Sanjiv Ridge

BWT Stygofauna Baseline Survey

Report to Atlas Iron

20 June 2025

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3				

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Executive Summary

Atlas Iron Ltd is currently in the process of developing the Sanjiv Ridge Project, an iron ore mine located approximately 33 km south of Marble Bar in the Pilbara region of Western Australia. Approval has been previously granted for above water table (AWT) mining of eight pits within the Sanjiv Ridge Project area. Proposed project development plans involve extending mining below the water table (BWT) at four pits: Sparrow Lake, Shark Gully, Runway South and Runway North. Consequently, there is a concern for stygofauna values due to predicted groundwater drawdown. To support the approval of BWT mining, Atlas commissioned Biologic Environmental Survey to conduct a stygofauna survey within the Study Area at Sanjiv Ridge to provide clarity regarding the potential impact on stygofauna associated with groundwater extraction.

The survey was undertaken across three trips between May and November in 2024. All available pastoral wells, production and monitoring bores were sampled and a total of 141 samples were taken across the three trips.

Of the 141 stygofauna samples collected during the survey, 54 yielded stygofauna (3,018 specimens from nine stygofauna orders). Initial morphological identification followed by molecular analyses determined 47 distinct stygofauna operational taxonomic units (OTUs), comprising annelids (7 OTUs), amphipods (8 OTUs), syncarids (6 OTUs), isopods (7 OTUs), copepods (11 OTUs) and ostracods (8 OTUs). Leftover material from subsampling for molecular identification, as well as regional specimens not selected for subsampling and a few specimens that failed during molecular analysis represented a further 25 indeterminate higher-level taxa.

Based on currently known linear ranges, the 47 stygofauna taxa recorded from the Study Area can be broken into four groups according to their currently known distributions:

- Regionally widespread throughout the Pilbara (100 – 1,000 km linear range) – 5 taxa
- Locally widespread within/beyond the Study Area (10 – 100 km linear range) – 10 taxa
- Locally restricted within/nearby the Study Area (linear range <10 km) – 9 taxa
- Known from a single site within/nearby the Study Area – 23 taxa.

Seventeen taxa are currently known only from the Study Area, and only six of the 47 taxa recorded in the current survey matched to an external sequence, meaning 41 taxa have never been recorded anywhere else previously.

With the present sampling effort and the current molecular results, it appears there may be a restricted stygofauna community within the area encompassing Sparrow Lake and Shark Gully pits. This is based on the current known range of OTU Bathynellidae `sp. Biologic-BATH038`, which extends from just west of Shark Gully to just north of Sparrow Lake, just over 1.5 km. Four other potentially restricted stygofauna OTUs Phreodrilidae `sp. Biologic-OLIG185`, *Atopobathynella* `sp. Biologic-PBAT081`, Microcerberidae `sp. Biologic-ISOP221` and *Parastenocaris* `sp. Biologic-HARP106 have not been recorded outside of the Sparrow Lake and Shark Gully areas.

No stygofauna were detected around the Runway pits to the north of this area despite 24 samples being taken there. No stygofauna have been detected at the Glen Herring pits either, however only six samples have been taken in this area.

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Glossary

AWT	Above water table
BoM	Bureau of Meteorology
BWT	Below water table
DBCA	Department Biodiversity, Conservation and Attractions
DEC	Department of Environment and Conservation
DO	Dissolved oxygen
DoW	Department of Water
EC	Electrical conductivity
EIA	Environmental impact assessment
EPA	Western Australian Environmental Protection Authority
LTA	Long-term average
ORP	Oxidation reduction potential
OTU	Operational taxonomic unit – species-equivalent taxonomic unit based on COI or 12S cluster similarity
SRE	Short-range endemic
WAM	Western Australian Museum

1 Introduction

1.1 Background

Atlas Iron Ltd (Atlas) is currently in the process of developing the Sanjiv Ridge Project (formerly known as the Corunna Downs Project, and hereafter referred to as the Study Area), an iron ore mine located approximately 33 km south of Marble Bar in the Pilbara region of Western Australia (the Project) (Figure 1.1). Approval has been previously granted for above water table (AWT) mining of eight pits within the Sanjiv Ridge Project area.

Proposed project development plans involve extending mining below the water table (BWT) at four pits: Sparrow Lake, Shark Gully, Runway South and Runway North. Consequently, there is a concern for stygofauna (animals that live in the groundwater) values due to predicted groundwater drawdown. In previous surveys of the Study Area, only troglofauna (subterranean animals living above the water table) have been recorded. It was assumed that the habitats beneath the range would not be prospective to stygofauna as the aquifers were too narrow. To support the approval of BWT mining, Atlas commissioned Biologic Environmental Survey (Biologic) to conduct a stygofauna survey within the Study Area at Sanjiv Ridge to provide clarity regarding the potential impact on stygofauna associated with groundwater extraction.

1.2 Scope and objectives

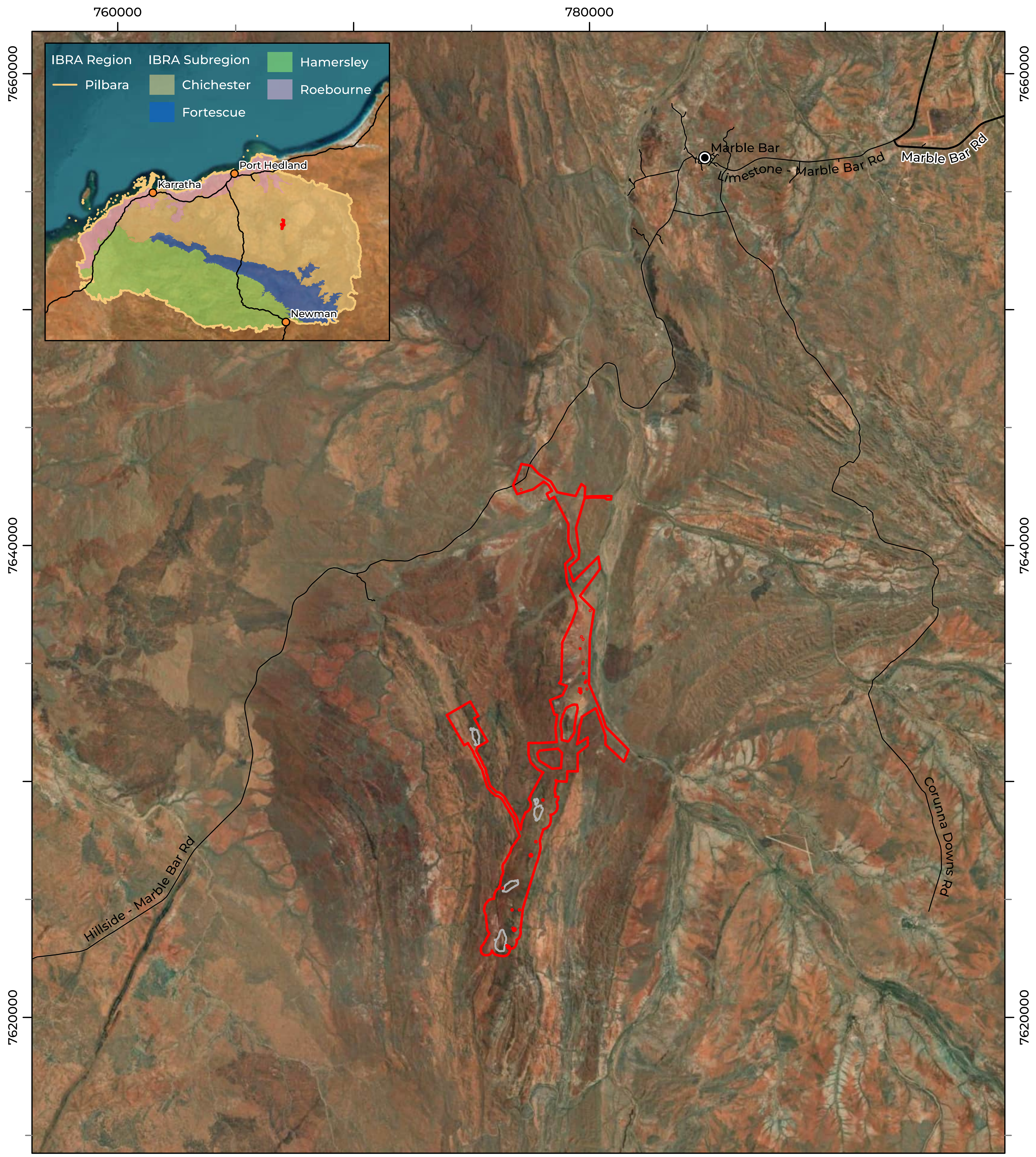
The aim of this report is as follows:

- Provide background information on the Study Area
- Provide details of the 2024 stygofauna survey undertaken by Biologic
- Present the results from morphological and genetic analysis of the specimens collected during the survey
- Provide context for the distribution of specimens within the Study Area and surrounds.

1.3 Compliance

This assessment was carried out in accordance with the following guidelines and recommendations developed by the relevant state and federal regulatory bodies:

- EPA (2016a) Environmental factor guideline: subterranean fauna
- EPA (2021) Technical guidance: subterranean fauna surveys for environmental impact assessment
- EPA (2023) Statement of environmental principles, factors, objectives and aims of EIA



LEGEND

- Study Area
- Pits
- Local Road
- State Road

Scale 1:150,000

0 1 2 3 4 5 km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 08/05/2025

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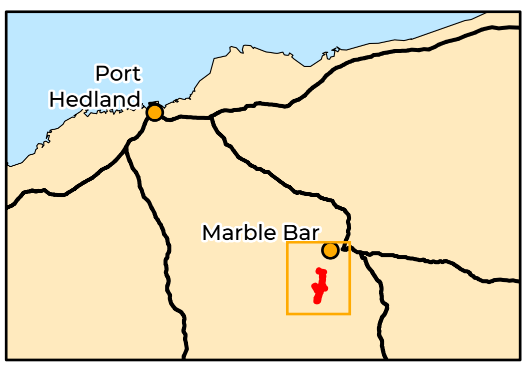

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Sanjiv Ridge BWT
Subterranean Fauna
Baseline Survey

Figure 1.1: Study Area and regional location

1.4 Subterranean fauna

Subterranean fauna are animals that spend most or all their lives in underground habitats such as caves, vugs, and aquifers. The subterranean fauna communities of Western Australia are globally significant due to their high levels of biodiversity and endemism (EPA, 2016a). Previous estimates of subterranean species richness in Western Australia ranged from 3,000 in the Pilbara alone (Halse, 2018) to over 4,000 in the western half of Australia (Guzik *et al.*, 2010), but the results of recent sampling and genetic sequencing point to far higher numbers. Additionally, many areas of Western Australia are under sampled, with sampling coverage biased towards areas that are of interest to mining. Surveys in unsampled areas, as well as molecular analyses of new and existing specimens, frequently unearth new putative species (e.g. Abrams *et al.*, 2019).

With the exceptions of three species of fish and one species of blind snake, all the recorded species of subterranean fauna in Western Australia are invertebrates (Aplin, 1998; EPA, 2016a; Larson *et al.*, 2013; Moore, 2019). They are typically categorised as either troglofauna (air-breathing species that live above the water table, such as arachnids and myriapods) or stygofauna (aquatic species that inhabit groundwater, such as crustaceans and diving beetles). Species can be further categorised based on their ecological dependence on subterranean habitats: troglobites and stygobites are obligate inhabitants of subterranean habitats; troglophiles and stygophiles use surface habitats at least occasionally; and trogloxenes and stygoxenes use subterranean habitats opportunistically. However, the reliability of this type of classification is limited by ecological information, and assumptions about the ecology of a species are usually based on morphology and collection data (Howarth & Moldovan, 2018). Populations within species can also be partitioned between epigean and subterranean habitats (Harms, 2018).

Obligate subterranean fauna species usually have small geographic ranges due to the limited extent and connectivity of suitable habitat within the wider landscape. For example, individual calcrete aquifers within arid zones act as 'subterranean islands' that support rich and highly endemic assemblages of subterranean fauna (Cooper *et al.*, 2002; Humphreys, 2001). Other isolated geological features such as elevated ranges can serve similar functions (DEC, 2007).

Species with restricted ranges are more susceptible to disturbance-induced conservation impacts than those that are widespread (Ponder & Colgan, 2002). Many (and potentially most) species of subterranean fauna in WA can be classified as short-range endemics (SRE; Harvey, 2002). This renders subterranean species highly vulnerable to the effects of habitat removal. Nevertheless, estimates of species ranges can be constrained by the coverage, intensity and success of sampling (Eberhard *et al.*, 2009) and are often based on few records, limited ecological data, and limited understandings of habitat.

2 Existing Environment

2.1 Biogeography

The Study Area is located within the Chichester (PIL01) subregion of the Pilbara bioregion as defined by the interim Biogeographic Regionalisation of Australia (IBRA) (Thackway & Cresswell, 1995). The Chichester subregion is characterised by undulating Archaean granite and basalt plains and include significant areas of basaltic ranges (Kendrick & McKenzie, 2003). Vegetation in this subregion is characterised by a shrub steppe containing *Acacia inaequilatera* over *Triodia wiseana* on the plains, while *Eucalyptus leucophloia* tree steppes occur on the ranges (Kendrick & McKenzie, 2003). A characteristic feature of the Chichester is the Chichester range that extends 400 km west of the Millstream-Chichester National park to Balfour Downs station in the east (McKenzie *et al.*, 2009). This region also contains the Marble Bar – Nullagine mineral province with its geological complexity (Kendrick & McKenzie, 2003).

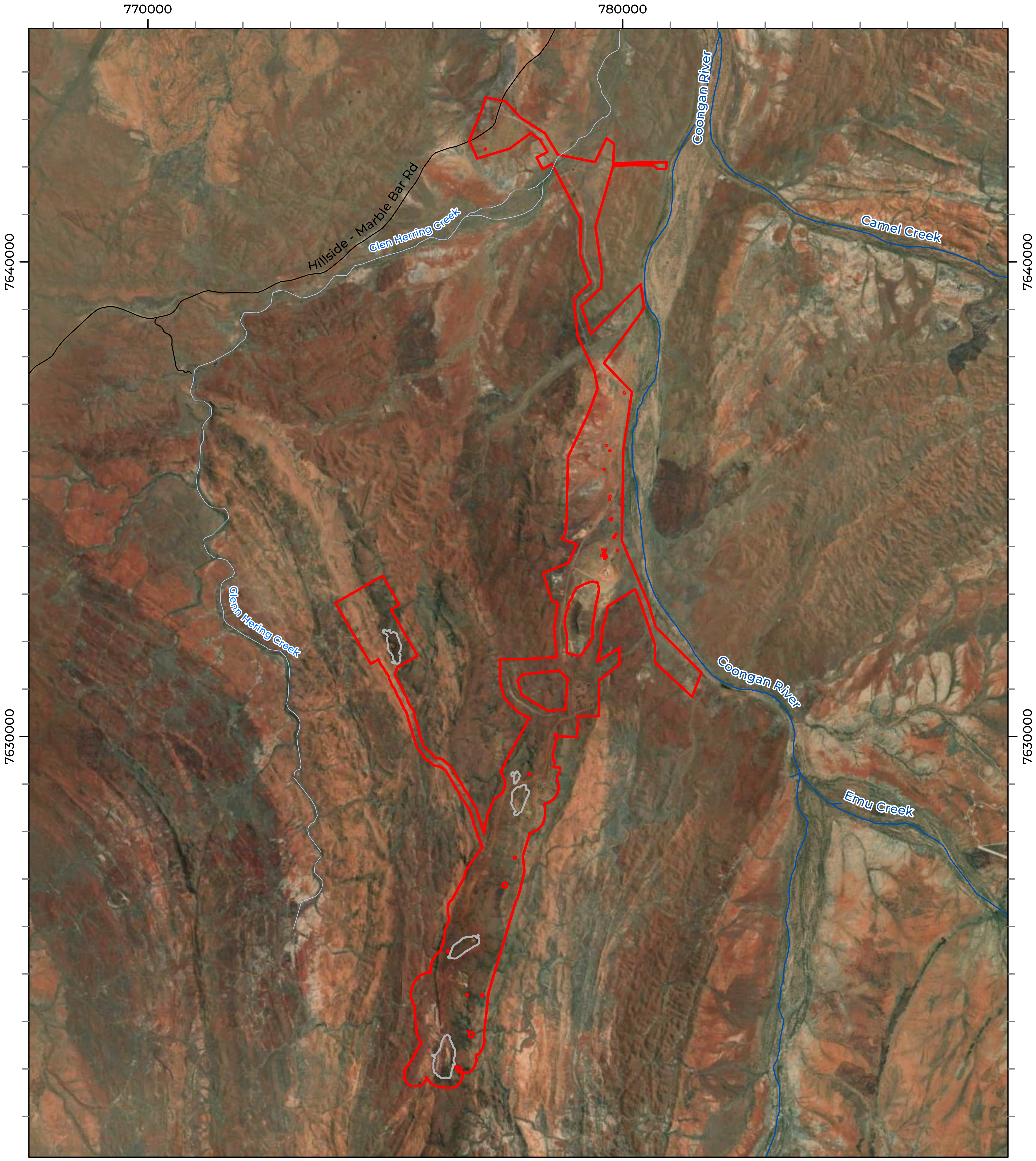
2.2 Hydrology

The surface and groundwater hydrology of the Pilbara is highly variable and dependent on climactic conditions, severe drought can be followed by major flooding (DoW, 2010). Stream flows in the Pilbara are dependent on rainfall resulting in high seasonality and variability. Most runoff and recharge occurs as a result of episodic cyclonic activities occurring mostly from January to March (DoW, 2010).

The Study Area lies entirely with the Coongan River subcatchment of the De Grey River Catchment (Ruprecht & Ivanescu, 2000). The Coongan River runs alongside the northern extent of the Study Area (Figure 2.1). Its tributary, Glen Herring Creek, crosses the Study Area near the northern end (Figure 2.1). Other drainage lines within the Study Area are ephemeral, running only during times of major rainfall events.

2.3 Hydrogeology

The Study Area occurs within the Pilbara Groundwater Province, which is characterised by discontinuous alluvium within ridges of faulted granitoid and folded greenstone rocks (Woodman Environmental, 2019). Both alluvial groundwater and fractured rock aquifer systems feed water features in the Study Area, however groundwater occurrence is often compartmentalised as the system is associated with varying degrees of permeability, controlled by structural features such as fractures, weathered zones, bedding planes, partings and joints (Woodman Environmental, 2019).



LEGEND

Study Area

Pits

Local Road

Surface Hydrology

Minor

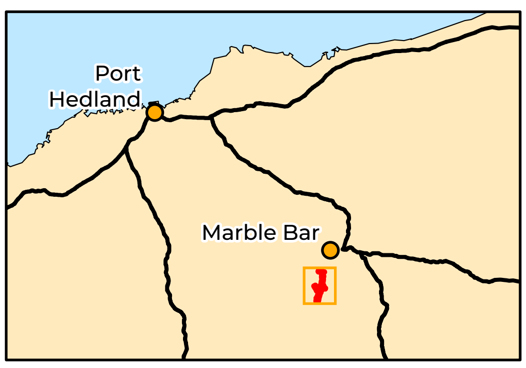
Major

Scale 1:75,000

0 1 2 3 km

Coordinate System: GDA 1994 MGA Zone 50 Transverse Mercator

Created: 12/05/2025



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Sanjiv Ridge BWT Subterranean Fauna Baseline Survey

Figure 2.1: Hydrology of the Study Area

2.4 Geology

The Study Area lies within the Cleaverville Formation of the Gorge Creek Group, which consists of banded iron-formation and ferruginous chert, with local banded quartz-magnetite-grunerite rock, overlaid with ferruginous duricrust and massive, pisolitic, and nodular ferricrete. The local geology of the Cleaverville Formation is deformed and offset to the north by the massive basalt, felsic volcanic sandstone and local quartz sandstone of the Wyman Formation of the Kelly Group. The banded iron-formation and ferruginous duricrust that is targeted for iron ore mining, and which comprises the likely most high-quality subterranean fauna habitat, runs through the southern end of the Study Area and through the Glen Herring spur. These prospects are bordered by the Coongan greenstone belt and the Corunna Downs and Shaw granitoid complexes.

3 Methods

3.1 Desktop assessment

Available records of Stygofauna taxa within a 50 km radius surrounding the Study Area were compiled from the following sources:

- Collection databases of the Western Australian Museum (WAM, 2025a, 2025b, 2025c, 2025d, 2025e) for arachnids and myriapods, crustaceans, insects, molluscs and worms (accessed February 2025).
- Department of Climate Change, Energy, the Environment and Water (DCCEEW, 2025) Environment Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool (accessed February 2025).
- Reports from previous regional subterranean fauna surveys.

Data were filtered by collection method, habitat, taxonomy, and other relevant data fields to exclude terrestrial and non-stygofauna records. WAM registration numbers were cross referenced between data sources to avoid duplication. Reports from subterranean fauna surveys within and surrounding the Study Area were reviewed for local and regional context. Reports from relevant surveys are listed below:

- Subterranean Ecology (2006) Sulphur Springs Project subterranean fauna survey report
- Subterranean Ecology (2012) Mount Webber Iron Ore Project stygofauna pilot survey
- MWH (2016) Corunna Downs subterranean fauna assessment
- Biologic (2019) Warrawoona Gold Project: subterranean fauna survey
- Biologic (2020) Miralga Creek: subterranean fauna assessment
- Biologic (2021) McPhee Creek subterranean fauna assessment

3.2 Survey design

3.2.1 Survey timing and personnel

The survey was undertaken across three trips between May and November in 2024 (Table 3.1). Sampling was conducted under DBCA Regulation 27 licence (BA27001059) (Appendix A).

Table 3.1: Summary of field survey details

Trip	Season	Survey dates	Personnel
Trip 1	Wet season	May 23rd to 30th 2024	Morgan Lythe (Senior Zoologist) Chao Lyu (Zoologist)
Trip 2	Dry season	September 2nd to 9th 2024	Phil Runham (Principal Zoologist) Chao Lyu (Zoologist)
Trip 3	Dry season	November 8th to 15th 2024	David Symons (Senior Field Technician) Brad Scanlon (Senior Zoologist)

3.2.2 Weather

Long term weather data (2000-2025) and survey specific weather data (November 2023-November 2024) was obtained from the Bureau of Meteorology (BoM) weather monitoring station in Marble Bar (station no. 004106) which is located approximately 30 km north of the Study Area.

The average monthly temperature 6 months prior to and for the duration of the survey were on par with the typical long-term average (LTA). Six months prior to the survey taking place, 250.6 mm of rain was recorded, with a significant rain event happening 8 weeks prior to the survey that saw 73.6 mm of rain falling in 19 days which was double the LTA. The rainfall recorded in every other month leading up to the survey fell below the LTA (Figure 3.1).

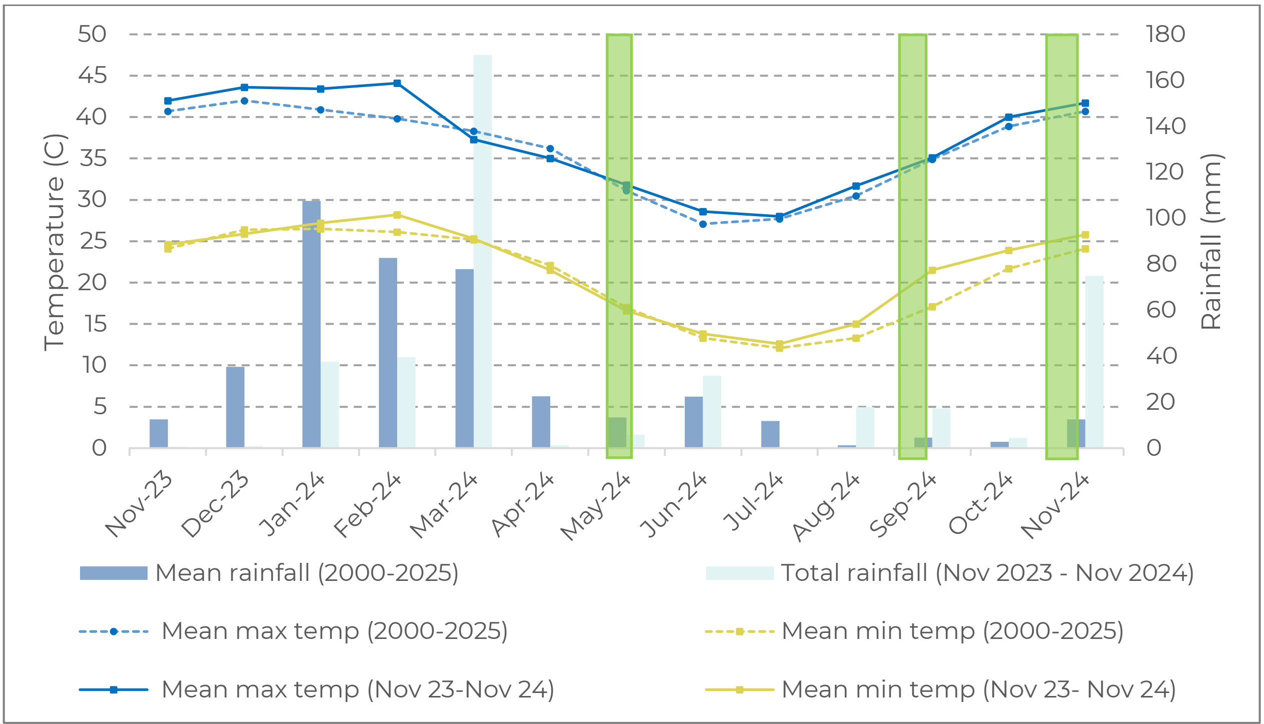


Figure 3.1: Historic and current rainfall and temperature for Marble Bar (004106). Green bars indicate survey timing.

3.2.3 Site selection and sample effort

Sites for the three rounds of sampling were selected to achieve a broad spatial distribution while capturing a diverse range of prospective habitat. Several factors were considered when selecting individual sites, including, aquifer depth, time since bore construction, and accessibility for the field team. Some sites adjacent to the Coongan River were selected to intercept alluvial deposits which have been shown to be great habitat for stygofauna (Hancock & Boulton, 2008). All available pastoral wells, production and monitoring bores were sampled for this survey. A total of 141 samples were taken across the three trips (Figure 3.1, Table 3.2). Sample details are provided in Appendix C.

Table 3.2: Sample effort across the three survey trips

Trip	No. sites sampled	No. haul samples	No. pump samples
Trip 1	37	33	4
Trip 2	50	48	2
Trip 3	54	49	5

3.2.4 Sampling methods

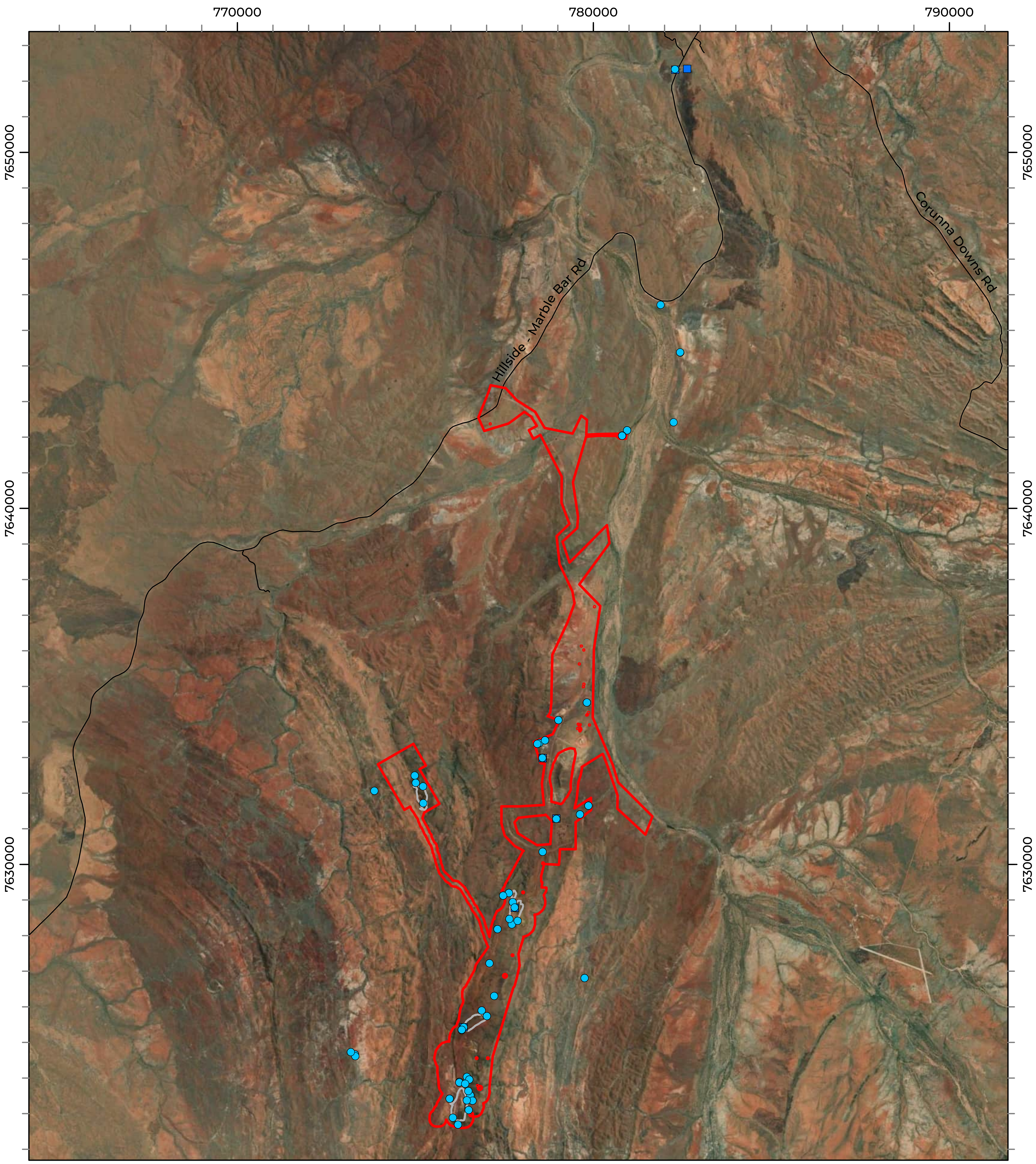
Stygofauna sampling was undertaken in accordance with published technical guidance (EPA, 2016b, 2021).

3.2.4.1 Stygofauna net hauling

Stygofauna were sampled in cased bores and uncased exploration drill holes via net hauling. A weighted, conical plankton net with 53 µm or 150 µm mesh sidewalls and a 53 µm mesh base was lowered to the bottom of the bore and retrieved slowly to filter stygofauna from the water column. The net was agitated at the base of each haul to maximise the collection of benthic animals before being retrieved at a moderate pace to avoid creating a bow wave and allow filtration. The diameter of the net was chosen to optimise the volume of water filtered while also reducing the risk of snagging and equipment damage. For example, 100–150 mm holes were sampled using 90 mm diameter nets, while 50 mm piezometer bores were sampled with 35 mm diameter nets. Each haul sample comprised three hauls using a 150 µm mesh net and three using a 50 µm mesh net. Fewer hauls were sometimes undertaken due to site-specific limitations such as thick sediment or drilling muds blocking the net, or snagging. The collected contents were then elutriated with cold water to remove coarse sediments and transferred into a clean 125 ml polycarbonate vial containing a chilled preservative (100% ethanol). Samples containing substantial amounts of sediment were split between multiple vials to optimise preservation.

3.2.4.2 Pumping

When sampling by hauling was not possible due to pump infrastructure covering the opening, ground water was sampled by pumping. This was done by placing a net over the pump outlet and allowing the water to flow through for up to 20 minutes. The contents of the net were then rinsed with a chilled preservative (100% ethanol) and transferred into a vial. The vial was then immediately placed on ice.



LEGEND

Study Area

Pits

Local Road

Stygofauna Sample

Haul

Pump

Scale 1:100,000

0 1 2 3 4 km

Coordinate System: GDA 1994 MGA Zone 50 Transverse Mercator

Created: 08/05/2025

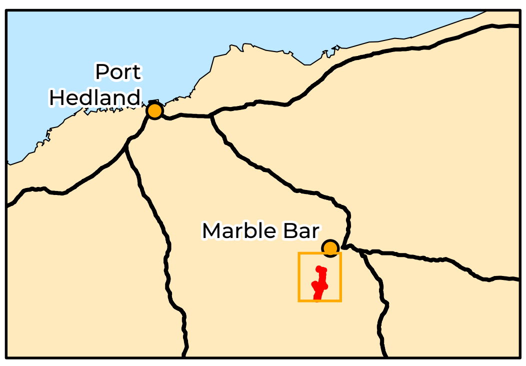


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Figure 3.1: Stygofauna sampling locations

3.2.5 Water physiochemistry

When and where possible, prior to stygofauna sampling at each site, physiochemical water quality parameters (temperature, electrical conductivity, pH, reductive oxidative potential, salinity and dissolved oxygen) were measured with a multiparameter water quality meter. Groundwater for water quality measurements was collected from the top of the water table using a plastic bailer. Groundwater physiochemical measurements for each analyte were pooled by area and presented as mean ± standard error, or as raw values where replicate measurements were not taken.

3.3 Specimen identification

3.3.1 Morphological identification

Sorting of subterranean fauna from the preserved samples was done with forceps and pipettes under dissecting microscopes. Subsequent parataxonomy and taxonomic identification was completed under dissecting microscopes and compound microscopes. Preliminary identification of subterranean fauna involved identification of specimens to morphotype classifications utilising published literature and available taxonomic keys for each group. Morphotypes from each sample were preserved in 100% ethanol for further morphological and molecular analyses. Unique specimen tracking codes were assigned to each individual specimen. Species comparisons and alignments were performed using specimens collected beyond the Study Area across the wider sub-regional area. Dr Juliana Pille Arnold, Dr Giulia Perina, Morgan Lythe, Jing Yi Lin and Aimee Carpenter completed specialist taxonomic identifications and regional comparisons of stygofauna.

3.3.2 Molecular analysis and identification

Biologic was also commissioned to undertake a molecular systematics analysis on a range of specimens from the study area. Specimens were chosen both to achieve an even geographical spread across the study areas well as to clarify morphological IDs when specimens could not be identified due to damage, sex or immature life stage. DNA barcoding of the mitochondrial CO1 gene was conducted on 96 specimens, 83 of which returned successful sequences. See Appendix E for molecular systematics methods and analysis.

3.4 Rationalisation of morphological and molecular identification

Final taxonomic affiliations for specimens were determined, with combined consideration of morphological and molecular analyses, according to the following protocol:

1. Specimens belonging to groups with comprehensive taxonomic treatments (*i.e.*, formally described), which were not sequenced, were assigned their morphological determinations as final identification.

2. For specimens that were morphologically identified but sequencing failed, the morphological species was retained as the final identification.
3. Where the same specimens were sequenced and morphologically identified, and the two data sets arrived at a matching and consistent taxon (*i.e.*, morphological species 'X' always equated to lineage 'X'), then the final identification was assigned as the lowest taxonomic rank, with the lineage name used as the species epithet.
4. Where the same specimens were sequenced and morphologically identified, and the two data sets did not align (*i.e.*, morphological species 'X' equated to multiple lineages), then the final identifications were split into species-level taxa based on the sequencing results and assigned the relevant lineage name as the species epithet.
5. Where specimens had not been, or could not be, morphologically identified (denoted by the indeterminate 'sp.'), and were sequenced, then the lineage name was used for the final identification.

4 Results & Discussion

4.1 Desktop assessment

The desktop assessment revealed only 102 records of stygofauna within 50 km of the Study Area, predominantly around Mount Webber, Miralga Creek and McPhee Creek, with a few specimens from regional pastoral bores (Appendix B). No stygofauna have been previously recorded within 25km of the Study Area. Most of these stygofauna records were morphological identifications, identified only to higher order, morphospecies or to species complex (Appendix B).

4.2 Stygofauna survey

Of the 141 stygofauna samples collected during the survey, 54 yielded stygofauna (3,018 specimens from nine stygofauna orders) (Appendix C). Initial morphological identification followed by molecular analyses determined 47 distinct stygofauna operational taxonomic units (OTUs), comprising annelids (7 OTUs), amphipods (8 OTUs), syncarids (6 OTUs), isopods (7 OTUs), copepods (11 OTUs) and ostracods (8 OTUs) (Table 4.1, Appendix D). Leftover material from subsampling for molecular identification, as well as regional specimens not selected for subsampling and a few specimens that failed during molecular analysis represented a further 25 indeterminate higher-level taxa (Appendix D).

Based on currently known linear ranges, the 45 stygofauna taxa recorded from the current survey can be broken into four groups according to their currently known distributions:

- Regionally widespread throughout the Pilbara (100 – 1,000 km linear range) – 4 taxa
- Locally widespread within/beyond the Study Area (10 – 100 km linear range) – 8 taxa
- Locally restricted within/nearby the Study Area (linear range <10 km) – 8 taxa
- Known from a single site within/nearby the Study Area – 25 taxa.

Currently, 17 stygofauna taxa are known only from within the Study Area (Table 4.1). Each stygofauna group is discussed in more detail below.

Table 4.1: Stygofauna OTUs recorded from the current survey

Higher taxon	Taxon	# sites	Linear range	Ecology
CLITELLATA: Enchytraeida				
Enchytraeidae	Enchytraeidae \`sp. Biologic-OLIG045\`	1	>600 km	Stygophile/xene
	Enchytraeidae \`sp. Biologic-OLIG183\`	1	Singleton	Stygophile/xene
	Enchytraeidae \`sp. E12 LB-2015\`	1	>600 km	Stygophile/xene
CLITELLATA: Haplotaxida				
Naididae	Naididae \`sp. N4 LB-2015\`	1	145.07 km	Stygophile/xene
Phreodrilidae	Phreodrilidae \`sp. Biologic-OLIG184\`	3	19.87 km	Stygophile/xene
	Phreodrilidae \`sp. Biologic-OLIG185\`	2	0.01 km	Stygophile/xene

Higher taxon	Taxon	# sites	Linear range	Ecology
	Phreodrilidae `sp. Biologic-OLIG186`	2	6.87 km	Stygophile/xene
MALACOSTRACA: Amphipoda				
Bogidiellidae	Bogidiellidae `sp. Biologic-AMPH112`	1	Singleton	Stygobite
	Bogidiellidae `sp. Biologic-AMPH113`	3	2.65 km	Stygobite
Eriopisidae	*Pilbarana* `sp. Biologic-AMPH114`	1	60.87 km	Stygobite
	Pilbarana `sp. Biologic-AMPH115`	2	10.70 km	Stygobite
Paramelitidae	Paramelitidae `sp. Biologic-AMPH108`	1	Singleton	Stygobite
	Paramelitidae `sp. Biologic-AMPH109`	1	Singleton	Stygobite
	Paramelitidae `sp. Biologic-AMPH110`	2	15.42 km	Stygobite
	Paramelitidae `sp. Biologic-AMPH111`	4	11.90 km	Stygobite
MALACOSTRACA: Bathynellacea				
Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	4	1.54 km	Stygobite
Parabathynellidae	*Atopobathynella* `sp. Biologic-PBAT081`	2	0.01 km	Stygobite
	Atopobathynella `sp. Biologic-PBAT082`	1	Single site	Stygobite
	Atopobathynella `sp. Biologic-PBAT083`	1	Single site	Stygobite
	Atopobathynella `sp. Biologic-PBAT084`	1	Single site	Stygobite
	Parabathynellidae `sp. Biologic-PBAT085`	1	Singleton	Stygobite
MALACOSTRACA: Isopoda				
Microcerberidae	Microcerberidae `sp. Biologic-ISOP208`	1	Single site	Stygobite
	Microcerberidae `sp. Biologic-ISOP209`	3	21.09 km	Stygobite
	Microcerberidae `sp. Biologic-ISOP210`	1	Single site	Stygobite
	Microcerberidae `sp. Biologic-ISOP211`	7	19.15 km	Stygobite
	Microcerberidae `sp. Biologic-ISOP212`	1	Singleton	Stygobite
	Microcerberidae `sp. Biologic-ISOP221`	1	Single site	Stygobite
Tainisopidae	*Pygolabis* `sp. Biologic-ISOP213`	1	Singleton	Stygobite
COPEPODA: Calanoida				
Ridgewayiidae	*Stygoridgewayia* `sp. Biologic-CALA011`	1	Singleton	Stygobite
COPEPODA: Cyclopoida				
Cyclopidae	*Diacyclops* `sp. Biologic-CYCL104`	1	Single site	Stygophile/xene
	Diacyclops `sp. Biologic-CYCL105`	7	25.64 km	Stygophile/xene

Higher taxon	Taxon	# sites	Linear range	Ecology
	Pescecyclops `sp. Biologic-CYCL107`	1	Singleton	Stygophile/xene
	Pescecyclops `sp. WAM CYLP001`	1	>300 km	Stygophile/xene
	Thermocyclops `sp. Biologic-CYCL014`	1	>400 km	Stygophile/xene
	Thermocyclops `sp. Biologic-CYCL106`	3	15.43 km	Stygophile/xene
COPEPODA: Harpacticoida				
Canthocamptidae	*Elaphoidella* `sp. Biologic-HARP103`	4	7.73 km	Stygobite
Parastenocarididae	*Parastenocaris* `sp. Biologic-HARP104`	1	Single site	Stygobite
	Parastenocaris `sp. Biologic-HARP105`	1	Singleton	Stygobite
	Parastenocaris `sp. Biologic-HARP106`	1	Singleton	Stygobite
OSTRACODA: Podocopida				
Candonidae	*Deminutiocandona* `sp. Biologic-OSTR139`	3	18.93 km	Stygobite
	Deminutiocandona `sp. Biologic-OSTR141`	2	2.65 km	Stygobite
	Leicacandona `sp. Biologic-OSTR140`	2	1.76 km	Stygobite
	Leicacandona `sp. Biologic-OSTR142`	1	Singleton	Stygobite
	Leicacandona `sp. Biologic-OSTR146`	1	Singleton	Stygobite
Limnocytheridae	*Gomphodella* `sp. Biologic-OSTR143`	4	1.83 km	Stygobite
	Gomphodella `sp. Biologic-OSTR144`	1	Singleton	Stygobite
	Gomphodella `sp. Biologic-OSTR145`	1	Singleton	Stygobite

Taxa in red are currently known only from the Study Area.

4.2.1 Clitellata (Enchytraeida, Haplotaxida)

4.2.1.1 Enchytraeida

Enchytraeid annelids are ubiquitous throughout the Pilbara, occurring in terrestrial waters, soils, and subterranean ecosystems above and below the water table. Specimens are always thin, eyeless, and pale, which makes it difficult to distinguish stygomorphy. As these annelids are not limited to groundwater habitats it is reasonable to assume wider potential habitat suitability for any new singleton taxa than for most other stygofauna groups. In the Pilbara, most enchytraeid OTUs are found to be regionally widespread (Brown *et al.*, 2015, Biologic, unpublished data). Of the three enchytraeid taxa recorded in the current survey, two are known to be very widespread, with linear ranges greater than 600 km (Table 4.1, Figure 4.1). The singleton Enchytraeidae `sp. Biologic-OLIG183` was collected outside the Study Area and is also likely to be widespread (Figure 4.1).

