	2	2	
Draculoides `SCH023` (B2 gp)	22	26	
Draculoides `SCH024`	1	1	
Draculoides `SCH029`	8	9	
Draculoides `SCH030`/`SCH107-DNA`	4	4	
Draculoides `SCH037`	6	6	
Draculoides `SCH054`	4	4	
Draculoides `SCH055`	1	1	
Draculoides `SCH067`	6	6	
Draculoides `SCH068`	5	5	
Draculoides `SCH069`	10	10	
Draculoides `SCH071`	1	1	
Draculoides `SCH072`	1	1	
Draculoides `SCH074`	2	2	
Draculoides `SCH081`	5	5	
Draculoides `SCH092`	3	3	
Draculoides `SCH097`	26	27	
Draculoides `SCH105`	1	1	
Draculoides `SCH107`	1	1	
Draculoides `SJ` (SCH054-DNA, SCH030 complex)	20	20	
Draculoides `SK` (SCH030 complex)	9	9	
Draculoides `SL` (SCH030 complex)	3	3	
Draculoides `SM`	2	2	
Draculoides `SO` (SCH030 complex)	2	2	
Draculoides `sp. Koodaideri/Yandi`	3	3	
Draculoides `sp. MJ`	1	1	
Draculoides S1	20	148	
Draculoides sp.	131	202	



Identification	No. records	No. individuals	Comments
Draculoides sp. B20	1	1	
Draculoides sp. B47	3	3	
Draculoides sp. B55	1	1	
Draculoides sp. MA	3	27	
Draculoides sp. MJ	2	26	
Draculoides sp. S1	1	1	
Draculoides sp. S2	2	2	
Draculoides sp. S3	1	1	
Hubbardiinae sp.	2	2	
nr Draculoides `sp. S1`	1	1	
nr Draculoides Draculoides sp. S4	2	2	
nr Draculoides sp. 1	1	1	
nr Draculoides sp. S3	1	1	
nr. Draculoides Draculoides sp. S1	18	18	
nr. Draculoides Draculoides sp. S2	9	108	
nr. Draculoides Draculoides sp. S3	16	16	
(blank)	9	108	
Crustacea	291	509	
Malacostraca	291	509	
Isopoda	291	509	Not all of the species listed will be unique (see Discussion)
lsopoda sp.	35	74	
Armadillidae	241	400	
?Troglarmadillo `sp. C`	1	2	
?Troglarmadillo sp. S10	1	1	
Armadillidae `ISO001`	2	2	
Armadillidae `marillana`	2	2	
Armadillidae `sp. B03`	6	6	
Armadillidae `sp. B06`	3	3	
Armadillidae `sp. B13`	2	2	



Identification	No. records	No. individuals	Comments
Armadillidae `sp. B6`	1	1	
Armadillidae sp.	7	9	
Armadillidae sp. B07	2	4	
Armadillidae sp. B11	1	2	
Barrowdillo `sp. 1`	1	1	
Buddelundia `ISO002`	1	3	
Buddelundia `sp. 10`	3	0	
Buddelundia `sp. 10ma`	6	9	
Buddelundia `sp. 13`	6	6	
Buddelundia `sp. 14`	30	47	
Buddelundia `sp. 15`	34	43	
Buddelundia `sp. 16?`	4	4	
Buddelundia `sp. 16`	34	63	
Buddelundia `sp. 19`	15	19	
Buddelundia `sp. 77`	6	10	
Buddelundia sp.	8	12	
Buddelundia sp. NT	1	1	
Pseudodiploexochus `BIS519`	1	1	
Pseudodiploexochus sp.	1	1	
Spherillo `sp. 3`	1	2	
Troglarmadillo `BIS345`	1	6	
Troglarmadillo `ISO006`	3	17	
Troglarmadillo `sp. S14`	1	1	
Troglarmadillo sp.	6	7	
Troglarmadillo sp. B03	3	12	
Troglarmadillo sp. B06	3	4	
Troglarmadillo sp. B11	6	29	
Troglarmadillo sp. B13	3	5	
Troglarmadillo sp. B14	4	12	
Troglarmadillo sp. B26	3	6	