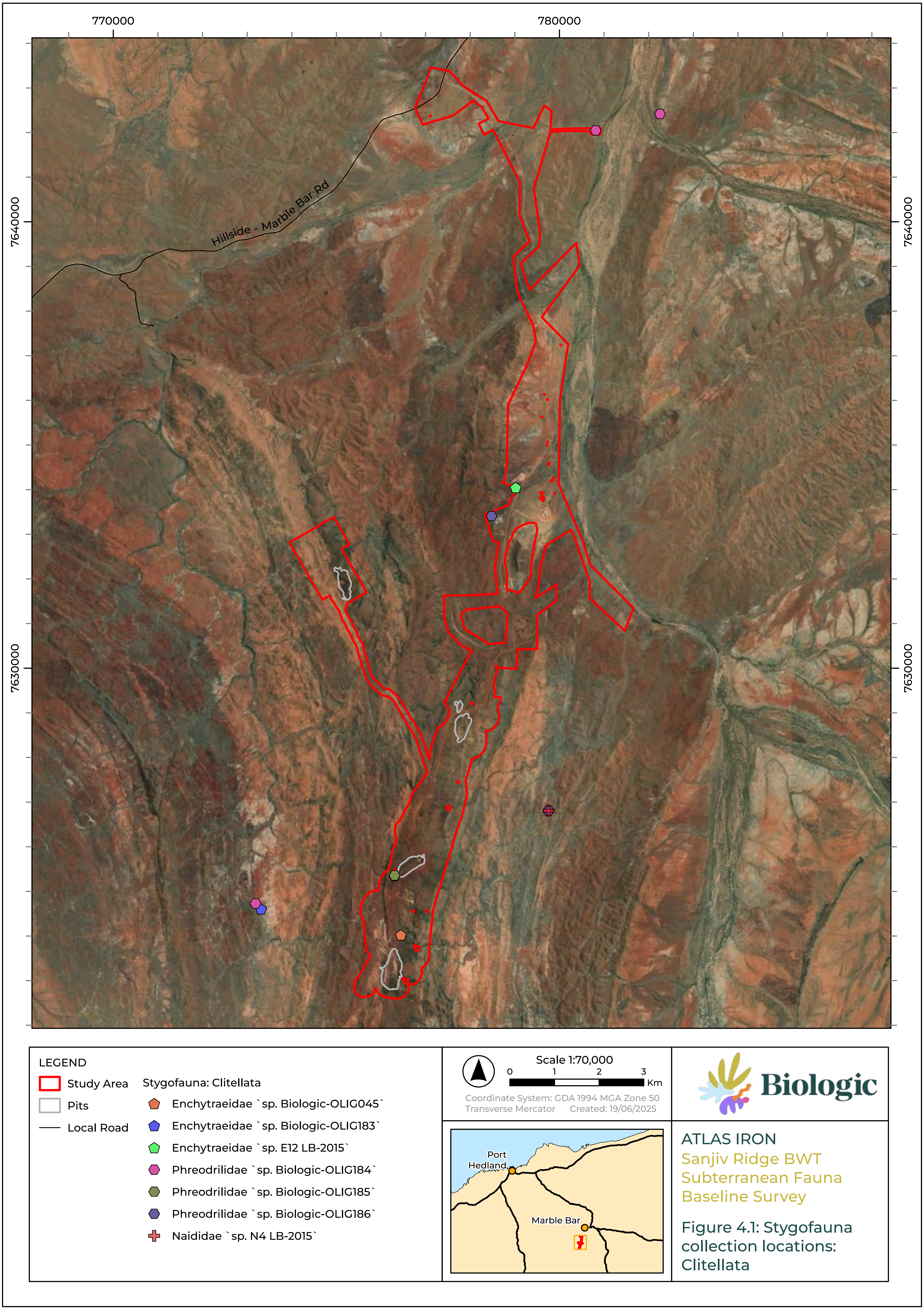


Figure 4.1: Stygofauna collection locations: Clitellata

4.2.1.2 Haplotaxida

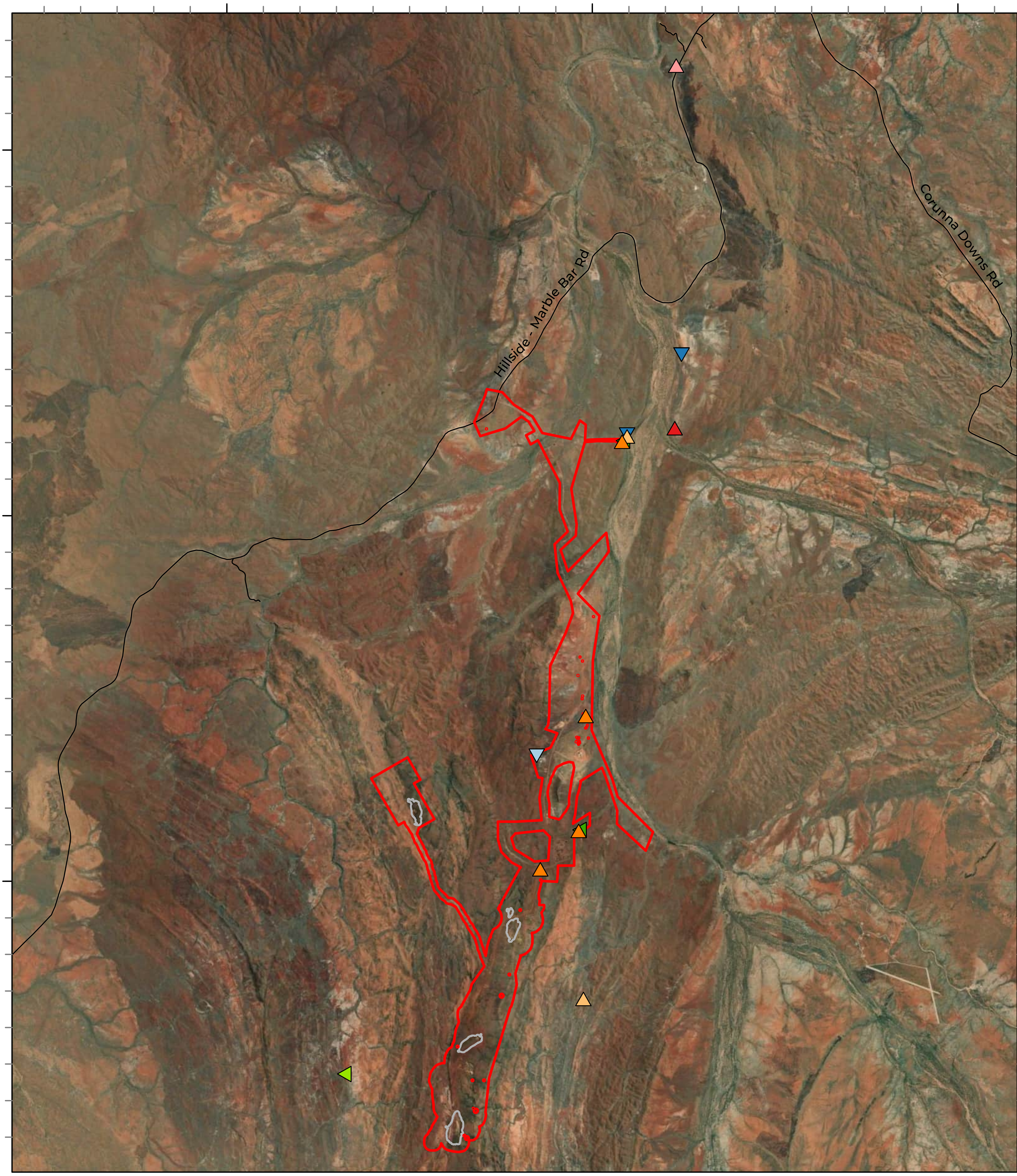
Annelids in the family Phreodrilidae and Naididae are regularly collected from groundwater throughout the Pilbara and Yilgarn regions. Phreodrilids and naidids often occur widely throughout regional catchments. The morphological and genetic taxonomy of these groups is reasonably well documented, but specimens are always eyeless and pale, which means that it is difficult to distinguish any relative degree of stygomorphy. A single naidid (Naididae `sp. N4 LB-2015`) was recorded from outside the Study Area (Figure 4.1). This taxon is at least regionally widespread (Table 4.1). Three phreodrilid taxa were recorded in the current survey (Table 4.1, Figure 4.1). Phreodrilidae `sp. Biologic-OLIG184` appears to be at least locally widespread, occurring both at the northern end and west of the Study Area (Figure 4.1). Phreodrilidae `sp. Biologic-OLIG186` is known from two locations, near the ROM and to the east of the Study Area (Figure 4.1). Phreodrilidae `sp. Biologic-OLIG185`is currently known only from two closely adjacent sites and only from the Study Area (Table 4.1, Figure 4.1). Given the lack of regional molecular work on this group, it is difficult to say whether these taxa have restricted ranges, though it is considered unlikely.

4.2.2 Malacostraca (Amphipoda, Bathynellacea, Isopoda)

4.2.2.1 Amphipoda

Stygal amphipods comprise a significant proportion of the stygofauna community of most groundwater systems in the Pilbara, with both locally and regionally widespread species, as well as more restricted species (Finston *et al.*, 2007; King *et al.*, 2021). Eight amphipod taxa from three families were recorded in the current survey (Table 4.1, Figure 4.2). Bogidiellidae `sp. Biologic-AMPH112`(Plate 4.1) is currently known only as a singleton and only from within the Study Area (Table 4.1, Figure 4.2). *Pilbarana* `sp. Biologic-AMPH115`and Paramelitidae `sp. Biologic-AMPH111`(Plate 4.2) are both also known only from within the Study Area, however both are locally widespread (Table 4.1, Figure 4.2). The remaining five amphipod taxa (Bogidiellidae `sp. Biologic-AMPH113`, *Pilbarana* `sp. Biologic-AMPH114` (Plate 4.2), Paramelitidae `sp. Biologic-AMPH108`, Paramelitidae `sp. Biologic-AMPH109` and Paramelitidae `sp. Biologic-AMPH110`) were all recorded from outside the Study Area (Figure 4.2).

Plate 4.1: Bogidiellidae `sp. Biologic-AMPH112`



LEGEND

- Study Area
- Pits
- Local Road

Stygofauna: Amphipoda

- Bogidiellidae `sp. Biologic-AMPH112`
- Bogidiellidae `sp. Biologic-AMPH113`
- *Pilbarana* `sp. Biologic-AMPH114`
- *Pilbarana* `sp. Biologic-AMPH115`
- Paramelitidae `sp. Biologic-AMPH108`
- Paramelitidae `sp. Biologic-AMPH109`
- Paramelitidae `sp. Biologic-AMPH110`
- Paramelitidae `sp. Biologic-AMPH111`

Scale 1:100,000

0 1 2 3 4 Km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 19/06/2025

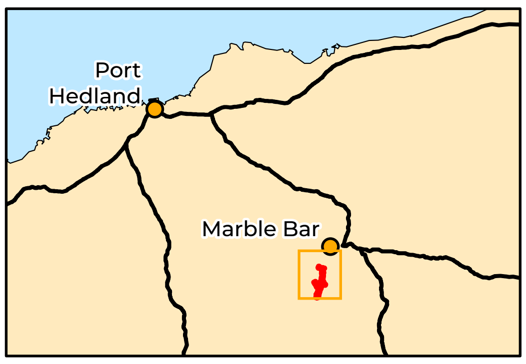


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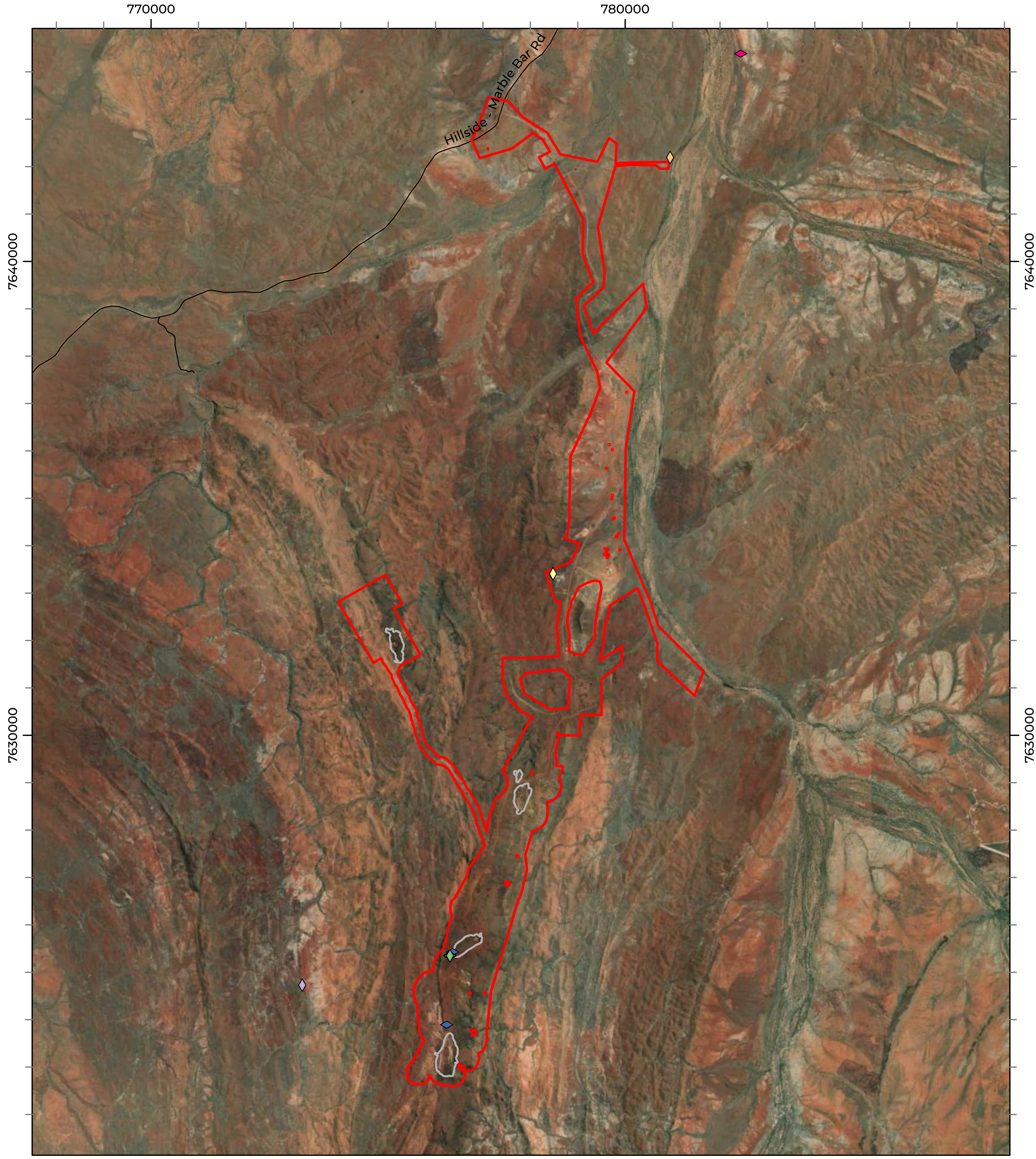
Figure 4.2: Stygofauna collection locations: Amphipoda

Plate 4.2: Paramelitidae `sp. Biologic-AMPH111` (left) and *Pilbarana* `sp. Biologic-AMPH114` (right)

4.2.2.2 Bathynellacea

Bathynellaceans are exclusively stygobitic, and many range-restricted species are known to occur in the Pilbara region (Perina *et al.*, 2023; Perina *et al.*, 2018, 2019a, 2019b; Perina *et al.*, 2024). Bathynellaceans have limited dispersal abilities due to their benthic crawling habit (Coineau & Camacho, 2013). Six Bathynellacea taxa from two families were recorded in the current survey (Table 4.1, Figure 4.3). Three taxa are only known from the Study Area, two from single or closely adjacent sites (*Atopobathynella* `sp. Biologic-PBAT081` and *Atopobathynella* `sp. Biologic-PBAT084`) and one which was recorded from four sites but is still locally restricted (Bathynellidae `sp. Biologic-BATH038`) (Table 4.1, Figure 4.3). The three remaining taxa were only recorded from outside the Study Area (*Atopobathynella* `sp. Biologic-PBAT082`, *Atopobathynella* `sp. Biologic-PBAT083` (Plate 4.3) and Parabathynellidae `sp. Biologic-PBAT085`) (Table 4.1, Figure 4.3).

Plate 4.3: *Atopobathynella* `sp. Biologic-PBAT083`



LEGEND

- Study Area
- Pits
- Local Road

Stygofauna: Bathynellacea

- *Atopobathynella* `sp. Biologic-PBAT081`
- *Atopobathynella* `sp. Biologic-PBAT082`
- *Atopobathynella* `sp. Biologic-PBAT083`
- *Atopobathynella* `sp. Biologic-PBAT084`
- Bathynellidae `sp. Biologic-BATH038`
- Parabathynellidae `sp. Biologic-PBAT085`

Scale 1:75,000

0 1 2 3 Km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 19/06/2025

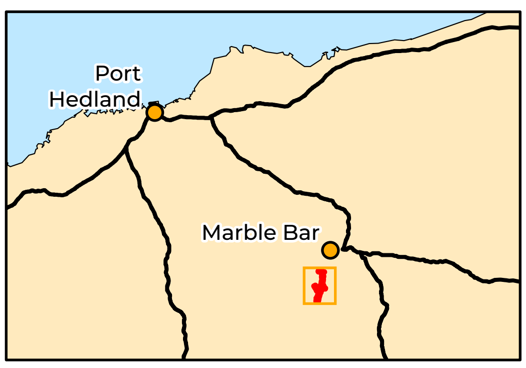


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Figure 4.3: Stygofauna collection locations: Bathynellacea

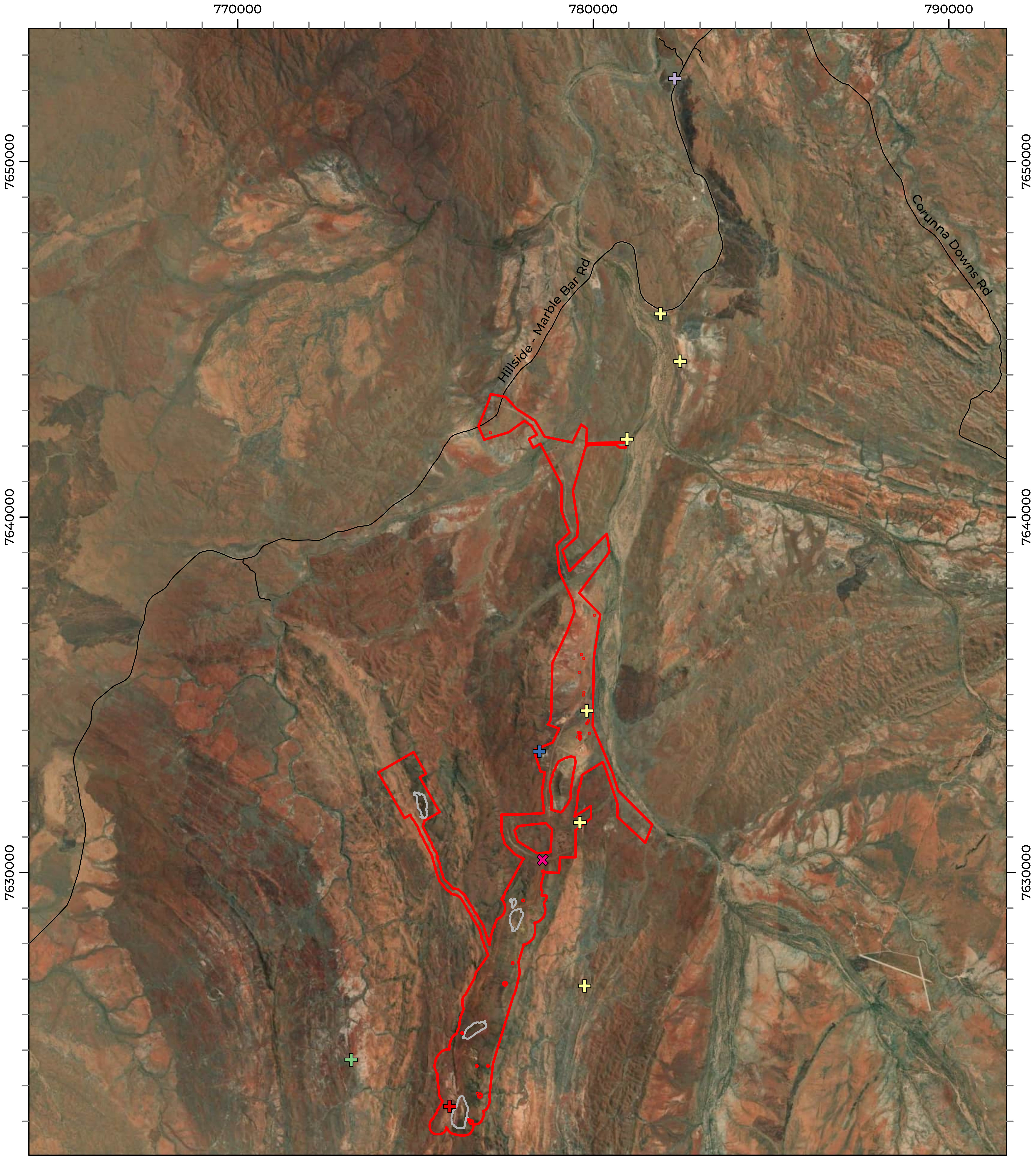
4.2.2.3 Isopoda

Pilbara stygal isopods vary greatly in size and habit, from tiny interstitial microcerberids to the very large (for stygofauna) free swimming tainisopids, both of which show patterns of regional endemism (Finston *et al.*, 2009). Six microcerberid taxa and one tainisopid were recorded in the current survey (Table 4.1, Figure 4.4). Four of the microcerberids (Microcerberidae `sp. Biologic-ISOP208`, Microcerberidae `sp. Biologic-ISOP210`, Microcerberidae `sp. Biologic-ISOP212` and Microcerberidae `sp. Biologic-ISOP221) were recorded as singletons or from single sites, with the latter three known only from the Study Area (Table 4.1, Figure 4.4). The two other microcerberids (Microcerberidae `sp. Biologic-ISOP209` (Plate 4.4) and Microcerberidae `sp. Biologic-ISOP211`) were recorded from multiple sites and are likely to be locally widespread (Table 4.1, Figure 4.4).

Plate 4.4: Microcerberidae `sp. Biologic-ISOP209`

The single tainisopid recorded from the current survey, *Pygolabis* `sp. Biologic-ISOP213` (Plate 4.5), was collected at a single site and is only known from the Study Area (Table 4.1, Figure 4.4). Very few records of this genus are known from north of the Fortescue River (Finston *et al.*, 2009).

Plate 4.5: *Pygolabis* `sp. Biologic-ISOP213`



LEGEND

Study Area

Pits

Local Road

Stygofauna: Isopoda

Microcerberidae `sp. Biologic-ISOP208`

Microcerberidae `sp. Biologic-ISOP209`

Microcerberidae `sp. Biologic-ISOP210`

Microcerberidae `sp. Biologic-ISOP211`

Microcerberidae `sp. Biologic-ISOP212`

Microcerberidae `sp. Biologic-ISOP221`

Pygolabis `sp. Biologic-ISOP213`

Scale 1:100,000

0 1 2 3 4 Km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 19/06/2025

Biologic

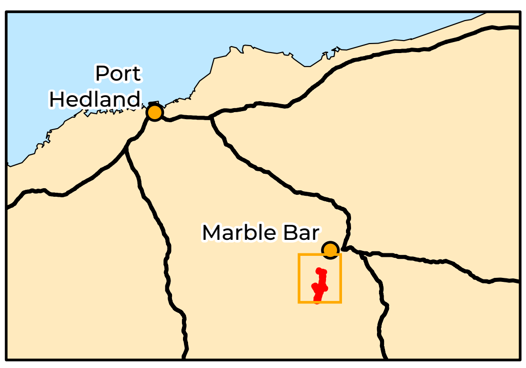


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Figure 4.4: Stygofauna collection locations: Isopoda

4.2.3 Copepoda (Calanoida, Cyclopoida, Harpacticoida)

4.2.3.1 Calanoida

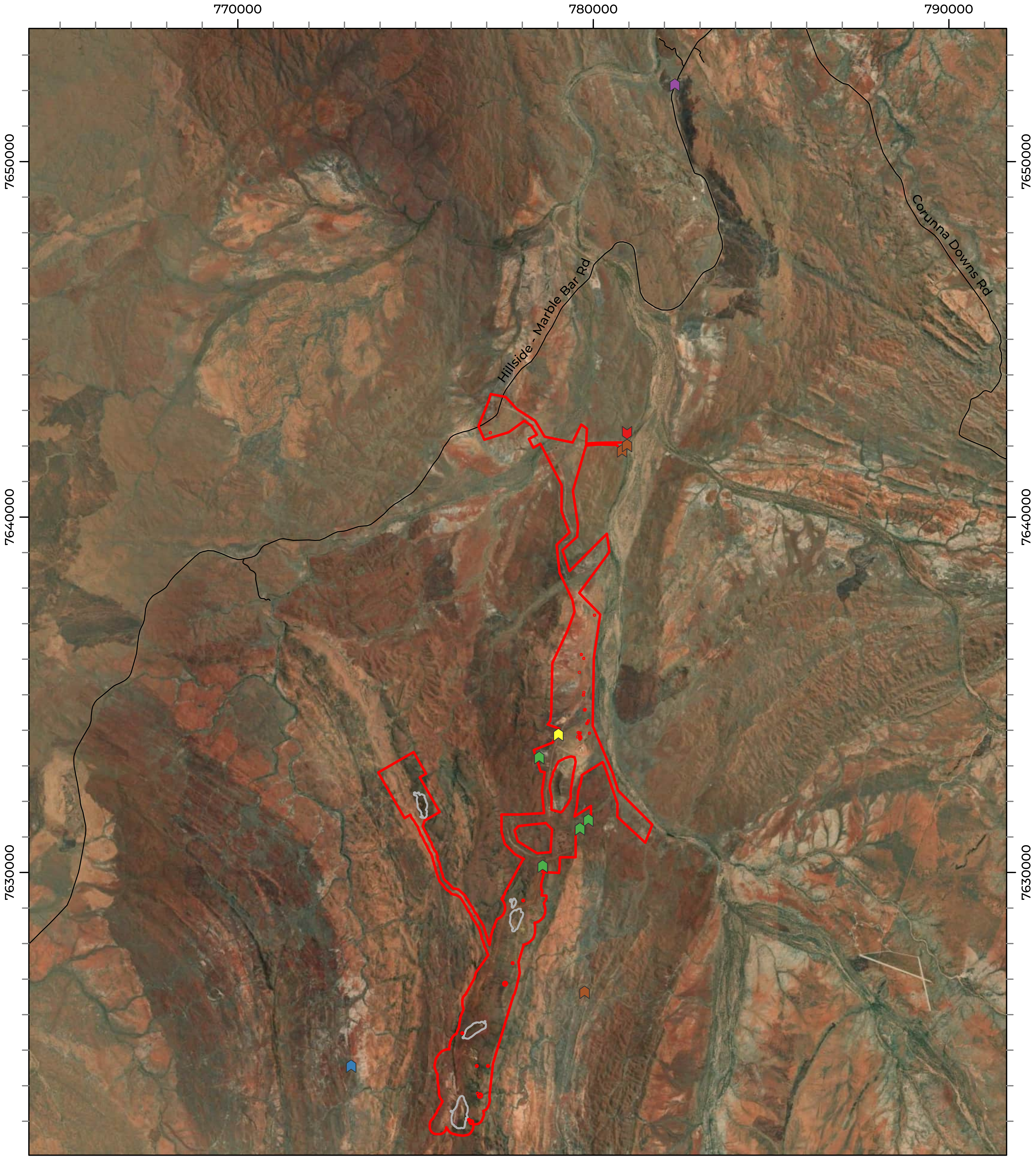
Calanoid copepods are primarily a marine group, with only about 25% of species known from freshwater ecosystems (Mauchline, 1998). Specimens from the family Ridgewayiidae have been collected from a few groundwater systems in the Pilbara (Tang *et al.*, 2008). The taxon *Stygoridgewayia* `sp. Biologic-CALA011` was recorded during the current survey, from a single site outside the Study Area (Table 4.1, Figure 4.5).

4.2.3.2 Cyclopoida

Cyclopoid copepods are among the most highly vagile stygofauna taxa regionally and throughout Australia, and many of the species in the Pilbara are considered locally or even regionally widespread, although some notionally widespread species have limited molecular support and are likely to be species complexes. Of the six cyclopoid taxa recorded during the current survey, none are restricted to the Study Area, and two are known to be regionally widespread, with linear ranges greater than 300 km (Table 4.1, Figure 4.5).

4.2.3.3 Harpacticoida

Stygal harpacticoids are regularly collected in groundwater throughout the Pilbara. Unlike the highly vagile, free-swimming cyclopoids, many harpacticoids are 'crawling' taxa and thus may be more limited in their dispersal patterns. Accordingly, molecular studies in the Yilgarn have uncovered significant radiations of unique and highly restricted stygal harpacticoids in response to discontinuous habitats (e.g. Karanovic & Cooper, 2012; Karanovic *et al.*, 2014). This trend can be seen in the current survey, with three singleton OTUs (*Parastenocaris* `sp. Biologic-HARP104`, *Parastenocaris* `sp. Biologic-HARP105` and *Parastenocaris* `sp. Biologic-HARP106`) recorded in the Study Area (Table 4.1, Figure 4.6). A further taxon, *Elaphoidella* `sp. Biologic-HARP103`, was recorded from several sites within and outside the Study Area, and appears at least locally widespread (Table 4.1, Figure 4.6).



LEGEND

Study Area

Pits

Local Road

Stygofauna: Calanoida & Cyclopoida

Stygoridgewayia `sp. Biologic-CALA011`

Diacyclops `sp. Biologic-CYCL104`

Diacyclops `sp. Biologic-CYCL105`

Pescecyclops `sp. Biologic-CYCL107`

Pescecyclops `sp. WAM CYLP001`

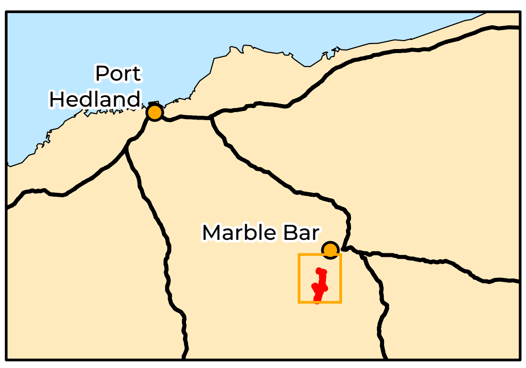
Thermocyclops `sp. Biologic-CYCL014`

Thermocyclops `sp. Biologic-CYCL106`

Scale 1:100,000

0 1 2 3 4 Km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 19/06/2025



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Subterranean Fauna
Baseline Survey

Figure 4.5: Stygofauna collection locations: Calanoida & Cyclopoida

LEGEND

- Study Area
- Pits
- Local Road

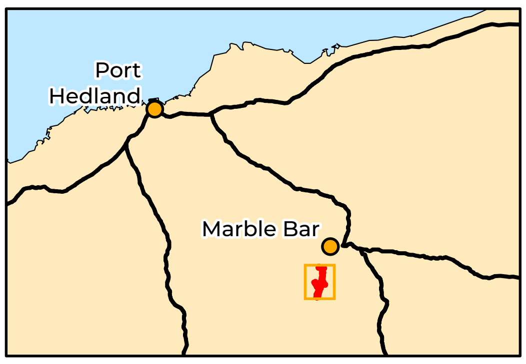
Stygofauna: Harpacticoida

- *Elaphoidella* `sp. Biologic-HARP103`
- *Parastenocaris* `sp. Biologic-HARP104`
- *Parastenocaris* `sp. Biologic-HARP105`
- *Parastenocaris* `sp. Biologic-HARP106`

Scale 1:70,000

0 1 2 3 Km

Coordinate System: GDA 1994 MGA Zone 50
Transverse Mercator Created: 19/06/2025



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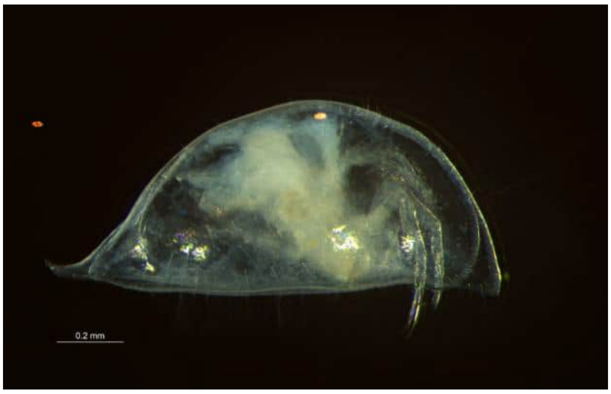
Subterranean Fauna
Baseline Survey

Figure 4.6: Stygofauna collection locations: Harpacticoida

4.2.4 Ostracoda

The distributions of stygal ostracods in the Pilbara vary from regionally widespread to highly range-restricted (Reeves *et al.*, 2007). Eight ostracod taxa from two families were recorded in the current survey (Table 4.1, Figure 4.7). One, *Deminutiocandona* `sp. Biologic-OSTR139`, appears to be at least locally widespread (Table 4.1, Figure 4.7). The other seven taxa are currently only known from one or two sites (Table 4.1, Figure 4.7). Three taxa are currently known only from the Study Area: *Leicacandona* `sp. Biologic-OSTR140`, *Leicacandona* `sp. Biologic-OSTR142` and *Gomphodella* `sp. Biologic-OSTR143` (Table 4.1, Figure 4.7).



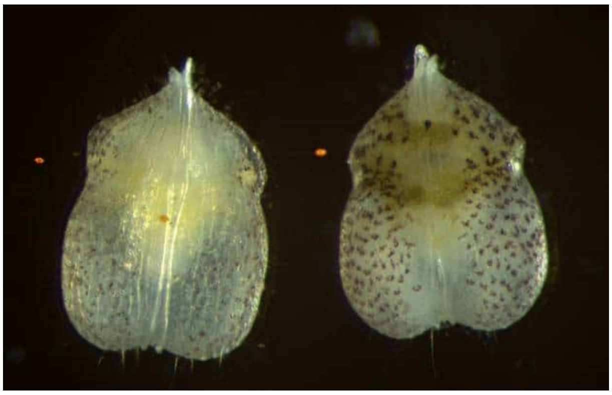


Plate 4.6: *Deminutiocandona* `sp. Biologic-OSTR141` (left) and *Gomphodella* `sp. Biologic-OSTR144` (right)

4.3 Water physiochemistry

Groundwater physiochemistry parameters were recorded from 46 bores throughout and nearby the Study Area, with at least one bore in each deposit or area sampled, except for Glen Herring where the depth to water prohibited gathering a sample (Table 4.2). The deposits or areas were divided up as follows:

- Sparrow Lake, Shark Gully and Runway refer to the sites surrounding and nearby these pits.
- ROM is the sites close to the ROM area.
- Camp is the sites directly west and north of the Sanjiv Camp.
- Coongan River is the sites at the northern end of the Study Area and along the Coongan River to Marble Bar
- East of Study Area is the single pastoral bore east of the main ridge.
- Glen Herring Creek is the sites west of the main ridge, on the edge of Glen Herring Creek.

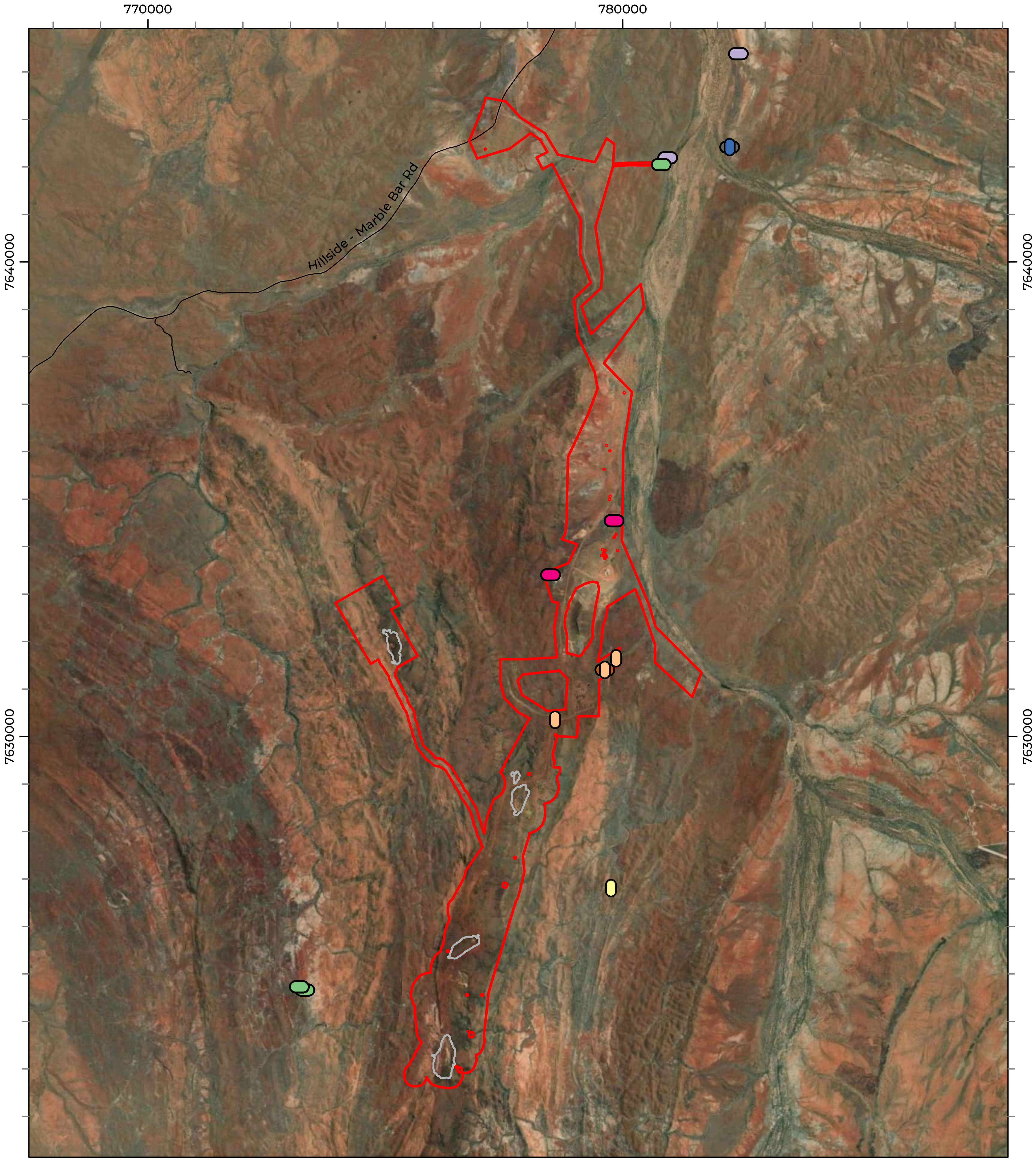
The groundwater chemistry measured throughout the Study Area was typical of Pilbara groundwater, namely circumneutral pH, fresh to brackish salinity, and positive/near-positive ORP. These conditions are considered suitable for stygofauna communities (Halse *et al.*, 2014; Humphreys, 2008). Mean groundwater temperatures for all areas were within a narrow range of approximately 30–32°C, with small standard errors, indicating stable temperatures across seasons and years (Table 4.2).

Table 4.2: Groundwater physiochemistry parameters recorded during the survey

	Temp (°C)	DO (%)	EC (µS/cm)	TDS (mg/L)	Salinity (ppt)	pH	ORP (mV)
Sparrow Lake	31.64 ± 0.13	26.01 ± 3.86	257.71 ± 109.00	291.03 ± 73.24	0.17 ± 0.06	6.65 ± 0.13	-65.81 ± 36.36
Shark Gully	31.70 ± 0.42	26.75 ± 10.68	405.63 ± 147.68	232.28 ± 83.57	0.17 ± 0.06	6.42 ± 0.24	-13.1 ± 51.63
Runway	32.47 ± 0.58	35.03 ± 2.82	283.30 ± 35.31	161.52 ± 20.96	0.12 ± 0.01	6.32 ± 0.25	16.43 ± 53.73
ROM	31.63 ± 0.34	28.10 ± 3.87	904.64 ± 332.98	804.68 ± 112.50	0.61 ± 0.09	7.24 ± 0.21	-12.32 ± 28.59
Camp	31.31 ± 0.32	25.47 ± 3.29	560.66 ± 141.80	575.07 ± 51.81	0.43 ± 0.04	7.09 ± 0.11	16.12 ± 20.55
Coongan River	30.73 ± 0.33	27.69 ± 3.51	912.36 ± 407.79	1058.75 ± 189.92	0.82 ± 0.16	7.33 ± 0.07	-8.725 ± 13.39
East of Study Area	31.7	42.8	1700	980	0.75	7.22	-45.2
Glen Herring Creek	30.48 ± 0.18	21.1 ± 2.70	705.38 ± 283.37	569.15 ± 137.79	0.43 ± 0.10	7.50 ± 0.18	-8.49 ± 44.76

Value is mean for that area ± standard error.

Dissolved oxygen (DO) levels were generally low for all areas, however still within range suitable for stygofauna (Hose *et al.*, 2015). There was a slight difference between areas in terms of pH, electrical conductivity (EC) and salinity. Those areas up on the main ridge (Sparrow Lake, Shark Gully and Runway) tended towards lower pH, EC and salinity than those at lower elevations (Table 4.2).



LEGEND

Study Area

Pits

Local Road

Stygofauna: Ostracoda

Gomphodella `sp. Biologic-OSTR143`

Gomphodella `sp. Biologic-OSTR144`

Gomphodella `sp. Biologic-OSTR145`

Deminutiocandona `sp. Biologic-OSTR139`

Deminutiocandona `sp. Biologic-OSTR141`

Leicacandona `sp. Biologic-OSTR140`

Leicacandona `sp. Biologic-OSTR142`

Leicacandona `sp. Biologic-OSTR146`

Scale 1:75,000

0 1 2 3 Km

Coordinate System: GDA 1994 MGA Zone 50 Transverse Mercator Created: 19/06/2025

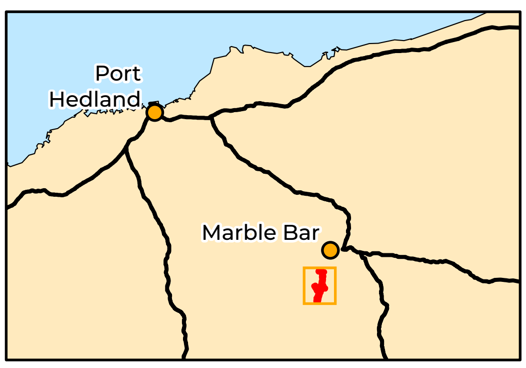


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Figure 4.7: Stygofauna collection locations: Ostracoda

4.4 Sampling adequacy

The sampling effort undertaken during the current survey consisted of 141 samples taken over three phases, two of which were following rainfall (Table 4.3). Potential impact and reference areas were adequately covered, except perhaps Glen Herring, where only six samples were taken. Stygofauna were recorded at all areas except Runway and Glen Herring.

Table 4.3: Sample effort by area in the current survey

Area	No. of samples	Samples recording stygofauna	% samples recording stygofauna
Sparrow Lake	31	6	19%
Shark Gully	20	8	40%
Runway	24	0	0%
Glen Herring	6	0	0%
ROM	13	7	54%
Camp	20	10	50%
Coongan River	15	13	87%
East of Study Area	3	3	100%
Glen Herring Creek	9	7	78%

4.5 Constraints and limitations

Subterranean fauna occupy habitats that are difficult to access. In Western Australia, sampling is primarily done via bores with distributions biased towards geologies that are prospective for mining. Yields of animals are typically low, which may reflect either naturally low densities of animals, or ineffective sampling methods. Large sampling efforts are required to achieve survey completeness due to relatively low detection rates and high proportions of infrequently detected species. As some species are difficult to reliably detect throughout their range, attaining confidence in the assessment of species distributions is challenging, despite repeated sampling. Additionally, limitations to the taxonomic and ecological understanding of subterranean fauna provide challenges when interpreting survey results. Within these general constraints, results were interpreted based on the best available information despite some inherent uncertainties.

Specific limitations relating to the survey data are listed below:

- Spatial spread of sampling: sampling was limited by the distribution, accessibility, and suitability of bores within the Study Area. Many of the previously available drillholes did not intersect with water and/or had already been rehabbed prior to the beginning of the survey, making them unsuitable or inaccessible. Several of the boreholes that were open and available were too newly dug to be suitable for sampling as guidance recommends a minimum age of six months for contaminants to settle and fauna to colonise (EPA, 2021). Reference bores outside of potential impact areas were sampled as much as possible, however nearly all of these were outside of the Study Area and likely targeted different geologies and aquifers.

- Groundwater physiochemistry measurements from bailer sampling: groundwater samples could not be collected in some bores due to great depth to water, and some time constraints on trip 2. Additionally, collection by bailer can alter physicochemical measurements (e.g. oxygenation of water via churning and pouring) and conditions in bailer samples may not reflect the conditions within the bore or the wider aquifer. Furthermore, conditions within bores may not represent those in the surrounding aquifer (Korbel *et al.*, 2017). Results for groundwater chemistry were thus interpreted cautiously, and care was taken to exclude erroneous results.
- Taxonomy and genetics: specimens were identified using a combination of morphological and genetic analyses wherever possible. Best practices were followed in the field and laboratory to enhance success rates of genetic sampling. However, despite a very high rate of sequencing success, a small proportion of sequence failure and contamination was unavoidable (Appendix E). Care was taken to omit any erroneous or contaminated DNA sequences.
- Sub-sampling for genetic analysis: the high number of specimens collected necessitated sub-sampling to complete genetic analysis. Detailed parataxonomic work was undertaken on each group to provide a basis for genetic sub-sampling of the putative species per site. The level of parataxonomic resolution prior to genetic analysis differed between groups and was limited by existing taxonomic frameworks. Sampling, parataxonomy, morphological identifications, and genetic analyses were undertaken with a cyclical, iterative approach to fill knowledge gaps in the understanding of species distributions within the Study Area. Not all specimens were able to be sequenced, and it is possible that some taxa remain undetected within the material. Nevertheless, repeated detection of the same OTUs in the same habitats provided a high degree of confidence in the distribution patterns of those subterranean fauna species/OTUs that were detected from multiple sites. Conversely, confidence is limited in cases where species/OTUs were underrepresented in samples, such as taxa that were only detected from single sites or as singletons (rare species).

5 Key findings

As seen in the desktop assessment there has been very little stygofauna sampling in the surrounding area, and almost no molecular analysis of specimens. Consequently, there is little to no regional data with which to compare the results of the current survey. Seventeen taxa are currently known only from the Study Area, and only six of the 47 taxa recorded in the current survey matched to an external sequence, meaning 41 taxa have never been recorded anywhere else previously.

With the present sampling effort and the current molecular results, it appears there may be a restricted stygofauna community within the area encompassing Sparrow Lake and Shark Gully pits. This is based on the current known range of OTU Bathynellidae `sp. Biologic-BATH038`, which extends from just west of Shark Gully to just north of Sparrow Lake, a distance of just over 1.5 km. Four other potentially restricted stygofauna OTUs (Phreodrilidae `sp. Biologic-OLIG185`, *Atopobathynella* `sp. Biologic-PBAT081`, Microcerberidae `sp. Biologic-ISOP221` and *Parastenocaris* `sp. Biologic-HARP106) have not been recorded outside of the Sparrow Lake and Shark Gully areas.

No stygofauna were detected around the Runway pits to the north of this area despite 24 samples being taken there. No stygofauna have been detected at the Glen Herring pits either, however only six samples have been taken in this area.

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Appendix A: DBCA licence

Department of **Biodiversity, Conservation and Attractions**

FAUNA TAKING (BIOLOGICAL ASSESSMENT) LICENCE

Regulation 27, Biodiversity Conservation Regulations 2018

Licence Number: BA27001059

Licence Holder: Syngeon Rodman
Biologic Environmental Survey
24 – 26 Wickham Street
EAST PERTH WA 6004

Date of Issue: 03/05/2024

Date Valid From: 03/05/2024
Date of Expiry: 02/05/2025

LICENSED ACTIVITIES

Subject to the terms and conditions on this licence, the licence holder may –

1. Undertake stygofauna survey and assessment for Atlas Iron Sanjiv Ridge Project to inform future environmental approvals. Sampling will be undertaken within proposed resource areas as well as regional reference areas in order to investigate the stygofauna assemblage of the area.

   Take fauna stygofauna sampling to be undertaken using haul nets 35mm, 50mm, 70mm, 90mm and 150 mm PVC rings with 30-40cm long cone of 150 micron and 53 micron mesh. Net-hauling for stygofauna comprises six hauls; three of which are undertaken with the 50 micrometer [µm] net, and another three using the 150 µm net. The base of the net is fitted with a lead weight and a sample receptacle with a base mesh of 50µm. Each sample is emptied into a bucket and elutriated to remove excess sediment, before being sieved back through the net, and preserved in 120mL vials of chilled 100% ethanol. Stygofauna occurring within near-surface groundwater habitats below stream beds (i.e. hyporheic habitats) can be sampled by Karaman sampling when the watertable is elevated at or near the surface. This method involves digging a smallhole in river gravels to a level just below the water table and filtering the inflowing groundwater through a stygofauna net using a bucket. eDNA sampling: Two approaches for collecting eDNA will be used groundwater sampling and passive eDNA collection.

   Specimens euthanised by submersion in ethanol as per animal ethics guidelines. Labelling and preservation of collected specimens will follow the latest WAM lodgement guidelines for specimen lodgement and long-term preservation.

LOCATIONS

1. Sanjiv Ridge project approximately 33km south of Marble Bar.

AUTHORISED PERSONS

The following persons or persons of the specified class may assist in carrying out the licensed activities:

1. Syngeon Rodman
2. Phil Runham

1

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

3. Fabian Rudin
4. Anton Mittra
5. Juliana Pile Arnold
6. Morgan Lythe
7. Mary van Wees
8. Chao Lyu
9. Aimee Carpenter
10. Hayley Hampton
11. Jing Yi Lin

CONDITIONS

1. Fauna must not be taken on CALM land, (as defined in the Conservation and Land Management Regulations 2002*)*, unless authorised by a written notice of a lawful authority issued under regulations 4 and 8 of the Conservation and Land Management Regulations 2002.
2. If persons, other than the licence holder, are authorised to carry out/assist in carrying out the activities under the licence, the licence holder must ensure those persons have read and understand the licence terms and conditions.
3. The written authorisation of the person in possession or occupation of the land accessed and upon which fauna is taken, as required under regulation 101(2) and referred to in "Additional information" below, must:
    a) state location details (including lot or location number, street/road, suburb and local government authority);
    b) state land owner or occupier name, and contact phone number;
    c) specify the time period that the authorisation is valid for;
    d) be signed and dated; and
    e) be attached to this licence at all times.
4. This licence, and any written authorisation or lawful authority which authorises the take of fauna on specified locations must be carried at all times while conducting licensed activities and be produced on demand by a wildlife officer.
5. If a species of fauna listed as a threatened species under Section 19 of the *Biodiversity Conservation Act 2016* is inadvertently captured, that species is to be released immediately at the point of capture. If the fauna is injured or deceased, the licence holder shall contact the DBCA Wildlife Licensing Section (wildlifelicensing@dbca.wa.gov.au) for advice on treatment or disposal. Details of any capture of threatened fauna must be included in the "Return of Fauna Taken."
6. The licence holder must not:
    a) release any fauna in any area where it does not naturally occur;
    b) transfer fauna to any other person or authority (other than the Western Australian Museum) unless approved in writing by the CEO; or
    c) dispose of the remains of fauna in any manner likely to interfere the natural or present day distribution of the species.
7. The licence holder must not take and remove more than ten specimens of any one protected species of fauna from any location less than 20km apart. Where exceptional circumstances make it necessary to take a larger number of specimens from a particular location in order to obtain adequate statistical data, the collector must proceed with circumspection and justify their actions to the Director General in advance.
8. All holotypes and syntypes and a half share of paratypes of species or subspecies permitted to be permanently taken under this licence must be donated to the Western Australian Museum. Duplicates

(one pair in each case) of any species collected, which represents a significant extension of geographic range must be offered to the Western Australian Museum.

9. All specimens and material retained under the authority of this licence must be offered to the Western Australian Museum for loan, for inclusion in its collection, or on request be made available to other persons involved in relevant scientific studies.

10. The licence holder must create, compile and maintain records and information as required in a DBCA approved "Return of Fauna Taken" of all fauna taking activities as they occur.

11. A DBCA approved "Return of Fauna Taken" must be completed in full (including nil taking details) and submitted to DBCA Wildlife Licensing Section (wildlifelicensing@dbca.wa.gov.au) prior to the end of each annual period of the licence (from the valid from date) (refer to "Additional Information" section below).

D Stefoni
LICENSING OFFICER
WILDLIFE PROTECTION BRANCH

Delegate of CEO

ADDITIONAL INFORMATION

1. It is an offence to take any species of fauna listed as a threatened species under Section 19 of the *Biodiversity Conservation Act 2016* unless the person is authorised under Section 40. The penalty ranges between $300 000 and $500 000; Section 150 Biodiversity Conservation Act 2016.

2. Regulation 82 empowers the CEO to add, substitute or delete a term or condition of a licence or to correct errors. Such power may be exercised on application of a licence holder or by the CEO's own initiative. If an amendment to a licence term or condition is required, please contact the CEO or the Licensing Section on wildlifelicensing@dbca.wa.gov.au in the first instance. The licence holder, if adversely affected by a condition imposed in this licence, may apply to the State Administrative Tribunal for review of the decision of the CEO to impose that condition on a licence: regulation 89(2) Biodiversity Conservation Regulations 2018.

3. A person must not contravene a condition of a licence. The penalty for an offence involving the contravention of a condition of a licence is a fine of $10 000: regulation 84 of the Biodiversity Conservation Regulations 2018.

4. It is an offence for persons authorised by this licence to enter land that is not in their possession or under their control without first having the *prior* written authorisation of the current owner or occupier of the land to:

   a) enter the land; and

   b) carry out the activity authorised by this licence.

   The penalty for this offence is a fine of $5 000: regulation 101(2) of the Biodiversity Conservation Regulations 2018.

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5. The licence holder must be able to produce for inspection upon request any information or records required by regulation 85(2) of the Biodiversity Conservation Regulations 2018 Penalty $10 000. It is an offence to knowingly include false or misleading information or make statements in records: regulation 85(3) of the Biodiversity Conservation Regulations 2018 Penalty $10 000. It is an offence to include any information or make any statement in a return that the licence holder knows to be false or misleading in a material particular: regulation 86 (2) of the Biodiversity Conservation Regulations 2018 Penalty $10 000.

6. The approved DBCA "Return of Fauna Taken" data file can be downloaded from the DBCA webpage (https://www.dpaw.wa.gov.au/plants-and-animals/licences-and-authorities).

7. The issuing of a licence under the Biodiversity Conservation Regulations 2018 does not constitute an animal ethics approval or a licence to use animals for scientific purposes as required under the *Animal Welfare Act 2002*, Animal Welfare (Scientific Purposes) Regulations 2003. It is the responsibility of a licence applicant / licence holder to ensure that they comply with the requirements of all applicable legislation. Enquiries relating to the Animal Welfare Act licences and animal ethics approvals are to be directed to the Department of Primary Industries and Regional Development (https://www.agric.wa.gov.au/animalwelfare).

8. Threatened fauna can only be taken under a *Biodiversity Conservation Act 2016* Section 40 authorisation, Occurrences of threatened species must be reported to the CEO. For more information please see https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals.

9. Any interaction involving Nationally Listed Threatened Fauna that may be invasive and/or harmful to the fauna may require approval from the Commonwealth Department of the Environment and Energy http://www.environment.gov.au/about-us/business-us/permits-assessments-licences. Interaction with such species is controlled by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and Environment Protection and Biodiversity Conservation Regulations 2000 as well as the *Biodiversity Conservation Act 2016* and Biodiversity Conservation Regulations 2018.

4

Appendix B: Desktop assessment results

Source	Latitude	Longitude	Order	Family	Taxon	Collection date	# specimens
WAM 2025c	-20.938	119.960	Amphipoda	Melitidae	Melitidae \`sp. 1 group (PSS) s.l.\`	6/05/2005	4
WAM 2025c	-21.515	119.319	Amphipoda	Melitidae	Melitidae \`sp. MW\`	3/07/2012	1
WAM 2025c	-21.522	119.318	Amphipoda	Paramelitidae	Paramelitidae \`sp. MW\`	3/07/2012	3
WAM 2025c	-21.799	119.348	Amphipoda	Paramelitidae	Paramelitidae \`sp. S3\`	20/08/2008	2
WAM 2025c	-21.407	120.123	Amphipoda	Paramelitidae	Paramelitidae \`sp. indet .OB\`	28/11/2011	13
WAM 2025c	-21.515	119.319	Amphipoda	Paramelitidae	Paramelitidae \`sp. MW\`	3/07/2012	1
WAM 2025c	-21.580	120.150	Bathynellacea	Bathynellidae	Bathynellidae \`sp. McPhee\`	3/10/2011	1
WAM 2025c	-21.580	120.150	Bathynellacea	Bathynellidae	Bathynellidae \`sp. McPhee\`	7/03/2012	1
WAM 2025c	-21.002	119.328	Bathynellacea	Bathynellidae	Bathynellidae \`sp. Miralga 3 spines C\`	9/07/2019	1
WAM 2025c	-21.002	119.328	Bathynellacea	Bathynellidae	Bathynellidae \`sp. Miralga 3 spines C\`	9/07/2019	1
WAM 2025c	-20.971	119.391	Bathynellacea	Bathynellidae	Bathynellidae \`sp. Miralga Long A2\`	9/07/2019	1
WAM 2025c	-21.515	119.319	Bathynellacea	Parabathynellidae	*Billibathynella* \`sp. MW\`	3/07/2012	1
WAM 2025c	-21.515	119.322	Bathynellacea	Parabathynellidae	*Billibathynella* \`sp. MW\`	3/07/2012	1
WAM 2025c	-21.515	119.322	Bathynellacea	Parabathynellidae	*Billibathynella* \`sp. MW\`	3/07/2012	2
WAM 2025c	-21.515	119.322	Bathynellacea	Parabathynellidae	*Billibathynella* \`sp. MW\`	3/07/2012	1
WAM 2025c	-21.580	120.150	Bathynellacea	Parabathynellidae	*Kimberleybathynella* nr. \`sp. McP\`	3/10/2011	1
WAM 2025c	-21.580	120.150	Bathynellacea	Parabathynellidae	*Kimberleybathynella* nr. \`sp. McP\`	7/03/2012	1
WAM 2025c	-21.014	120.004	Bathynellacea	Parabathynellidae	nr. *Atopobathynella* \`sp. B16\`	12/02/2013	5
WAM 2025c	-20.938	119.960	Isopoda	Microcerberidae	Microcerberidae \`sp. indet.\`	12/09/2004	1
WAM 2025c	-20.938	119.960	Isopoda	Microcerberidae	Microcerberidae \`sp. indet.\`	6/05/2005	8
WAM 2025c	-21.103	119.408	Isopoda	Microcerberidae	Microcerberidae \`sp. indet.\`	5/05/2005	1
WAM 2025c	-21.460	120.021	Isopoda	Microcerberidae	Microcerberidae \`sp. indet.\`	1/10/2005	1
WAM 2025c	-21.140	119.865	Isopoda	Microcerberidae	Microcerberidae \`sp. indet.\`	13/10/2004	7
WAM 2025c	-21.522	119.318	Isopoda	Microcerberidae	*Coxicerberus* \`sp. MW\`	3/07/2012	2

Source	Latitude	Longitude	Order	Family	Taxon	Collection date	# specimens
WAM 2025c	-21.545	119.330	Isopoda	Microcerberidae	*Coxicerberus* `sp. MW`	3/07/2012	2
WAM 2025c	-21.522	119.318	Isopoda	Microcerberidae	*Coxicerberus* `sp. MW`	3/07/2012	9
WAM 2025c	-21.515	119.319	Isopoda	Microcerberidae	*Coxicerberus* `sp. MW`	3/07/2012	10
WAM 2025c	-21.522	119.318	Cyclopoida	Cyclopidae	*Diacyclops cockingi*	3/07/2012	13
WAM 2025c	-21.545	119.330	Cyclopoida	Cyclopidae	*Diacyclops cockingi*	3/07/2012	60
WAM 2025c	-21.515	119.322	Cyclopoida	Cyclopidae	*Diacyclops cockingi*	3/07/2012	1
WAM 2025c	-21.522	119.318	Cyclopoida	Cyclopidae	*Diacyclops cockingi*	3/07/2012	60
WAM 2025c	-21.515	119.319	Cyclopoida	Cyclopidae	*Diacyclops cockingi*	3/07/2012	12
WAM 2025c	-21.544	119.329	Cyclopoida	Cyclopidae	*Diacyclops cockingi*	3/07/2012	1
WAM 2025c	-21.528	119.316	Cyclopoida	Cyclopidae	*Diacyclops cockingi*	3/07/2012	2
WAM 2025c	-21.742	119.293	Cyclopoida	Cyclopidae	*Diacyclops humphreysi*	20/08/2008	3
WAM 2025c	-21.407	120.123	Cyclopoida	Cyclopidae	*Diacyclops humphreysi*	28/11/2011	9
WAM 2025c	-21.580	120.150	Cyclopoida	Cyclopidae	*Diacyclops humphreysi*	7/03/2012	35
WAM 2025c	-21.014	120.003	Cyclopoida	Cyclopidae	*Diacyclops sobeprolatus*	19/09/2012	5
WAM 2025c	-21.406	120.069	Cyclopoida	Cyclopidae	*Mesocyclops brooksi*	28/11/2011	5
WAM 2025c	-21.372	120.164	Cyclopoida	Cyclopidae	*Microcyclops varicans*	28/11/2011	1
WAM 2025c	-21.602	120.104	Cyclopoida	Cyclopidae	*Microcyclops varicans*	29/11/2011	300
WAM 2025c	-21.014	120.003	Cyclopoida	Cyclopidae	*Microcyclops varicans*	12/02/2013	2
WAM 2025c	-21.600	120.102	Cyclopoida	Cyclopidae	*Microcyclops varicans*	29/11/2011	1
WAM 2025c	-21.602	120.104	Cyclopoida	Cyclopidae	*Microcyclops varicans*	4/10/2011	100
WAM 2025c	-21.014	120.004	Cyclopoida	Cyclopidae	*Orbuscyclops westaustraliensis*	12/02/2013	1
WAM 2025c	-21.522	119.318	Harpacticoida	Ameiridae	*Megastygonitocrella trispinosa*	3/07/2012	4
WAM 2025c	-21.522	119.318	Harpacticoida	Ameiridae	*Megastygonitocrella trispinosa*	3/07/2012	9
WAM 2025c	-21.515	119.319	Harpacticoida	Ameiridae	*Megastygonitocrella trispinosa*	3/07/2012	8

Source	Latitude	Longitude	Order	Family	Taxon	Collection date	# specimens
WAM 2025c	-21.406	120.069	Harpacticoida	Ameiridae	*Megastygonitocrella trispinosa*	28/11/2011	1
WAM 2025c	-21.515	119.322	Harpacticoida	Ameiridae	*Megastygonitocrella trispinosa*	3/07/2012	2
WAM 2025c	-21.545	119.330	Harpacticoida	Ameiridae	*Megastygonitocrella trispinosa*	3/07/2012	8
WAM 2025c	-21.014	120.004	Harpacticoida	Ameiridae	*Megastygonitocrella unispinosa*	19/09/2012	4
WAM 2025c	-21.522	119.318	Harpacticoida	Canthocamptidae	*Elaphoidella humphreysi*	3/07/2012	15
WAM 2025c	-21.515	119.319	Harpacticoida	Canthocamptidae	*Elaphoidella humphreysi*	3/07/2012	12
WAM 2025c	-21.545	119.330	Harpacticoida	Canthocamptidae	*Elaphoidella humphreysi*	3/07/2012	9
WAM 2025c	-21.522	119.318	Harpacticoida	Canthocamptidae	*Elaphoidella humphreysi*	3/07/2012	3
WAM 2025c	-21.515	119.322	Harpacticoida	Canthocamptidae	*Elaphoidella humphreysi*	3/07/2012	1
WAM 2025c	-21.545	119.330	Harpacticoida	Parastenocarididae	*Dussartstenocaris* `sp. MW`	3/07/2012	2
WAM 2025c	-21.014	120.004	Harpacticoida	Parastenocarididae	*Parastenocaris* `sp. B23`	18/09/2012	10
WAM 2025c	-21.515	119.322	Harpacticoida	Parastenocarididae	*Parastenocaris jane*	3/07/2012	1
WAM 2025c	-21.406	120.069	Harpacticoida	Parastenocarididae	*Parastenocaris jane*	28/11/2011	7
WAM 2025c	-21.545	119.330	Harpacticoida	Parastenocarididae	*Parastenocaris jane*	3/07/2012	2
WAM 2025c	-21.407	120.123	Harpacticoida	Parastenocarididae	*Parastenocaris jane*	28/11/2011	1
WAM 2025c	-21.545	119.330	Podocopida	Candonidae	Candonidae `sp. indet.`	3/07/2012	1
WAM 2025c	-21.515	119.319	Podocopida	Candonidae	Candonidae `sp. indet.`	3/07/2012	1
WAM 2025c	-20.935	119.851	Podocopida	Candonidae	*Amphitritecandona secunda*	12/10/2004	1
WAM 2025c	-21.097	119.352	Podocopida	Candonidae	*Candonopsis pilbarae*	14/09/2004	1
WAM 2025c	-21.097	119.352	Podocopida	Candonidae	*Candonopsis pilbarae*	14/09/2004	2
WAM 2025c	-21.097	119.352	Podocopida	Candonidae	*Candonopsis pilbarae*	14/09/2004	1
WAM 2025c	-21.407	120.123	Podocopida	Candonidae	*Humphreyscandona capillus*	28/11/2011	1
WAM 2025c	-21.406	120.069	Podocopida	Candonidae	*Humphreyscandona capillus*	28/11/2011	2
WAM 2025c	-20.938	119.960	Podocopida	Candonidae	*Kencandona harleyi*	6/05/2005	8

Source	Latitude	Longitude	Order	Family	Taxon	Collection date	# specimens
WAM 2025c	-20.938	119.960	Podocopida	Candonidae	*Kencandona harleyi*	6/05/2005	1
WAM 2025c	-20.938	119.960	Podocopida	Candonidae	*Kencandona harleyi*	6/05/2005	1
WAM 2025c	-21.522	119.318	Podocopida	Candonidae	*Leicacandona* `sp. indet.`	3/07/2012	1
WAM 2025c	-21.515	119.319	Podocopida	Candonidae	*Leicacandona* `sp. indet.`	3/07/2012	14
WAM 2025c	-21.103	119.408	Podocopida	Candonidae	*Leicacandona lite*	5/05/2005	5
WAM 2025c	-21.103	119.408	Podocopida	Candonidae	*Leicacandona lite*	5/05/2005	1
WAM 2025c	-20.938	119.960	Podocopida	Candonidae	*Leicacandona makra*	12/09/2004	1
WAM 2025c	-20.938	119.960	Podocopida	Candonidae	*Leicacandona makra*	6/05/2005	1
WAM 2025c	-20.938	119.960	Podocopida	Candonidae	*Leicacandona makra*	12/09/2004	1
WAM 2025c	-21.372	120.164	Podocopida	Cyprididae	Cyprididae `sp. indet.`	28/11/2011	1
WAM 2025c	-21.406	120.069	Podocopida	Cyprididae	Cyprididae `sp. indet.`	28/11/2011	20
WAM 2025c	-20.933	119.850	Podocopida	Limnocytheridae	*Gomphodella pilbarensis*	12/12/2004	1
WAM 2025c	-20.933	119.850	Podocopida	Limnocytheridae	*Gomphodella pilbarensis*	12/12/2004	1
WAM 2025a	-21.584	120.139	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. Biologic-OLIG021`	4/04/2020	1
WAM 2025a	-21.595	120.096	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. Biologic-OLIG022`	2/04/2020	1
WAM 2025a	-21.584	120.139	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. Biologic-OLIG022`	6/04/2020	1
WAM 2025a	-21.584	120.137	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. E6`	6/04/2020	1
WAM 2025a	-21.584	120.139	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. E6`	6/04/2020	1
WAM 2025a	-21.545	119.330	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	3/07/2012	1
WAM 2025a	-21.584	120.139	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	6/04/2020	4
WAM 2025a	-21.584	120.137	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	6/04/2020	1
WAM 2025a	-21.591	120.108	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. McP`	5/03/2012	9
WAM 2025a	-21.535	119.287	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. TRH`	17/06/2010	1
WAM 2025a	-21.550	119.297	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. TRH`	5/09/2010	2

Source	Latitude	Longitude	Order	Family	Taxon	Collection date	# specimens
WAM 2025a	-21.372	120.164	Haplotaxida	Naididae	cf. *Pristina* `sp. indet.`	28/11/2011	6
WAM 2025a	-21.595	120.096	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG059`	2/04/2020	1
WAM 2025a	-21.595	120.096	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	2/04/2020	40
WAM 2025a	-21.407	120.123	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	28/11/2011	8
WAM 2025a	-21.522	119.318	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	3/07/2012	3

Appendix C: Current survey sample details

Latitude	Longitude	Site	Date	Sample type	Stygofauna collected	Temp (°C)	DO (%L)	EC (µS/cm)	TDS (mg/L)	Salinity (ppt)	pH	ORP (mV)
-21.3838	119.6866	CRD0026	24/05/2024	Haul	No	30.2	15.1	881	520	0.39	7.3	81.2
-21.3838	119.6866	CRD0083	24/05/2024	Pump	No	30.4	46.3	923	546	0.41	6.89	83.2
-21.3801	119.6857	CRD0112	24/05/2024	Haul	Yes	31.2	13.2	918	533	0.4	6.6	73.7
-21.3980	119.6970	CRD0073	24/05/2024	Haul	Yes	33	12.6	1811	1027	0.78	6.91	66.7
-21.3793	119.6872	CRD0111	24/05/2024	Haul	No	30.7	23.7	1150	676	0.51	6.8	59.8
-21.3803	119.6852	CRD0075	24/05/2024	Haul	No	29.9	18.4	1.32	539.6	0.4	6.76	43.2
-21.3957	119.6993	CRD0048	24/05/2024	Haul	Yes	31.6	21.1	1482	858	0.65	7.41	-84.4
-21.3958	119.6545	CRD0029	25/05/2024	Haul	No							
-21.4598	119.6372	CRD0004	25/05/2024	Haul	No	30.4	29.9	1303	767	0.58	8.23	61
-21.4602	119.6373	CRD0158	25/05/2024	Haul	Yes	30.3	12.2	226.7	133.9	0.1	7.4	96.4
-21.4592	119.6361	CRD0016	25/05/2024	Haul	Yes	29.8	21.3	1342	799.6	0.6	7.05	25.7
-21.3004	119.7080	CRD0108	25/05/2024	Haul	Yes							
-21.4709	119.6677	CRD0099	26/05/2024	Haul	No							
-21.4524	119.6665	CRD0120	26/05/2024	Haul	No							
-21.4524	119.6665	CRD0122	26/05/2024	Pump	No							
-21.3992	119.6906	CRD0050	26/05/2024	Haul	No							
-21.4697	119.6686	CRD0091	26/05/2024	Haul	No							
-21.4531	119.6660	CRD0007	26/05/2024	Haul	Yes							
-21.4531	119.6660	CRD0090	26/05/2024	Haul	Yes							
-21.3991	119.6906	CRD0082	26/05/2024	Pump	No							
-21.4218	119.6797	CRD0015	27/05/2024	Haul	No							
-21.4219	119.6798	CRD0101	27/05/2024	Pump	No	31.3	39.3	313.6	182.65	0.13	6.52	-19.5
-21.4394	119.6990	CRD0152	27/05/2024	Haul	Yes							
-21.4248	119.6784	CRD0096	27/05/2024	Haul	No							

Latitude	Longitude	Site	Date	Sample type	Stygofauna collected	Temp (°C)	DO (%L)	EC (µS/cm)	TDS (mg/L)	Salinity (ppt)	pH	ORP (mV)
-21.4205	119.6792	CRD0124	27/05/2024	Haul	No							
-21.3696	119.6984	CRD0034	27/05/2024	Haul	Yes							
-21.3741	119.6907	CRD0027	27/05/2024	Haul	Yes							
-21.4189	119.6766	CRD0105	28/05/2024	Haul	No							
-21.4182	119.6781	CRD0006	28/05/2024	Haul	No							
-21.4706	119.6630	CRD0005	28/05/2024	Haul	Yes							
-21.4274	119.6752	CRD0095	28/05/2024	Haul	No							
-21.4664	119.6656	CRD0098	28/05/2024	Haul	No							
-21.4663	119.6656	CRD0074	28/05/2024	Haul	No							
-21.4481	119.6713	CRD0020	29/05/2024	Haul	No							
-21.4444	119.6746	CRD0023	29/05/2024	Haul	No							
-21.4495	119.6727	CRD0093	29/05/2024	Haul	No							
-21.3018	119.7067	CRD0085	29/05/2024	Haul	Yes							
-21.3907	119.6524	CRD0130	18/09/2024	Haul	No							
-21.4602	119.6373	CRD0158	18/09/2024	Haul	Yes							
-21.3916	119.6544	CRD0132	18/09/2024	Haul	No							
-21.3929	119.6413	CRD0155	18/09/2024	Haul	No							
-21.4592	119.6361	CRD0016	18/09/2024	Haul	Yes							
-21.4598	119.6372	CRD0004	18/09/2024	Haul	Yes							
-21.3018	119.7067	CRD0085	19/09/2024	Haul	Yes							
-21.3696	119.6984	CRD0034	19/09/2024	Haul	Yes							
-21.3793	119.6872	CRD0111	19/09/2024	Haul	No							
-21.3004	119.7080	CRD0108	19/09/2024	Haul	Yes							
-21.3017	119.7067	CRD0064	19/09/2024	Haul	Yes							

Latitude	Longitude	Site	Date	Sample type	Stygofauna collected	Temp (°C)	DO (%L)	EC (µS/cm)	TDS (mg/L)	Salinity (ppt)	pH	ORP (mV)
-21.4394	119.6990	CRD0152	19/09/2024	Haul	Yes							
-21.3741	119.6907	CRD0027	19/09/2024	Haul	Yes							
-21.3801	119.6857	CRD0112	19/09/2024	Haul	Yes							
-21.3803	119.6852	CRD0075	19/09/2024	Haul	No							
-21.3838	119.6866	CRD0026	19/09/2024	Haul	No							
-21.3838	119.6866	CRD0083	19/09/2024	Pump	No							
-21.4706	119.6630	CRD0005	20/09/2024	Haul	Yes							
-21.4771	119.6654	CRD0144	20/09/2024	Haul	No							
-21.4734	119.6683	CRD0011	20/09/2024	Haul	No							
-21.4710	119.6693	CRD0150	20/09/2024	Haul	No							
-21.4754	119.6640	CRD0143	20/09/2024	Haul	No							
-21.4686	119.6681	CRD0140	20/09/2024	Haul	No							
-21.4697	119.6686	CRD0091	20/09/2024	Haul	No							
-21.4709	119.6677	CRD0099	20/09/2024	Haul	No							
-21.3957	119.6993	CRD0048	21/09/2024	Haul	No							
-21.3992	119.6906	CRD0050	21/09/2024	Haul	No							
-21.4531	119.6660	CRD0090	21/09/2024	Haul	Yes							
-21.4531	119.6660	CRD0007	21/09/2024	Haul	Yes							
-21.4481	119.6713	CRD0020	21/09/2024	Haul	No							
-21.4495	119.6727	CRD0093	21/09/2024	Haul	No							
-21.3980	119.6970	CRD0073	21/09/2024	Haul	Yes							
-21.4524	119.6665	CRD0122	21/09/2024	Pump	No							
-21.4524	119.6665	CRD0120	21/09/2024	Haul	No							
-21.4444	119.6746	CRD0023	21/09/2024	Haul	Yes							

Latitude	Longitude	Site	Date	Sample type	Stygofauna collected	Temp (°C)	DO (%L)	EC (µS/cm)	TDS (mg/L)	Salinity (ppt)	pH	ORP (mV)
-21.4663	119.6656	CRD0074	21/09/2024	Haul	No							
-21.3888	119.6521	CRD0046	22/09/2024	Haul	No							
-21.4076	119.6871	CRD0103	22/09/2024	Haul	Yes							
-21.4650	119.6676	CRD0010	22/09/2024	Haul	Yes							
-21.4656	119.6683	CRD0139	22/09/2024	Haul	No							
-21.4664	119.6656	CRD0098	22/09/2024	Haul	No							
-21.4361	119.6732	CRD0094	22/09/2024	Haul	No							
-21.4252	119.6806	CRD0125	23/09/2024	Haul	No							
-21.4218	119.6797	CRD0015	23/09/2024	Haul	No							
-21.4182	119.6781	CRD0006	23/09/2024	Haul	No							
-21.4274	119.6752	CRD0095	23/09/2024	Haul	No							
-21.4262	119.6791	CRD0137	23/09/2024	Haul	No							
-21.4248	119.6784	CRD0096	23/09/2024	Haul	No							
-21.4205	119.6792	CRD0124	23/09/2024	Haul	No							
-21.4189	119.6766	CRD0105	23/09/2024	Haul	No							
-21.4205	119.6792	CRD0124	9/11/2024	Haul	No							
-21.4218	119.6797	CRD0015	9/11/2024	Haul	No							
-21.4219	119.6798	CRD0101	9/11/2024	Pump	No	33	29.7	323.4	182.3	0.13	6.63	-53.3
-21.4182	119.6781	CRD0006	9/11/2024	Haul	No	33.1	36.1	212.9	119.6	0.09	5.82	122.1
-21.4481	119.6713	CRD0020	9/11/2024	Haul	No	32.3	30.3	804	458.4	0.34	7.08	20
-21.4252	119.6806	CRD0125	9/11/2024	Haul	No							
-21.4189	119.6766	CRD0105	9/11/2024	Haul	No							
-21.4495	119.6727	CRD0093	9/11/2024	Haul	No	32.5	1.41	452.9	257.4	0.19	6.37	-143.4
-21.4524	119.6665	CRD0120	10/11/2024	Haul	Yes							

Latitude	Longitude	Site	Date	Sample type	Stygofauna collected	Temp (°C)	DO (%L)	EC (µS/cm)	TDS (mg/L)	Salinity (ppt)	pH	ORP (mV)
-21.4524	119.6665	CRD0122	10/11/2024	Pump	No	31.3	22.2	209.9	122	0.09	6.28	-32.3
-21.4531	119.6660	CRD0090	10/11/2024	Haul	Yes							
-21.4663	119.6656	CRD0074	10/11/2024	Haul	Yes	31.2	24.7	476.8	277.2	0.2	6.8	-3.8
-21.4650	119.6676	CRD0010	10/11/2024	Haul	Yes	31.7	11.8	246.3	141.9	0.11	6.2	-142.8
-21.4274	119.6752	CRD0095	10/11/2024	Haul	No							
-21.4531	119.6660	CRD0007	10/11/2024	Haul	Yes	30.7	53.1	155.7	91.3	0.07	5.93	103.3
-21.4664	119.6656	CRD0098	10/11/2024	Haul	No							
-21.4656	119.6683	CRD0139	10/11/2024	Haul	No							
-21.4656	119.6683	CRD0139	10/11/2024	Haul	No	31.7	18.5	1.22	180.9	0.13	6.41	-122.7
-21.4361	119.6732	CRD0094	10/11/2024	Haul	No							
-21.4697	119.6686	CRD0091	11/11/2024	Haul	No							
-21.4686	119.6681	CRD0140	11/11/2024	Haul	No							
-21.4771	119.6654	CRD0144	11/11/2024	Haul	No	32.1	25	1.7	153.9	0.11	6.46	-170
-21.4706	119.6630	CRD0005	11/11/2024	Haul	Yes	31.2	23.8	1.63	665	0.5	7.23	49.3
-21.4734	119.6683	CRD0011	11/11/2024	Haul	No							
-21.4710	119.6693	CRD0150	11/11/2024	Haul	No							
-21.4709	119.6677	CRD0099	11/11/2024	Haul	No							
-21.4667	119.6672	CRD0142	11/11/2024	Haul	No	31.6	41.9	318.3	183.8	0.14	6.78	-126.3
-21.4754	119.6640	CRD0143	11/11/2024	Haul	No	32	36.4	758	434.5	0.032	6.67	55.6
-21.4598	119.6372	CRD0004	12/11/2024	Haul	No	30.9	25.9	1358	793	0.6	7.83	-216.1
-21.3004	119.7080	CRD0108	12/11/2024	Haul	Yes	31.7	32	1624	937	0.71	7.26	34.1
-21.3017	119.7067	CRD0064	12/11/2024	Haul	Yes	31.5	17.8	1468	849	0.65	7.23	27.8
-21.4602	119.6373	CRD0158	12/11/2024	Haul	Yes	30.5	15	1.05	133.4	0.1	7.14	-10.14
-21.4592	119.6361	CRD0016	12/11/2024	Haul	Yes	31	22.3	1.55	788	0.6	7.32	-7.8

Latitude	Longitude	Site	Date	Sample type	Stygofauna collected	Temp (°C)	DO (%L)	EC (µS/cm)	TDS (mg/L)	Salinity (ppt)	pH	ORP (mV)
-21.3018	119.7067	CRD0085	12/11/2024	Haul	Yes	31.1	22.5	1.55	808	0.61	7.42	40.5
-21.3907	119.6524	CRD0130	12/11/2024	Haul	No							
-21.4076	119.6871	CRD0103	13/11/2024	Haul	Yes	30.7	37.1	569	333.1	0.25	6.43	-76.1
-21.3980	119.6970	CRD0073	13/11/2024	Haul	Yes	31.9	29.6	1561	897	0.68	7.91	20
-21.4394	119.6990	CRD0152	13/11/2024	Haul	Yes	31.7	42.8	1700	980	0.75	7.22	-45.2
-21.3957	119.6993	CRD0048	13/11/2024	Haul	Yes	30.8	32.5	2.34	1070	0.82	7.37	61.9
-21.3992	119.6906	CRD0050	13/11/2024	Haul	No							
-21.3991	119.6906	CRD0082	13/11/2024	Pump	No	31.8	35.7	2.52	643	0.48	7.41	-62
-21.3696	119.6984	CRD0034	13/11/2024	Haul	Yes	30.8	44.7	3.21	982	0.75	7.75	10.5
-21.3741	119.6907	CRD0027	13/11/2024	Haul	Yes	31.9	24.3	469	269.2	0.2	7.08	-105.3
-21.3801	119.6857	CRD0112	13/11/2024	Haul	Yes	33	27.1	941	531	0.4	6.94	48.3
-21.3793	119.6872	CRD0111	13/11/2024	Haul	Yes	32.1	18	1.26	682	0.51	7.2	15.6
-21.3803	119.6852	CRD0075	13/11/2024	Haul	No	33	21.8	1.5	537	0.4	7.03	-32.5
-21.3838	119.6866	CRD0026	14/11/2024	Haul	No	31.2	27.6	878	510	0.38	7.67	-100.4
-21.2088	119.7193	CRD0088	14/11/2024	Pump	No	30.9	49.4	3.58	631	0.47	7.33	-16.6
-21.2804	119.7220	CRD0086	14/11/2024	Haul	Yes	29.8	22.7	1.66	1884	1.49	7.61	-35.7
-21.2684	119.7165	CRD0087	14/11/2024	Haul	Yes	30.6	28.7	2.08	841	0.64	7.29	-45.3
-21.2085	119.7225	CRD0089	14/11/2024	Pump	No	31.3	20.7	1011	587	0.44	6.98	-55.9
-21.2086	119.7192	CRD0039	14/11/2024	Haul	Yes							
-21.2982	119.7205	CRD0072	14/11/2024	Haul	Yes	28.9	27.7	3187	1933	1.54	7.49	-18.7
-21.2804	119.7220	CRD0058	14/11/2024	Haul	Yes							

Appendix D: Stygofauna recorded in the current survey

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.4602	119.6373	CRD0158	Haul	12/11/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	22
-21.4602	119.6373	CRD0158	Haul	18/09/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	14
-21.4602	119.6373	CRD0158	Haul	25/05/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	15
-21.4602	119.6373	CRD0158	Haul	18/09/2024			Oligochaeta `sp. indet.`	35
-21.4602	119.6373	CRD0158	Haul	18/09/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. Biologic-OLIG183`	1
-21.4602	119.6373	CRD0158	Haul	25/05/2024			Oligochaeta `sp. indet.`	35
-21.4598	119.6372	CRD0004	Haul	18/09/2024	Podocopida	Candonidae	Deminutiocandona `sp. Biologic-OSTR139`	1
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Amphipoda	Eriopisidae	Eriopisidae `sp. indet.`	1
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	17
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	9
-21.4592	119.6361	CRD0016	Haul	12/11/2024			Oligochaeta `sp. indet.`	1
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	3
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Cyclopoida		Cyclopoida `sp. indet.`	45
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	4
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	2
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	14
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	4
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	35
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	6
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	27
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	7
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Amphipoda	Eriopisidae	Pilbarana `sp. Biologic-AMPH114`	1
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Bathynellacea		Bathynellacea `sp. indet.`	0
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	5
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Amphipoda	Eriopisidae	Pilbarana `sp. Biologic-AMPH114`	1
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP208`	1
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	1
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP208`	1