Identification	No. records	No. individuals	Comments
Troglarmadillo sp. B36	1	1	
Troglarmadillo sp. B37	3	3	
Troglarmadillo sp. B44	5	17	
Troglarmadillo sp. B51	2	3	
Troglarmadillo sp. B52	1	2	
Troglarmadillo sp. B57	1	1	
Troglarmadillo sp. B58	1	1	
Troglarmadillo sp. B58	1	1	
Troglarmadillo sp. B59	1	1	
Troglarmadillo sp. B62	2	2	
Troglarmadillo sp. B64 (= sp. S14)	7	9	
Troglarmadillo sp. B65	1	2	
Troglarmadillo sp. S10	1	1	
Troglarmadillo sp. S14	1	1	
Philosciidae	15	35	
Laevophiloscia sp.	1	1	
nr Andricophiloscia sp. B03	1	1	
nr Andricophiloscia sp. B16	1	1	
Philosciidae `ISO017`	3	5	
Philosciidae `sp. B04`	1	1	
Philosciidae sp.	2	6	
Philosciidae sp. B03	3	17	
Philosciidae sp. B10	1	1	
Philosciidae sp. B15	1	1	
Philosciidae sp. MA	1	1	
Hexapoda	3858	12115	
Entognatha	537	1319	Not all of the species listed will be unique (see Discussion)
Entognatha sp.	90	448	
Collembola	250	534	



Identification	No. records	No. individuals	Comments
Collembola sp.	250	534	
Diplura	197	337	
Diplura sp.	30	48	
Diplura sp. indet. MN	1	1	
Diplura sp. S1	1	1	
Campodeidae	1	1	
Campodeidae sp. B12	1	1	
Japygidae	88	181	
Japygidae `BDP152`	1	1	
Japygidae `BDP155` (DPL002)	1	2	
Japygidae `BDP157`	1	1	
Japygidae `BDP159`	4	4	
Japygidae `BDP164`	1	1	
Japygidae `DPL002`	1	1	
Japygidae `DPL002` s.l.	32	35	
Japygidae `DPL005`	2	2	
Japygidae `DPL007`	2	3	
Japygidae `DPL011`	1	1	
Japygidae `DPL017`	3	3	
Japygidae `sp. B04`	1	1	
Japygidae `sp. B34`	1	1	
Japygidae `sp. S2_MJ`	1	1	
Japygidae `Won1`	2	2	
Japygidae sp.	17	26	
Japygidae sp. B21	1	2	
Japygidae sp. B22	2	2	
Japygidae sp. B34	2	2	
Japygidae sp. B40	1	2	
Japygidae sp. S01	1	1	
Japygidae sp. S02_MJ	2	2	



Identification	No. records	No. individuals	Comments
Japygidae sp. S1	8	85	
Parajapygidae	60	89	
Parajapygidae `BDP173`	1	1	
Parajapygidae `BDP174`	1	1	
Parajapygidae `DPL020`	4	4	
Parajapygidae `DPL020`	1	1	
Parajapygidae `DPL023`	2	2	
Parajapygidae `DPL024`	1	1	
Parajapygidae `DPL029` (Parajapax swani group)	1	1	
Parajapygidae `DPL030` s.l.	2	2	
Parajapygidae `DPL031` s.l.	6	6	
Parajapygidae sp.	30	35	
Parajapygidae sp. B09	1	1	
Parajapygidae sp. B25	1	1	
Parajapygidae sp. B27	1	1	
Parajapygidae sp. MJ1	1	1	
Parajapygidae sp. MJ2	1	1	
Parajapygidae sp. S03	1	1	
Parajapygidae sp. S1	3	3	
Parajapygidae sp. S3	2	26	
Projapygidae	16	16	
Projapygidae `BDP218`	1	1	
Projapygidae `sp. MJ`	1	1	
Projapygidae `Won1`	1	1	
Projapygidae `Won2`	1	1	
Projapygidae sp.	2	2	
Projapygidae sp. B02	2	2	
Projapygidae sp. B05	1	1	
Projapygidae sp. B08	1	1	
Projapygidae sp. B09	1	1	