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG184`	1
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	14
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL104`	1
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	1
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT082`	1
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Cyclopoida		Cyclopoida `sp. indet.`	35
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL104`	1
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	1
-21.4592	119.6361	CRD0016	Haul	18/09/2024	Podocopida	Candonidae	Deminutiocandona `sp. Biologic-OSTR139`	1
-21.4592	119.6361	CRD0016	Haul	12/11/2024	Podocopida	Candonidae	Deminutiocandona `sp. Biologic-OSTR139`	1
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP208`	1
-21.4592	119.6361	CRD0016	Haul	25/05/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT082`	1
-21.4650	119.6676	CRD0010	Haul	10/11/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	1
-21.4650	119.6676	CRD0010	Haul	22/09/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	1
-21.4650	119.6676	CRD0010	Haul	10/11/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. Biologic-OLIG045`	1
-21.3696	119.6984	CRD0034	Haul	27/05/2024	Amphipoda		Amphipoda `sp. indet.`	2
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	13/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	7
-21.3696	119.6984	CRD0034	Haul	13/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	2
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	7
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	7
-21.3696	119.6984	CRD0034	Haul	13/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	13/11/2024	Harpacticoida	Ameiridae	Megastygonitocrella `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	6
-21.3696	119.6984	CRD0034	Haul	27/05/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	5
-21.3696	119.6984	CRD0034	Haul	13/11/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	27/05/2024	Harpacticoida	Ameiridae	Megastygonitocrella `sp. indet.`	3

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.3696	119.6984	CRD0034	Haul	27/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. Biologic-AMPH111`	1
-21.3696	119.6984	CRD0034	Haul	13/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP210`	1
-21.3696	119.6984	CRD0034	Haul	13/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	6
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. Biologic-HARP103`	1
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP210`	1
-21.3696	119.6984	CRD0034	Haul	13/11/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	7
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Podocopida	Candonidae	Leicacandona `sp. Biologic-OSTR140`	1
-21.3696	119.6984	CRD0034	Haul	19/09/2024	Podocopida	Candonidae	Leicacandona `sp. Biologic-OSTR140`	1
-21.3696	119.6984	CRD0034	Haul	27/05/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	27/05/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	1
-21.3696	119.6984	CRD0034	Haul	27/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP211`	1
-21.4706	119.6630	CRD0005	Haul	11/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	4
-21.4706	119.6630	CRD0005	Haul	20/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	0
-21.4706	119.6630	CRD0005	Haul	28/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	64
-21.4706	119.6630	CRD0005	Haul	20/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	9
-21.4706	119.6630	CRD0005	Haul	11/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	1
-21.4706	119.6630	CRD0005	Haul	11/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP221`	1
-21.4706	119.6630	CRD0005	Haul	20/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	1
-21.4706	119.6630	CRD0005	Haul	28/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP221`	1
-21.4706	119.6630	CRD0005	Haul	20/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP221`	1
-21.4444	119.6746	CRD0023	Scrape	21/09/2024	Harpacticoida	Parastenocarididae	Parastenocaris `sp. indet.`	59
-21.4444	119.6746	CRD0023	Scrape	21/09/2024	Harpacticoida	Parastenocarididae	Parastenocaris `sp. Biologic-HARP106`	1
-21.3741	119.6907	CRD0027	Haul	27/05/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	7
-21.3741	119.6907	CRD0027	Haul	19/09/2024	Cyclopoida		Cyclopoida `sp. indet.`	44
-21.3741	119.6907	CRD0027	Haul	27/05/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	17
-21.3741	119.6907	CRD0027	Haul	13/11/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	24

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.3741	119.6907	CRD0027	Haul	27/05/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. E12 LB-2015`	1
-21.3741	119.6907	CRD0027	Haul	19/09/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	14
-21.3741	119.6907	CRD0027	Haul	27/05/2024	Cyclopoida		Cyclopoida `sp. indet.`	50
-21.3741	119.6907	CRD0027	Haul	27/05/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. Biologic-CYCL014`	1
-21.3741	119.6907	CRD0027	Haul	13/11/2024	Cyclopoida		Cyclopoida `sp. indet.`	22
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. Biologic-AMPH108`	1
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	1
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Cyclopoida	Cyclopidae	Pescecyclops `sp. Biologic-CYCL107`	1
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	13
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	19
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	10
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Cyclopoida		Cyclopoida `sp. indet.`	18
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Harpacticoida	Ameiridae	Megastygonitocrella `sp. indet.`	3
-21.2086	119.7192	CRD0039	Haul	14/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP209`	1
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	13
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Amphipoda	Bogidiellidae	Bogidiellidae `sp. Biologic-AMPH113`	1
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	11
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	2
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Bathynellacea	Parabathynellidae	nr. Billibathynella `sp. Biologic-PBAT085`	1
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP211`	1
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	2
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Cyclopoida		Cyclopoida `sp. indet.`	16
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	1
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Podocopida	Candonidae	Deminutiocandona `sp. Biologic-OSTR141`	1
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	10
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	4
-21.2804	119.7220	CRD0058	Haul	14/11/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	1

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	7
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	3
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG186`	1
-21.4394	119.6990	CRD0152	Haul	19/09/2024	Haplotaxida	Naididae	Naididae `sp. N4 LB-2015`	1
-21.4394	119.6990	CRD0152	Haul-Scrape	27/05/2024	Haplotaxida	Naididae	Pristina `sp. indet.`	4
-21.4394	119.6990	CRD0152	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	20
-21.4394	119.6990	CRD0152	Haul	19/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	1
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	12
-21.4394	119.6990	CRD0152	Haul	19/09/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	11
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	43
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	40
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP211`	1
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Amphipoda		Amphipoda `sp. indet.`	1
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. Biologic-AMPH110`	1
-21.4394	119.6990	CRD0152	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.4394	119.6990	CRD0152	Haul	19/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. Biologic-HARP103`	1
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. Biologic-CYCL106`	1
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Cyclopoida		Cyclopoida `sp. indet.`	33
-21.4394	119.6990	CRD0152	Haul	19/09/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	1
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Podocopida	Candonidae	Candoninae `sp. indet.`	5
-21.4394	119.6990	CRD0152	Haul	13/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. Biologic-OSTR144`	1
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	2
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	4
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	4
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	3

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. Biologic-AMPH109`	1
-21.2982	119.7205	CRD0072	Haul	14/11/2024		Aeolosomatidae	Aeolosomatidae `sp. indet.`	4
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG184`	1
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Podocopida	Candonidae	Leicacandona `sp. Biologic-OSTR146`	1
-21.2982	119.7205	CRD0072	Haul	14/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. Biologic-OSTR145`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Amphipoda	Eriopisidae	Pilbarana `sp. Biologic-AMPH115`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP211`	1
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. Biologic-AMPH111`	1
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Amphipoda	Eriopisidae	Pilbarana `sp. Biologic-AMPH115`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024			Nematoda `sp. indet.`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Cyclopoida		Cyclopoida `sp. indet.`	8
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	13
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Cyclopoida	Cyclopidae	Pescecyclops `sp. indet.`	36
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Cyclopoida	Cyclopidae	Pescecyclops `sp. indet.`	4
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	13
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	27
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	5
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	1
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	40
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	2
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	4
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	8
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Cyclopoida	Cyclopidae	Pescecyclops `sp. indet.`	8
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Cyclopoida	Cyclopidae	Pescecyclops `sp. WAM-CYLP001`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. Biologic-HARP103`	1
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	3

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Cyclopoida		Cyclopoida `sp. indet.`	17
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	6
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Cyclopoida	Cyclopidae	Pescecyclops `sp. WAM-CYLP001`	1
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Podocopida	Candonidae	Leicacandona `sp. Biologic-OSTR142`	1
-21.3980	119.6970	CRD0073	Haul	21/09/2024	Podocopida	Limnocytheridae	Gomphodella `sp. Biologic-OSTR143`	1
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	1
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Podocopida	Limnocytheridae	Gomphodella `sp. Biologic-OSTR143`	1
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Podocopida	Candonidae	Candoninae `sp. indet.`	1
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Harpacticoida	Parastenocarididae	Parastenocaris `sp. indet.`	1
-21.3980	119.6970	CRD0073	Haul	24/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP209`	1
-21.3980	119.6970	CRD0073	Haul	13/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP209`	1
-21.4663	119.6656	CRD0074	Haul	10/11/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.2804	119.7220	CRD0086	Haul	14/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	4
-21.2804	119.7220	CRD0086	Haul	14/11/2024	Amphipoda		Amphipoda `sp. indet.`	1
-21.2804	119.7220	CRD0086	Haul	14/11/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	3
-21.2804	119.7220	CRD0086	Haul	14/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP211`	1
-21.2804	119.7220	CRD0086	Haul	14/11/2024	Amphipoda	Bogidiellidae	Bogidiellidae `sp. indet.`	0
-21.2804	119.7220	CRD0086	Haul	14/11/2024	Amphipoda	Bogidiellidae	Bogidiellidae `sp. Biologic-AMPH113`	1
-21.2684	119.7165	CRD0087	Haul	14/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	2
-21.2684	119.7165	CRD0087	Haul	14/11/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	2
-21.2684	119.7165	CRD0087	Haul	14/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	21
-21.2684	119.7165	CRD0087	Haul	14/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP211`	1
-21.2684	119.7165	CRD0087	Haul	14/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	5
-21.2684	119.7165	CRD0087	Haul	14/11/2024	Podocopida	Candonidae	Humphreyscandona `sp. indet.`	18
-21.2684	119.7165	CRD0087	Haul	14/11/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	8

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.2684	119.7165	CRD0087	Haul	14/11/2024	Podocopida	Candonidae	Candoninae `sp. indet.`	1
-21.4531	119.6660	CRD0090	Haul	10/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	22
-21.4531	119.6660	CRD0090	Haul	26/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	21
-21.4531	119.6660	CRD0090	Haul	21/09/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	5
-21.4531	119.6660	CRD0090	Haul	21/09/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. indet.`	48
-21.4531	119.6660	CRD0090	Haul	26/05/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. indet.`	33
-21.4531	119.6660	CRD0090	Haul	10/11/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. indet.`	47
-21.4531	119.6660	CRD0090	Haul	10/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG185`	1
-21.4531	119.6660	CRD0090	Haul	26/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG185`	1
-21.4531	119.6660	CRD0090	Haul	26/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG185`	1
-21.4531	119.6660	CRD0090	Haul	21/09/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG185`	1
-21.4531	119.6660	CRD0090	Haul	21/09/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.4531	119.6660	CRD0090	Haul	21/09/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.4531	119.6660	CRD0090	Haul	26/05/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. indet.`	2
-21.4531	119.6660	CRD0090	Haul	26/05/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.4531	119.6660	CRD0090	Haul	10/11/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.4531	119.6660	CRD0090	Haul	10/11/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	1
-21.4531	119.6660	CRD0090	Haul	10/11/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT081`	1
-21.4531	119.6660	CRD0007	Haul	10/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	6
-21.4531	119.6660	CRD0007	Haul	21/09/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	17
-21.4531	119.6660	CRD0007	Haul	26/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	44
-21.4531	119.6660	CRD0007	Haul	21/09/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. indet.`	79
-21.4531	119.6660	CRD0007	Haul	10/11/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. indet.`	70
-21.4531	119.6660	CRD0007	Haul	26/05/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. indet.`	17
-21.4531	119.6660	CRD0007	Haul	10/11/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. indet.`	1
-21.4531	119.6660	CRD0007	Haul	10/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG185`	1
-21.4531	119.6660	CRD0007	Haul	21/09/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG185`	1
-21.4531	119.6660	CRD0007	Haul	26/05/2024			Oligochaeta `sp. indet.`	30

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.4531	119.6660	CRD0007	Haul	26/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG185`	1
-21.4531	119.6660	CRD0007	Haul	21/09/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT081`	1
-21.4531	119.6660	CRD0007	Haul	21/09/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.4531	119.6660	CRD0007	Haul	21/09/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.4531	119.6660	CRD0007	Haul	10/11/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.4531	119.6660	CRD0007	Haul	10/11/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	2
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Isopoda	Tainisopidae	Pygolabis `sp. indet.`	1
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	15
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Harpacticoida	Parastenocarididae	Parastenocaris `sp. Biologic-HARP105`	1
-21.4076	119.6871	CRD0103	Haul	13/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	15
-21.4076	119.6871	CRD0103	Haul	13/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	6
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	1
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. Biologic-AMPH111`	1
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Isopoda	Tainisopidae	Pygolabis `sp. Biologic-ISOP213`	1
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.4076	119.6871	CRD0103	Haul	13/11/2024	Cyclopoida		Cyclopoida `sp. indet.`	36
-21.4076	119.6871	CRD0103	Haul	13/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.4076	119.6871	CRD0103	Haul	13/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. Biologic-OSTR143`	1
-21.4076	119.6871	CRD0103	Haul	22/09/2024	Podocopida	Limnocytheridae	Gomphodella `sp. Biologic-OSTR143`	1
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Amphipoda	Bogidiellidae	Bogidiellidae `sp. Biologic-AMPH113`	1
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	3
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	6
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	15
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Harpacticoida	Ameiridae	Megastygonitocrella `sp. indet.`	1
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	16
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Calanoida	Ridgewayiidae	Stygoridgewayia `sp. Biologic-CALA011`	1

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Cyclopoida		Cyclopoida `sp. indet.`	43
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	50
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	13
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Podocopida	Candonidae	Humphreyscandona `sp. indet.`	3
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	9
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	4
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	2
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	3
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	2
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. Biologic-AMPH110`	1
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP209`	1
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP211`	1
-21.3004	119.7080	CRD0108	Haul	25/05/2024			Oligochaeta `sp. indet.`	55
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. Biologic-CYCL106`	1
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Cyclopoida		Cyclopoida `sp. indet.`	59
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	14
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	12
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	6
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Podocopida	Candonidae	Humphreyscandona `sp. indet.`	5
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Podocopida	Candonidae	Humphreyscandona `sp. indet.`	1
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Podocopida	Candonidae	Candoninae `sp. indet.`	1
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Podocopida	Candonidae	Deminutiocandona `sp. Biologic-OSTR141`	1
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	3
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	6
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	1
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP211`	1
-21.3004	119.7080	CRD0108	Haul	19/09/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT083`	1

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.3004	119.7080	CRD0108	Haul	25/05/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT083`	1
-21.3004	119.7080	CRD0108	Haul	12/11/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT083`	1
-21.3793	119.6872	CRD0111	Haul	19/09/2024	Isopoda		Oniscidea `sp. indet.`	1
-21.3793	119.6872	CRD0111	Haul	13/11/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	1
-21.3793	119.6872	CRD0111	Haul	13/11/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. indet.`	1
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Amphipoda	Bogidiellidae	Bogidiellidae `sp. Biologic-AMPH112`	1
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	3
-21.3801	119.6857	CRD0112	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	42
-21.3801	119.6857	CRD0112	Haul	19/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	28
-21.3801	119.6857	CRD0112	Haul	19/09/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	1
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	11
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	16
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	31
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	3
-21.3801	119.6857	CRD0112	Haul	19/09/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	2
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	3
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. indet.`	20
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. indet.`	3
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	4
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. indet.`	3
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG186`	1
-21.3801	119.6857	CRD0112	Haul	19/09/2024	Harpacticoida	Canthocamptidae	Elaphoidella `sp. Biologic-HARP103`	1
-21.3801	119.6857	CRD0112	Haul	19/09/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT084`	1
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Cyclopoida		Cyclopoida `sp. indet.`	88
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Cyclopoida		Cyclopoida `sp. indet.`	18
-21.3801	119.6857	CRD0112	Haul	19/09/2024	Podocopida	Candonidae	Leicacandona `sp. Biologic-OSTR140`	1

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Isopoda	Microcerberidae	Microcerberidae `sp. Biologic-ISOP212`	1
-21.3801	119.6857	CRD0112	Haul	24/05/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT084`	1
-21.3801	119.6857	CRD0112	Haul	13/11/2024	Bathynellacea	Parabathynellidae	Atopobathynella `sp. Biologic-PBAT084`	1
-21.4524	119.6665	CRD0120	Haul	10/11/2024	Bathynellacea	Bathynellidae	Bathynellidae `sp. Biologic-BATH038`	1
-21.3957	119.6993	CRD0048	Haul	24/05/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. Biologic-CYCL105`	1
-21.3957	119.6993	CRD0048	Haul	13/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. Biologic-OSTR143`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Amphipoda	Eriopisidae	Pilbarana `sp. Biologic-AMPH115`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	15
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Cyclopoida		Cyclopoida `sp. indet.`	55
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Harpacticoida	Parastenocarididae	Parastenocaris `sp. indet.`	32
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Harpacticoida		Harpacticoida `sp. indet.`	34
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	13
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Harpacticoida	Ameiridae	Megastygonitocrella `sp. indet.`	1
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Podocopida	Candonidae	Humphreyscandona `sp. indet.`	2
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	3
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	19
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. indet.`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Amphipoda	Paramelitidae	Paramelitidae `sp. Biologic-AMPH111`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024			Oligochaeta `sp. indet.`	65
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. indet.`	1
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	1
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Haplotaxida	Phreodrilidae	Phreodrilidae `sp. Biologic-OLIG184`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	15
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Harpacticoida		Harpacticoida `sp. indet.`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Cyclopoida	Cyclopidae	Diacyclops `sp. indet.`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Harpacticoida	Parastenocarididae	Parastenocaris `sp. Biologic-HARP104`	1

Latitude	Longitude	Site	Sample type	Date	Order	Family	Taxon	# collected
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Harpacticoida	Parastenocarididae	Parastenocaris `sp. Biologic-HARP104`	1
-21.3017	119.7067	CRD0064	Haul	19/09/2024	Harpacticoida	Ameiridae	Megastygonitocrella `sp. indet.`	18
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Cyclopoida		Cyclopoida `sp. indet.`	37
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	0
-21.3017	119.7067	CRD0064	Haul	12/11/2024	Podocopida	Candonidae	Deminutiocandona `sp. Biologic-OSTR139`	1
-21.3018	119.7067	CRD0085	Haul	19/09/2024	Enchytraeida	Enchytraeidae	Enchytraeidae `sp. indet.`	1
-21.3018	119.7067	CRD0085	Haul	29/05/2024	Haplotaxida	Naididae	Pristina `sp. indet.`	3
-21.3018	119.7067	CRD0085	Haul	29/05/2024	Cyclopoida	Cyclopidae	Thermocyclops `sp. Biologic-CYCL106`	1
-21.3018	119.7067	CRD0085	Haul	12/11/2024	Harpacticoida	Ameiridae	Megastygonitocrella `sp. indet.`	1
-21.3018	119.7067	CRD0085	Haul	12/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	4
-21.3018	119.7067	CRD0085	Haul	29/05/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	39
-21.3018	119.7067	CRD0085	Haul	19/09/2024	Podocopida	Candonidae	Candoninae `sp. indet.`	2
-21.3018	119.7067	CRD0085	Haul	12/11/2024	Podocopida	Candonidae	Humphreyscandona `sp. indet.`	2
-21.3018	119.7067	CRD0085	Haul	12/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	1
-21.3018	119.7067	CRD0085	Haul	12/11/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	1
-21.3018	119.7067	CRD0085	Haul	29/05/2024	Podocopida	Candonidae	Humphreyscandona `sp. indet.`	16
-21.3018	119.7067	CRD0085	Haul	29/05/2024	Podocopida	Candonidae	Candoninae `sp. indet.`	7
-21.3018	119.7067	CRD0085	Haul	29/05/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	1
-21.3018	119.7067	CRD0085	Haul	19/09/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	38
-21.3018	119.7067	CRD0085	Haul	19/09/2024	Podocopida	Candonidae	Deminutiocandona `sp. indet.`	1
-21.3018	119.7067	CRD0085	Haul	19/09/2024	Podocopida	Candonidae	Leicacandona `sp. indet.`	2
-21.3018	119.7067	CRD0085	Haul	19/09/2024	Podocopida	Candonidae	Humphreyscandona `sp. indet.`	6
-21.3018	119.7067	CRD0085	Haul	19/09/2024	Podocopida	Limnocytheridae	Gomphodella `sp. indet.`	1

Appendix E: Molecular Systematics Report

Sanjiv Ridge BWT Subfauna

Molecular Systematics Analysis

Report to Atlas Iron

20 June 2025

Document Status				
Revision No.	Author	Review / Approved for Issue	Approved for Issue to Name	Date
1	Stephanie Floeckner, Liesel Morgan, Joesphine Hyde	Joel Huey	Larissa Byrne (Atlas Iron)	14/05/2025
2	Stephanie Floeckner, Liesel Morgan, Joesphine Hyde	Joel Huey	Larissa Byrne (Atlas Iron)	20/06/2025
3				

"IMPORTANT NOTE"

Glossary

Bootstrap Value between 0 and 100 that indicates the robustness of the node in a phylogenetic tree.

COI Cytochrome Oxidase subunit 1, a mitochondrial gene commonly used in phylogenetic studies and used as a DNA barcode to identify species.

GenBank Annotated open access sequence database of all publicly available nucleotide sequences and their protein translations.

Incertae sedis The term used for a taxonomic group where its broader relationships are unknown or undefined.

Monophyletic A grouping of specimens that all share a common ancestor, inferred by sequence data. The sequences within the monophyletic group will all be more closely related to each other, relative to sequences outside of the monophyletic group. This grouping is often referred to as a lineage or clade and is graphically represented in phylogenies/trees by sharing a single node with a high bootstrap value.

OTU Operational taxonomic unit – species-equivalent taxonomic unit based on COI or 12S cluster similarity.

Study Area Sanjiv Ridge project area

Study sequences Sequences derived from the specimens collected by Biologic for analysis in this report. Sequences not included in the Study sequences are referred to as non-Study sequences.

Study specimens Specimens collected by Biologic for analysis in this report.

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1 Introduction

1.1 Background

Atlas Iron commissioned Biologic Environmental Survey Pty Ltd (Biologic) to undertake a molecular systematics analysis (DNA barcoding) of 141 specimens collected from Sanjiv Ridge (the Study Area). Specimens were collected in May, September, November and December of 2024.

The specimens collected and sequenced by Biologic and analysed here are collectively referred to as the Study specimens. Sequences derived from the Study specimens are collectively referred to as the Study sequences. Sequences not included in the Study sequences are referred to as non-Study sequences.

The aims and objectives of the molecular systematics analysis were to:

Undertake DNA sequencing of 141 subterranean fauna specimens to obtain barcoding sequences of the mitochondrial gene Cytochrome Oxidase subunit 1 (COI; Hebert *et al.*, 2003b).

Investigate the interspecific and intraspecific relationships among sequences of each higher taxonomic group (i.e. use the results of the DNA analysis to indicate how many different OTU/species are likely to occur within each genus or relevant higher taxon)

Investigate the relationships among sequences from the Study Area and relevant previous sequences from the wider region, using available DNA databases (i.e. compare the results of the current analysis with accessible DNA databases to assess whether any of the species/ OTUs from the Study Area have been collected previously or more widely beyond the Study Area).

This document reports the methods and results of the molecular systematics analysis. All sequence data will be uploaded to GenBank (https://www.ncbi.nlm.nih.gov/genbank/) as per Biologic Molecular Systematics standard procedure.

2 Methods

2.1 Sub-sample Preparation

After taxonomic examination, a total of 141 specimens collected from the Study Area by Biologic were selected for molecular systematics analysis (Table 2.1). The specimens were chosen based on their geographic spread across the Study Area to assist with understanding species distributions. Adequate redundancy in specimen selection was incorporated to account for any potential sequence generation failure. Specimens in good condition were chosen to increase their DNA extraction potential.

Where whole specimens were available, tissue preparation was undertaken by removing a leg or another body part less important for taxonomic identification, briefly drying off the ethanol, and placing the tissue in ATL buffer. In some instances, for very small and/or juvenile specimens, the entire animal was utilised. Again, these were briefly dried and placed in ATL buffer. Greatest care was taken to decontaminate all tools and equipment between samples, using bleach and repeated rinsing in deionised water. Table 2.1 provides details of the taxonomic orders chosen for molecular analysis. Further taxonomic clarification for each specimen included in the analysis can be found in Appendix A.

Table 2.1: Taxonomic groups from the Study Area included in the analysis, with a summary of PCR and sequencing success

Taxa	Fail	Pass	Total
Clitellata			
Enchytraeida	0	3	3
Haplotaxida	0	13	13
Malacostraca			
Amphipoda	2	17	19
Bathynellacea	0	21	21
Isopoda	2	22	24
Maxillopoda			
Calanoida	0	1	1
Cyclopoida	4	19	23
Harpacticoida	2	8	10
Ostracoda			
Podocopida	9	18	27
Total	**19**	**122**	**141**

2.2 DNA Extraction, Amplification and Sequencing

DNA extraction and sequencing methods followed standard methods (e.g. Edgecombe *et al.*, 2019; Framenau *et al.*, 2018; Huey *et al.*, 2019; Perina *et al.*, 2018), as follows:

Subsampled tissue/specimen was placed directly into ATL buffer for extraction using the QIAGEN DNeasy Blood and Tissue extraction kit, and DNA extraction followed the manufacturer's protocols. DNA extractions were amplified by Polymerase Chain Reaction (PCR) using Folmer PCR primers (LCO1490, HCO2198; Folmer *et al.*, 1994) to assess the variability of COI. For some specimens that did not amplify using the Folmer primers, alternative primers amplifying the same part of COI were used, such as C1-J2329 and C1-J1718 (Perina *et al.*, 2018; Simon *et al.*, 1994).

The resulting PCR product was cleaned up and sequenced by the Australian Genomic Research Facility (AGRF) Perth node. Molecular laboratory workflows were managed using GENEIOUS Prime (Kearse et al., 2012) with the Biocode plugin (http://www.mooreabiocode. org). Raw sequence data were edited and assembled in GENEIOUS, and final consensus sequences were then available for downstream analysis.

2.3 Specimen Selection for Comparative Analysis

DNA comparisons were typically conducted at the order level (Table 2.1). Comparative sequences were from GenBank (a publicly available DNA sequence database) and Biologic's unpublished DNA sequence libraries, using two separate methods.

- BLAST (Basic Local Alignment Search Tool): a method for rapidly searching a DNA sequence library to identify similar sequences. Sequences were searched using the "blastn" function, which returns similar matches.
- Taxonomic Curation: BLAST occasionally fails to identify sequences that could be considered useful for comparison, such as species that might be genetically distant, but are required to be included in the analysis for comparison. Taxonomically relevant specimens were identified using the available taxonomic classifications and identifications in those databases.

The final phylogenies and distance matrices in this report were pruned back to those sequences that can be provided to the Client, with any matches to sequences that cannot be provided to the Client discussed in the relevant sections.

2.4 Analysis and Interpretation of Alignments and Phylogenies

For each taxonomic group, the selected sequences were aligned using the MAFFT (Multiple Alignment using Fast Fourier Transform) algorithm (Katoh *et al.*, 2002). Trees were constructed on resulting alignments using the RaxML (Stamatakis, 2014) plugin in GENEIOUS Prime, using 1,000 bootstrap replicates and the GTR+G substitution model.

To identify OTUs and species using molecular data, we integrated multiple lines of evidence, including:

- Genetic distance threshold method (~8% pairwise distances at COI, see below);
- Morphological identifications, where available;
- Geographic information; and
- Interpretation of phylogenetic topology.

Fauna-specific genetic distance thresholds for discovering species and OTUs were used wherever possible, based on published literature and available previous reports. Where these thresholds were not available, the assessment used average divergence thresholds for related groups or higher taxa developed by broad-level studies (e.g. Hebert *et al.*, 2003a). In general, ≤8% COI divergence is seen as appropriate to determine OTUs (Hebert *et al.*, 2003a), however, higher or lower divergences are sometimes justified depending on the organism studied. Unless otherwise stated, we considered sequences that exhibited COI divergences ≤8% to belong to the same OTU.

The branching pattern and statistical robustness of the nodes (measured using bootstrap support) is also used to inform OTU discovery. OTUs form monophyletic groups (or lineages), and so if an unknown sequence falls within a lineage comprised of other sequences that have already been identified as a single OTU or species, then that unknown sequence likely shares the same OTU/species as those sequences it is nested within (Figure 2.1). Additionally, distinct OTUs typically have large internode distances separating OTUs, with short internode distances within the OTU/species (Figure 2.1).

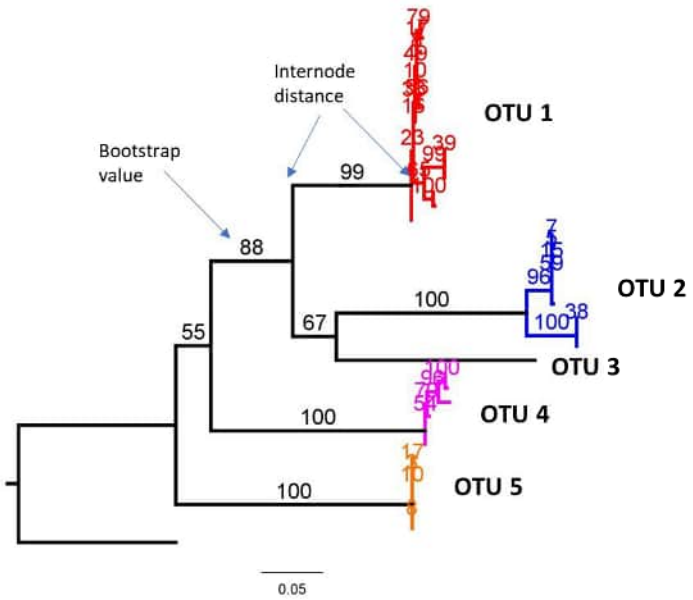

Figure 2.1: Example phylogeny showing OTUs with internode distances and bootstrap values indicated

2.5 Constraints and Limitations

The analysis was constrained by the breadth of data available to undertake comparisons, the accessibility of pre-existing regional sequences, and the success rate of genetic sequencing, which can be affected by specimen collection, preservation, storage methods and contamination. Best practises were followed during specimen collection, preservation, and storage, prior to specimens arriving at Biologic's laboratories. All care was taken to ensure that the risks of laboratory contamination, data handling issues, and specimen management issues were minimised within Biologic's laboratories throughout the subsampling, processing and genetic analysis.

The databases used for regional comparisons included GenBank and Biologic's sequence libraries. While these sequence databases, in combination, comprise a large portion of the subterranean fauna genetic work undertaken in the Pilbara region, it is acknowledged that there may be many other relevant sequences from third party project areas nearby or elsewhere in the region that were not available for comparison at the time of the study. GenBank is dynamic database, and the addition of new sequences and altered taxonomic classifications could not be included into this report if they occurred after the 11th of March 2024.

DNA barcoding using the mitochondrial gene COI, while useful for explaining genetic differences between closely related or moderately related species, is limited in its ability to resolve deeper phylogenetic relationships among taxa at higher taxonomic levels (e.g. genus, family, order). In the current study, phylogenetic relationships among species/OTUs >25% COI divergence are treated with caution. If further resolution of deeper phylogeny is important for project goals, this could be investigated using a multiple gene approach.

We have very intentionally used the term ‘species discovery’ in this report, rather than the oft-used ‘species delimitation’. This follows the recommendations of Collins and Cruickshank (2013). This is because a single DNA barcode is not adequate to undertake molecular delimitation, and can be better thought of as ‘molecular para-taxonomy’ (Brower, 2006). Species delimitation is the use of DNA data in a statistical framework, typically with multiple, independent genes (Carstens *et al.*, 2013). While single gene species delimitation methods do exist (Dellicour & Flot, 2018), they have several shortcomings and are rarely used in isolation to delimit and describe new species. We consider the OTUs presented here as preliminary molecular identifications, that may change over time as more genetic and morphological data become available. We have documented any known name changes in the relevant sections.

3 Results and Discussion

A total of 141 specimens were processed for sequencing by Biologic (Table 3.1). Sequences were successfully derived for 133 of these specimens (94% of specimens), with 8 failing to produce a PCR product. Of these 133 sequences, 11 did not produce a high-quality sequence (less than 80% of untrimmed bases in the sequence were of high quality) or were high quality sequences of an organism that was not the target organism (likely contamination). This left 122 high quality sequences for analysis (91% of sequences). The orders of the sequences are tabulated in Table 3.1.

In total, 47 OTUs have been designated to specimens from the Study Area, 41 of these being specific to this study (Table 3.1). The results of each taxonomic group's analysis are described in the subsequent sections.

Table 3.1: Summary of species and OTUs recovered from samples successfully sequenced in this study, organised by taxon

OTU (genetic taxon)	Sequenced specimens	Matches to non-Study sequences	Linear Range (km)
Clitellata			
Enchytraeida			
Enchytraeidae `sp. Biologic-OLIG045`	1	Yes	631.03
Enchytraeidae `sp. Biologic-OLIG183`	1	No	Singleton
Enchytraeidae `sp. E12 LB-2015`	1	Yes	689.14
Haplotaxida			
Naididae `sp. N4 LB-2015`	1	Yes	145.07
Phreodrilidae `sp. Biologic-OLIG184`	3	No	19.87
Phreodrilidae `sp. Biologic-OLIG185`	7	No	0.01
Phreodrilidae `sp. Biologic-OLIG186`	2	No	6.72
Malacostraca			
Amphipoda			
Bogidiellidae `sp. Biologic-AMPH112`	1	No	Singleton
Bogidiellidae `sp. Biologic-AMPH113`	3	No	2.65
Paramelitidae `sp. Biologic-AMPH108`	1	No	Singleton
Paramelitidae `sp. Biologic-AMPH109`	1	No	Singleton
Paramelitidae `sp. Biologic-AMPH110`	2	No	15.42
Paramelitidae `sp. Biologic-AMPH111`	4	No	11.90
Pilbarana `sp. Biologic-AMPH114`	2	Yes	60.87
Pilbarana `sp. Biologic-AMPH115`	3	No	10.71
Bathynellacea			
Atopobathynella `sp. Biologic-PBAT081`	2	No	0.01
Atopobathynella `sp. Biologic-PBAT082`	2	No	Single Site
Atopobathynella `sp. Biologic-PBAT083`	3	No	Single Site

OTU (genetic taxon)	Sequenced specimens	Matches to non-Study sequences	Linear Range (km)
Atopobathynella `sp. Biologic-PBAT084`	3	No	Single Site
Bathynellidae `sp. Biologic-BATH038`	10	No	1.54
Parabathynellidae `sp. Biologic-PBAT085`	1	No	Singleton
Isopoda			
Microcerberidae `sp. Biologic-ISOP208`	3	No	Single Site
Microcerberidae `sp. Biologic-ISOP209`	6	No	21.09
Microcerberidae `sp. Biologic-ISOP210`	2	No	Single Site
Microcerberidae `sp. Biologic-ISOP211`	8	No	19.15
Microcerberidae `sp. Biologic-ISOP212`	1	No	Singleton
Microcerberidae `sp. Biologic-ISOP221`	3	No	Single Site
Pygolabis `sp. Biologic-ISOP213`	1	No	Singleton
Maxillopoda			
Calanoida			
Stygoridgewayia `sp. Biologic-CALA011`	1	No	Singleton
Cyclopoida			
Diacyclops `sp. Biologic-CYCL104`	2	No	Single Site
Diacyclops `sp. Biologic-CYCL105`	10	No	25.64
Pescecyclops `sp. Biologic-CYCL107`	1	No	Singleton
Pescecyclops `sp. WAM-CYLP001`	2	Yes	388.55
Thermocyclops `sp. Biologic-CYCL014`	1	Yes	407.25
Thermocyclops `sp. Biologic-CYCL106`	3	No	15.43
Harpacticoida			
Elaphoidella `sp. Biologic-HARP103`	4	No	7.73
Parastenocaris `sp. Biologic-HARP104`	2	No	Single Site
Parastenocaris `sp. Biologic-HARP105`	1	No	Singleton
Parastenocaris `sp. Biologic-HARP106`	1	No	Singleton
Ostracoda			
Podocopida			
Deminutiocandona `sp. Biologic-OSTR139`	4	No	18.93
Deminutiocandona `sp. Biologic-OSTR141`	2	No	2.65
Gomphodella `sp. Biologic-OSTR143`	5	No	1.83
Gomphodella `sp. Biologic-OSTR144`	1	No	Singleton
Gomphodella `sp. Biologic-OSTR145`	1	No	Singleton
Leicacandona `sp. Biologic-OSTR140`	3	No	1.76
Leicacandona `sp. Biologic-OSTR142`	1	No	Singleton
Leicacandona `sp. Biologic-OSTR146`	1	No	Singleton

3.1 Clitellata

Sixteen Clitellata sequences formed seven OTUs in three families: Enchytraeidae, Naididae, and Phreodrilidae (Figure 3.1). Three Enchytraeidae OTUs were recovered from three sequences; Enchytraeidae `sp. Biologic-OLIG183`represented a singleton and was more than 12.7% divergent from all the other sequences in the analysis (Table 3.2). The other two OTUs Enchytraeidae `sp. Biologic-OLIG045`, and Enchytraeidae `sp. E12 LB-2015` both matched non-project sequences and had extremely wide linear ranges of 631 km and 689.1 km, respectively. Both OTUs had intraspecific distances below 5.6% and were more than 12.6% divergent from all other sequences in the analysis (Table 3.2).

Three Phreodrilidae OTUs were recovered from twelve sequences. All three OTUs, Phreodrilidae sp. Biologic-OLIG184`, Phreodrilidae `sp. Biologic-OLIG185`, and Phreodrilidae `sp. Biologic-OLIG186, were new OTUs and did not match any non-project sequences. Phreodrilidae `sp. Biologic-OLIG184` had a linear range of 19.9 km, had an intraspecific distance of less than 8.9%, and was more than 15.7% divergent from all other sequences in the analysis (Table 3.2). Phreodrilidae `sp. Biologic-OLIG185` was represented by seven sequences with an intraspecific distance of less than 0.5%, these sequences had a linear range of 0.01 km and were more than 15.3% divergent from all other sequences in the analysis (Table 3.2). Phreodrilidae `sp. Biologic-OLIG186` represented by two sequences, they had a linear range of 6.7 km, had an intraspecific distance of less than 3.1%, and was more than 8.2% divergent from all other sequences in the analysis (Table 3.2).

One sequence matched the OTU Naididae `sp. N4 LB-2015`, which matched non-project sequences and had a linear range of 145.1 km. This OTU had an intraspecific distance below 8.8% and was more than 12.7% divergent from all other sequences in the analysis (Table 3.2).

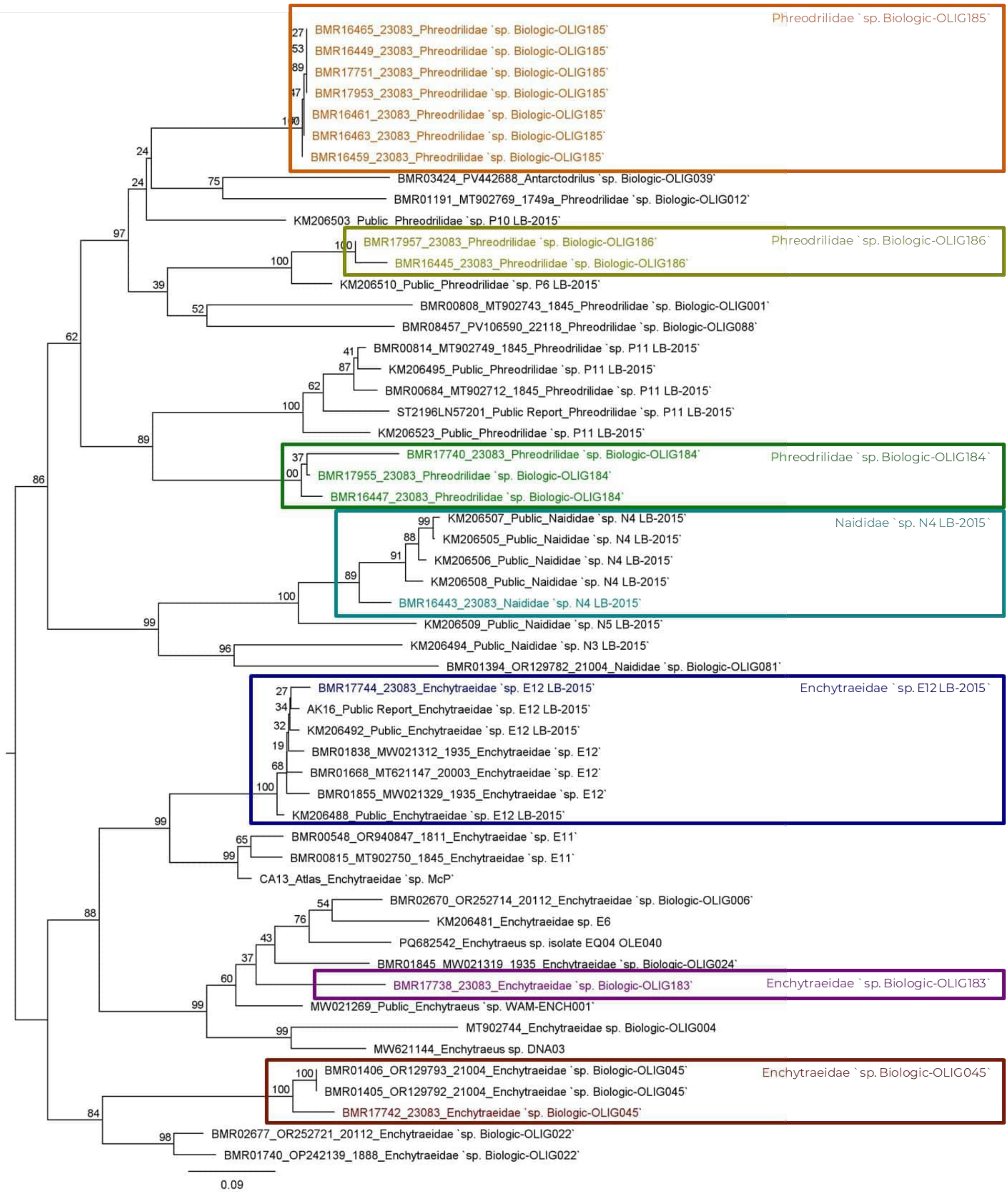

Figure 3.1: Phylogeny for the Clitellata dataset, with bootstrap values

Table 3.2: Pairwise distances (%) for the Clitellata dataset

COI Pairwise Distances (%)	BMR17744	AK16_Public	KM206492	BMR01838	BMR01668	KM206488	BMR01855	BMR00815	BMR00548	CA13_Atlas	BMR17738	MW021269	BMR02670	PQ682542	KM206481	BMR01845	MW621144	MT902744	BMR17742	BMR01406	BMR01405	BMR02677	BMR01740	BMR16459	BMR16463	BMR16461	BMR16449
BMR17744_23083_Enchytraeidae `sp. E12 LB-2015`		2.7	3.0	3.3	3.6	3.7	4.0	13.9	14.2	13.0	18.2	17.4	16.2	18.5	16.5	17.9	17.1	19.3	19.7	19.7	19.7	17.9	17.9	21.2	21.2	21.3	21.2
AK16_Public Report_Enchytraeidae `sp. E12 LB-2015`	2.7		1.8	2.4	2.6	2.3	3.5	14.3	14.7	13.1	17.5	17.4	16.4	18.6	16.4	17.7	16.9	19.9	19.8	19.9	19.9	17.9	17.8	20.8	20.8	20.9	20.8
KM206492_Public_Enchytraeidae `sp. E12 LB-2015`	3.0	1.8		2.6	2.4	2.6	3.5	14.4	14.6	13.2	17.5	16.4	16.7	18.0	16.6	17.2	16.6	19.9	19.3	19.3	19.3	18.2	17.9	20.8	20.8	20.9	20.8
BMR01838_MW021312_1935_Enchytraeidae `sp. E12`	3.3	2.4	2.6		3.0	3.2	4.0	13.8	14.1	13.2	17.6	16.3	16.4	18.3	16.3	17.7	16.6	19.9	19.6	19.6	19.6	18.4	17.9	20.8	20.8	20.9	20.8
BMR01668_MT621147_20003_Enchytraeidae `sp. E12`	3.6	2.6	2.4	3.0		3.0	3.5	14.4	14.9	13.5	17.0	16.3	16.9	18.0	16.3	17.1	16.6	19.8	20.2	20.2	20.2	18.4	17.9	20.8	21.0	21.1	21.0
KM206488_Public_Enchytraeidae `sp. E12 LB-2015`	3.7	2.3	2.6	3.2	3.0		3.5	14.3	13.8	12.6	17.2	16.6	16.3	18.0	16.7	16.6	16.4	19.5	19.9	19.5	19.5	17.6	17.5	20.7	20.7	20.7	20.7
BMR01855_MW021329_1935_Enchytraeidae `sp. E12`	4.0	3.5	3.5	4.0	3.5	3.5		14.0	14.7	14.1	18.1	17.2	17.4	18.1	17.1	17.4	17.5	19.9	19.9	19.9	19.9	18.1	17.8	20.7	20.7	20.7	20.7
BMR00815_MT902750_1845_Enchytraeidae `sp. E11`	13.9	14.3	14.4	13.8	14.4	14.3	14.0		5.5	5.0	20.7	17.8	17.4	18.0	17.5	18.3	18.1	20.1	16.6	17.2	17.2	17.5	17.5	22.8	23.0	23.0	23.0
BMR00548_OR940847_1811_Enchytraeidae `sp. E11`	14.2	14.7	14.6	14.1	14.9	13.8	14.7	5.5		5.1	19.6	16.6	17.0	17.8	17.6	18.1	17.2	19.8	16.9	17.8	17.8	17.0	16.7	21.6	21.8	21.9	21.8
CA13_Atlas_Enchytraeidae `sp. McP`	13.0	13.1	13.2	13.2	13.5	12.6	14.1	5.0	5.1		19.2	17.4	16.9	17.8	17.1	17.1	17.4	20.1	17.6	17.8	17.8	16.2	15.9	21.7	21.9	22.0	21.9
BMR17738_23083_Enchytraeidae `sp. Biologic-OLIG183`	18.2	17.5	17.5	17.6	17.0	17.2	18.1	20.7	19.6	19.2		12.8	13.7	14.6	15.5	13.7	17.1	17.5	21.7	21.0	21.0	19.1	18.5	19.9	20.1	20.1	19.8
MW021269_Public_Enchytraeus `sp. WAM-ENCH001`	17.4	17.4	16.4	16.3	16.3	16.6	17.2	17.8	16.6	17.4	12.8		12.2	13.1	14.5	12.5	13.9	16.6	20.4	20.2	20.2	18.1	16.5	19.2	19.3	19.4	19.3
BMR02670_OR252714_20112_Enchytraeidae `sp. Biologic-OLIG006`	16.2	16.4	16.7	16.4	16.9	16.3	17.4	17.4	17.0	16.9	13.7	12.2		10.8	10.5	13.6	15.4	17.1	18.7	18.0	18.0	18.8	17.6	21.0	21.0	21.1	21.0
PQ682542_Enchytraeus sp. isolate EQ04 OLE040	18.5	18.6	18.0	18.3	18.0	18.0	18.1	18.0	17.8	17.8	14.6	13.1	10.8		12.2	13.0	17.2	18.0	22.3	20.4	20.4	18.9	17.9	18.0	18.1	18.2	18.5
KM206481_Enchytraeidae sp. E6	16.5	16.4	16.6	16.3	16.3	16.7	17.1	17.5	17.6	17.1	15.5	14.5	10.5	12.2		13.4	15.4	17.4	19.9	19.3	19.3	17.5	17.2	19.6	19.8	19.9	19.8
BMR01845_MW021319_1935_Enchytraeidae `sp. Biologic-OLIG024`	17.9	17.7	17.2	17.7	17.1	16.6	17.4	18.3	18.1	17.1	13.7	12.5	13.6	13.0	13.4		15.6	17.5	21.2	19.6	19.6	17.8	17.3	19.9	20.1	20.2	20.1
MW621144_Enchytraeus sp. DNA03	17.1	16.9	16.6	16.6	16.6	16.4	17.5	18.1	17.2	17.4	17.1	13.9	15.4	17.2	15.4	15.6		14.3	19.5	20.1	20.1	18.1	17.8	20.1	20.1	20.2	20.2
MT902744_Enchytraeidae sp. Biologic-OLIG004	19.3	19.9	19.9	19.9	19.8	19.5	19.9	20.1	19.8	20.1	17.5	16.6	17.1	18.0	17.4	17.5	14.3		22.2	22.8	22.8	21.3	20.4	20.6	20.6	20.6	20.9
BMR17742_23083_Enchytraeidae `sp. Biologic-OLIG045`	19.7	19.8	19.3	19.6	20.2	19.9	19.9	16.6	16.9	17.6	21.7	20.4	18.7	22.3	19.9	21.2	19.5	22.2		5.6	5.6	16.5	17.0	22.2	22.2	22.3	22.3
BMR01406_OR129793_21004_Enchytraeidae `sp. Biologic-OLIG045`	19.7	19.9	19.3	19.6	20.2	19.5	19.9	17.2	17.8	17.8	21.0	20.2	18.0	20.4	19.3	19.6	20.1	22.8	5.6		0.0	16.2	17.0	21.4	21.4	21.5	21.6
BMR01405_OR129792_21004_Enchytraeidae `sp. Biologic-OLIG045`	19.7	19.9	19.3	19.6	20.2	19.5	19.9	17.2	17.8	17.8	21.0	20.2	18.0	20.4	19.3	19.6	20.1	22.8	5.6	0.0		16.2	17.0	21.4	21.4	21.5	21.6
BMR02677_OR252721_20112_Enchytraeidae `sp. Biologic-OLIG022`	17.9	17.9	18.2	18.4	18.4	17.6	18.1	17.5	17.0	16.2	19.1	18.1	18.8	18.9	17.5	17.8	18.1	21.3	16.5	16.2	16.2		5.8	19.5	19.5	19.5	19.6
BMR01740_OP242139_1888_Enchytraeidae `sp. Biologic-OLIG022`	17.9	17.8	17.9	17.9	17.9	17.5	17.8	17.5	16.7	15.9	18.5	16.5	17.6	17.9	17.2	17.3	17.8	20.4	17.0	17.0	17.0	5.8		19.0	19.0	19.1	19.1
BMR16459_23083_Phreodrilidae `sp. Biologic-OLIG185`	21.2	20.8	20.8	20.8	20.8	20.7	20.7	22.8	21.6	21.7	19.9	19.2	21.0	18.0	19.6	19.9	20.1	20.6	22.2	21.4	21.4	19.5	19.0		0.2	0.2	0.5
BMR16463_23083_Phreodrilidae `sp. Biologic-OLIG185`	21.2	20.8	20.8	20.8	21.0	20.7	20.7	23.0	21.8	21.9	20.1	19.3	21.0	18.1	19.8	20.1	20.1	20.6	22.2	21.4	21.4	19.5	19.0	0.2		0.1	0.3
BMR16461_23083_Phreodrilidae `sp. Biologic-OLIG185`	21.3	20.9	20.9	20.9	21.1	20.7	20.7	23.0	21.9	22.0	20.1	19.4	21.1	18.2	19.9	20.2	20.2	20.6	22.3	21.5	21.5	19.5	19.1	0.2	0.1		0.4
BMR16449_23083_Phreodrilidae `sp. Biologic-OLIG185`	21.2	20.8	20.8	20.8	21.0	20.7	20.7	23.0	21.8	21.9	19.8	19.3	21.0	18.5	19.8	20.1	20.2	20.9	22.3	21.6	21.6	19.6	19.1	0.5	0.3	0.4	
BMR17751_23083_Phreodrilidae `sp. Biologic-OLIG185`	21.2	20.8	20.8	20.8	21.0	20.7	20.7	23.0	21.8	21.9	19.8	19.3	21.0	18.5	19.8	20.1	20.2	20.9	22.3	21.6	21.6	19.6	19.1	0.5	0.3	0.4	0.0
BMR16465_23083_Phreodrilidae `sp. Biologic-OLIG185`	21.2	20.8	20.8	20.8	21.0	20.7	20.7	23.0	21.8	21.9	19.8	19.3	21.0	18.5	19.8	20.1	20.2	20.9	22.3	21.6	21.6	19.6	19.1	0.5	0.3	0.4	0.0
BMR17953_23083_Phreodrilidae `sp. Biologic-OLIG185`	21.1	20.7	20.7	20.7	20.9	20.6	20.6	22.8	21.8	21.8	19.6	19.2	20.9	18.5	19.7	20.1	20.1	20.7	22.2	21.5	21.5	19.5	19.0	0.5	0.3	0.4	0.0
KM206503_Public_Phreodrilidae `sp. P10 LB-2015`	20.6	20.7	20.7	20.4	20.9	20.4	20.9	18.7	19.5	18.9	21.6	20.3	19.8	20.9	20.7	19.5	20.4	19.9	18.1	17.8	17.8	19.0	18.3	15.3	15.3	15.4	15.5
BMR03424_PV442688_Antarctodrilus `sp. Biologic-OLIG039`	22.2	21.6	21.3	21.3	21.2	20.7	22.4	22.5	21.6	21.5	22.7	21.2	20.3	21.5	21.3	21.9	22.9	23.6	23.3	22.4	22.4	20.7	20.6	15.8	15.8	15.9	16.0
BMR01191_MT902769_1749a_Phreodrilidae `sp. Biologic-OLIG012`	22.2	22.4	22.1	21.9	22.4	22.5	22.2	23.0	22.2	22.5	22.5	21.7	22.3	20.7	20.7	20.9	21.0	22.6	24.1	23.1	23.1	19.6	18.9	16.3	16.3	16.4	16.4
BMR16445_23083_Phreodrilidae `sp. Biologic-OLIG186`	19.9	20.5	20.4	19.9	21.1	19.9	21.0	21.0	21.3	19.6	23.3	22.7	21.0	21.7	21.6	21.8	20.4	22.4	23.7	23.4	23.4	19.9	20.4	17.8	17.8	17.9	17.8
BMR17957_23083_Phreodrilidae `sp. Biologic-OLIG186`	19.9	20.9	20.2	20.1	21.0	19.6	20.1	20.7	20.6	19.6	21.9	21.8	20.9	21.2	21.0	21.3	20.3	22.3	23.4	23.4	23.4	19.5	19.9	17.4	17.4	17.4	17.4
KM206510_Public_Phreodrilidae `sp. P6 LB-2015`	20.8	21.2	20.6	20.9	20.9	20.4	20.2	22.5	22.4	21.5	20.9	21.7	19.4	21.0	22.3	21.6	19.8	22.3	21.9	21.3	21.3	21.8	20.1	18.0	18.0	18.0	18.0
BMR08457_PV106590_22118_Phreodrilidae `sp. Biologic-OLIG088`	21.8	21.5	21.5	21.3	21.8	21.0	21.2	23.1	22.4	21.6	21.5	20.7	20.7	19.5	21.8	20.7	21.7	24.4	23.3	22.5	22.5	19.0	19.5	17.4	17.4	17.4	17.4
BMR00808_MT902743_1845_Phreodrilidae `sp. Biologic-OLIG001`	20.9	20.4	20.4	20.7	20.1	19.8	19.5	23.0	22.2	21.8	20.5	20.8	19.3	20.6	20.5	19.8	19.0	21.6	23.3	23.3	23.3	21.3	20.5	18.5	18.5	18.6	18.7
BMR16447_23083_Phreodrilidae `sp. Biologic-OLIG184`	18.6	19.0	19.2	18.8	19.2	19.3	19.5	20.2	19.8	19.3	20.7	21.3	19.2	21.0	21.5	20.2	19.9	22.1	19.3	19.0	19.0	19.9	20.4	18.8	18.8	18.9	19.0
BMR17955_23083_Phreodrilidae `sp. Biologic-OLIG184`	18.2	18.4	18.4	18.4	18.5	18.5	19.0	19.5	19.2	18.7	20.4	20.7	18.4	20.7	20.7	19.8	19.5	21.5	18.5	18.7	18.7	19.3	19.8	18.8	18.8	18.9	19.0
BMR17740_23083_Phreodrilidae `sp. Biologic-OLIG184`	20.1	20.5	20.2	20.5	20.4	20.1	20.8	20.5	21.2	20.5	21.4	21.3	19.5	21.5	22.4	20.7	21.3	22.7	20.7	19.8	19.8	20.2	20.4	21.3	21.4	21.5	21.6
KM206523_Public_Phreodrilidae `sp. P11 LB-2015`	21.4	21.7	21.6	21.4	21.7	21.1	21.9	21.3	20.1	20.8	22.1	20.7	20.3	21.8	21.6	21.6	22.3	22.6	21.3	20.5	20.5	20.3	20.6	19.2	19.3	19.3	19.2
BMR00684_MT902712_1845_Phreodrilidae `sp. P11 LB-2015`	21.5	21.2	20.9	21.2	21.2	21.5	21.5	22.5	21.3	22.1	21.9	21.5	21.7	22.0	21.5	23.1	21.7	21.3	21.6	22.5	22.5	20.9	21.6	19.5	19.5	19.6	19.3
KM206495_Public_Phreodrilidae `sp. P11 LB-2015`	22.1	21.3	21.5	21.6	21.6	20.6	21.6	23.1	21.5	21.9	20.9	21.5	21.1	22.9	22.7	23.0	21.3	20.6	21.3	21.8	21.8	20.1	20.7	18.9	18.9	19.0	18.7
BMR00814_MT902749_1845_Phreodrilidae `sp. P11 LB-2015`	21.4	20.9	21.3	21.0	21.0	20.9	20.7	21.5	20.4	21.2	21.3	21.0	21.3	21.8	21.3	22.4	21.0	21.7	21.8	22.2	22.2	19.8	20.6	19.2	19.2	19.3	19.0
ST2196LN57201_Public Report_Phreodrilidae `sp. P11 LB-2015`	21.2	21.0	20.6	20.9	21.3	21.2	21.5	21.0	19.6	20.2	21.8	20.4	20.6	21.2	21.3	21.5	21.0	21.5	21.2	21.0	21.0	20.3	20.4	18.6	18.7	18.8	18.9
BMR16443_23083_Naididae `sp. N4 LB-2015`	23.2	22.9	23.4	22.9	23.4	22.0	22.3	21.6	21.6	20.3	22.7	22.9	23.4	22.1	21.8	22.3	22.5	24.2	23.6	23.1	23.1	20.0	20.5	21.4	21.4	21.5	21.2
KM206508_Public_Naididae `sp. N4 LB-2015`	23.7	22.3	22.3	22.7	22.0	21.7	22.3	22.5	22.2	21.3	22.5	22.7	22.7	22.2	22.8	22.4	22.7	25.0	22.8	22.7	22.7	20.6	20.9	21.6	21.6	21.6	21.4
KM206506_Public_Naididae `sp. N4 LB-2015`	23.2	22.0	22.0	22.3	21.7	22.0	22.0	22.3	22.5	21.3	22.5	22.3	22.2	22.4	23.0	22.2	21.7	25.2	21.6	22.0	22.0	20.9	21.3	22.5	22.5	22.6	22.3
KM206505_Public_Naididae `sp. N4 LB-2015`	23.9	22.8	22.8	23.1	22.5	22.8	22.6	22.5	23.0	21.9	22.6	23.3	23.0	23.1	23.3	23.1	22.5	25.7	22.2	22.2	22.2	21.1	22.0	22.2	22.2	22.2	22.0
KM206507_Public_Naididae `sp. N4 LB-2015`	23.7	22.5	22.5	22.8	22.3	22.5	22.6	22.5	23.0	21.6	22.3	23.3	22.5	23.2	23.4	22.7	22.2	25.8	21.9	21.7	21.7	21.3	22.2	22.0	22.0	22.1	21.9
KM206509_Public_Naididae `sp. N5 LB-2015`	23.1	22.3	22.3	23.1	22.7	22.5	22.7	22.5	23.4	21.8	24.2	24.2	25.1	22.5	20.7	23.4	22.9	24.5	24.0	22.7	22.7	19.4	19.4	21.4	21.4	21.5	21.2
BMR01394_OR129782_21004_Naididae `sp. Biologic-OLIG081`	19.4	20.4	19.9	20.6	20.4	20.4	19.7	23.0	21.0	21.2	20.8	19.9	20.8	22.8	21.5	19.7	21.2	22.1	23.2	22.1	22.1	19.9	20.6	21.5	21.2	21.4	20.8
KM206494_Public_Naididae `sp. N3 LB-2015`	20.4	22.1	21.9	21.4	22.1	22.1	21.6	20.8	19.7	18.3	21.0	23.0	22.5	21.5	21.4	20.4	22.3	24.1	23.6	23.8	23.8	19.7	19.7	22.3	22.5	22.6	22.5

COI Pairwise Distances (%)	BMR17751	BMR16465	BMR17953	KM206503	BMR03424	BMR01191	BMR16445	BMR17957	KM206510	BMR08457	BMR00808	BMR16447	BMR17955	BMR17740	KM206523	BMR00684	KM206495	BMR00814	ST2196LN57201	BMR16443	KM206508	KM206506	KM206505	KM206507	KM206509	BMR01394	KM206494
BMR17744_23083_Enchytraeidae `sp. E12 LB-2015`	21.2	21.2	21.1	20.6	22.2	22.2	19.9	19.9	20.8	21.8	20.9	18.6	18.2	20.1	21.4	21.5	22.1	21.4	21.2	23.2	23.7	23.2	23.9	23.7	23.1	19.4	20.4
AK16_Public Report_Enchytraeidae `sp. E12 LB-2015`	20.8	20.8	20.7	20.7	21.6	22.4	20.5	20.9	21.2	21.5	20.4	19.0	18.4	20.5	21.7	21.2	21.3	20.9	21.0	22.9	22.3	22.0	22.8	22.5	22.3	20.4	22.1
KM206492_Public_Enchytraeidae `sp. E12 LB-2015`	20.8	20.8	20.7	20.7	21.3	22.1	20.4	20.2	20.6	21.5	20.4	19.2	18.4	20.2	21.6	20.9	21.5	21.3	20.6	23.4	22.3	22.0	22.8	22.5	22.3	19.9	21.9
BMR01838_MW021312_1935_Enchytraeidae `sp. E12`	20.8	20.8	20.7	20.4	21.3	21.9	19.9	20.1	20.9	21.3	20.7	18.8	18.4	20.5	21.4	21.2	21.6	21.0	20.9	22.9	22.7	22.3	23.1	22.8	23.1	20.6	21.4
BMR01668_MT621147_20003_Enchytraeidae `sp. E12`	21.0	21.0	20.9	20.9	21.2	22.4	21.1	21.0	20.9	21.8	20.1	19.2	18.5	20.4	21.7	21.2	21.6	21.0	21.3	23.4	22.0	21.7	22.5	22.3	22.7	20.4	22.1
KM206488_Public_Enchytraeidae `sp. E12 LB-2015`	20.7	20.7	20.6	20.4	20.7	22.5	19.9	19.6	20.4	21.0	19.8	19.3	18.5	20.1	21.1	21.5	20.6	20.9	21.2	22.0	21.7	22.0	22.8	22.5	22.5	20.4	22.1
BMR01855_MW021329_1935_Enchytraeidae `sp. E12`	20.7	20.7	20.6	20.9	22.4	22.2	21.0	20.1	20.2	21.2	19.5	19.5	19.0	20.8	21.9	21.5	21.6	20.7	21.5	22.3	22.3	22.0	22.6	22.6	22.7	19.7	21.6
BMR00815_MT902750_1845_Enchytraeidae `sp. E11`	23.0	23.0	22.8	18.7	22.5	23.0	21.0	20.7	22.5	23.1	23.0	20.2	19.5	20.5	21.3	22.5	23.1	21.5	21.0	21.6	22.5	22.3	22.5	22.5	22.5	23.0	20.8
BMR00548_OR940847_1811_Enchytraeidae `sp. E11`	21.8	21.8	21.8	19.5	21.6	22.2	21.3	20.6	22.4	22.4	22.2	19.8	19.2	21.2	20.1	21.3	21.5	20.4	19.6	21.6	22.2	22.5	23.0	23.0	23.4	21.0	19.7
CA13_Atlas_Enchytraeidae `sp. McP`	21.9	21.9	21.8	18.9	21.5	22.5	19.6	19.6	21.5	21.6	21.8	19.3	18.7	20.5	20.8	22.1	21.9	21.2	20.2	20.3	21.3	21.3	21.9	21.6	21.8	21.2	18.3
BMR17738_23083_Enchytraeidae `sp. Biologic-OLIG183`	19.8	19.8	19.6	21.6	22.7	22.5	23.3	21.9	20.9	21.5	20.5	20.7	20.4	21.4	22.1	21.9	20.9	21.3	21.8	22.7	22.5	22.5	22.6	22.3	24.2	20.8	21.0
MW021269_Public_Enchytraeus `sp. WAM-ENCH001`	19.3	19.3	19.2	20.3	21.2	21.7	22.7	21.8	21.7	20.7	20.8	21.3	20.7	21.3	20.7	21.5	21.5	21.0	20.4	22.9	22.7	22.3	23.3	23.3	24.2	19.9	23.0
BMR02670_OR252714_20112_Enchytraeidae `sp. Biologic-OLIG006`	21.0	21.0	20.9	19.8	20.3	22.3	21.0	20.9	19.4	20.7	19.3	19.2	18.4	19.5	20.3	21.7	21.1	21.3	20.6	23.4	22.7	22.2	23.0	22.5	25.1	20.8	22.5
PQ682542_Enchytraeus sp. isolate EQ04 OLE040	18.5	18.5	18.5	20.9	21.5	20.7	21.7	21.2	21.0	19.5	20.6	21.0	20.7	21.5	21.8	22.0	22.9	21.8	21.2	22.1	22.2	22.4	23.1	23.2	22.5	22.8	21.5
KM206481_Enchytraeidae sp. E6	19.8	19.8	19.7	20.7	21.3	20.7	21.6	21.0	22.3	21.8	20.5	21.5	20.7	22.4	21.6	21.5	22.7	21.3	21.3	21.8	22.8	23.0	23.3	23.4	20.7	21.5	21.4
BMR01845_MW021319_1935_Enchytraeidae `sp. Biologic-OLIG024`	20.1	20.1	20.1	19.5	21.9	20.9	21.8	21.3	21.6	20.7	19.8	20.2	19.8	20.7	21.6	23.1	23.0	22.4	21.5	22.3	22.4	22.2	23.1	22.7	23.4	19.7	20.4
MW621144_Enchytraeus sp. DNA03	20.2	20.2	20.1	20.4	22.9	21.0	20.4	20.3	19.8	21.7	19.0	19.9	19.5	21.3	22.3	21.7	21.3	21.0	21.0	22.5	22.7	21.7	22.5	22.2	22.9	21.2	22.3
MT902744_Enchytraeidae sp. Biologic-OLIG004	20.9	20.9	20.7	19.9	23.6	22.6	22.4	22.3	22.3	24.4	21.6	22.1	21.5	22.7	22.6	21.3	20.6	21.7	21.5	24.2	25.0	25.2	25.7	25.8	24.5	22.1	24.1
BMR17742_23083_Enchytraeidae `sp. Biologic-OLIG045`	22.3	22.3	22.2	18.1	23.3	24.1	23.7	23.4	21.9	23.3	23.3	19.3	18.5	20.7	21.3	21.6	21.3	21.8	21.2	23.6	22.8	21.6	22.2	21.9	24.0	23.2	23.6
BMR01406_OR129793_21004_Enchytraeidae `sp. Biologic-OLIG045`	21.6	21.6	21.5	17.8	22.4	23.1	23.4	23.4	21.3	22.5	23.3	19.0	18.7	19.8	20.5	22.5	21.8	22.2	21.0	23.1	22.7	22.0	22.2	21.7	22.7	22.1	23.8
BMR01405_OR129792_21004_Enchytraeidae `sp. Biologic-OLIG045`	21.6	21.6	21.5	17.8	22.4	23.1	23.4	23.4	21.3	22.5	23.3	19.0	18.7	19.8	20.5	22.5	21.8	22.2	21.0	23.1	22.7	22.0	22.2	21.7	22.7	22.1	23.8
BMR02677_OR252721_20112_Enchytraeidae `sp. Biologic-OLIG022`	19.6	19.6	19.5	19.0	20.7	19.6	19.9	19.5	21.8	19.0	21.3	19.9	19.3	20.2	20.3	20.9	20.1	19.8	20.3	20.0	20.6	20.9	21.1	21.3	19.4	19.9	19.7
BMR01740_OP242139_1888_Enchytraeidae `sp. Biologic-OLIG022`	19.1	19.1	19.0	18.3	20.6	18.9	20.4	19.9	20.1	19.5	20.5	20.4	19.8	20.4	20.6	21.6	20.7	20.6	20.4	20.5	20.9	21.3	22.0	22.2	19.4	20.6	19.7
BMR16459_23083_Phreodrilidae `sp. Biologic-OLIG185`	0.5	0.5	0.5	15.3	15.8	16.3	17.8	17.4	18.0	17.4	18.5	18.8	18.8	21.3	19.2	19.5	18.9	19.2	18.6	21.4	21.6	22.5	22.2	22.0	21.4	21.5	22.3
BMR16463_23083_Phreodrilidae `sp. Biologic-OLIG185`	0.3	0.3	0.3	15.3	15.8	16.3	17.8	17.4	18.0	17.4	18.5	18.8	18.8	21.4	19.3	19.5	18.9	19.2	18.7	21.4	21.6	22.5	22.2	22.0	21.4	21.2	22.5
BMR16461_23083_Phreodrilidae `sp. Biologic-OLIG185`	0.4	0.4	0.4	15.4	15.9	16.4	17.9	17.4	18.0	17.4	18.6	18.9	18.9	21.5	19.3	19.6	19.0	19.3	18.8	21.5	21.6	22.6	22.2	22.1	21.5	21.4	22.6
BMR16449_23083_Phreodrilidae `sp. Biologic-OLIG185`	0.0	0.0	0.0	15.5	16.0	16.4	17.8	17.4	18.0	17.4	18.7	19.0	19.0	21.6	19.2	19.3	18.7	19.0	18.9	21.2	21.4	22.3	22.0	21.9	21.2	20.8	22.5
BMR17751_23083_Phreodrilidae `sp. Biologic-OLIG185`		0.0	0.0	15.5	16.0	16.4	17.8	17.4	18.0	17.4	18.7	19.0	19.0	21.6	19.2	19.3	18.7	19.0	18.9	21.2	21.4	22.3	22.0	21.9	21.2	20.8	22.5
BMR16465_23083_Phreodrilidae `sp. Biologic-OLIG185`	0.0		0.0	15.5	16.0	16.4	17.8	17.4	18.0	17.4	18.7	19.0	19.0	21.6	19.2	19.3	18.7	19.0	18.9	21.2	21.4	22.3	22.0	21.9	21.2	20.8	22.5
BMR17953_23083_Phreodrilidae `sp. Biologic-OLIG185`	0.0	0.0		15.5	16.0	16.4	17.7	17.4	18.0	17.4	18.6	18.9	18.9	21.6	19.2	19.3	18.7	19.0	18.9	21.0	21.3	22.2	21.9	21.8	21.0	20.8	22.4
KM206503_Public_Phreodrilidae `sp. P10 LB-2015`	15.5	15.5	15.5		17.9	15.8	16.4	16.9	17.2	18.6	17.9	17.8	17.2	19.5	18.7	19.0	17.9	18.3	18.6	21.4	21.1	21.6	22.8	22.4	21.4	20.8	20.6
BMR03424_PV442688_Antarctodrilus `sp. Biologic-OLIG039`	16.0	16.0	16.0	17.9		16.9	18.0	18.4	17.7	19.0	20.4	20.1	19.6	21.2	19.8	20.4	20.6	20.2	19.9	21.4	21.6	21.8	22.2	21.6	23.6	20.8	22.6
BMR01191_MT902769_1749a_Phreodrilidae `sp. Biologic-OLIG012`	16.4	16.4	16.4	15.8	16.9		18.1	17.8	17.5	18.9	17.9	20.9	20.2	22.5	21.3	21.8	21.8	20.1	20.7	22.1	22.2	23.2	23.3	23.6	22.5	19.9	21.7
BMR16445_23083_Phreodrilidae `sp. Biologic-OLIG186`	17.8	17.8	17.7	16.4	18.0	18.1		3.0	9.4	17.8	18.1	19.2	19.0	21.1	19.8	19.6	18.9	18.9	18.3	22.9	23.6	23.8	25.0	24.5	22.5	22.6	21.4
BMR17957_23083_Phreodrilidae `sp. Biologic-OLIG186`	17.4	17.4	17.4	16.9	18.4	17.8	3.0		8.2	17.7	17.0	19.8	19.3	21.0	19.8	18.9	17.8	17.8	17.8	22.1	22.7	23.2	23.9	23.8	22.5	22.1	21.7
KM206510_Public_Phreodrilidae `sp. P6 LB-2015`	18.0	18.0	18.0	17.2	17.7	17.5	9.4	8.2		17.5	17.6	18.9	19.3	21.0	19.7	19.9	19.8	19.3	18.1	21.0	21.6	21.8	22.5	22.4	22.7	21.9	21.2
BMR08457_PV106590_22118_Phreodrilidae `sp. Biologic-OLIG088`	17.4	17.4	17.4	18.6	19.0	18.9	17.8	17.7	17.5		18.3	20.4	20.2	21.6	21.3	22.1	21.8	21.4	21.3	21.6	23.9	24.1	24.5	24.4	23.2	21.9	21.5
BMR00808_MT902743_1845_Phreodrilidae `sp. Biologic-OLIG001`	18.7	18.7	18.6	17.9	20.4	17.9	18.1	17.0	17.6	18.3		19.8	19.1	21.0	21.8	20.7	20.6	20.1	20.4	22.5	23.0	23.1	23.6	24.2	24.7	24.6	23.6
BMR16447_23083_Phreodrilidae `sp. Biologic-OLIG184`	19.0	19.0	18.9	17.8	20.1	20.9	19.2	19.8	18.9	20.4	19.8		2.7	8.8	15.8	17.5	17.8	18.0	16.7	21.6	21.3	21.1	21.9	21.6	23.1	20.1	21.0
BMR17955_23083_Phreodrilidae `sp. Biologic-OLIG184`	19.0	19.0	18.9	17.2	19.6	20.2	19.0	19.3	19.3	20.2	19.1	2.7		7.3	15.9	16.7	17.2	17.4	16.6	21.6	20.0	20.2	20.9	20.6	22.7	19.9	21.2
BMR17740_23083_Phreodrilidae `sp. Biologic-OLIG184`	21.6	21.6	21.5	19.5	21.2	22.5	21.1	21.0	21.0	21.6	21.0	8.8	7.3		17.6	20.1	19.5	19.8	19.2	23.8	21.6	22.5	22.5	22.0	23.6	23.0	21.2
KM206523_Public_Phreodrilidae `sp. P11 LB-2015`	19.2	19.2	19.2	18.7	19.8	21.3	19.8	19.8	19.7	21.3	21.8	15.8	15.9	17.6		9.7	10.0	9.2	10.8	21.1	22.2	21.9	22.7	22.6	24.0	21.6	22.6
BMR00684_MT902712_1845_Phreodrilidae `sp. P11 LB-2015`	19.3	19.3	19.3	19.0	20.4	21.8	19.6	18.9	19.9	22.1	20.7	17.5	16.7	20.1	9.7		4.3	3.2	8.5	21.0	22.5	21.1	22.0	22.1	21.6	24.1	23.0
KM206495_Public_Phreodrilidae `sp. P11 LB-2015`	18.7	18.7	18.7	17.9	20.6	21.8	18.9	17.8	19.8	21.8	20.6	17.8	17.2	19.5	10.0	4.3		2.9	8.4	20.3	21.9	21.8	22.2	22.4	21.4	22.8	22.8
BMR00814_MT902749_1845_Phreodrilidae `sp. P11 LB-2015`	19.0	19.0	19.0	18.3	20.2	20.1	18.9	17.8	19.3	21.4	20.1	18.0	17.4	19.8	9.2	3.2	2.9		8.1	19.9	21.8	21.4	22.0	22.1	21.4	23.7	22.6
ST2196LN57201_Public Report_Phreodrilidae `sp. P11 LB-2015`	18.9	18.9	18.9	18.6	19.9	20.7	18.3	17.8	18.1	21.3	20.4	16.7	16.6	19.2	10.8	8.5	8.4	8.1		21.2	20.3	21.0	21.4	21.3	23.0	22.8	21.7
BMR16443_23083_Naididae `sp. N4 LB-2015`	21.2	21.2	21.0	21.4	21.4	22.1	22.9	22.1	21.0	21.6	22.5	21.6	21.6	23.8	21.1	21.0	20.3	19.9	21.2		7.5	7.7	8.6	8.8	12.8	19.3	19.7
KM206508_Public_Naididae `sp. N4 LB-2015`	21.4	21.4	21.3	21.1	21.6	22.2	23.6	22.7	21.6	23.9	23.0	21.3	20.0	21.6	22.2	22.5	21.9	21.8	20.3	7.5		3.4	4.0	4.5	14.1	20.6	19.9
KM206506_Public_Naididae `sp. N4 LB-2015`	22.3	22.3	22.2	21.6	21.8	23.2	23.8	23.2	21.8	24.1	23.1	21.1	20.2	22.5	21.9	21.1	21.8	21.4	21.0	7.7	3.4		2.2	2.6	13.9	19.7	20.1
KM206505_Public_Naididae `sp. N4 LB-2015`	22.0	22.0	21.9	22.8	22.2	23.3	25.0	23.9	22.5	24.5	23.6	21.9	20.9	22.5	22.7	22.0	22.2	22.0	21.4	8.6	4.0	2.2		0.8	14.1	19.5	20.3
KM206507_Public_Naididae `sp. N4 LB-2015`	21.9	21.9	21.8	22.4	21.6	23.6	24.5	23.8	22.4	24.4	24.2	21.6	20.6	22.0	22.6	22.1	22.4	22.1	21.3	8.8	4.5	2.6	0.8		14.3	19.3	20.5
KM206509_Public_Naididae `sp. N5 LB-2015`	21.2	21.2	21.0	21.4	23.6	22.5	22.5	22.5	22.7	23.2	24.7	23.1	22.7	23.6	24.0	21.6	21.4	21.4	23.0	12.8	14.1	13.9	14.1	14.3		21.9	21.0
BMR01394_OR129782_21004_Naididae `sp. Biologic-OLIG081`	20.8	20.8	20.8	20.8	20.8	19.9	22.6	22.1	21.9	21.9	24.6	20.1	19.9	23.0	21.6	24.1	22.8	23.7	22.8	19.3	20.6	19.7	19.5	19.3	21.9		17.9
KM206494_Public_Naididae `sp. N3 LB-2015`	22.5	22.5	22.4	20.6	22.6	21.7	21.4	21.7	21.2	21.5	23.6	21.0	21.2	21.2	22.6	23.0	22.8	22.6	21.7	19.7	19.9	20.1	20.3	20.5	21.0	17.9	

3.2 Malacostraca

3.2.1 Amphipoda

Seventeen sequences formed eight OTUs from three different families: Bogidiellidae, Eriopisidae, and Paramelitidae (Figure 3.2). Two Bogidiellidae OTUs were recovered from four sequences. Bogidiellidae `sp. Biologic-AMPH112` represented a singleton and was more than 16.1% divergent from all other sequences in the analysis (Table 3.3). Bogidiellidae `sp. Biologic-AMPH113` formed a new OTU and had a linear range of 2.7 km. It had an intraspecific distance of less than 1.8% and was more than 16.1% divergent from all the other sequences in the analysis (Table 3.3).

Two Eriopisidae OTUs were recovered from five sequences, *Pilbarana* `sp. Biologic-AMPH115`represents a new OTU while *Pilbarana* `sp. Biologic-AMPH114 matched three non-project sequences, which were used as an outgroup in the *Nedsia* description paper (King *et al.*, 2021), and are currently in the process of being described (D. Stringer, personal communication, 19th March 2025). These OTUs had intraspecific distances of less than 0.5 and 5.8% respectively and were both more than 7.1% divergent from all other sequences in the analysis (Table 3.3). Eriopisidae `sp. Biologic-AMPH115` had a linear range of 10.7 km while Eriopisidae `sp. Biologic-AMPH114`had a linear range of 60.9 km.

Four Paramelitidae OTUS were recovered from eight sequences, all representing new OTUs. Paramelitidae `sp. Biologic-AMPH111`had an intraspecific distance of less than 0.8%, was more than 20.8% divergent from all the other sequences in the analysis (Table 3.3), and had a linear range of 11.9 km. Paramelitidae `sp. Biologic-AMPH110`had an intraspecific distance of less than 0.7%, was more than 11.7% divergent from all the other sequences in the analysis (Table 3.3), and had a linear range of 15.4 km. The other two OTUs were all singletons: Paramelitidae `sp. Biologic-AMPH108`, and Paramelitidae `sp. Biologic-AMPH109. All were more than 14.4% divergent from all other sequences in the analysis (Table 3.3).