Identification	No. records	No. individuals	Comments
Projapygidae sp. B10	1	1	
Projapygidae sp. B23	1	1	
Projapygidae sp. MJ (DPR001)	2	2	
Projapygidae sp. UM (DPR002)	1	1	
Insecta	3321	10796	
Insecta sp.	1	1	
Blattodea	1364	3266	
Blattodea sp.	118	269	
Blattidae	368	624	
Blattidae `Helix-BNA`	7	29	
Blattidae `sp. S1`	1	1	
Blattidae `sp. S2`	27	27	
Blattidae sp.	190	316	
Blattidae sp. B06	20	86	
Blattidae sp. B06 (= sp. S02)	80	114	
Blattidae sp. S2	43	51	
Nocticolidae	878	2373	Not all of the species listed will be unique (see
			Discussion)
Nocticola `BBL038` (cockingi s.l.)	12	32	
Nocticola `BLA003`	8	21	
Nocticola `BLA005`	1	10	
Nocticola `sp. B07`	1	1	
Nocticola `sp. B29 (nr sp. B10)`	1	1	
Nocticola `sp. B31`	1	1	
Nocticola `Won1`	6	6	
Nocticola cockingi s.l.	117	318	
Nocticola quartermainei s.l.	63	127	
Nocticola sp.	414	1297	
Nocticola sp. B09	2	3	
Nocticola sp. B10	7	30	



Identification	No. records	No. individuals	Comments
Nocticola sp. B31	3	8	
Nocticola sp. B35	1	1	
Nocticola sp. B36 (cockingi s.l.)	49	118	
Nocticola 'sp. BIOLOGIC-BLAT002'	3	3	
Nocticola 'sp. BIOLOGIC-BLAT003'	6	6	
Nocticola 'sp. BIOLOGIC-BLAT004'	1	1	
Nocticola sp. S1	30	30	
Nocticola sp. S1	80	269	
Nocticola sp. S3	7	7	
Nocticola sp. S3	21	25	
Nocticolidae `Blattidae sp. S2`	1	1	
Nocticolidae lix-BNA`	5	12	
Nocticolidae lix-BNN`	30	37	
Nocticolidae sp.	8	8	
Coleoptera	379	977	
Coleoptera `marillana1`	2	5	
Coleoptera `marillana2`	1	6	
Coleoptera gen 1 sp. B06	3	4	
Coleoptera sp.	76	155	
Coleoptera sp. 806	2	26	
Coleoptera sp. B07/B09	3	3	
Brentidae	2	6	
Brentidae sp.	1	5	
Brentidae sp. B02	1	1	
Carabidae	62	82	
Anillini sp. S06	1	1	
Bembidiinae sp. B01	1	1	
Bembidiinae sp. B02	1	1	
Bembidiinae sp. B07	1	6	
Bembidiinae sp. B08	2	4	



Identification	No. records	No. individuals	Comments
Bembidiini sp.	1	1	
Carabidae sp.	9	9	
Carabidae sp. B01	2	2	
Carabidae sp. B01 (=Zuphiinae sp. S01)	1	1	
Carabidae sp. S1	2	2	
Carabidae sp. S8	1	1	
Gracilanillus `BCO220`	1	1	
Typhlozuphium humicolum	8	9	
Typhlozuphium longipenne	1	1	
Typhlozuphium sp. B02	4	7	
Typhlozuphium sp. B03	1	1	
Typhlozuphium sp. B04	1	1	
Zuphiinae sp. S01 s.l.	1	1	
Zuphiini sp.	21	30	
Zuphiini sp. B04	1	1	
Zuphiini sp. UM	1	1	
Colididae	2	2	
Colididae sp.	2	2	
Curculionidae	163	296	Not all of the species listed will be unique (see Discussion)
Cryptorhynchinae sp.	6	6	
Cryptorhynchinae sp. B10	7	7	
Cryptorhynchinae sp. B19	1	1	
Cryptorhynchinae sp. B20 (=sp. MA)	3	3	
Cryptorhynchinae sp. MJ	2	2	
Cryptorhynchinae sp. S03	1	1	
Curculionidae Genus 1 Genus 1 sp. B02 (=Curculionidae	9	66	
Curculionidae Genus 1 sp	5	7	
Curculionidae Genus 1 sp. 802 (=Curculionidae sp. 502)	88	100	