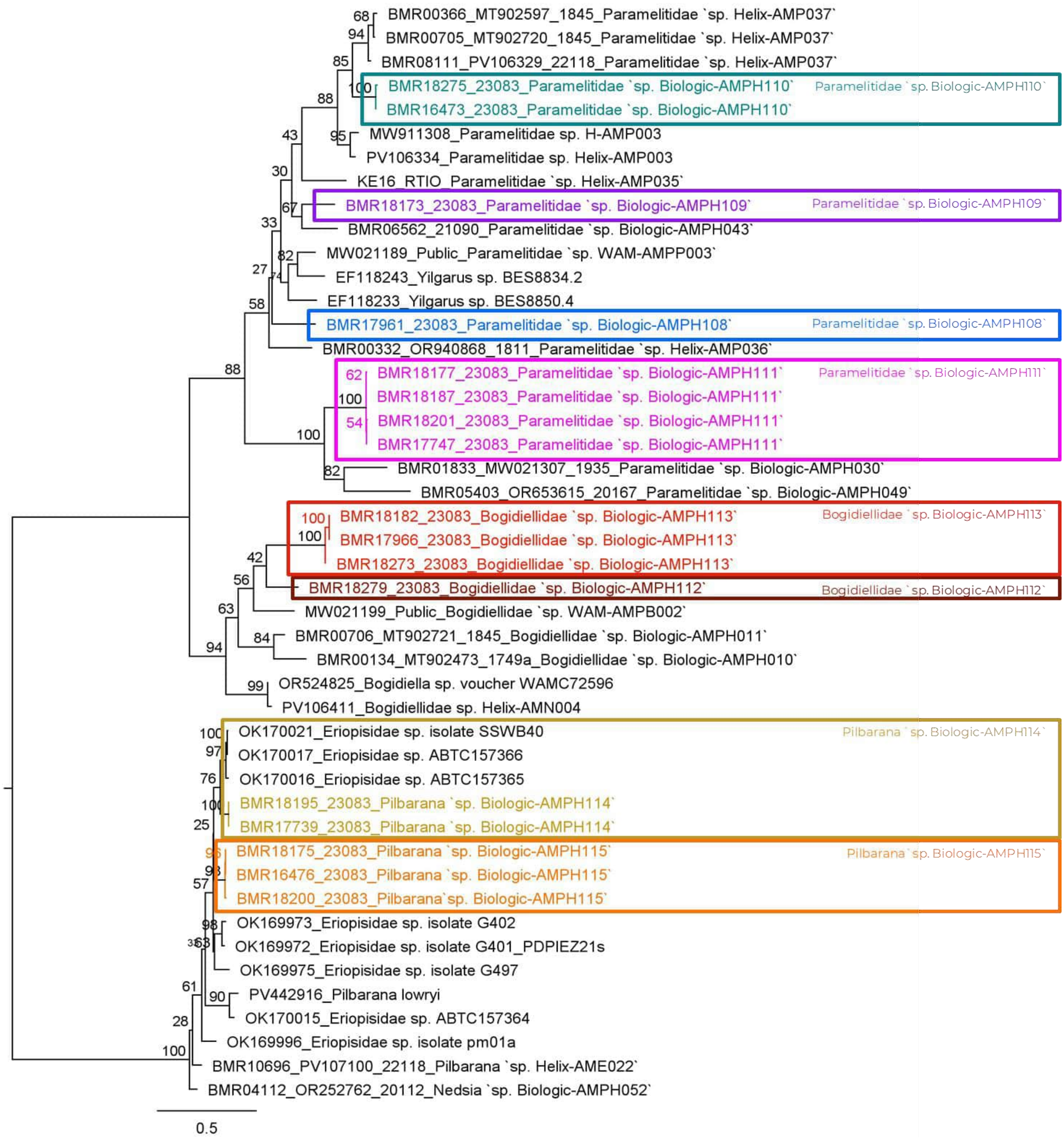

Figure 3.2: Phylogeny for the Amphipoda dataset, with bootstrap values

Table 3.3: Pairwise distances (%) for the Amphipoda dataset

COI Pairwise Distances (%)	EF118233	EF118243	MW021189	BMR18173	BMR06562	BMR17961	KE16_RTIO	BMR00332	MW911308	PV106334	BMR00366	BMR00705	BMR08111	BMR16473	BMR18275	OR524825	PV106411	BMR00134	BMR00706	BMR17966	BMR18182	BMR18273	BMR18279	MW021199	BMR01833	BMR17747	BMR18177	BMR18187	BMR18201	BMR05403	OK169972	OK169973	BMR16476	BMR18175	BMR18200	OK170016	OK170017	OK170021	BMR17739	BMR18195	OK169975	OK169996	BMR04112	BMR10696	OK170015	PV442916
EF118233_Yilgarus sp. BES8850.4		13.2	11.6	14.6	17.5	15.9	17.3	16.4	17.5	17.9	20.2	20.0	20.0	19.8	21.3	24.5	24.8	24.2	23.7	27.8	27.9	27.5	25.3	26.9	27.0	28.8	27.5	27.4	27.2	26.4	30.7	30.4	32.6	32.6	32.7	29.6	29.2	29.2	32.2	32.2	30.4	31.1	30.5	32.9	28.9	30.8
EF118243_Yilgarus sp. BES8834.2	13.2		11.1	16.5	17.1	15.7	16.8	17.3	18.7	18.4	20.8	20.8	20.5	18.7	19.9	25.4	25.2	25.0	24.7	27.3	27.4	26.7	25.8	26.4	29.0	29.6	28.8	28.7	28.6	28.1	30.0	29.6	31.3	31.3	31.2	30.4	30.2	30.2	31.8	31.8	29.6	31.1	29.6	31.8	30.1	31.3
MW021189_Public_Paramelitidae `sp. WAM-AMPP003`	11.6	11.1		15.5	17.9	14.4	16.0	15.8	17.4	17.1	19.7	19.7	19.5	18.6	19.2	23.5	23.3	21.3	22.0	25.8	25.9	24.7	23.7	24.0	26.9	27.8	26.8	26.7	26.3	25.4	30.9	30.7	31.3	31.3	31.2	29.8	29.4	29.4	31.0	31.0	30.4	30.9	29.1	31.5	28.7	30.3
BMR18173_23083_Paramelitidae `sp. Biologic-AMPH109`	14.6	16.5	15.5		15.1	16.3	16.4	19.6	19.7	19.3	22.4	21.9	22.2	19.6	20.5	24.0	24.2	23.0	23.5	26.9	27.0	26.3	25.1	25.3	27.9	30.0	29.1	29.0	28.9	27.0	30.7	30.7	31.0	31.0	31.2	30.7	30.4	30.4	31.5	31.5	30.2	30.0	28.3	31.5	29.9	30.5
BMR06562_21090_Paramelitidae `sp. Biologic-AMPH043`	17.5	17.1	17.9	15.1		17.4	19.1	18.0	17.7	16.9	21.0	20.0	20.4	19.1	19.9	25.5	25.2	24.3	24.6	27.9	28.0	27.6	24.2	23.5	25.8	27.8	27.1	27.0	27.0	28.2	29.4	29.4	31.3	31.3	31.0	30.2	29.6	29.6	31.7	31.7	31.1	30.9	30.9	31.7	30.6	31.1
BMR17961_23083_Paramelitidae `sp. Biologic-AMPH108`	15.9	15.7	14.4	16.3	17.4		19.8	17.0	19.1	19.8	22.4	22.5	21.5	21.4	20.9	23.2	23.4	22.2	23.2	26.3	26.4	25.4	25.2	23.3	27.3	29.3	28.8	28.6	28.3	28.7	30.0	30.4	32.2	32.2	32.1	30.7	30.4	30.7	32.4	32.4	31.5	30.9	29.6	31.8	30.1	31.4
KE16_RTIO_Paramelitidae `sp. Helix-AMP035`	17.3	16.8	16.0	16.4	19.1	19.8		18.9	19.5	18.6	20.8	20.9	20.4	19.9	20.7	25.7	25.9	25.5	24.0	26.5	26.6	26.2	26.2	25.4	26.0	28.0	27.7	27.6	27.3	26.5	33.6	34.0	34.1	34.1	33.9	34.0	34.3	34.0	33.9	33.9	34.9	34.3	31.9	33.6	33.3	33.7
BMR00332_OR940868_1811_Paramelitidae `sp. Helix-AMP036`	16.4	17.3	15.8	19.6	18.0	17.0	18.9		19.8	19.0	20.1	20.7	20.6	20.5	21.8	24.6	24.6	25.2	25.4	28.9	29.0	28.1	26.4	26.5	26.9	26.9	27.2	27.1	27.1	26.8	30.7	31.3	33.3	33.3	33.1	31.5	30.9	30.9	32.8	32.8	31.7	32.4	31.9	33.1	29.9	32.5
MW911308_Paramelitidae sp. H-AMP003	17.5	18.7	17.4	19.7	17.7	19.1	19.5	19.8		4.8	15.3	14.3	13.5	13.7	15.2	25.4	25.4	26.5	26.4	30.0	30.1	29.7	26.9	24.8	25.7	26.2	26.2	26.1	26.3	27.4	30.7	30.4	30.4	30.4	30.3	29.0	28.8	28.8	31.2	31.2	30.7	29.8	31.3	31.5	30.6	31.0
PV106334_Paramelitidae sp. Helix-AMP003	17.9	18.4	17.1	19.3	16.9	19.8	18.6	19.0	4.8		14.4	14.9	13.9	13.1	14.8	26.0	26.3	26.2	25.7	29.0	29.1	29.0	26.9	24.4	25.4	27.8	27.2	27.1	27.1	26.6	30.2	30.2	31.0	31.0	30.9	29.8	29.2	29.2	32.1	32.1	30.9	31.5	31.3	31.6	29.7	31.6
BMR00366_MT902597_1845_Paramelitidae `sp. Helix-AMP037`	20.2	20.8	19.7	22.4	21.0	22.4	20.8	20.1	15.3	14.4		1.8	4.2	12.2	12.4	27.1	27.6	29.0	27.4	31.9	32.0	31.0	29.7	27.9	23.9	27.9	27.9	27.9	27.9	29.4	34.5	33.4	33.0	33.0	32.7	33.4	32.9	32.9	33.6	33.6	32.9	33.9	32.6	33.4	32.0	33.9
BMR00705_MT902720_1845_Paramelitidae `sp. Helix-AMP037`	20.0	20.8	19.7	21.9	20.0	22.5	20.9	20.7	14.3	14.9	1.8		3.3	11.9	12.6	25.9	25.9	27.7	27.2	32.1	32.2	31.5	28.6	26.7	24.1	27.2	26.9	26.8	26.8	29.0	31.9	31.5	31.8	31.8	32.0	30.9	30.4	30.4	32.4	32.4	31.3	30.7	31.3	32.3	31.0	32.5
BMR08111_PV106329_22118_Paramelitidae `sp. Helix-AMP037`	20.0	20.5	19.5	22.2	20.4	21.5	20.4	20.6	13.5	13.9	4.2	3.3		11.7	13.5	25.7	25.5	27.8	27.4	32.7	32.8	32.0	28.8	27.1	23.0	25.8	26.6	26.5	26.5	27.5	32.1	31.7	32.1	32.1	32.0	31.1	31.1	31.3	33.3	33.3	32.4	31.5	32.0	32.4	31.6	32.7
BMR16473_23083_Paramelitidae `sp. Biologic-AMPH110`	19.8	18.7	18.6	19.6	19.1	21.4	19.9	20.5	13.7	13.1	12.2	11.9	11.7		0.7	24.6	24.5	25.6	25.7	29.3	29.4	28.9	26.3	25.0	25.3	27.5	27.9	27.8	27.8	27.6	30.2	29.8	30.1	30.1	29.9	29.8	29.4	29.4	30.6	30.6	29.8	31.1	30.3	31.5	29.7	30.9
BMR18275_23083_Paramelitidae `sp. Biologic-AMPH110`	21.3	19.9	19.2	20.5	19.9	20.9	20.7	21.8	15.2	14.8	12.4	12.6	13.5	0.7		26.6	26.2	27.5	27.6	30.4	30.6	29.7	27.8	25.8	24.5	28.2	28.2	28.2	28.2	28.9	32.3	31.8	30.8	30.8	30.6	32.3	31.8	31.8	30.4	30.4	31.5	33.6	29.9	31.5	32.4	31.9
OR524825_Bogidiella sp. voucher WAMC72596	24.5	25.4	23.5	24.0	25.5	23.2	25.7	24.6	25.4	26.0	27.1	25.9	25.7	24.6	26.6		1.4	19.1	17.2	19.4	19.5	18.9	17.4	16.9	30.8	32.0	31.2	30.9	30.9	31.3	31.1	31.5	31.4	31.4	31.1	30.0	29.6	29.6	31.2	31.2	31.3	27.7	28.8	31.1	28.0	29.4
PV106411_Bogidiellidae sp. Helix-AMN004	24.8	25.2	23.3	24.2	25.2	23.4	25.9	24.6	25.4	26.3	27.6	25.9	25.5	24.5	26.2	1.4		18.9	17.9	19.9	20.0	19.4	17.1	16.9	30.8	32.4	31.5	31.2	31.2	31.7	30.9	31.3	31.5	31.5	31.2	30.4	30.0	30.0	31.5	31.5	31.5	28.1	29.3	31.2	28.9	30.0
BMR00134_MT902473_1749a_Bogidiellidae `sp. Biologic-AMPH010`	24.2	25.0	21.3	23.0	24.3	22.2	25.5	25.2	26.5	26.2	29.0	27.7	27.8	25.6	27.5	19.1	18.9		11.0	20.1	20.2	19.4	17.6	18.2	28.7	33.3	31.6	31.5	31.3	30.0	32.8	32.4	33.0	33.0	32.8	31.9	31.9	31.9	33.6	33.6	31.7	31.3	31.6	32.7	31.0	32.5
BMR00706_MT902721_1845_Bogidiellidae `sp. Biologic-AMPH011`	23.7	24.7	22.0	23.5	24.6	23.2	24.0	25.4	26.4	25.7	27.4	27.2	27.4	25.7	27.6	17.2	17.9	11.0		19.7	19.8	18.9	16.2	17.5	29.4	32.0	31.0	30.9	30.8	30.6	31.7	31.7	31.1	31.1	30.9	31.1	31.3	31.3	31.4	31.4	29.8	31.5	30.0	31.9	31.0	32.3
BMR17966_23083_Bogidiellidae `sp. Biologic-AMPH113`	27.8	27.3	25.8	26.9	27.9	26.3	26.5	28.9	30.0	29.0	31.9	32.1	32.7	29.3	30.4	19.4	19.9	20.1	19.7		0.2	1.6	16.6	16.9	33.3	35.2	33.5	33.3	32.8	31.6	34.5	34.5	34.0	34.0	33.9	32.4	32.1	32.1	34.2	34.2	34.5	33.4	33.5	35.1	33.9	35.4
BMR18182_23083_Bogidiellidae `sp. Biologic-AMPH113`	27.9	27.4	25.9	27.0	28.0	26.4	26.6	29.0	30.1	29.1	32.0	32.2	32.8	29.4	30.6	19.5	20.0	20.2	19.8	0.2		1.8	16.7	17.0	33.4	35.4	33.6	33.4	32.9	31.7	34.5	34.5	34.1	34.1	34.0	32.4	32.1	32.1	34.3	34.3	34.5	33.4	33.6	35.2	33.9	35.5
BMR18273_23083_Bogidiellidae `sp. Biologic-AMPH113`	27.5	26.7	24.7	26.3	27.6	25.4	26.2	28.1	29.7	29.0	31.0	31.5	32.0	28.9	29.7	18.9	19.4	19.4	18.9	1.6	1.8		16.2	16.4	33.1	34.8	33.2	33.0	32.5	30.9	34.0	34.0	33.6	33.6	33.4	31.9	31.7	31.7	33.9	33.9	34.0	33.0	33.2	34.5	33.3	34.8
BMR18279_23083_Bogidiellidae `sp. Biologic-AMPH112`	25.3	25.8	23.7	25.1	24.2	25.2	26.2	26.4	26.9	26.9	29.7	28.6	28.8	26.3	27.8	17.4	17.1	17.6	16.2	16.6	16.7	16.2		16.7	31.7	34.1	31.9	31.6	31.3	30.5	31.1	31.5	31.2	31.2	31.3	31.5	31.3	31.3	31.5	31.5	31.7	32.6	31.0	32.7	31.2	31.4
MW021199_Public_Bogidiellidae `sp. WAM-AMPB002`	26.9	26.4	24.0	25.3	23.5	23.3	25.4	26.5	24.8	24.4	27.9	26.7	27.1	25.0	25.8	16.9	16.9	18.2	17.5	16.9	17.0	16.4	16.7		30.9	31.3	30.6	30.3	30.0	30.7	32.6	32.8	31.5	31.5	31.4	31.1	30.9	30.9	32.4	32.4	31.3	30.9	30.9	32.9	32.7	33.2
BMR01833_MW021307_1935_Paramelitidae `sp. Biologic-AMPH030`	27.0	29.0	26.9	27.9	25.8	27.3	26.0	26.9	25.7	25.4	23.9	24.1	23.0	25.3	24.5	30.8	30.8	28.7	29.4	33.3	33.4	33.1	31.7	30.9		20.9	21.1	20.9	21.0	20.3	33.0	33.4	36.2	36.2	36.2	34.3	34.5	34.7	35.8	35.8	34.7	34.7	35.5	34.4	33.5	36.1
BMR17747_23083_Paramelitidae `sp. Biologic-AMPH111`	28.8	29.6	27.8	30.0	27.8	29.3	28.0	26.9	26.2	27.8	27.9	27.2	25.8	27.5	28.2	32.0	32.4	33.3	32.0	35.2	35.4	34.8	34.1	31.3	20.9		0.2	0.2	0.4	22.5	40.0	39.7	37.9	37.9	37.7	40.5	40.8	40.8	38.6	38.6	39.0	40.8	39.5	38.1	39.1	38.8
BMR18177_23083_Paramelitidae `sp. Biologic-AMPH111`	27.5	28.8	26.8	29.1	27.1	28.8	27.7	27.2	26.2	27.2	27.9	26.9	26.6	27.9	28.2	31.2	31.5	31.6	31.0	33.5	33.6	33.2	31.9	30.6	21.1	0.2		0.3	0.8	22.9	37.6	37.6	37.9	37.9	37.5	38.1	38.1	38.1	37.8	37.8	36.6	38.5	38.2	37.6	36.9	37.5
BMR18187_23083_Paramelitidae `sp. Biologic-AMPH111`	27.4	28.7	26.7	29.0	27.0	28.6	27.6	27.1	26.1	27.1	27.9	26.8	26.5	27.8	28.2	30.9	31.2	31.5	30.9	33.3	33.4	33.0	31.6	30.3	20.9	0.2	0.3		0.5	22.9	37.6	37.6	37.8	37.8	37.4	38.1	38.1	38.1	37.7	37.7	36.6	38.5	38.1	37.5	36.9	37.4
BMR18201_23083_Paramelitidae `sp. Biologic-AMPH111`	27.2	28.6	26.3	28.9	27.0	28.3	27.3	27.1	26.3	27.1	27.9	26.8	26.5	27.8	28.2	30.9	31.2	31.3	30.8	32.8	32.9	32.5	31.3	30.0	21.0	0.4	0.8	0.5		22.7	37.4	37.4	37.7	37.7	37.2	37.8	37.8	37.8	37.5	37.5	36.4	38.3	38.3	37.4	36.7	37.2
BMR05403_OR653615_20167_Paramelitidae `sp. Biologic-AMPH049`	26.4	28.1	25.4	27.0	28.2	28.7	26.5	26.8	27.4	26.6	29.4	29.0	27.5	27.6	28.9	31.3	31.7	30.0	30.6	31.6	31.7	30.9	30.5	30.7	20.3	22.5	22.9	22.9	22.7		36.8	37.4	36.9	36.9	37.4	38.5	38.5	38.7	37.2	37.2	38.3	38.9	38.7	37.5	36.9	38.5
OK169972_Eriopisidae sp. isolate G401_PDPIEZ21s	30.7	30.0	30.9	30.7	29.4	30.0	33.6	30.7	30.7	30.2	34.5	31.9	32.1	30.2	32.3	31.1	30.9	32.8	31.7	34.5	34.5	34.0	31.1	32.6	33.0	40.0	37.6	37.6	37.4	36.8		2.3	7.6	7.6	7.8	8.7	7.6	7.8	8.3	8.3	8.5	11.2	11.6	12.1	12.2	13.5
OK169973_Eriopisidae sp. isolate G402	30.4	29.6	30.7	30.7	29.4	30.4	34.0	31.3	30.4	30.2	33.4	31.5	31.7	29.8	31.8	31.5	31.3	32.4	31.7	34.5	34.5	34.0	31.5	32.8	33.4	39.7	37.6	37.6	37.4	37.4	2.3		7.4	7.4	7.6	8.9	7.8	8.0	8.3	8.3	8.0	11.4	11.2	11.8	12.4	13.7
BMR16476_23083_Pilbarana `sp. Biologic-AMPH115`	32.6	31.3	31.3	31.0	31.3	32.2	34.1	33.3	30.4	31.0	33.0	31.8	32.1	30.1	30.8	31.4	31.5	33.0	31.1	34.0	34.1	33.6	31.2	31.5	36.2	37.9	37.9	37.8	37.7	36.9	7.6	7.4		0.0	0.5	8.7	8.5	8.5	8.7	8.7	8.0	11.8	11.0	11.1	11.7	12.9
BMR18175_23083_Pilbarana `sp. Biologic-AMPH115`	32.6	31.3	31.3	31.0	31.3	32.2	34.1	33.3	30.4	31.0	33.0	31.8	32.1	30.1	30.8	31.4	31.5	33.0	31.1	34.0	34.1	33.6	31.2	31.5	36.2	37.9	37.9	37.8	37.7	36.9	7.6	7.4	0.0		0.5	8.7	8.5	8.5	8.7	8.7	8.0	11.8	11.0	11.1	11.7	12.9
BMR18200_23083_Pilbarana` sp. Biologic-AMPH115`	32.7	31.2	31.2	31.2	31.0	32.1	33.9	33.1	30.3	30.9	32.7	32.0	32.0	29.9	30.6	31.1	31.2	32.8	30.9	33.9	34.0	33.4	31.3	31.4	36.2	37.7	37.5	37.4	37.2	37.4	7.8	7.6	0.5	0.5		8.9	8.7	8.7	8.8	8.8	8.3	12.1	10.8	10.9	11.5	12.7
OK170016_Eriopisidae sp. ABTC157365	29.6	30.4	29.8	30.7	30.2	30.7	34.0	31.5	29.0	29.8	33.4	30.9	31.1	29.8	32.3	30.0	30.4	31.9	31.1	32.4	32.4	31.9	31.5	31.1	34.3	40.5	38.1	38.1	37.8	38.5	8.7	8.9	8.7	8.7	8.9		1.5	1.7	5.5	5.5	8.9	8.7	10.6	11.4	12.2	12.5
OK170017_Eriopisidae sp. ABTC157366	29.2	30.2	29.4	30.4	29.6	30.4	34.3	30.9	28.8	29.2	32.9	30.4	31.1	29.4	31.8	29.6	30.0	31.9	31.3	32.1	32.1	31.7	31.3	30.9	34.5	40.8	38.1	38.1	37.8	38.5	7.6	7.8	8.5	8.5	8.7	1.5		0.2	5.5	5.5	8.3	8.9	10.6	11.4	12.2	12.9
OK170021_Eriopisidae sp. isolate SSWB40	29.2	30.2	29.4	30.4	29.6	30.7	34.0	30.9	28.8	29.2	32.9	30.4	31.3	29.4	31.8	29.6	30.0	31.9	31.3	32.1	32.1	31.7	31.3	30.9	34.7	40.8	38.1	38.1	37.8	38.7	7.8	8.0	8.5	8.5	8.7	1.7	0.2		5.7	5.7	8.3	8.9	10.4	11.2	12.2	12.9
BMR17739_23083_Pilbarana `sp. Biologic-AMPH114`	32.2	31.8	31.0	31.5	31.7	32.4	33.9	32.8	31.2	32.1	33.6	32.4	33.3	30.6	30.4	31.2	31.5	33.6	31.4	34.2	34.3	33.9	31.5	32.4	35.8	38.6	37.8	37.7	37.5	37.2	8.3	8.3	8.7	8.7	8.8	5.5	5.5	5.7		0.0	8.7	9.9	10.2	11.7	14.3	14.6
BMR18195_23083_Pilbarana `sp. Biologic-AMPH114`	32.2	31.8	31.0	31.5	31.7	32.4	33.9	32.8	31.2	32.1	33.6	32.4	33.3	30.6	30.4	31.2	31.5	33.6	31.4	34.2	34.3	33.9	31.5	32.4	35.8	38.6	37.8	37.7	37.5	37.2	8.3	8.3	8.7	8.7	8.8	5.5	5.5	5.7	0.0		8.7	9.9	10.2	11.7	14.3	14.6
OK169975_Eriopisidae sp. isolate G497	30.4	29.6	30.4	30.2	31.1	31.5	34.9	31.7	30.7	30.9	32.9	31.3	32.4	29.8	31.5	31.3	31.5	31.7	29.8	34.5	34.5	34.0	31.7	31.3	34.7	39.0	36.6	36.6	36.4	38.3	8.5	8.0	8.0	8.0	8.3	8.9	8.3	8.3	8.7	8.7		11.0	11.8	12.7	13.9	13.7
OK169996_Eriopisidae sp. isolate pm01a	31.1	31.1	30.9	30.0	30.9	30.9	34.3	32.4	29.8	31.5	33.9	30.7	31.5	31.1	33.6	27.7	28.1	31.3	31.5	33.4	33.4	33.0	32.6	30.9	34.7	40.8	38.5	38.5	38.3	38.9	11.2	11.4	11.8	11.8	12.1	8.7	8.9	8.9	9.9	9.9	11.0		10.6	10.2	11.5	11.8
BMR04112_OR252762_20112_Nedsia `sp. Biologic-AMPH052`	30.5	29.6	29.1	28.3	30.9	29.6	31.9	31.9	31.3	31.3	32.6	31.3	32.0	30.3	29.9	28.8	29.3	31.6	30.0	33.5	33.6	33.2	31.0	30.9	35.5	39.5	38.2	38.1	38.3	38.7	11.6	11.2	11.0	11.0	10.8	10.6	10.6	10.4	10.2	10.2	11.8	10.6		6.5	12.2	12.6
BMR10696_PV107100_22118_Pilbarana `sp. Helix-AME022`	32.9	31.8	31.5	31.5	31.7	31.8	33.6	33.1	31.5	31.6	33.4	32.3	32.4	31.5	31.5	31.1	31.2	32.7	31.9	35.1	35.2	34.5	32.7	32.9	34.4	38.1	37.6	37.5	37.4	37.5	12.1	11.8	11.1	11.1	10.9	11.4	11.4	11.2	11.7	11.7	12.7	10.2	6.5		11.5	11.9
OK170015_Eriopisidae sp. ABTC157364	28.9	30.1	28.7	29.9	30.6	30.1	33.3	29.9	30.6	29.7	32.0	31.0	31.6	29.7	32.4	28.0	28.9	31.0	31.0	33.9	33.9	33.3	31.2	32.7	33.5	39.1	36.9	36.9	36.7	36.9	12.2	12.4	11.7	11.7	11.5	12.2	12.2	12.2	14.3	14.3	13.9	11.5	12.2	11.5		4.8
PV442916_Pilbarana lowryi	30.8	31.3	30.3	30.5	31.1	31.4	33.7	32.5	31.0	31.6	33.9	32.5	32.7	30.9	31.9	29.4	30.0	32.5	32.3	35.4	35.5	34.8	31.4	33.2	36.1	38.8	37.5	37.4	37.2	38.5	13.5	13.7	12.9	12.9	12.7	12.5	12.9	12.9	14.6	14.6	13.7	11.8	12.6	11.9	4.8	

3.2.2 Bathynellacea

Seventeen sequences formed six Bathynellacea OTUs from two families: Bathynellidae and Parabathynellidae (Figure 3.3). The only Bathynellidae OTU, Bathynellidae `sp. Biologic-BATH038, was represented by ten sequences and had a linear range of 1.5 km. It had an intraspecific divergence of less than 0.1% and was more than 19.9% divergent from all the other sequences in the analysis (Table 3.4).

The nine sequences in the family Parabathynellidae, represented five OTUs. One of the OTUs Parabathynellidae `sp. Biologic-PBAT085` was a singleton and was more than 16.6% divergent from all the other sequences in the analysis (Table 3.4). Three of the OTUs *Atopobathynella* `sp. Biologic-PBAT082`, *Atopobathynella* `sp. Biologic-PBAT083`, and *Atopobathynella* `sp. Biologic-PBAT084` were restricted to three single sites. They all had an intraspecific divergence of less than 3.2% and were more than 10.1% divergent from all the other sequences in the analysis (Table 3.4). The final OTU, *Atopobathynella* `sp. Biologic-PBAT081` had a linear range of <0.1 km, and the two sequences were identical, it was more than 18% divergent than all other sequences in the analysis (Table 3.4).

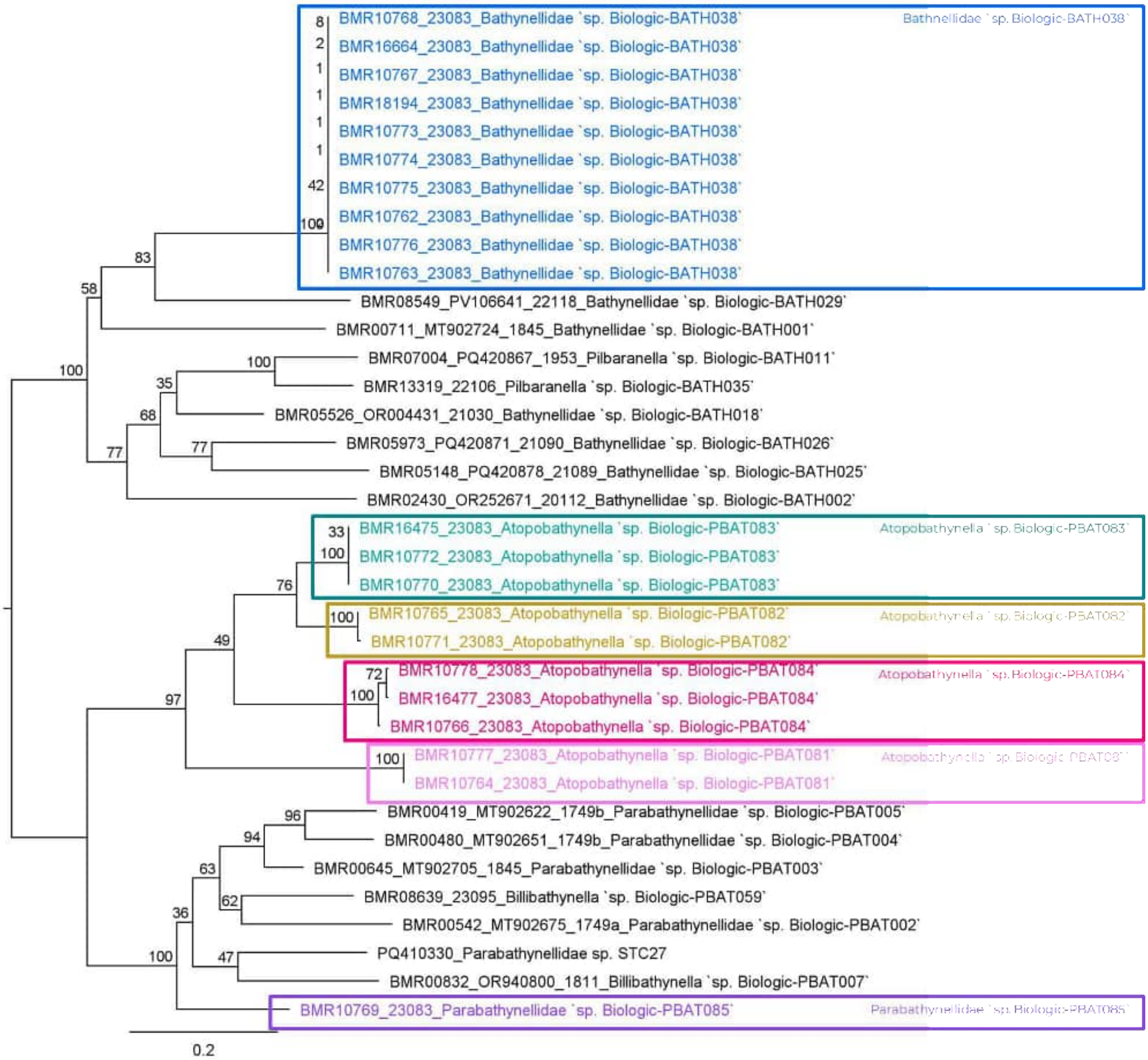

Figure 3.3: Phylogeny for the Bathynellacea dataset, with bootstrap values

Table 3.4: Pairwise distances (%) for the Bathynellacea dataset

COI Pairwise Distances (%)	PQ410330	BMR00419	BMR00480	BMR00645	BMR08639	BMR00542	BMR10769	BMR00832	BMR10764	BMR10777	BMR10765	BMR10771	BMR10770	BMR10772	BMR16475	BMR10766	BMR10778	BMR16477	BMR00711	BMR02430	BMR05148	BMR05526	BMR07004	BMR13319	BMR05973	BMR08549	BMR10762	BMR10767	BMR10768	BMR10773	BMR10774	BMR10775	BMR10776	BMR16664	BMR18194	BMR10763
PQ410330_Parabathynellidae sp. STC27		20.7	20.1	16.4	19.8	19.2	18.4	16.3	23.6	23.6	21.5	21.6	21.9	21.9	21.9	20.9	21.0	21.2	24.6	25.0	25.9	23.2	27.0	26.3	25.5	23.4	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.1
BMR00419_MT902622_1749b_Parabathynellidae `sp. Biologic-PBAT005`	20.7		13.3	13.0	18.3	17.5	18.4	19.6	25.5	25.5	24.9	24.9	25.3	25.3	25.3	24.7	24.5	25.1	27.1	27.0	29.6	27.6	26.7	27.6	27.4	27.0	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6
BMR00480_MT902651_1749b_Parabathynellidae `sp. Biologic-PBAT004`	20.1	13.3		12.9	19.4	18.1	19.1	22.2	26.2	26.2	26.2	26.2	25.7	25.7	25.7	25.1	25.7	26.4	28.6	27.4	28.2	26.2	28.2	28.6	27.6	29.1	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.4	30.5
BMR00645_MT902705_1845_Parabathynellidae `sp. Biologic-PBAT003`	16.4	13.0	12.9		14.6	16.5	16.7	18.3	24.2	24.2	22.7	22.7	22.5	22.5	22.5	22.9	23.3	23.4	24.8	25.1	26.2	24.7	25.0	25.0	25.9	26.2	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.2
BMR08639_23095_Billibathynella `sp. Biologic-PBAT059`	19.8	18.3	19.4	14.6		17.1	17.5	17.3	24.2	24.2	24.4	24.4	24.4	24.4	24.4	22.6	22.2	22.6	27.1	25.8	28.1	24.9	26.5	27.6	25.9	27.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.7	26.8
BMR00542_MT902675_1749a_Parabathynellidae `sp. Biologic-PBAT002`	19.2	17.5	18.1	16.5	17.1		19.1	19.1	25.2	25.2	24.2	24.1	24.1	24.1	24.1	25.3	25.5	25.6	28.2	27.1	29.3	26.5	27.9	27.4	26.8	29.0	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.7
BMR10769_23083_Parabathynellidae `sp. Biologic-PBAT085`	18.4	18.4	19.1	16.7	17.5	19.1		19.3	24.2	24.2	23.1	23.1	22.6	22.6	22.6	23.3	24.2	24.1	24.5	27.4	25.4	24.3	26.2	25.3	25.1	26.9	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1	26.1
BMR00832_OR940800_1811_Billibathynella `sp. Biologic-PBAT007`	16.3	19.6	22.2	18.3	17.3	19.1	19.3		21.7	21.7	19.7	19.6	20.3	20.3	20.3	21.0	21.4	21.7	25.8	27.2	26.7	23.9	28.0	27.8	26.7	24.8	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.4
BMR10764_23083_Atopobathynella `sp. Biologic-PBAT081`	23.6	25.5	26.2	24.2	24.2	25.2	24.2	21.7		0.0	18.1	18.1	20.5	20.5	20.5	21.3	21.2	21.8	27.4	29.4	27.4	26.0	27.3	27.9	28.3	27.1	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8
BMR10777_23083_Atopobathynella `sp. Biologic-PBAT081`	23.6	25.5	26.2	24.2	24.2	25.2	24.2	21.7	0.0		18.1	18.1	20.5	20.5	20.5	21.3	21.2	21.8	27.4	29.4	27.4	26.0	27.3	27.9	28.3	27.1	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8	26.8
BMR10765_23083_Atopobathynella `sp. Biologic-PBAT082`	21.5	24.9	26.2	22.7	24.4	24.2	23.1	19.7	18.1	18.1		0.3	10.2	10.2	10.2	17.3	17.1	17.8	25.9	27.3	24.8	23.4	25.1	26.0	26.0	22.2	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.4
BMR10771_23083_Atopobathynella `sp. Biologic-PBAT082`	21.6	24.9	26.2	22.7	24.4	24.1	23.1	19.6	18.1	18.1	0.3		10.5	10.5	10.5	17.1	17.0	17.6	26.0	27.4	24.7	23.4	25.3	25.9	26.0	22.4	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.4
BMR10770_23083_Atopobathynella `sp. Biologic-PBAT083`	21.9	25.3	25.7	22.5	24.4	24.1	22.6	20.3	20.5	20.5	10.2	10.5		0.0	0.0	16.1	16.8	16.6	25.5	26.5	23.7	24.2	24.8	25.3	26.2	22.2	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	25.0
BMR10772_23083_Atopobathynella `sp. Biologic-PBAT083`	21.9	25.3	25.7	22.5	24.4	24.1	22.6	20.3	20.5	20.5	10.2	10.5	0.0		0.0	16.1	16.8	16.6	25.5	26.5	23.7	24.2	24.8	25.3	26.2	22.2	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	25.0
BMR16475_23083_Atopobathynella `sp. Biologic-PBAT083`	21.9	25.3	25.7	22.5	24.4	24.1	22.6	20.3	20.5	20.5	10.2	10.5	0.0	0.0		16.1	16.8	16.6	25.5	26.5	23.7	24.2	24.8	25.3	26.2	22.2	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	25.0
BMR10766_23083_Atopobathynella `sp. Biologic-PBAT084`	20.9	24.7	25.1	22.9	22.6	25.3	23.3	21.0	21.3	21.3	17.3	17.1	16.1	16.1	16.1		3.0	3.2	25.9	23.4	24.2	22.6	23.8	26.0	25.6	23.5	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.3
BMR10778_23083_Atopobathynella `sp. Biologic-PBAT084`	21.0	24.5	25.7	23.3	22.2	25.5	24.2	21.4	21.2	21.2	17.1	17.0	16.8	16.8	16.8	3.0		1.4	26.0	23.7	24.6	22.1	23.7	25.7	25.4	24.0	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.7
BMR16477_23083_Atopobathynella `sp. Biologic-PBAT084`	21.2	25.1	26.4	23.4	22.6	25.6	24.1	21.7	21.8	21.8	17.8	17.6	16.6	16.6	16.6	3.2	1.4		26.6	23.9	24.7	22.4	23.8	25.7	25.8	24.1	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.7
BMR00711_MT902724_1845_Bathynellidae `sp. Biologic-BATH001`	24.6	27.1	28.6	24.8	27.1	28.2	24.5	25.8	27.4	27.4	25.9	26.0	25.5	25.5	25.5	25.9	26.0	26.6		23.1	24.2	21.7	23.5	23.2	22.6	23.1	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.4
BMR02430_OR252671_20112_Bathynellidae `sp. Biologic-BATH002`	25.0	27.0	27.4	25.1	25.8	27.1	27.4	27.2	29.4	29.4	27.3	27.4	26.5	26.5	26.5	23.4	23.7	23.9	23.1		21.6	19.3	22.1	22.7	22.7	23.6	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.6
BMR05148_PQ420878_21089_Bathynellidae `sp. Biologic-BATH025`	25.9	29.6	28.2	26.2	28.1	29.3	25.4	26.7	27.4	27.4	24.8	24.7	23.7	23.7	23.7	24.2	24.6	24.7	24.2	21.6		18.0	21.1	19.1	18.6	24.0	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.4	21.5
BMR05526_OR004431_21030_Bathynellidae `sp. Biologic-BATH018`	23.2	27.6	26.2	24.7	24.9	26.5	24.3	23.9	26.0	26.0	23.4	23.4	24.2	24.2	24.2	22.6	22.1	22.4	21.7	19.3	18.0		17.8	17.2	18.0	21.3	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1
BMR07004_PQ420867_1953_Pilbaranella `sp. Biologic-BATH011`	27.0	26.7	28.2	25.0	26.5	27.9	26.2	28.0	27.3	27.3	25.1	25.3	24.8	24.8	24.8	23.8	23.7	23.8	23.5	22.1	21.1	17.8		12.8	19.0	22.8	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
BMR13319_22106_Pilbaranella `sp. Biologic-BATH035`	26.3	27.6	28.6	25.0	27.6	27.4	25.3	27.8	27.9	27.9	26.0	25.9	25.3	25.3	25.3	26.0	25.7	25.7	23.2	22.7	19.1	17.2	12.8		18.7	23.6	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.4
BMR05973_PQ420871_21090_Bathynellidae `sp. Biologic-BATH026`	25.5	27.4	27.6	25.9	25.9	26.8	25.1	26.7	28.3	28.3	26.0	26.0	26.2	26.2	26.2	25.6	25.4	25.8	22.6	22.7	18.6	18.0	19.0	18.7		24.5	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
BMR08549_PV106641_22118_Bathynellidae `sp. Biologic-BATH029`	23.4	27.0	29.1	26.2	27.7	29.0	26.9	24.8	27.1	27.1	22.2	22.4	22.2	22.2	22.2	23.5	24.0	24.1	23.1	23.6	24.0	21.3	22.8	23.6	24.5		19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	20.0
BMR10762_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
BMR10767_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
BMR10768_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.1
BMR10773_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.1
BMR10774_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.1
BMR10775_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.1
BMR10776_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.1
BMR16664_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.1
BMR18194_23083_Bathynellidae `sp. Biologic-BATH038`	25.0	28.5	30.4	27.1	26.7	27.6	26.1	25.3	26.8	26.8	26.3	26.3	24.9	24.9	24.9	26.2	26.6	26.6	22.3	22.5	21.4	20.1	21.5	21.3	20.9	19.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.1
BMR10763_23083_Bathynellidae `sp. Biologic-BATH038`	25.1	28.6	30.5	27.2	26.8	27.7	26.1	25.4	26.8	26.8	26.4	26.4	25.0	25.0	25.0	26.3	26.7	26.7	22.4	22.6	21.5	20.1	21.5	21.4	20.9	20.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	

3.2.3 Isopoda

Twenty-four sequenced specimens formed seven OTUs from two different families: Microcerberidae and Tainisopidae (Figure 3.4). None of the OTUs in this study matched non-project sequences. Ten Microcerberidae sequences represented six OTUs, one Microcerberidae `sp. Biologic-ISOP212` represented a singleton that were more than 17.1% divergent from all other sequences in the analysis (Table 3.5). Three other OTUs, Microcerberidae `sp. Biologic-ISOP208`, Microcerberidae `sp. Biologic-ISOP210`, and Microcerberidae `sp. Biologic-ISOP221` were all from single sites. All three OTUs had intraspecific distance below 4.2%, was more than 14.2% divergent from all other sequences in the analysis (Table 3.5). Microcerberidae `sp. Biologic-ISOP211`had intraspecific distance below 6.8%, was more than 15.4% divergent from all other sequences in the analysis (Table 3.5), and it had a linear range of 19.2 km. Microcerberidae `sp. Biologic-ISOP209`had intraspecific distance below 5.4%, was more than 14.2% divergent from all other sequences in the analysis (Table 3.5), and it had a linear range of 21.1 km.

Pygolabis `sp. Biologic-ISOP213`represented a singleton in the family Tainisopidae which was more than 9.1% divergent than all other sequences in the analysis (Table 3.5).