Identification	No. records	No. individuals	Comments
Curculionidae Genus 1 sp. B02 (=sp. S02)	1	1	
Curculionidae Genus 1 sp. B14	5	7	
Curculionidae Genus 1 sp. B15 (B02=S02 clade)	6	8	
Curculionidae Genus 2 sp.	1	1	
Curculionidae Genus 2 sp. B02	1	1	
Curculionidae Genus 2 sp. B07	4	6	
Curculionidae Genus 3 Genus 2 sp. B19	1	1	
Curculionidae sp.	2	2	
Curculionidae sp. MA	2	2	
Curculionidae sp. MJ	2	2	
Curculionidae sp. S2	11	43	
Curculionidae sp. S3	1	1	
Curculionidae sp. S8	1	25	
Curculionidae sp. UM	1	1	
Cyclominae sp. MA	2	2	
Ptiliidae	18	240	
Ptinella sp. B01	2	2	
Ptinella sp. B01 (=MC)	15	237	
Rodwayia sp. B02	1	1	
Scarabaeidae	1	1	
Scarabaeidae sp.	1	1	
Staphylinidae	38	141	
nr Claviger sp. B01	1	1	
Pselaphinae sp.	2	2	
Pselaphinae sp. B01	8	13	
Pselaphinae sp. B02	3	3	
Pselaphinae sp. B12	1	1	
Pselaphinae sp. S04	2	3	
Pselaphinae sp. UM	2	4	
Staphylinidae sp.	14	76	



Identification	No. records	No. individuals	Comments
Staphylinidae sp. B01	2	35	
Staphylinidae sp. S4	2	2	
Staphylinidae sp. UM	1	1	
Zopheridae	6	10	
?Colydiinae sp. MJ1	1	1	
?Colydiinae sp. MJ2	2	6	
Zopheridae sp. MJ1	1	1	
Zopheridae sp. MJ2	2	2	
Diptera	401	2413	
Diptera sp.	177	897	
Culicidae	9	107	
Culicidae sp.	9	107	
Phoridae	3	5	
Phoridae sp. B03	2	4	
Phoridae sp. B05	1	1	
Psychodidae	61	110	
Psychodidae sp.	61	110	
Sciaridae	151	1294	
Allopnyxia sp. B01	135	1167	
Sciaridae sp.	3	3	
Sciaridae sp. B01	13	124	
Embioptera	1	1	
Embioptera sp.	1	1	
Hemiptera	515	2036	
Hemiptera sp.	59	214	
Hemiptera sp. B02 (=Fulgoridae sp. S01)	3	31	
Hemiptera sp. S1	1	1	
Cicadellidae	1	1	
Cicadellidae sp.	1	1	
Cixiidae	56	121	



Identification	No. records	No. individuals	Comments
Cixiidae sp.	1	1	
Cixiidae sp. B02	55	120	
Coccoidea	3	4	
Coccoidea sp.	3	4	
Fulgoroidea	16	16	
Fulgoroidea sp.	8	8	
Fulgoroidea sp. S1	8	8	
Meenoplidae	372	1644	Not all of the species listed will be unique (see Discussion)
Meenoplidae `Helix-HEM003`	1	2	
Meenoplidae `sp. B02`	1	1	
Meenoplidae `sp. B04`	2	2	
Meenoplidae `sp. MJ-UM-OP-CAS`	1	1	
Meenoplidae sp.	41	90	
Meenoplidae sp. B02 (=Meenoplidae sp. S01)	2	11	
Meenoplidae sp. B04 (small eyes, faint pigment)	1	1	
Meenoplidae sp. MA	3	7	
Meenoplidae sp. S1	32	70	
Meenoplidae sp. WAM-PHAC001/H-HEM003	35	127	
Nisia sp.	2	2	
Phaconeura `BHE030`	4	20	
Phaconeura `BHE032`	6	9	
Phaconeura sp.	183	690	
Phaconeura sp. B02 (B form)	3	56	
Phaconeura sp. B02 (D form)	3	23	
Phaconeura sp. B02 s.l. (=Meenoplidae sp. S01)	20	213	
Phaconeura sp. B03 (winged, remnant eyes)	4	44	
Phaconeura sp. 806	8	98	
Phaconeura sp. B08	2	27	
Phaconeura sp. B13	12	112	



Identification	No. records	No. individuals	Comments
Phaconeura sp. B19	6	38	
Psyllidae	1	1	
Psyllidae sp.	1	1	
Reduviidae	3	3	
Emesinae `marillana`	1	1	
Ploiaria sp.	1	1	
Reduviidae sp.	1	1	
Hymenoptera	253	854	Probably not truly troglofaunal; see Discussion
Hymenoptera sp.	21	196	
Formicidae	232	658	
Aenictus sp.	1	1	
Formicidae sp.	225	651	
Paratrechina sp.	6	6	
Isoptera	67	488	Highly dubious records
lsoptera sp.	67	488	
Lepidoptera	35	92	Highly dubious records
Lepidoptera sp.	35	92	
Orthoptera	4	12	Highly dubious records
Orthoptera sp.	4	12	
Phthiraptera	1	1	Highly dubious records
Phthiraptera sp.	1	1	
Psocoptera	57	137	Highly dubious records
Psocoptera sp.	52	115	
Trogiidae	5	22	
Trogiidae sp.	5	22	
Thysanoptera	5	5	Highly dubious records
Thysanoptera sp.	5	5	
Thysanura	9	13	
Thysanura sp.	1	1	
Ateluridae	5	5	