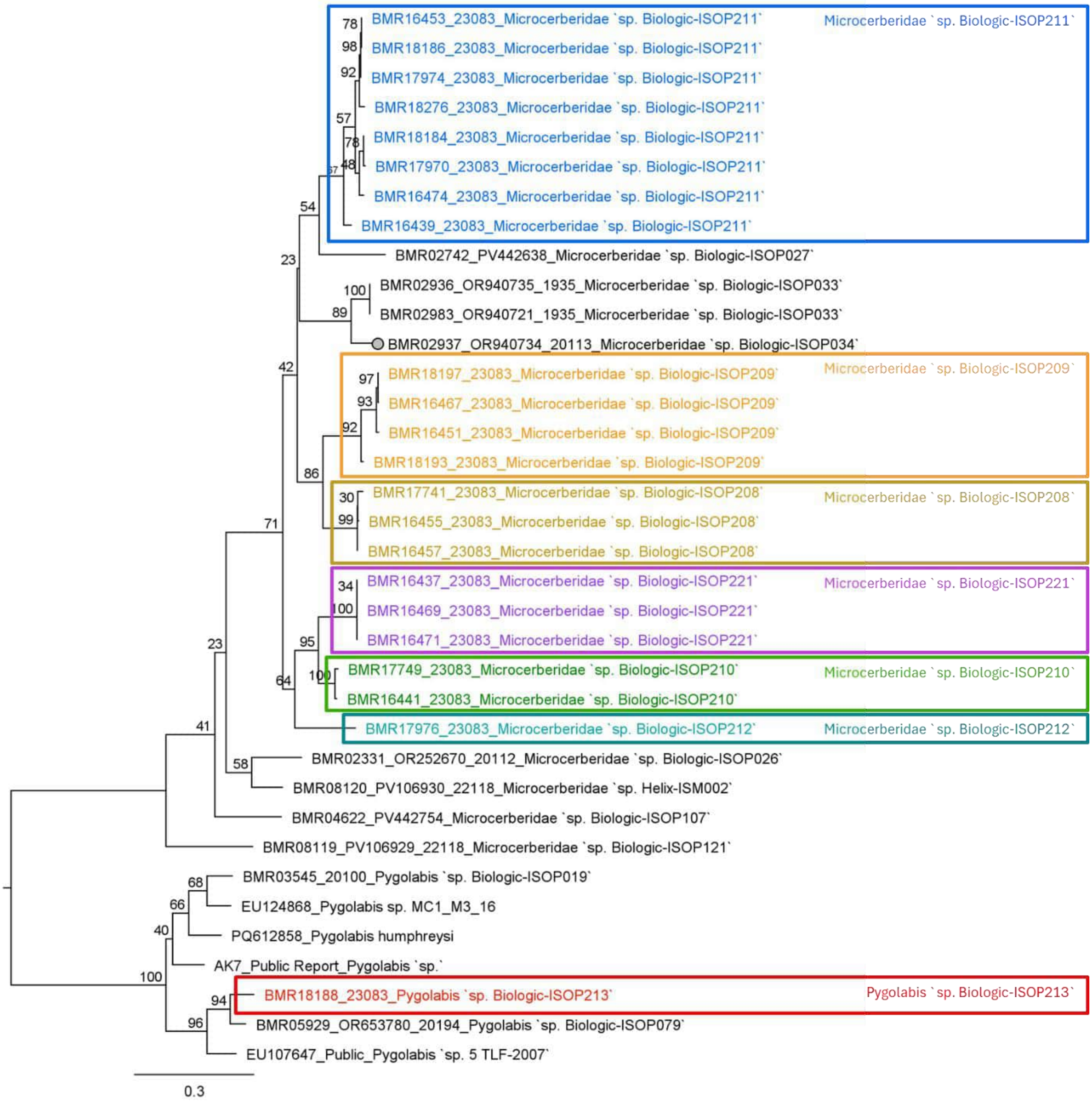

Figure 3.4: Phylogeny for the Isopoda dataset, with bootstrap values

Table 3.5: Pairwise distances (%) for the Isopoda dataset

COI Pairwise Distances (%)	BMR02331	BMR08120	BMR04622	BMR02936	BMR02983	BMR02937	BMR16439	BMR16453	BMR18186	BMR17974	BMR18276	BMR16474	BMR17970	BMR18184	BMR02742	BMR16451	BMR16467	BMR18197	BMR18193	BMR16455	BMR16457	BMR17741	BMR16437	BMR16469	BMR16471	BMR16441	BMR17749	BMR17976	BMR08119	AK7_Public	BMR03545	EU124868	PQ612858	BMR05929	BMR18188	EU107647
BMR02331_OR252670_20112_Microcerberidae `sp. Biologic-ISOP026`		15.1	20.8	22.7	23.5	21.3	21.7	21.5	21.5	21.3	21.6	21.2	21.0	20.9	23.2	22.1	21.6	21.5	20.6	22.7	22.5	22.9	21.9	21.9	21.9	20.4	20.4	19.2	19.6	29.3	28.8	28.4	30.0	30.0	28.8	29.7
BMR08120_PV106930_22118_Microcerberidae `sp. Helix-ISM002`	15.1		18.1	19.7	19.7	20.2	19.9	19.9	19.9	19.7	19.4	19.4	19.2	19.5	21.0	19.5	19.2	19.2	19.7	20.4	20.6	21.0	21.5	21.5	21.5	20.4	20.4	19.5	21.2	26.6	25.9	27.8	27.4	27.8	26.4	28.4
BMR04622_PV442754_Microcerberidae `sp. Biologic-ISOP107`	20.8	18.1		20.3	19.3	21.9	21.0	21.5	21.5	21.4	21.2	21.2	20.2	20.5	20.6	21.5	21.2	21.4	21.7	22.0	21.9	23.3	20.8	20.8	20.8	21.2	21.5	23.5	22.6	28.9	27.7	26.9	28.9	29.4	28.2	28.2
BMR02936_OR940735_1935_Microcerberidae `sp. Biologic-ISOP033`	22.7	19.7	20.3		0.0	10.2	17.9	17.0	17.0	16.9	16.9	15.9	15.6	15.5	18.1	20.0	20.5	20.5	20.4	18.0	17.9	18.9	19.1	19.1	19.1	18.3	18.9	20.7	24.9	29.7	29.0	28.4	29.8	31.2	28.6	30.2
BMR02983_OR940721_1935_Microcerberidae `sp. Biologic-ISOP033`	23.5	19.7	19.3	0.0		10.8	19.0	17.0	17.0	17.0	16.3	15.9	15.7	15.5	19.0	19.0	19.7	19.7	19.9	18.5	18.2	19.8	18.3	18.3	18.3	18.1	18.5	20.8	25.2	30.2	28.5	29.8	30.2	30.9	28.9	31.3
BMR02937_OR940734_20113_Microcerberidae `sp. Biologic-ISOP034`	21.3	20.2	21.9	10.2	10.8		18.6	17.9	17.9	17.8	17.6	17.4	16.9	16.5	19.4	18.1	17.9	17.9	18.3	16.9	17.3	18.3	19.4	19.4	19.4	18.6	18.6	20.4	22.7	29.6	27.8	27.7	28.1	32.1	29.3	30.1
BMR16439_23083_Microcerberidae `sp. Biologic-ISOP211`	21.7	19.9	21.0	17.9	19.0	18.6		6.6	6.6	6.4	6.7	6.4	6.4	6.2	17.1	19.2	19.3	19.2	18.4	17.1	17.1	18.1	18.0	18.0	18.0	16.4	16.9	20.2	23.9	30.7	29.8	29.7	31.3	32.3	30.5	31.9
BMR16453_23083_Microcerberidae `sp. Biologic-ISOP211`	21.5	19.9	21.5	17.0	17.0	17.9	6.6		0.0	0.2	1.8	3.8	4.3	3.8	18.1	19.6	19.5	19.3	19.5	19.0	19.0	19.9	17.6	17.6	17.6	16.7	16.7	19.6	25.8	29.8	30.1	30.6	31.4	31.1	29.0	31.9
BMR18186_23083_Microcerberidae `sp. Biologic-ISOP211`	21.5	19.9	21.5	17.0	17.0	17.9	6.6	0.0		0.2	1.8	3.8	4.3	3.8	18.1	19.6	19.5	19.3	19.5	19.0	19.0	19.9	17.6	17.6	17.6	16.7	16.7	19.6	25.8	29.8	30.1	30.6	31.4	31.1	29.0	31.9
BMR17974_23083_Microcerberidae `sp. Biologic-ISOP211`	21.3	19.7	21.4	16.9	17.0	17.8	6.4	0.2	0.2		1.7	3.7	4.1	3.7	18.0	19.8	19.6	19.5	19.3	18.8	18.8	19.7	17.8	17.8	17.8	16.9	16.9	19.6	25.7	29.8	30.1	30.6	31.4	31.1	29.0	31.9
BMR18276_23083_Microcerberidae `sp. Biologic-ISOP211`	21.6	19.4	21.2	16.9	16.3	17.6	6.7	1.8	1.8	1.7		4.6	5.0	4.6	18.1	20.4	19.9	20.1	19.6	18.7	18.7	19.7	17.8	17.8	17.8	17.6	17.6	19.5	25.2	29.4	30.1	30.0	31.7	30.6	29.3	31.7
BMR16474_23083_Microcerberidae `sp. Biologic-ISOP211`	21.2	19.4	21.2	15.9	15.9	17.4	6.4	3.8	3.8	3.7	4.6		2.6	2.4	18.7	19.8	19.9	19.8	20.1	18.7	18.7	19.5	17.5	17.5	17.5	17.0	17.0	19.9	24.9	30.4	29.8	31.1	31.5	32.1	30.2	31.9
BMR17970_23083_Microcerberidae `sp. Biologic-ISOP211`	21.0	19.2	20.2	15.6	15.7	16.9	6.4	4.3	4.3	4.1	5.0	2.6		0.5	18.7	18.7	18.8	18.7	19.2	18.8	18.8	19.9	17.8	17.8	17.8	16.7	16.7	19.8	24.6	30.8	28.9	31.0	31.5	31.4	29.5	31.0
BMR18184_23083_Microcerberidae `sp. Biologic-ISOP211`	20.9	19.5	20.5	15.5	15.5	16.5	6.2	3.8	3.8	3.7	4.6	2.4	0.5		18.9	18.8	19.0	18.8	19.0	18.7	18.7	19.7	17.8	17.8	17.8	16.6	16.6	19.6	24.8	30.4	29.2	30.6	31.5	31.1	29.2	31.0
BMR02742_PV442638_Microcerberidae `sp. Biologic-ISOP027`	23.2	21.0	20.6	18.1	19.0	19.4	17.1	18.1	18.1	18.0	18.1	18.7	18.7	18.9		19.6	19.8	19.6	18.7	18.3	18.3	19.6	19.8	19.8	19.8	19.8	19.8	20.1	24.2	30.1	31.5	30.2	31.2	32.6	32.4	31.5
BMR16451_23083_Microcerberidae `sp. Biologic-ISOP209`	22.1	19.5	21.5	20.0	19.0	18.1	19.2	19.6	19.6	19.8	20.4	19.8	18.7	18.8	19.6		1.2	1.1	5.3	15.5	15.5	16.7	19.6	19.6	19.6	19.6	19.0	18.8	24.6	29.5	30.4	28.4	30.1	28.5	28.3	27.0
BMR16467_23083_Microcerberidae `sp. Biologic-ISOP209`	21.6	19.2	21.2	20.5	19.7	17.9	19.3	19.5	19.5	19.6	19.9	19.9	18.8	19.0	19.8	1.2		0.2	5.3	15.5	15.5	16.7	19.3	19.3	19.3	19.3	19.0	19.5	24.2	29.1	30.1	28.8	30.0	28.5	28.0	27.0
BMR18197_23083_Microcerberidae `sp. Biologic-ISOP209`	21.5	19.2	21.4	20.5	19.7	17.9	19.2	19.3	19.3	19.5	20.1	19.8	18.7	18.8	19.6	1.1	0.2		5.2	15.5	15.5	16.7	19.3	19.3	19.3	19.3	19.0	19.3	24.2	29.1	30.1	28.8	29.8	28.5	28.0	27.0
BMR18193_23083_Microcerberidae `sp. Biologic-ISOP209`	20.6	19.7	21.7	20.4	19.9	18.3	18.4	19.5	19.5	19.3	19.6	20.1	19.2	19.0	18.7	5.3	5.3	5.2		14.3	14.3	15.1	19.9	19.9	19.9	18.4	17.5	18.8	24.5	30.4	31.5	29.1	30.8	30.3	28.6	29.3
BMR16455_23083_Microcerberidae `sp. Biologic-ISOP208`	22.7	20.4	22.0	18.0	18.5	16.9	17.1	19.0	19.0	18.8	18.7	18.7	18.8	18.7	18.3	15.5	15.5	15.5	14.3		0.5	4.1	20.8	20.8	20.8	17.9	18.5	19.0	23.0	28.6	30.6	29.7	30.1	30.4	28.4	28.4
BMR16457_23083_Microcerberidae `sp. Biologic-ISOP208`	22.5	20.6	21.9	17.9	18.2	17.3	17.1	19.0	19.0	18.8	18.7	18.7	18.8	18.7	18.3	15.5	15.5	15.5	14.3	0.5		4.2	20.8	20.8	20.8	17.6	18.2	18.9	23.0	28.5	30.9	29.4	30.4	30.8	28.7	28.3
BMR17741_23083_Microcerberidae `sp. Biologic-ISOP208`	22.9	21.0	23.3	18.9	19.8	18.3	18.1	19.9	19.9	19.7	19.7	19.5	19.9	19.7	19.6	16.7	16.7	16.7	15.1	4.1	4.2		21.6	21.6	21.6	18.1	18.7	17.9	23.2	30.1	31.7	30.9	30.8	31.4	29.1	29.7
BMR16437_23083_Microcerberidae `sp. Biologic-ISOP221`	21.9	21.5	20.8	19.1	18.3	19.4	18.0	17.6	17.6	17.8	17.8	17.5	17.8	17.8	19.8	19.6	19.3	19.3	19.9	20.8	20.8	21.6		0.0	0.0	12.2	12.3	18.8	22.8	30.8	31.5	29.3	32.4	32.4	29.9	31.5
BMR16469_23083_Microcerberidae `sp. Biologic-ISOP221`	21.9	21.5	20.8	19.1	18.3	19.4	18.0	17.6	17.6	17.8	17.8	17.5	17.8	17.8	19.8	19.6	19.3	19.3	19.9	20.8	20.8	21.6	0.0		0.0	12.2	12.3	18.8	22.8	30.8	31.5	29.3	32.4	32.4	29.9	31.5
BMR16471_23083_Microcerberidae `sp. Biologic-ISOP221`	21.9	21.5	20.8	19.1	18.3	19.4	18.0	17.6	17.6	17.8	17.8	17.5	17.8	17.8	19.8	19.6	19.3	19.3	19.9	20.8	20.8	21.6	0.0	0.0		12.2	12.3	18.8	22.8	30.8	31.5	29.3	32.4	32.4	29.9	31.5
BMR16441_23083_Microcerberidae `sp. Biologic-ISOP210`	20.4	20.4	21.2	18.3	18.1	18.6	16.4	16.7	16.7	16.9	17.6	17.0	16.7	16.6	19.8	19.6	19.3	19.3	18.4	17.9	17.6	18.1	12.2	12.2	12.2		1.4	17.2	24.2	30.1	30.8	29.1	31.4	30.8	29.2	31.3
BMR17749_23083_Microcerberidae `sp. Biologic-ISOP210`	20.4	20.4	21.5	18.9	18.5	18.6	16.9	16.7	16.7	16.9	17.6	17.0	16.7	16.6	19.8	19.0	19.0	19.0	17.5	18.5	18.2	18.7	12.3	12.3	12.3	1.4		17.3	24.6	30.8	31.4	29.5	31.4	31.1	30.2	31.3
BMR17976_23083_Microcerberidae `sp. Biologic-ISOP212`	19.2	19.5	23.5	20.7	20.8	20.4	20.2	19.6	19.6	19.6	19.5	19.9	19.8	19.6	20.1	18.8	19.5	19.3	18.8	19.0	18.9	17.9	18.8	18.8	18.8	17.2	17.3		24.2	29.1	30.3	31.0	30.6	29.1	29.2	30.1
BMR08119_PV106929_22118_Microcerberidae `sp. Biologic-ISOP121`	19.6	21.2	22.6	24.9	25.2	22.7	23.9	25.8	25.8	25.7	25.2	24.9	24.6	24.8	24.2	24.6	24.2	24.2	24.5	23.0	23.0	23.2	22.8	22.8	22.8	24.2	24.6	24.2		28.5	28.2	28.8	30.0	29.1	29.2	28.6
AK7_Public Report_Pygolabis `sp.`	29.3	26.6	28.9	29.7	30.2	29.6	30.7	29.8	29.8	29.8	29.4	30.4	30.8	30.4	30.1	29.5	29.1	29.1	30.4	28.6	28.5	30.1	30.8	30.8	30.8	30.1	30.8	29.1	28.5		14.3	13.6	14.0	16.9	17.5	16.4
BMR03545_20100_Pygolabis `sp. Biologic-ISOP019`	28.8	25.9	27.7	29.0	28.5	27.8	29.8	30.1	30.1	30.1	30.1	29.8	28.9	29.2	31.5	30.4	30.1	30.1	31.5	30.6	30.9	31.7	31.5	31.5	31.5	30.8	31.4	30.3	28.2	14.3		10.8	14.0	17.2	17.4	18.0
EU124868_Pygolabis sp. MC1_M3_16	28.4	27.8	26.9	28.4	29.8	27.7	29.7	30.6	30.6	30.6	30.0	31.1	31.0	30.6	30.2	28.4	28.8	28.8	29.1	29.7	29.4	30.9	29.3	29.3	29.3	29.1	29.5	31.0	28.8	13.6	10.8		13.7	18.5	18.1	18.3
PQ612858_Pygolabis humphreysi	30.0	27.4	28.9	29.8	30.2	28.1	31.3	31.4	31.4	31.4	31.7	31.5	31.5	31.5	31.2	30.1	30.0	29.8	30.8	30.1	30.4	30.8	32.4	32.4	32.4	31.4	31.4	30.6	30.0	14.0	14.0	13.7		17.5	18.0	17.3
BMR05929_OR653780_20194_Pygolabis `sp. Biologic-ISOP079`	30.0	27.8	29.4	31.2	30.9	32.1	32.3	31.1	31.1	31.1	30.6	32.1	31.4	31.1	32.6	28.5	28.5	28.5	30.3	30.4	30.8	31.4	32.4	32.4	32.4	30.8	31.1	29.1	29.1	16.9	17.2	18.5	17.5		9.1	12.8
BMR18188_23083_Pygolabis `sp. Biologic-ISOP213`	28.8	26.4	28.2	28.6	28.9	29.3	30.5	29.0	29.0	29.0	29.3	30.2	29.5	29.2	32.4	28.3	28.0	28.0	28.6	28.4	28.7	29.1	29.9	29.9	29.9	29.2	30.2	29.2	29.2	17.5	17.4	18.1	18.0	9.1		14.0
EU107647_Public_Pygolabis `sp. 5 TLF-2007`	29.7	28.4	28.2	30.2	31.3	30.1	31.9	31.9	31.9	31.9	31.7	31.9	31.0	31.0	31.5	27.0	27.0	27.0	29.3	28.4	28.3	29.7	31.5	31.5	31.5	31.3	31.3	30.1	28.6	16.4	18.0	18.3	17.3	12.8	14.0	

3.3 Maxillopoda

Twenty-eight sequences formed 11 OTUs in four families: Ridgewayiidae, Cyclopidae, Canthocamptidae, and Parastenocarididae (Figure 3.5). The one Ridgewayiidae sequence, *Stygoridgewayia* `sp. Biologic-CALA011`, formed a singleton and was more than 10.7% divergent from all other sequences in the analysis (Table 3.6).

Nineteen Cyclopidae sequences formed six OTUs, two of which, *Pescecyclops* `sp. WAM CYLP001` and *Thermocyclops* `sp. Biologic-CYCL014`, matched non-project sequences. Both OTUs are widespread with linear ranges of 388.6 km and 407.2 km respectively. These OTUs had intraspecific distances below 4% and were more than 19.8% divergent from all other sequences in the analysis (Table 3.6). *Diacyclops* `sp. Biologic-CYCL105` and *Thermocyclops* `sp. Biologic-CYCL106`had intraspecific distances below 3.4% and were more than 14.4% divergent from all other sequences (Table 3.6). The OTUs had linear ranges of 25.6 km and 15.4 km respectively. *Diacyclops* `sp. Biologic-CYCL104` represented a single site and had an intraspecific distance below 1.3% and was more than 14.6% divergent from all other sequences in the analysis (Table 3.6). *Pescecyclops* `sp. Biologic-CYCL107` formed a singleton and was more than 21.9% divergent from all other sequences in the analysis (Table 3.6).

Four Canthocamptidae sequences formed one OTU, *Elaphoidella* `sp. Biologic-HARP103`. This OTU was unique to this study and had a linear range of 7.7 km. *Elaphoidella* `sp. Biologic-HARP103`had intraspecific distances below 5.7% and were more than 14% divergent from all other sequences in the analysis (Table 3.6).

Two of the Parastenocarididae OTUs, *Parastenocaris* `sp. Biologic-HARP105`, and *Parastenocaris* `sp. Biologic-HARP106` were singletons and were all more than 15.2% divergent from all other sequences in the analysis (Table 3.6). The OTU *Parastenocaris* `sp. Biologic-HARP104` represented a single site and had intraspecific distances below 0.3% and was more than 18.9% divergent from all other sequences (Table 3.6).

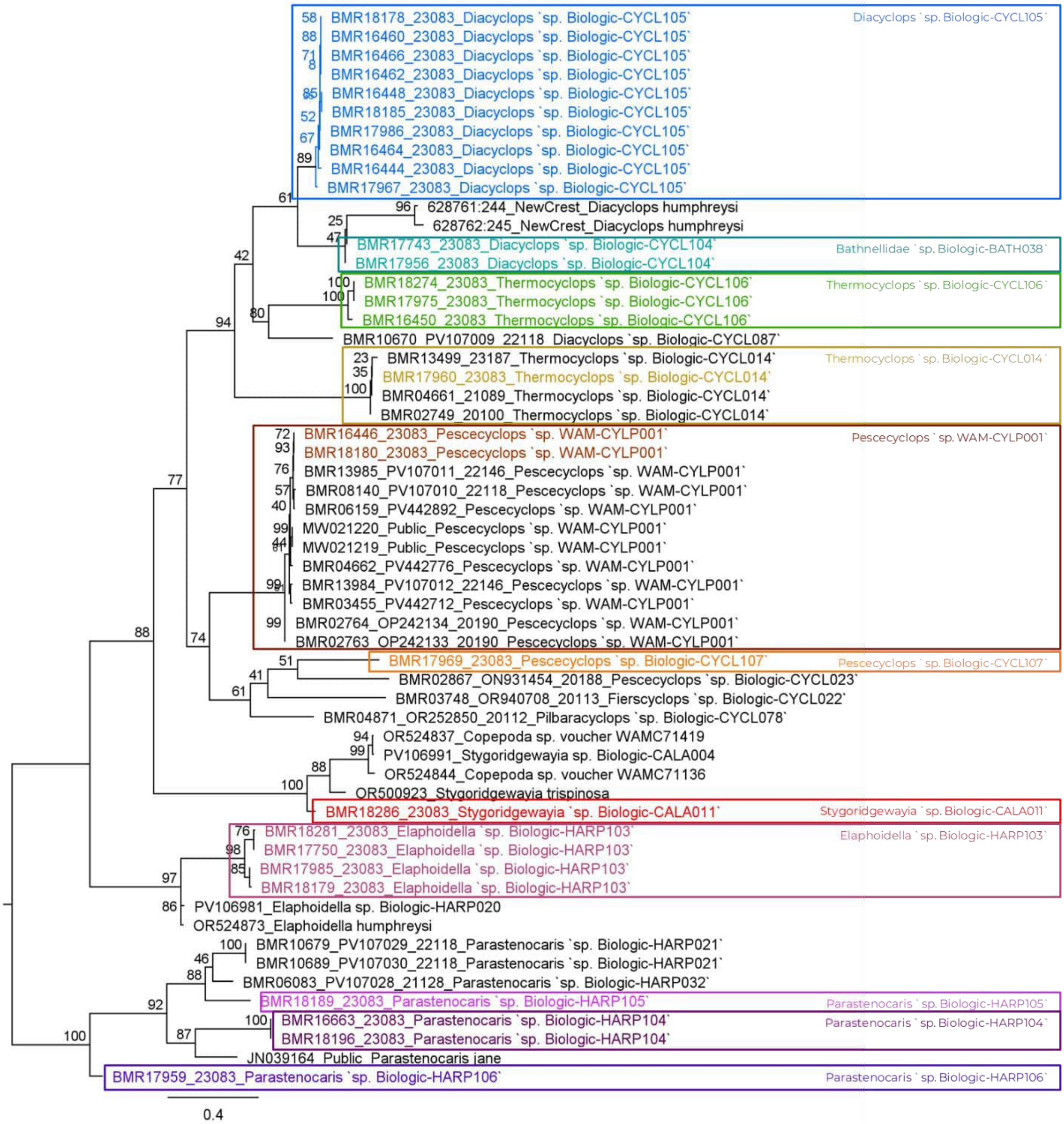

Figure 3.5: Phylogeny for the Maxillopoda dataset, with bootstrap values

Table 3.6: Pairwise distances (%) for the Maxillopoda dataset

COI Pairwise Distances (%)	628761244	628762245	BMR16444	BMR16448	BMR16460	BMR16462	BMR16466	BMR18178	BMR16464	BMR17986	BMR18185	BMR17967	BMR17743	BMR17956	BMR10670	BMR16450	BMR17975	BMR18274	BMR02749	BMR04661	BMR17960	BMR13499	MW021219	MW021220	BMR04662	BMR08140	BMR06159	BMR13985	BMR16446	BMR18180	BMR02763	BMR02764	BMR13984	BMR03455	BMR04871	BMR17969	BMR02867	BMR03748	BMR18286	OR500923	OR524837	PV106991	OR524844	BMR17750	BMR18281	BMR17985	BMR18179	OR524873	PV106981	JN039164	BMR16663	BMR18196	BMR06083	BMR10679	BMR10689	BMR18189	BMR17959
628761244_NewCrest_Diacyclops humphreysi		4.2	20.8	19.8	21.0	21.0	21.0	21.0	20.5	20.5	19.9	19.8	15.4	15.6	23.8	21.5	21.5	21.5	22.5	22.0	22.3	23.0	26.7	26.7	26.2	25.5	26.5	26.6	26.2	26.2	26.7	26.7	26.4	26.5	22.8	26.0	28.5	24.0	29.0	30.9	30.7	30.5	29.7	26.2	26.2	26.2	26.5	25.5	25.5	28.5	27.7	28.0	27.0	26.2	26.2	30.2	28.2
628762245_NewCrest_Diacyclops humphreysi	4.2		21.0	20.1	21.2	21.2	21.2	21.3	20.8	20.9	20.3	20.3	16.8	17.3	23.0	22.3	21.9	21.9	21.3	20.5	20.7	22.2	27.0	26.1	25.2	25.0	25.9	26.0	25.7	25.6	25.7	25.7	25.3	26.1	22.5	25.2	28.4	23.7	28.8	30.8	28.6	28.6	28.6	26.4	26.7	26.4	26.1	26.4	26.0	29.1	27.5	27.7	27.0	25.7	25.7	31.1	29.5
BMR16444_23083_Diacyclops `sp. Biologic-CYCL105`	20.8	21.0		1.8	1.9	1.8	1.8	1.8	1.3	1.7	1.9	2.2	15.1	15.0	19.7	19.9	20.4	20.0	20.8	21.2	20.2	21.4	21.0	20.7	21.3	21.2	21.2	21.0	21.1	21.0	21.2	21.2	21.2	20.8	23.0	23.9	27.4	25.6	25.0	29.2	26.3	26.1	26.6	26.3	26.3	27.2	26.8	24.4	24.2	30.1	30.0	30.9	27.2	28.4	28.4	27.9	29.4
BMR16448_23083_Diacyclops `sp. Biologic-CYCL105`	19.8	20.1	1.8		0.8	1.2	1.0	1.1	0.9	1.0	0.5	2.4	14.4	14.5	19.4	20.1	20.9	20.5	21.1	20.7	19.8	21.2	21.3	20.7	21.3	20.9	21.2	21.1	21.3	21.4	21.0	21.0	21.6	21.1	22.5	23.6	26.8	25.8	24.2	28.9	25.7	25.4	25.5	25.7	26.0	26.7	26.2	23.6	23.6	30.3	29.7	30.5	26.8	28.8	28.8	28.2	29.6
BMR16460_23083_Diacyclops `sp. Biologic-CYCL105`	21.0	21.2	1.9	0.8		0.0	0.0	0.0	0.5	0.5	0.9	2.2	15.3	15.0	20.1	20.0	20.4	20.5	21.3	21.8	20.7	21.6	21.8	21.5	22.0	21.8	21.8	21.6	21.7	21.7	21.9	21.9	22.1	21.7	21.9	22.5	26.6	25.6	25.1	28.9	25.9	25.8	25.8	26.3	26.5	27.1	26.6	23.9	23.6	31.1	29.9	31.3	27.3	28.7	28.7	28.6	29.7
BMR16462_23083_Diacyclops `sp. Biologic-CYCL105`	21.0	21.2	1.8	1.2	0.0		0.2	0.5	0.8	0.8	1.2	2.2	15.1	15.2	19.5	19.7	20.4	20.0	21.3	21.4	20.5	21.2	21.6	21.0	22.0	21.9	21.9	21.7	21.9	22.0	21.4	21.4	22.3	21.6	22.6	23.8	27.0	25.8	24.2	28.9	25.4	25.2	25.6	25.6	26.2	26.4	26.0	23.6	23.6	30.6	29.8	30.7	26.8	28.7	28.7	28.0	29.4
BMR16466_23083_Diacyclops `sp. Biologic-CYCL105`	21.0	21.2	1.8	1.0	0.0	0.2		0.2	0.6	0.7	1.0	2.0	15.1	15.2	19.4	19.6	20.4	19.9	21.3	21.4	20.4	21.2	21.6	21.0	21.9	21.7	21.7	21.6	21.8	21.9	21.4	21.4	22.1	21.6	22.5	23.7	27.0	25.7	24.0	28.9	25.3	25.0	25.4	25.5	26.1	26.3	25.8	23.5	23.5	30.6	29.6	30.7	26.6	28.4	28.4	28.0	29.4
BMR18178_23083_Diacyclops `sp. Biologic-CYCL105`	21.0	21.3	1.8	1.1	0.0	0.5	0.2		0.8	0.8	1.1	2.2	15.2	15.3	19.5	19.7	20.4	20.0	21.3	21.5	20.4	21.3	21.6	21.1	21.9	21.8	21.8	21.7	21.9	22.0	21.5	21.5	22.2	21.7	22.5	23.8	27.1	25.8	24.2	28.9	25.3	25.0	25.5	25.7	26.2	26.4	25.9	23.7	23.7	30.6	29.9	30.8	26.7	28.7	28.7	28.0	29.4
BMR16464_23083_Diacyclops `sp. Biologic-CYCL105`	20.5	20.8	1.3	0.9	0.5	0.8	0.6	0.8		0.6	0.9	2.0	15.1	15.3	19.6	19.8	20.6	20.1	21.3	21.5	20.4	21.6	21.5	20.9	21.7	21.6	21.6	21.5	21.6	21.7	21.3	21.3	21.9	21.5	22.4	23.9	26.8	25.6	24.5	28.9	25.6	25.4	25.4	25.4	26.0	26.1	25.7	24.1	24.1	30.3	29.3	30.2	26.6	28.6	28.6	27.9	29.6
BMR17986_23083_Diacyclops `sp. Biologic-CYCL105`	20.5	20.9	1.7	1.0	0.5	0.8	0.7	0.8	0.6		0.8	2.1	15.3	15.4	19.5	20.0	20.9	20.3	21.5	21.5	20.5	21.6	21.5	20.9	21.8	21.7	21.7	21.6	21.8	21.8	21.4	21.4	22.1	21.6	22.6	23.9	27.0	25.8	24.4	28.9	25.5	25.3	25.7	25.7	26.3	26.4	26.0	24.0	24.0	30.7	29.6	30.4	26.8	28.8	28.8	28.1	30.0
BMR18185_23083_Diacyclops `sp. Biologic-CYCL105`	19.9	20.3	1.9	0.5	0.9	1.2	1.0	1.1	0.9	0.8		2.3	14.7	15.0	19.7	20.1	20.9	20.4	21.4	21.2	20.2	21.5	21.6	21.0	21.8	21.3	21.6	21.5	21.7	21.8	21.5	21.5	22.0	21.6	22.7	23.8	27.0	25.9	24.4	28.7	25.7	25.5	25.5	25.7	26.2	26.6	26.1	23.9	23.9	30.5	29.6	30.4	26.7	28.8	28.8	28.4	30.0
BMR17967_23083_Diacyclops `sp. Biologic-CYCL105`	19.8	20.3	2.2	2.4	2.2	2.2	2.0	2.2	2.0	2.1	2.3		14.7	14.7	19.7	19.3	20.0	19.6	22.1	22.0	21.1	21.9	21.0	20.5	21.3	21.1	21.1	21.1	21.3	21.4	21.0	21.0	21.6	21.1	22.6	24.8	26.8	26.2	24.6	29.5	25.6	25.4	25.7	25.0	25.7	25.8	25.4	23.6	23.6	31.0	29.2	30.1	26.6	28.6	28.6	29.1	29.4
BMR17743_23083_Diacyclops `sp. Biologic-CYCL104`	15.4	16.8	15.1	14.4	15.3	15.1	15.1	15.2	15.1	15.3	14.7	14.7		1.2	23.0	24.3	24.3	24.3	20.6	21.1	20.9	21.5	23.4	22.3	22.3	22.0	22.5	22.3	22.4	22.4	22.5	22.5	21.5	21.6	23.3	26.5	25.9	26.1	26.5	27.5	29.4	29.0	28.8	27.9	28.6	28.1	28.1	25.2	25.0	29.3	29.0	29.2	27.2	30.5	30.5	29.2	26.7
BMR17956_23083_Diacyclops `sp. Biologic-CYCL104`	15.6	17.3	15.0	14.5	15.0	15.2	15.2	15.3	15.3	15.4	15.0	14.7	1.2		22.8	24.2	24.1	24.2	20.3	21.4	21.2	21.8	22.8	22.1	22.1	21.9	22.3	22.2	22.3	22.1	22.5	22.5	21.2	21.1	23.1	26.9	26.1	26.1	26.8	27.7	29.9	29.5	29.1	28.2	28.6	28.2	28.2	25.5	25.3	29.7	29.6	29.8	27.3	30.7	30.7	29.5	26.8
BMR10670_PV107009_22118_Diacyclops `sp. Biologic-CYCL087`	23.8	23.0	19.7	19.4	20.1	19.5	19.4	19.5	19.6	19.5	19.7	19.7	23.0	22.8		19.5	19.9	19.2	24.4	24.5	23.1	24.2	22.2	22.0	22.5	22.5	22.0	22.4	22.2	22.1	24.3	24.3	22.2	22.6	25.5	25.7	25.7	26.2	24.2	28.0	26.5	26.4	27.5	26.5	26.5	27.9	27.9	25.9	25.7	30.3	29.9	31.7	26.6	28.2	28.2	27.8	29.1
BMR16450_23083_Thermocyclops `sp. Biologic-CYCL106`	21.5	22.3	19.9	20.1	20.0	19.7	19.6	19.7	19.8	20.0	20.1	19.3	24.3	24.2	19.5		3.3	3.3	23.6	24.0	22.5	23.9	24.5	24.0	24.0	23.1	23.7	23.7	23.5	23.6	24.7	24.7	23.9	24.6	25.1	26.3	27.8	26.5	26.4	28.3	27.6	27.7	28.2	26.4	26.6	25.8	25.5	23.9	24.1	29.6	29.6	31.6	28.1	28.6	28.6	29.7	30.3
BMR17975_23083_Thermocyclops `sp. Biologic-CYCL106`	21.5	21.9	20.4	20.9	20.4	20.4	20.4	20.4	20.6	20.9	20.9	20.0	24.3	24.1	19.9	3.3		0.0	24.1	24.7	22.8	24.2	24.8	24.8	25.0	24.0	24.7	24.2	24.1	24.1	25.9	25.9	24.6	25.0	24.7	26.7	27.7	26.5	27.2	28.6	27.9	28.1	28.4	25.9	26.0	26.2	26.0	24.1	24.3	30.4	29.3	31.8	28.8	28.6	28.6	29.8	30.9
BMR18274_23083_Thermocyclops `sp. Biologic-CYCL106`	21.5	21.9	20.0	20.5	20.5	20.0	19.9	20.0	20.1	20.3	20.4	19.6	24.3	24.2	19.2	3.3	0.0		24.1	24.0	22.4	23.9	24.7	24.3	24.3	23.4	24.0	24.0	23.8	23.8	25.2	25.2	24.1	24.7	25.1	26.3	28.1	26.6	26.5	28.6	27.1	27.2	27.7	25.6	25.8	25.6	25.4	24.4	24.9	30.1	29.5	31.4	28.2	28.3	28.3	29.7	30.3
BMR02749_20100_Thermocyclops `sp. Biologic-CYCL014`	22.5	21.3	20.8	21.1	21.3	21.3	21.3	21.3	21.3	21.5	21.4	22.1	20.6	20.3	24.4	23.6	24.1	24.1		0.5	0.8	3.9	26.2	25.9	25.9	25.4	25.6	26.0	25.9	25.9	25.9	25.9	25.3	25.1	24.9	27.9	32.0	25.1	25.9	28.1	29.4	29.7	29.2	30.7	30.7	29.7	29.7	27.4	27.2	27.2	31.7	32.0	27.9	31.5	31.5	28.9	30.5
BMR04661_21089_Thermocyclops `sp. Biologic-CYCL014`	22.0	20.5	21.2	20.7	21.8	21.4	21.4	21.5	21.5	21.5	21.2	22.0	21.1	21.4	24.5	24.0	24.7	24.0	0.5		0.2	3.8	25.8	24.9	24.7	24.0	24.2	24.8	24.9	24.8	24.5	24.5	24.3	24.8	25.0	27.3	31.6	26.0	26.0	28.1	28.9	29.3	29.1	29.5	29.8	29.1	29.1	26.1	25.8	26.2	31.3	31.5	27.5	30.2	30.2	29.3	29.4
BMR17960_23083_Thermocyclops `sp. Biologic-CYCL014`	22.3	20.7	20.2	19.8	20.7	20.5	20.4	20.4	20.4	20.5	20.2	21.1	20.9	21.2	23.1	22.5	22.8	22.4	0.8	0.2		3.6	23.3	23.0	22.6	22.3	22.5	23.0	22.9	23.0	24.3	24.3	22.6	23.1	23.7	26.0	28.4	25.7	24.3	28.0	26.5	26.7	26.6	26.1	26.1	26.1	26.0	23.6	23.6	26.4	30.2	31.3	26.9	29.3	29.3	29.5	29.6
BMR13499_23187_Thermocyclops `sp. Biologic-CYCL014`	23.0	22.2	21.4	21.2	21.6	21.2	21.2	21.3	21.6	21.6	21.5	21.9	21.5	21.8	24.2	23.9	24.2	23.9	3.9	3.8	3.6		24.6	24.3	23.7	23.9	23.9	24.9	25.0	24.9	23.7	23.7	23.8	24.1	24.0	27.4	30.1	25.9	26.7	29.4	29.7	30.0	29.7	30.0	30.2	29.9	29.9	27.6	27.4	27.3	30.3	30.6	27.7	29.3	29.3	29.1	30.0
MW021219_Public_Pescecyclops `sp. WAM-CYLP001`	26.7	27.0	21.0	21.3	21.8	21.6	21.6	21.6	21.5	21.5	21.6	21.0	23.4	22.8	22.2	24.5	24.8	24.7	26.2	25.8	23.3	24.6		0.0	1.0	2.6	1.9	2.0	2.0	2.0	3.1	3.1	2.3	2.2	20.7	23.5	23.3	25.0	25.4	28.0	25.7	25.6	25.7	26.4	26.2	26.8	26.8	25.9	25.0	31.7	29.3	29.4	28.5	30.3	30.3	29.4	27.9
MW021220_Public_Pescecyclops `sp. WAM-CYLP001`	26.7	26.1	20.7	20.7	21.5	21.0	21.0	21.1	20.9	20.9	21.0	20.5	22.3	22.1	22.0	24.0	24.8	24.3	25.9	24.9	23.0	24.3	0.0		1.3	2.7	2.1	2.2	2.2	2.1	3.3	3.3	2.4	2.1	20.7	23.5	23.8	24.8	25.1	28.0	25.2	25.2	25.4	26.0	26.1	26.2	26.2	25.3	24.6	31.0	29.0	29.1	27.8	29.7	29.7	28.9	27.6
BMR04662_PV442776_Pescecyclops `sp. WAM-CYLP001`	26.2	25.2	21.3	21.3	22.0	22.0	21.9	21.9	21.7	21.8	21.8	21.3	22.3	22.1	22.5	24.0	25.0	24.3	25.9	24.7	22.6	23.7	1.0	1.3		2.6	2.0	2.5	2.5	2.5	2.2	2.2	2.4	2.3	20.1	23.2	23.6	24.6	24.9	28.0	24.8	24.7	25.5	26.0	26.1	26.2	26.2	25.1	24.5	30.6	29.5	29.1	27.8	30.7	30.7	29.1	28.2
BMR08140_PV107010_22118_Pescecyclops `sp. WAM-CYLP001`	25.5	25.0	21.2	20.9	21.8	21.9	21.7	21.8	21.6	21.7	21.3	21.1	22.0	21.9	22.5	23.1	24.0	23.4	25.4	24.0	22.3	23.9	2.6	2.7	2.6		0.9	1.4	1.5	1.4	3.8	3.8	3.4	3.7	20.7	23.4	24.0	24.8	24.8	26.8	25.5	25.5	25.7	26.3	26.5	26.5	26.2	24.7	23.9	30.6	28.9	28.9	27.7	30.9	30.9	29.3	28.7
BMR06159_PV442892_Pescecyclops `sp. WAM-CYLP001`	26.5	25.9	21.2	21.2	21.8	21.9	21.7	21.8	21.6	21.7	21.6	21.1	22.5	22.3	22.0	23.7	24.7	24.0	25.6	24.2	22.5	23.9	1.9	2.1	2.0	0.9		1.1	1.2	1.1	2.9	2.9	2.8	3.1	20.8	23.4	23.9	25.1	24.8	27.4	24.9	25.0	25.4	26.2	26.3	26.3	26.0	24.5	23.7	30.1	28.8	28.6	28.0	30.6	30.6	28.6	28.0
BMR13985_PV107011_22146_Pescecyclops `sp. WAM-CYLP001`	26.6	26.0	21.0	21.1	21.6	21.7	21.6	21.7	21.5	21.6	21.5	21.1	22.3	22.2	22.4	23.7	24.2	24.0	26.0	24.8	23.0	24.9	2.0	2.2	2.5	1.4	1.1		0.5	0.5	3.6	3.6	2.8	3.1	21.5	23.9	24.7	25.7	24.8	27.2	25.1	25.1	25.6	26.1	26.1	26.5	26.2	24.9	24.1	30.9	29.1	29.0	28.5	30.7	30.7	28.7	28.2
BMR16446_23083_Pescecyclops `sp. WAM-CYLP001`	26.2	25.7	21.1	21.3	21.7	21.9	21.8	21.9	21.6	21.8	21.7	21.3	22.4	22.3	22.2	23.5	24.1	23.8	25.9	24.9	22.9	25.0	2.0	2.2	2.5	1.5	1.2	0.5		0.4	3.8	3.8	3.0	3.1	21.4	23.5	24.6	25.5	24.6	27.1	24.9	24.9	25.4	25.9	25.9	26.1	25.9	24.9	24.1	31.0	29.0	28.6	28.4	30.7	30.7	28.6	28.3
BMR18180_23083_Pescecyclops `sp. WAM-CYLP001`	26.2	25.6	21.0	21.4	21.7	22.0	21.9	22.0	21.7	21.8	21.8	21.4	22.4	22.1	22.1	23.6	24.1	23.8	25.9	24.8	23.0	24.9	2.0	2.1	2.5	1.4	1.1	0.5	0.4		3.6	3.6	2.9	3.1	21.5	23.3	24.3	25.3	24.9	27.1	25.0	25.1	25.5	26.0	25.8	26.2	26.1	24.9	24.2	31.1	29.0	28.5	28.4	30.6	30.6	28.3	28.3
BMR02763_OP242133_20190_Pescecyclops `sp. WAM-CYLP001`	26.7	25.7	21.2	21.0	21.9	21.4	21.4	21.5	21.3	21.4	21.5	21.0	22.5	22.5	24.3	24.7	25.9	25.2	25.9	24.5	24.3	23.7	3.1	3.3	2.2	3.8	2.9	3.6	3.8	3.6		0.0	3.0	2.3	20.7	23.8	23.8	22.5	27.6	27.0	26.7	26.7	27.6	28.5	28.9	28.9	28.7	27.7	26.8	30.8	29.4	29.6	28.7	30.5	30.5	28.3	27.8
BMR02764_OP242134_20190_Pescecyclops `sp. WAM-CYLP001`	26.7	25.7	21.2	21.0	21.9	21.4	21.4	21.5	21.3	21.4	21.5	21.0	22.5	22.5	24.3	24.7	25.9	25.2	25.9	24.5	24.3	23.7	3.1	3.3	2.2	3.8	2.9	3.6	3.8	3.6	0.0		3.0	2.3	20.7	23.8	23.8	22.5	27.6	27.0	26.7	26.7	27.6	28.5	28.9	28.9	28.7	27.7	26.8	30.8	29.4	29.6	28.7	30.5	30.5	28.3	27.8
BMR13984_PV107012_22146_Pescecyclops `sp. WAM-CYLP001`	26.4	25.3	21.2	21.6	22.1	22.3	22.1	22.2	21.9	22.1	22.0	21.6	21.5	21.2	22.2	23.9	24.6	24.1	25.3	24.3	22.6	23.8	2.3	2.4	2.4	3.4	2.8	2.8	3.0	2.9	3.0	3.0		1.1	20.8	23.0	24.0	24.3	25.8	27.8	25.2	25.1	25.6	26.0	26.0	26.5	26.5	24.9	24.3	31.5	29.9	29.6	28.2	30.8	30.8	29.2	28.3
BMR03455_PV442712_Pescecyclops `sp. WAM-CYLP001`	26.5	26.1	20.8	21.1	21.7	21.6	21.6	21.7	21.5	21.6	21.6	21.1	21.6	21.1	22.6	24.6	25.0	24.7	25.1	24.8	23.1	24.1	2.2	2.1	2.3	3.7	3.1	3.1	3.1	3.1	2.3	2.3	1.1		21.2	23.4	23.9	24.7	24.9	27.1	25.2	25.0	25.7	26.5	26.4	26.8	26.8	25.0	24.4	31.4	29.4	29.7	27.6	30.7	30.7	29.2	27.7
BMR04871_OR252850_20112_Pilbaracyclops `sp. Biologic-CYCL078`	22.8	22.5	23.0	22.5	21.9	22.6	22.5	22.5	22.4	22.6	22.7	22.6	23.3	23.1	25.5	25.1	24.7	25.1	24.9	25.0	23.7	24.0	20.7	20.7	20.1	20.7	20.8	21.5	21.4	21.5	20.7	20.7	20.8	21.2		22.0	21.9	22.1	25.3	29.8	27.0	27.0	26.4	26.1	26.2	26.2	26.2	24.7	24.5	29.9	30.1	30.4	29.0	28.9	28.9	30.3	28.8
BMR17969_23083_Pescecyclops `sp. Biologic-CYCL107`	26.0	25.2	23.9	23.6	22.5	23.8	23.7	23.8	23.9	23.9	23.8	24.8	26.5	26.9	25.7	26.3	26.7	26.3	27.9	27.3	26.0	27.4	23.5	23.5	23.2	23.4	23.4	23.9	23.5	23.3	23.8	23.8	23.0	23.4	22.0		22.1	22.7	27.7	29.2	27.1	27.5	27.1	27.3	26.9	28.0	28.6	27.0	27.1	32.9	31.5	31.8	29.6	29.3	29.3	32.4	30.7
BMR02867_ON931454_20188_Pescecyclops `sp. Biologic-CYCL023`	28.5	28.4	27.4	26.8	26.6	27.0	27.0	27.1	26.8	27.0	27.0	26.8	25.9	26.1	25.7	27.8	27.7	28.1	32.0	31.6	28.4	30.1	23.3	23.8	23.6	24.0	23.9	24.7	24.6	24.3	23.8	23.8	24.0	23.9	21.9	22.1		22.9	30.4	33.0	28.3	28.3	28.9	27.0	26.7	28.4	28.3	29.0	29.0	35.2	31.7	34.4	30.3	30.9	30.9	33.6	33.3
BMR03748_OR940708_20113_Fierscyclops `sp. Biologic-CYCL022`	24.0	23.7	25.6	25.8	25.6	25.8	25.7	25.8	25.6	25.8	25.9	26.2	26.1	26.1	26.2	26.5	26.5	26.6	25.1	26.0	25.7	25.9	25.0	24.8	24.6	24.8	25.1	25.7	25.5	25.3	22.5	22.5	24.3	24.7	22.1	22.7	22.9		28.9	31.3	29.2	29.2	28.2	26.5	26.0	26.0	26.2	28.2	28.4	31.5	29.5	29.4	30.3	30.6	30.6	31.5	30.7
BMR18286_23083_Stygoridgewayia `sp. Biologic-CALA011`	29.0	28.8	25.0	24.2	25.1	24.2	24.0	24.2	24.5	24.4	24.4	24.6	26.5	26.8	24.2	26.4	27.2	26.5	25.9	26.0	24.3	26.7	25.4	25.1	24.9	24.8	24.8	24.8	24.6	24.9	27.6	27.6	25.8	24.9	25.3	27.7	30.4	28.9		10.7	14.0	14.0	14.5	27.8	28.1	27.2	26.9	24.5	24.1	28.9	30.4	32.3	26.6	30.1	30.1	28.2	30.1
OR500923_Stygoridgewayia trispinosa	30.9	30.8	29.2	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.7	29.5	27.5	27.7	28.0	28.3	28.6	28.6	28.1	28.1	28.0	29.4	28.0	28.0	28.0	26.8	27.4	27.2	27.1	27.1	27.0	27.0	27.8	27.1	29.8	29.2	33.0	31.3	10.7		12.5	11.9	13.1	30.4	31.0	30.1	29.8	28.9	28.0	32.1	33.9	34.0	30.4	35.4	35.4	31.4	31.9
OR524837_Copepoda sp. voucher WAMC71419	30.7	28.6	26.3	25.7	25.9	25.4	25.3	25.3	25.6	25.5	25.7	25.6	29.4	29.9	26.5	27.6	27.9	27.1	29.4	28.9	26.5	29.7	25.7	25.2	24.8	25.5	24.9	25.1	24.9	25.0	26.7	26.7	25.2	25.2	27.0	27.1	28.3	29.2	14.0	12.5		0.5	3.7	27.1	27.6	27.3	27.3	26.4	25.8	31.7	30.6	32.3	28.9	30.6	30.6	29.3	28.0
PV106991_Stygoridgewayia sp. Biologic-CALA004	30.5	28.6	26.1	25.4	25.8	25.2	25.0	25.0	25.4	25.3	25.5	25.4	29.0	29.5	26.4	27.7	28.1	27.2	29.7	29.3	26.7	30.0	25.6	25.2	24.7	25.5	25.0	25.1	24.9	25.1	26.7	26.7	25.1	25.0	27.0	27.5	28.3	29.2	14.0	11.9	0.5		3.8	26.7	27.1	26.9	26.9	26.2	25.5	31.7	30.6	32.3	28.9	30.7	30.7	29.5	28.0
OR524844_Copepoda sp. voucher WAMC71136	29.7	28.6	26.6	25.5	25.8	25.6	25.4	25.5	25.4	25.7	25.5	25.7	28.8	29.1	27.5	28.2	28.4	27.7	29.2	29.1	26.6	29.7	25.7	25.4	25.5	25.7	25.4	25.6	25.4	25.5	27.6	27.6	25.6	25.7	26.4	27.1	28.9	28.2	14.5	13.1	3.7	3.8		27.2	27.6	26.6	26.6	26.8	26.2	32.2	29.8	31.4	28.9	30.9	30.9	29.5	28.5
BMR17750_23083_Elaphoidella `sp. Biologic-HARP103`	26.2	26.4	26.3	25.7	26.3	25.6	25.5	25.7	25.4	25.7	25.7	25.0	27.9	28.2	26.5	26.4	25.9	25.6	30.7	29.5	26.1	30.0	26.4	26.0	26.0	26.3	26.2	26.1	25.9	26.0	28.5	28.5	26.0	26.5	26.1	27.3	27.0	26.5	27.8	30.4	27.1	26.7	27.2		0.6	5.1	5.4	14.7	15.0	30.9	28.0	28.3	27.7	28.3	28.3	31.4	29.0
BMR18281_23083_Elaphoidella `sp. Biologic-HARP103`	26.2	26.7	26.3	26.0	26.5	26.2	26.1	26.2	26.0	26.3	26.2	25.7	28.6	28.6	26.5	26.6	26.0	25.8	30.7	29.8	26.1	30.2	26.2	26.1	26.1	26.5	26.3	26.1	25.9	25.8	28.9	28.9	26.0	26.4	26.2	26.9	26.7	26.0	28.1	31.0	27.6	27.1	27.6	0.6		5.3	5.7	15.0	15.2	31.3	28.4	29.2	28.2	28.1	28.1	31.9	29.5
BMR17985_23083_Elaphoidella `sp. Biologic-HARP103`	26.2	26.4	27.2	26.7	27.1	26.4	26.3	26.4	26.1	26.4	26.6	25.8	28.1	28.2	27.9	25.8	26.2	25.6	29.7	29.1	26.1	29.9	26.8	26.2	26.2	26.5	26.3	26.5	26.1	26.2	28.9	28.9	26.5	26.8	26.2	28.0	28.4	26.0	27.2	30.1	27.3	26.9	26.6	5.1	5.3		0.6	14.6	14.2	30.3	28.1	28.1	26.4	27.5	27.5	31.1	27.6
BMR18179_23083_Elaphoidella `sp. Biologic-HARP103`	26.5	26.1	26.8	26.2	26.6	26.0	25.8	25.9	25.7	26.0	26.1	25.4	28.1	28.2	27.9	25.5	26.0	25.4	29.7	29.1	26.0	29.9	26.8	26.2	26.2	26.2	26.0	26.2	25.9	26.1	28.7	28.7	26.5	26.8	26.2	28.6	28.3	26.2	26.9	29.8	27.3	26.9	26.6	5.4	5.7	0.6		14.8	14.0	30.3	27.8	27.9	26.1	27.2	27.2	30.4	28.0
OR524873_Elaphoidella humphreysi	25.5	26.4	24.4	23.6	23.9	23.6	23.5	23.7	24.1	24.0	23.9	23.6	25.2	25.5	25.9	23.9	24.1	24.4	27.4	26.1	23.6	27.6	25.9	25.3	25.1	24.7	24.5	24.9	24.9	24.9	27.7	27.7	24.9	25.0	24.7	27.0	29.0	28.2	24.5	28.9	26.4	26.2	26.8	14.7	15.0	14.6	14.8		1.8	27.3	29.4	30.8	26.1	26.8	26.8	29.6	24.8
PV106981_Elaphoidella sp. Biologic-HARP020	25.5	26.0	24.2	23.6	23.6	23.6	23.5	23.7	24.1	24.0	23.9	23.6	25.0	25.3	25.7	24.1	24.3	24.9	27.2	25.8	23.6	27.4	25.0	24.6	24.5	23.9	23.7	24.1	24.1	24.2	26.8	26.8	24.3	24.4	24.5	27.1	29.0	28.4	24.1	28.0	25.8	25.5	26.2	15.0	15.2	14.2	14.0	1.8		26.6	29.3	30.6	25.8	27.0	27.0	29.6	24.8
JN039164_Public_Parastenocaris jane	28.5	29.1	30.1	30.3	31.1	30.6	30.6	30.6	30.3	30.7	30.5	31.0	29.3	29.7	30.3	29.6	30.4	30.1	27.2	26.2	26.4	27.3	31.7	31.0	30.6	30.6	30.1	30.9	31.0	31.1	30.8	30.8	31.5	31.4	29.9	32.9	35.2	31.5	28.9	32.1	31.7	31.7	32.2	30.9	31.3	30.3	30.3	27.3	26.6		19.0	19.2	19.7	20.4	20.4	20.4	20.7
BMR16663_23083_Parastenocaris `sp. Biologic-HARP104`	27.7	27.5	30.0	29.7	29.9	29.8	29.6	29.9	29.3	29.6	29.6	29.2	29.0	29.6	29.9	29.6	29.3	29.5	31.7	31.3	30.2	30.3	29.3	29.0	29.5	28.9	28.8	29.1	29.0	29.0	29.4	29.4	29.9	29.4	30.1	31.5	31.7	29.5	30.4	33.9	30.6	30.6	29.8	28.0	28.4	28.1	27.8	29.4	29.3	19.0		0.2	20.1	20.5	20.5	22.3	23.7
BMR18196_23083_Parastenocaris `sp. Biologic-HARP104`	28.0	27.7	30.9	30.5	31.3	30.7	30.7	30.8	30.2	30.4	30.4	30.1	29.2	29.8	31.7	31.6	31.8	31.4	32.0	31.5	31.3	30.6	29.4	29.1	29.1	28.9	28.6	29.0	28.6	28.5	29.6	29.6	29.6	29.7	30.4	31.8	34.4	29.4	32.3	34.0	32.3	32.3	31.4	28.3	29.2	28.1	27.9	30.8	30.6	19.2	0.2		21.4	21.2	21.2	22.5	23.9
BMR06083_PV107028_21128_Parastenocaris `sp. Biologic-HARP032`	27.0	27.0	27.2	26.8	27.3	26.8	26.6	26.7	26.6	26.8	26.7	26.6	27.2	27.3	26.6	28.1	28.8	28.2	27.9	27.5	26.9	27.7	28.5	27.8	27.8	27.7	28.0	28.5	28.4	28.4	28.7	28.7	28.2	27.6	29.0	29.6	30.3	30.3	26.6	30.4	28.9	28.9	28.9	27.7	28.2	26.4	26.1	26.1	25.8	19.7	20.1	21.4		12.2	12.2	15.2	20.5
BMR10679_PV107029_22118_Parastenocaris `sp. Biologic-HARP021`	26.2	25.7	28.4	28.8	28.7	28.7	28.4	28.7	28.6	28.8	28.8	28.6	30.5	30.7	28.2	28.6	28.6	28.3	31.5	30.2	29.3	29.3	30.3	29.7	30.7	30.9	30.6	30.7	30.7	30.6	30.5	30.5	30.8	30.7	28.9	29.3	30.9	30.6	30.1	35.4	30.6	30.7	30.9	28.3	28.1	27.5	27.2	26.8	27.0	20.4	20.5	21.2	12.2		0.0	16.5	19.8
BMR10689_PV107030_22118_Parastenocaris `sp. Biologic-HARP021`	26.2	25.7	28.4	28.8	28.7	28.7	28.4	28.7	28.6	28.8	28.8	28.6	30.5	30.7	28.2	28.6	28.6	28.3	31.5	30.2	29.3	29.3	30.3	29.7	30.7	30.9	30.6	30.7	30.7	30.6	30.5	30.5	30.8	30.7	28.9	29.3	30.9	30.6	30.1	35.4	30.6	30.7	30.9	28.3	28.1	27.5	27.2	26.8	27.0	20.4	20.5	21.2	12.2	0.0		16.5	19.8
BMR18189_23083_Parastenocaris `sp. Biologic-HARP105`	30.2	31.1	27.9	28.2	28.6	28.0	28.0	28.0	27.9	28.1	28.4	29.1	29.2	29.5	27.8	29.7	29.8	29.7	28.9	29.3	29.5	29.1	29.4	28.9	29.1	29.3	28.6	28.7	28.6	28.3	28.3	28.3	29.2	29.2	30.3	32.4	33.6	31.5	28.2	31.4	29.3	29.5	29.5	31.4	31.9	31.1	30.4	29.6	29.6	20.4	22.3	22.5	15.2	16.5	16.5		20.8
BMR17959_23083_Parastenocaris `sp. Biologic-HARP106`	28.2	29.5	29.4	29.6	29.7	29.4	29.4	29.4	29.6	30.0	30.0	29.4	26.7	26.8	29.1	30.3	30.9	30.3	30.5	29.4	29.6	30.0	27.9	27.6	28.2	28.7	28.0	28.2	28.3	28.3	27.8	27.8	28.3	27.7	28.8	30.7	33.3	30.7	30.1	31.9	28.0	28.0	28.5	29.0	29.5	27.6	28.0	24.8	24.8	20.7	23.7	23.9	20.5	19.8	19.8	20.8	