Identification	No. records	No. individuals	Comments
?Atelurodes sp.	1	1	
Ateluridae `sp. MJ_UM_MA`	4	4	
Nicoletiidae	3	7	
Nicoletiidae sp.	1	1	
Trinemura sp.	2	6	
Zygentoma	229	500	
Zygentoma sp.	25	185	
Ateluridae	14	14	
?Atelurodes sp. S2	14	14	
Lepismatidae	3	3	
Lepismatidae sp.	3	3	
Nicoletiidae	187	298	
Ateluridae sp. MJ_UM_MA	6	7	
Atelurinae `Won2`	1	1	
Atelurinae sp.	7	9	
Atelurinae sp. B02	3	3	
Atelurinae sp. B04	1	1	
Atelurinae sp. B08	2	2	
Atelurodes sp. S2	4	4	
Dodecastyla `BZY084` (nr crypta)	1	1	
Dodecastyla crypta	63	85	
Dodecastyla sp.	5	12	
Dodecastyla sp. B02 (=Atelurodes sp. S02)	36	76	
Nicoletiidae sp.	2	2	
Nicoletiidae sp. B02 (=?Atelurodes sp. S02)	10	46	
Nicoletiidae sp. MJ_UM_MA	1	1	
Nicoletiinae sp.	4	4	
Trinemura sp.	17	17	
Trinemura sp. ?UM	1	1	
Trinemura sp. B02 (nr watsoni)	9	11	



Identification	No. records	No. individuals	Comments
Trinemura sp. B03	3	3	
Trinemura sp. B09	6	7	
Trinemura sp. B14	1	1	
Trinemura sp. B25	1	1	
Trinemura sp. B32	1	1	
Trinemura sp. UM	1	1	
Trinemura sp. UM	1	1	
Myriapoda	611	1931	
Myriapoda sp.	1	1	
Chilopoda	72	233	
Chilopoda sp.	4	6	
Chilopoda sp. B01 (Scolopendridae/Cryptopidae)	1	1	
Chilopoda sp. indet. MN	2	2	
Geophilida	14	16	
Geophilida sp.	4	4	
Chilenophilidae	6	7	
Chilenophilidae `BGE053`	1	1	
Chilenophilidae sp. B02	2	3	
Chilenophilidae sp. B04	1	1	
Chilenophilidae sp. B07	1	1	
Ribautia sp. B02	1	1	
Geophilidae	2	3	
Geophilidae sp.	2	3	
Schendylidae	2	2	
Australoschendyla sp. B06	2	2	
Scolopendrida	50	207	Not all of the species listed will be unique (see Discussion)
Scolopendrida sp.	5	5	
Scolopendrida sp. B01	1	1	
Scolopendrida sp. S1	1	1	



Identification	No. records	No. individuals	Comments
Scolopendrida sp. S2	1	100	
Cryptopidae	34	88	
Cryptopidae sp.	6	6	
Cryptops `BSCOL059-DNA`	1	1	
Cryptops `DNA17`	1	1	
Cryptops sp.	5	5	
Cryptops sp. B07 (=Scolopendrida sp. S02)	9	10	
Cryptops sp. B07 (=Scolopendrida sp. S02)	1	5	
Cryptops sp. B10 (=Scolopendrida sp. S05)	1	1	
Cryptops sp. B15	2	2	
Cryptops sp. B15 (moved to)	3	3	
Cryptops sp. B39	1	1	
Cryptops sp. B39	1	50	
Cryptops sp. MJ	1	1	
Cryptorhinchinae sp. S3	1	1	
nr Cryptops sp. B11	1	1	
Scolopendridae	8	12	
Cormocephalus `CHI003`	3	3	
Cormocephalus `CHI003`	1	5	
Cormocephalus `pyropygus`	1	1	
Cormocephalus sp. B03	1	1	
Scolopendridae sp. B02	1	1	
Scolopendridae sp. S05	1	1	
Scolopendromorpha	1	1	
Cryptopidae	1	1	
Cryptopidae indet. MN	1	1	
Diplopoda	343	1263	
Diplopoda sp.	1	1	
Polydesmida	4	28	
Polydesmida sp. B03 (nr Lissodesmus)	1	1	



Identification	No. records	No. individuals	Comments
Polydesmida sp. B11	2	2	
Dalodesmidae	1	25	
Dalodesmidae sp. B01	1	25	
Polyxenida	323	1189	
Polyxenida sp.	3	3	
Polyxenida sp. S1	46	106	
Polyxenida sp. S5	7	7	
Lophoproctidae	267	1073	
Lophoproctidae sp.	36	116	
Lophoturus madecassus	212	910	
Lophoturus madecassus	19	47	
Spirobolida	15	45	
Trigoniulidae	15	45	
Trigoniulidae sp.	2	3	
Trigoniulidae sp. B03	11	38	
Trigoniulidae sp. B05	1	2	
Trigoniulidae sp. B06	1	2	
Pauropoda	107	236	Not all of the species listed will be unique (see Discussion)
Pauropoda sp.	49	121	
Pauropoda sp. MA	1	3	
Pauropoda sp. MA	1	5	
Pauropoda sp. MJ	1	1	
Pauropoda sp. S04	2	2	
Pauropoda sp. S1	4	4	
Pauropoda sp. S4	2	2	
Pauropoda sp. UM	1	6	
Tetramerocerata	46	92	
Tetramerocerata sp.	1	1	
Pauropodidae	45	91	



Identification	No. records	No. individuals	Comments
Allopauropus sp. B11	2	2	
Decapauropus sp. B01	1	1	
Decapauropus sp. B02	1	5	
Decapauropus tenuis	1	1	
Pauropodidae `BPU076`	2	2	
Pauropodidae `BPU078`	1	1	
Pauropodidae `BPU114`	1	3	
Pauropodidae sp.	2	19	
Pauropodidae sp. B01 s.l.	12	25	
Pauropodidae sp. B04 (Decapauropus tenuis?)	6	6	
Pauropodidae sp. B06	2	2	
Pauropodidae sp. 807	2	4	
Pauropodidae sp. B12	1	1	
Pauropodidae sp. B13	1	1	
Pauropodidae sp. B14	6	14	
Pauropodidae sp. B15	1	1	
Pauropodidae sp. B16	1	1	
Pauropodidae sp. B28	1	1	
Polypauropus sp. B01	1	1	
Symphyla	88	198	Not all of the species listed will be unique (see Discussion)
Symphyla GEN 1 sp B3	1	1	
Symphyla sp.	23	45	
Symphyla sp. B04 (BHP)	1	1	
Symphyla sp. MA	4	25	
Symphyla sp. MJ	1	1	
Symphyla sp. UM	1	2	
Cephalostigmata	57	123	
Cephalostigmata `DNA06`	1	1	
Cephalostigmata `DNA07`	1	2	



Identification	No. records	No. individuals	Comments
Cephalostigmata `sp. Yandi`	1	1	
Cephalostigmata sp.	6	6	
Scolopendrellidae	12	12	
Symphylella sp.	6	6	
Symphylella sp. B03	1	1	
Symphylella sp. B05	2	2	
Symphylella sp. B11	2	2	
Symphylella sp. B13	1	1	
Scutigerellidae	36	101	
Hanseniella sp.	1	1	
Hanseniella sp. B07	5	7	
Hanseniella sp. B08	4	6	
Hanseniella sp. B08	2	51	
Hanseniella sp. B09	1	1	
Hanseniella sp. B13	1	1	
Hanseniella sp. B14	5	8	
Hanseniella sp. B21	2	3	
Hanseniella sp. B34	1	1	
Hanseniella sp. B35	1	1	
Hanseniella sp. B36-DNA	1	1	
Hanseniella sp. B37-DNA	1	1	
Hanseniella sp. B42-DNA	1	1	
Hanseniella sp. B43-DNA	1	1	
Hanseniella sp. MAo	4	4	
Scutigerella sp. B03	4	8	
Symphyella sp.	1	5	
Mollusca	2	51	
Gastropoda sp.	2	51	
Grand Total	6614	19355	