3.4 Ostracoda

Eighteen sequences formed eight OTUs in two families: Candonidae, and Limnocytheridae (Figure 3.6), all of which were unique to this study. Four of the OTUs, *Gomphodella* `sp. Biologic-OSTR144`, *Gomphodella* `sp. Biologic-OSTR145`, *Leicacandona* `sp. Biologic-OSTR142`, and *Leicacandona* `sp. Biologic-OSTR146`, formed singletons. All singletons were more than 7.9% divergent from all other sequences in the analysis (Table 3.7).

The remaining Limnocytheridae OTU *Gomphodella* `sp. Biologic-OSTR143` had an intraspecific divergence of less than 6.4% and were more than 9.5% divergent from all other sequences in the analysis with a linear range of 1.8 km (Table 3.7).

The remaining three Candonidae OTUs, *Deminutiocandona* `sp. Biologic-OSTR139`, *Deminutiocandona* `sp. Biologic-OSTR141`, and *Leicacandona* `sp. Biologic-OSTR140`, were formed from nine sequences. All three OTUs had intraspecific divergences less than 2.3% and were more than 7.9% divergent from all other sequences in the analysis (Table 3.7). The largest linear range for these OTUs was for *Deminutiocandona* `sp. Biologic-OSTR139`, which was 18.9 km. The remaining OTUs, *Deminutiocandona* `sp. Biologic-OSTR141`, and *Leicacandona* `sp. Biologic-OSTR140` had linear ranges of 2.6 and 1.8 km respectively.

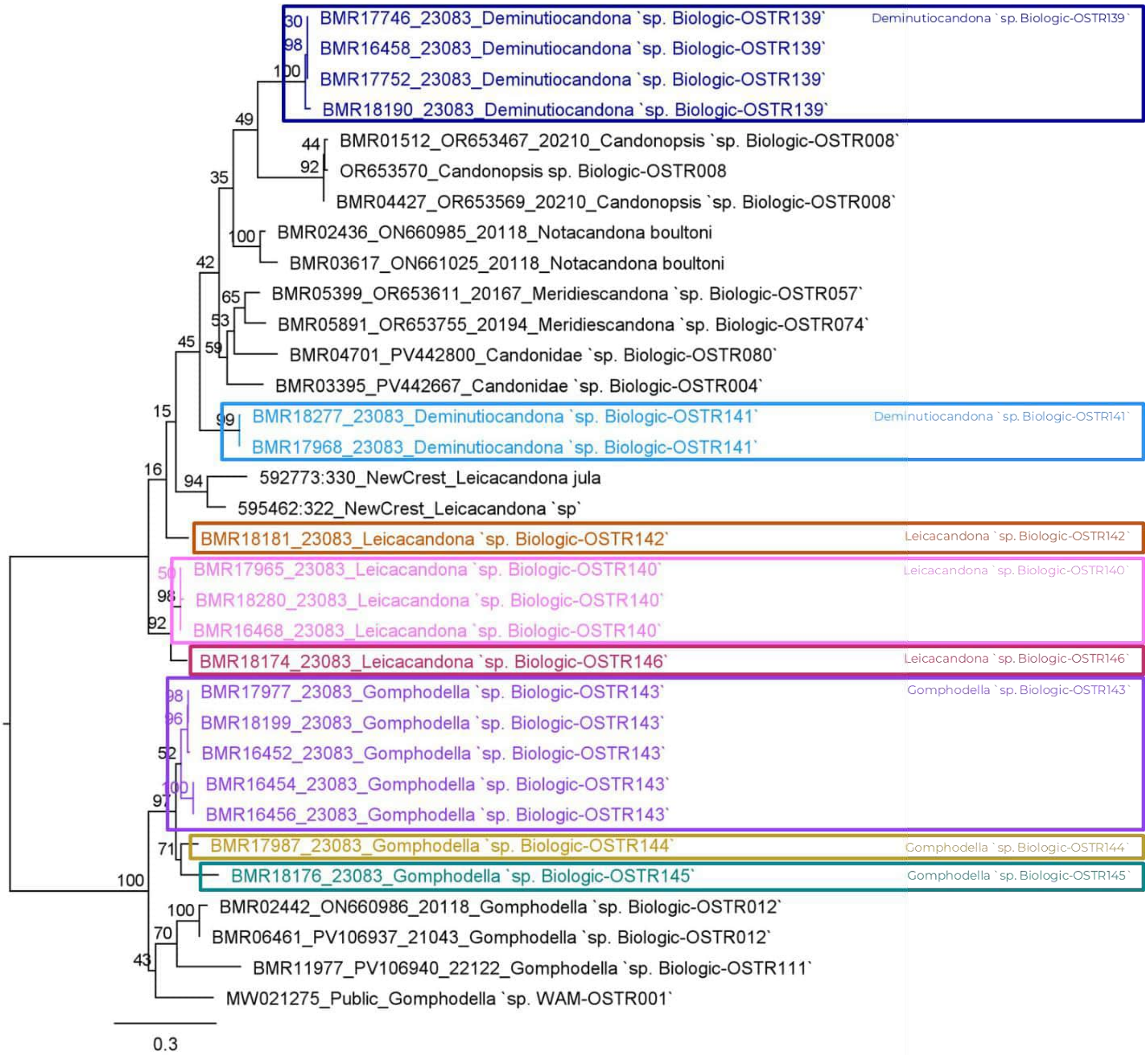

Figure 3.6: Phylogeny for the Ostracoda dataset, with bootstrap values

Table 3.7: Pairwise distances (%) for the Ostracoda dataset

COI Pairwise Distances (%)	592773:330	595462:322	BMR18181	BMR16468	BMR17965	BMR18280	BMR18174	BMR17968	BMR18277	BMR02436	BMR03617	BMR05399	BMR05891	BMR04701	BMR03395	BMR16458	BMR17746	BMR17752	BMR18190	BMR01512	BMR04427	OR653570	MW021275	BMR02442	BMR06461	BMR11977	BMR16452	BMR17977	BMR18199	BMR16454	BMR16456	BMR17987	BMR18176
592773:330_NewCrest_Leicacandona jula		14.4	18.9	19.9	20.1	19.9	20.6	20.4	20.1	21.8	22.2	20.1	22.2	22.7	21.8	22.7	22.7	22.7	24.1	24.9	25.3	25.9	30.3	29.8	29.9	32.1	30.8	30.8	30.8	31.3	31.3	31.9	32.5
595462:322_NewCrest_Leicacandona `sp`	14.4		15.9	19.8	19.9	19.8	19.2	20.8	20.5	20.1	21.1	21.2	22.3	21.2	20.9	23.0	23.0	23.0	22.6	22.2	22.8	23.5	30.6	31.1	30.8	29.8	28.9	28.4	28.4	29.5	29.5	30.4	31.2
BMR18181_23083_Leicacandona `sp. Biologic-OSTR142`	18.9	15.9		16.5	16.6	16.6	18.0	19.1	19.1	19.0	19.2	17.4	21.5	20.9	19.1	21.7	21.7	21.7	21.8	22.1	22.3	22.6	31.2	29.8	30.1	29.9	28.8	28.7	28.7	29.4	29.4	30.2	29.0
BMR16468_23083_Leicacandona `sp. Biologic-OSTR140`	19.9	19.8	16.5		0.2	1.1	7.9	19.9	20.2	22.7	23.4	20.6	21.3	20.7	19.7	21.6	21.6	21.6	22.2	22.8	22.3	23.4	29.1	30.3	31.0	30.0	29.3	29.2	29.2	29.2	29.2	30.4	30.1
BMR17965_23083_Leicacandona `sp. Biologic-OSTR140`	20.1	19.9	16.6	0.2		0.9	8.1	20.1	20.4	22.8	23.6	20.7	21.4	20.9	19.8	21.7	21.7	21.7	22.3	22.8	22.3	23.4	29.3	30.4	31.1	29.8	29.5	29.3	29.3	29.3	29.3	30.2	30.2
BMR18280_23083_Leicacandona `sp. Biologic-OSTR140`	19.9	19.8	16.6	1.1	0.9		8.1	19.9	20.2	23.0	23.7	20.9	21.6	21.3	20.1	22.0	22.0	22.0	22.6	22.8	22.3	23.5	29.3	30.3	31.1	30.0	29.6	29.5	29.5	29.6	29.6	30.2	30.2
BMR18174_23083_Leicacandona `sp. Biologic-OSTR146`	20.6	19.2	18.0	7.9	8.1	8.1		19.2	19.5	23.6	24.0	19.9	20.1	20.2	21.2	22.3	22.3	22.3	21.9	23.4	23.1	24.0	28.8	28.5	28.4	30.0	28.3	28.4	28.4	27.7	27.7	28.9	28.4
BMR17968_23083_Deminutiocandona `sp. Biologic-OSTR141`	20.4	20.8	19.1	19.9	20.1	19.9	19.2		0.3	19.4	18.8	18.6	18.7	19.6	18.9	20.2	20.2	20.2	20.5	20.4	19.5	21.1	31.0	30.6	30.7	30.0	31.9	31.6	31.6	30.9	30.9	31.3	29.6
BMR18277_23083_Deminutiocandona `sp. Biologic-OSTR141`	20.1	20.5	19.1	20.2	20.4	20.2	19.5	0.3		19.7	19.2	18.6	19.0	19.9	18.9	20.5	20.5	20.5	20.8	20.8	19.9	21.5	31.0	30.3	30.4	29.7	31.6	31.3	31.3	30.9	30.9	31.0	29.3
BMR02436_ON660985_20118_Notacandona boultoni	21.8	20.1	19.0	22.7	22.8	23.0	23.6	19.4	19.7		7.2	16.2	15.9	18.8	17.8	18.7	18.7	18.7	18.4	20.5	20.6	20.8	30.6	29.8	29.5	30.7	30.2	29.9	29.9	30.4	30.4	30.6	29.2
BMR03617_ON661025_20118_Notacandona boultoni	22.2	21.1	19.2	23.4	23.6	23.7	24.0	18.8	19.2	7.2		15.7	16.4	18.7	19.1	20.5	20.5	20.5	20.2	20.8	20.3	21.6	31.4	30.8	30.8	32.9	31.0	31.0	31.0	31.2	31.2	31.3	30.4
BMR05399_OR653611_20167_Meridiescandona `sp. Biologic-OSTR057`	20.1	21.2	17.4	20.6	20.7	20.9	19.9	18.6	18.6	16.2	15.7		10.2	16.6	15.2	20.6	20.6	20.6	20.7	20.7	21.0	22.0	30.6	27.4	26.9	30.1	30.9	31.1	31.1	29.7	29.7	30.9	29.4
BMR05891_OR653755_20194_Meridiescandona `sp. Biologic-OSTR074`	22.2	22.3	21.5	21.3	21.4	21.6	20.1	18.7	19.0	15.9	16.4	10.2		16.4	16.0	21.0	21.0	21.0	20.7	19.9	20.5	21.9	30.6	28.0	27.8	30.1	30.6	30.4	30.4	30.2	30.2	31.5	29.8
BMR04701_PV442800_Candonidae `sp. Biologic-OSTR080`	22.7	21.2	20.9	20.7	20.9	21.3	20.2	19.6	19.9	18.8	18.7	16.6	16.4		17.2	21.3	21.3	21.3	21.8	21.8	21.7	22.6	30.2	31.5	31.4	30.8	30.9	30.8	30.8	30.1	30.1	32.6	28.2
BMR03395_PV442667_Candonidae `sp. Biologic-OSTR004`	21.8	20.9	19.1	19.7	19.8	20.1	21.2	18.9	18.9	17.8	19.1	15.2	16.0	17.2		21.7	21.7	21.7	22.3	21.7	21.2	22.7	31.3	31.1	31.0	30.3	30.8	30.5	30.5	31.6	31.6	31.9	30.0
BMR16458_23083_Deminutiocandona `sp. Biologic-OSTR139`	22.7	23.0	21.7	21.6	21.7	22.0	22.3	20.2	20.5	18.7	20.5	20.6	21.0	21.3	21.7		0.0	0.0	2.3	20.2	19.6	20.7	30.0	31.4	31.0	30.4	31.2	30.9	30.9	31.8	31.8	31.9	29.9
BMR17746_23083_Deminutiocandona `sp. Biologic-OSTR139`	22.7	23.0	21.7	21.6	21.7	22.0	22.3	20.2	20.5	18.7	20.5	20.6	21.0	21.3	21.7	0.0		0.0	2.3	20.2	19.6	20.7	30.0	31.4	31.0	30.4	31.2	30.9	30.9	31.8	31.8	31.9	29.9
BMR17752_23083_Deminutiocandona `sp. Biologic-OSTR139`	22.7	23.0	21.7	21.6	21.7	22.0	22.3	20.2	20.5	18.7	20.5	20.6	21.0	21.3	21.7	0.0	0.0		2.3	20.2	19.6	20.7	30.0	31.4	31.0	30.4	31.2	30.9	30.9	31.8	31.8	31.9	29.9
BMR18190_23083_Deminutiocandona `sp. Biologic-OSTR139`	24.1	22.6	21.8	22.2	22.3	22.6	21.9	20.5	20.8	18.4	20.2	20.7	20.7	21.8	22.3	2.3	2.3	2.3		20.0	19.8	20.3	29.9	30.9	30.2	30.2	31.3	31.0	31.0	31.8	31.8	31.5	29.3
BMR01512_OR653467_20210_Candonopsis `sp. Biologic-OSTR008`	24.9	22.2	22.1	22.8	22.8	22.8	23.4	20.4	20.8	20.5	20.8	20.7	19.9	21.8	21.7	20.2	20.2	20.2	20.0		2.2	3.0	26.0	26.4	26.5	26.9	26.7	26.3	26.3	24.6	24.6	27.2	27.0
BMR04427_OR653569_20210_Candonopsis `sp. Biologic-OSTR008`	25.3	22.8	22.3	22.3	22.3	22.3	23.1	19.5	19.9	20.6	20.3	21.0	20.5	21.7	21.2	19.6	19.6	19.6	19.8	2.2		3.1	25.2	26.1	26.2	27.0	25.6	25.3	25.3	24.5	24.5	26.4	27.1
OR653570_Candonopsis sp. Biologic-OSTR008	25.9	23.5	22.6	23.4	23.4	23.5	24.0	21.1	21.5	20.8	21.6	22.0	21.9	22.6	22.7	20.7	20.7	20.7	20.3	3.0	3.1		28.6	28.6	28.9	29.3	28.8	28.4	28.4	27.6	27.6	28.7	29.1
MW021275_Public_Gomphodella `sp. WAM-OSTR001`	30.3	30.6	31.2	29.1	29.3	29.3	28.8	31.0	31.0	30.6	31.4	30.6	30.6	30.2	31.3	30.0	30.0	30.0	29.9	26.0	25.2	28.6		19.5	18.4	22.6	18.6	18.6	18.6	19.7	19.7	21.5	20.6
BMR02442_ON660986_20118_Gomphodella `sp. Biologic-OSTR012`	29.8	31.1	29.8	30.3	30.4	30.3	28.5	30.6	30.3	29.8	30.8	27.4	28.0	31.5	31.1	31.4	31.4	31.4	30.9	26.4	26.1	28.6	19.5		2.7	17.8	17.2	17.2	17.2	18.4	18.4	17.7	20.1
BMR06461_PV106937_21043_Gomphodella `sp. Biologic-OSTR012`	29.9	30.8	30.1	31.0	31.1	31.1	28.4	30.7	30.4	29.5	30.8	26.9	27.8	31.4	31.0	31.0	31.0	31.0	30.2	26.5	26.2	28.9	18.4	2.7		18.2	17.7	17.7	17.7	18.2	18.2	17.0	19.4
BMR11977_PV106940_22122_Gomphodella `sp. Biologic-OSTR111`	32.1	29.8	29.9	30.0	29.8	30.0	30.0	30.0	29.7	30.7	32.9	30.1	30.1	30.8	30.3	30.4	30.4	30.4	30.2	26.9	27.0	29.3	22.6	17.8	18.2		19.9	20.1	20.1	21.2	21.2	21.3	22.8
BMR16452_23083_Gomphodella `sp. Biologic-OSTR143`	30.8	28.9	28.8	29.3	29.5	29.6	28.3	31.9	31.6	30.2	31.0	30.9	30.6	30.9	30.8	31.2	31.2	31.2	31.3	26.7	25.6	28.8	18.6	17.2	17.7	19.9		0.6	0.6	6.4	6.4	9.9	13.5
BMR17977_23083_Gomphodella `sp. Biologic-OSTR143`	30.8	28.4	28.7	29.2	29.3	29.5	28.4	31.6	31.3	29.9	31.0	31.1	30.4	30.8	30.5	30.9	30.9	30.9	31.0	26.3	25.3	28.4	18.6	17.2	17.7	20.1	0.6		0.0	6.1	6.1	9.6	13.7
BMR18199_23083_Gomphodella `sp. Biologic-OSTR143`	30.8	28.4	28.7	29.2	29.3	29.5	28.4	31.6	31.3	29.9	31.0	31.1	30.4	30.8	30.5	30.9	30.9	30.9	31.0	26.3	25.3	28.4	18.6	17.2	17.7	20.1	0.6	0.0		6.1	6.1	9.6	13.7
BMR16454_23083_Gomphodella `sp. Biologic-OSTR143`	31.3	29.5	29.4	29.2	29.3	29.6	27.7	30.9	30.9	30.4	31.2	29.7	30.2	30.1	31.6	31.8	31.8	31.8	31.8	24.6	24.5	27.6	19.7	18.4	18.2	21.2	6.4	6.1	6.1		0.0	11.1	14.0
BMR16456_23083_Gomphodella `sp. Biologic-OSTR143`	31.3	29.5	29.4	29.2	29.3	29.6	27.7	30.9	30.9	30.4	31.2	29.7	30.2	30.1	31.6	31.8	31.8	31.8	31.8	24.6	24.5	27.6	19.7	18.4	18.2	21.2	6.4	6.1	6.1	0.0		11.1	14.0
BMR17987_23083_Gomphodella `sp. Biologic-OSTR144`	31.9	30.4	30.2	30.4	30.2	30.2	28.9	31.3	31.0	30.6	31.3	30.9	31.5	32.6	31.9	31.9	31.9	31.9	31.5	27.2	26.4	28.7	21.5	17.7	17.0	21.3	9.9	9.6	9.6	11.1	11.1		13.4
BMR18176_23083_Gomphodella `sp. Biologic-OSTR145`	32.5	31.2	29.0	30.1	30.2	30.2	28.4	29.6	29.3	29.2	30.4	29.4	29.8	28.2	30.0	29.9	29.9	29.9	29.3	27.0	27.1	29.1	20.6	20.1	19.4	22.8	13.5	13.7	13.7	14.0	14.0	13.4	

4 Summary

Using well-established DNA extraction and sequencing methods, this molecular systematics analysis designated 45 distinct OTU/species to 83 high quality sequences from the Study Area. All OTUs, the areas in which they were found, and the specimen numbers per OTU are shown in Appendix A. The following are the key findings at the OTU/species level:

- Clitellata (COI): 7 OTUs, 4 unique lineages, 3 matching with external sequences,
- Amphipoda (COI): 8 OTUs, 7 unique lineages, 1 matching with external sequences,
- Bathynellacea (COI): 6 OTUs, all unique lineages,
- Isopoda (COI): 7 OTUs, all unique lineages,
- Maxillopoda (COI): 11 OTUs, 9 unique lineages, 2 matching with external sequences,
- Ostracoda (COI): 8 OTUs, 8 unique lineages

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Appendix A: Specimen Data

BMR	Unique ID code	Site	Latitude	Longitude	Morphological ID	OTU Name	Pass/Fail
Clitellata							
Enchytraeida: Enchytraeidae							
BMR17742	37138	CRD0010	-21.46500241	119.6676082	Enchytraeidae `sp. indet.`	Enchytraeidae `sp. Biologic-OLIG045`	PASS
BMR17738	33528	CRD0158	-21.46022196	119.637303	Enchytraeidae `sp. indet.`	Enchytraeidae `sp. Biologic-OLIG183`	PASS
BMR17744	32077	CRD0027	-21.3741487	119.69074	Enchytraeidae `sp. indet.`	Enchytraeidae `sp. E12 LB-2015`	PASS
Haplotaxida: Naididae							
BMR16443	31488	CRD0139	-21.43942535	119.6990289	Phreodrilidae `sp. indet.`	Naididae `sp. N4 LB-2015`	PASS
Haplotaxida: Phreodrilidae							
BMR17740	32319	CRD0016	-21.45920358	119.6360733	Phreodrilidae `sp. 1 bifid-1 single-pointed`	Phreodrilidae `sp. Biologic-OLIG184`	PASS
BMR17953	31978	CRD0090	-21.45313751	119.6660073	Phreodrilidae `sp. 1 bifid-1 single-pointed`	Phreodrilidae `sp. Biologic-OLIG185`	PASS
BMR17955	33508	CRD0064	-21.30171943	119.706693	Phreodrilidae `sp. 2 bifid`	Phreodrilidae `sp. Biologic-OLIG184`	PASS
BMR17751	31945	CRD0090	-21.45313751	119.6660073	Phreodrilidae `sp. 2 bifid`	Phreodrilidae `sp. Biologic-OLIG185`	PASS
BMR17957	33503	CRD0112	-21.38005385	119.6856536	Phreodrilidae `sp. 2 bifid`	Phreodrilidae `sp. Biologic-OLIG186`	PASS
BMR16445	37157	CRD0139	-21.43942535	119.6990289	Phreodrilidae `sp. indet.`	Phreodrilidae `sp. Biologic-OLIG186`	PASS
BMR16447	36765	CRD0072	-21.29815754	119.720516	Phreodrilidae `sp. indet.`	Phreodrilidae `sp. Biologic-OLIG184`	PASS
BMR16449	36535	CRD0090	-21.45313751	119.6660073	Phreodrilidae `sp. indet.`	Phreodrilidae `sp. Biologic-OLIG185`	PASS
BMR16459	35433	CRD0007	-21.45305826	119.6660146	Phreodrilidae `sp. indet.`	Phreodrilidae `sp. Biologic-OLIG185`	PASS
BMR16461	35330	CRD0007	-21.45305826	119.6660146	Phreodrilidae `sp. indet.`	Phreodrilidae `sp. Biologic-OLIG185`	PASS
BMR16463	35443	CRD0090	-21.45313751	119.6660073	Phreodrilidae `sp. indet.`	Phreodrilidae `sp. Biologic-OLIG185`	PASS
BMR16465	35340	CRD0007	-21.45305826	119.6660146	Phreodrilidae `sp. indet.`	Phreodrilidae `sp. Biologic-OLIG185`	PASS
Malacostraca							
Amphipoda: Bogidiellidae							
BMR18279	28422	CRD0112	-21.38005385	119.6856536	Bogidiellidae `sp. indet.`	Bogidiellidae `sp. Biologic-AMPH112`	PASS
BMR17966	37094	CRD0058	-21.28038751	119.721959	Bogidiellidae `sp. indet.`	Bogidiellidae `sp. Biologic-AMPH113`	PASS
BMR18182	37419	CRD0086	-21.28044342	119.7220056	Bogidiellidae `sp. indet.`	Bogidiellidae `sp. Biologic-AMPH113`	PASS

BMR18273	28582	CRD0108	-21.30039334	119.7079855	Bogidiellidae `sp. indet.`	Bogidiellidae `sp. Biologic-AMPH113`	PASS
Amphipoda: Eriopisidae							
BMR16476	37258	CRD0073	-21.39796396	119.6970093	Eriopisidae `sp. indet.`	*Pilbarana* `sp. Biologic-AMPH115`	PASS
BMR17739	31990	CRD0016	-21.45920358	119.6360733	*Pilbarana* `sp. indet.`	*Pilbarana* `sp. Biologic-AMPH114`	PASS
BMR18195	30047	CRD0016	-21.45920358	119.6360733	*Pilbarana* `sp. indet.`	*Pilbarana* `sp. Biologic-AMPH114`	PASS
BMR18175	31465	CRD0073	-21.39796396	119.6970093	*Pilbarana* `sp. indet.`	*Pilbarana* `sp. Biologic-AMPH115`	PASS
BMR18200	31429	CRD0064	-21.30171943	119.706693	*Pilbarana* `sp. indet.`	*Pilbarana* `sp. Biologic-AMPH115`	PASS
Amphipoda: Paramelitidae							
BMR17961	37422	CRD0039	-21.20864837	119.7192427	Paramelitidae `sp. indet.`	Paramelitidae `sp. Biologic-AMPH108`	PASS
BMR18173	33430	CRD0072	-21.29815754	119.720516	Paramelitidae `sp. indet.`	Paramelitidae `sp. Biologic-AMPH109`	PASS
BMR18275	33779	CRD0108	-21.30039334	119.7079855	Paramelitidae `sp. indet.`	Paramelitidae `sp. Biologic-AMPH110`	PASS
BMR17747	33549	CRD0034	-21.36956732	119.6983596	Paramelitidae `sp. indet.`	Paramelitidae `sp. Biologic-AMPH111`	PASS
BMR18177	33802	CRD0073	-21.39796396	119.6970093	Paramelitidae `sp. indet.`	Paramelitidae `sp. Biologic-AMPH111`	PASS
BMR18187	37114	CRD0103	-21.4076039	119.687077	Paramelitidae `sp. indet.`	Paramelitidae `sp. Biologic-AMPH111`	PASS
BMR18201	31786	CRD0064	-21.30171943	119.706693	Paramelitidae `sp. indet.`	Paramelitidae `sp. Biologic-AMPH111`	PASS
BMR16473	35076	CRD0139	-21.43942535	119.6990289	Paramelitidae `sp. indet.`	Paramelitidae `sp. Biologic-AMPH110`	PASS
Bathynellacea: Bathynellidae							
BMR10762	20428	CRD0007	-21.45305826	119.6660146	Bathynellidae `sp. indet. diff.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR10763	20429	CRD0007	-21.45305826	119.6660146	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR10767	20432	CRD0090	-21.45313751	119.6660073	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR10768	20433	CRD0090	-21.45313751	119.6660073	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR10773	20440	CRD0007	-21.45305826	119.6660146	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR10775	37297	CRD0074	-21.46627042	119.6656085	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR10776	20443	CRD0090	-21.45313751	119.6660073	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR18194	37342	CRD0120	-21.4524051	119.6665154	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR10774	20442	CRD0090	-21.45313751	119.6660073	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS
BMR16664	35007	CRD0007	-21.45305826	119.6660146	Bathynellidae `sp. indet.`	Bathynellidae `sp. Biologic-BATH038`	PASS

Bathynellacea: Parabathynellidae							
BMR10764	20427	CRD0007	-21.45305826	119.6660146	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT081`	PASS
BMR10777	20445	CRD0090	-21.45313751	119.6660073	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT081`	PASS
BMR10765	20430	CRD0016	-21.45920358	119.6360733	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT082`	PASS
BMR10771	20438	CRD0016	-21.45920358	119.6360733	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT082`	PASS
BMR10770	20437	CRD0108	-21.30039334	119.7079855	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT083`	PASS
BMR10772	20439	CRD0108	-21.30039334	119.7079855	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT083`	PASS
BMR10766	20431	CRD0112	-21.38005385	119.6856536	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT084`	PASS
BMR10778	20446	CRD0112	-21.38005385	119.6856536	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT084`	PASS
BMR16475	35013	CRD0108	-21.30039334	119.7079855	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT083`	PASS
BMR16477	35104	CRD0112	-21.38005385	119.6856536	*Atopobathynella* `sp. indet.`	*Atopobathynella* `sp. Biologic-PBAT084`	PASS
BMR10769	37089	CRD0058	-21.28038751	119.721959	nr. *Billibathynella* `sp. indet.`	Parabathynellidae `sp. Biologic-PBAT085`	PASS
Isopoda: Microcerberidae							
BMR17741	33713	CRD0016	-21.45920358	119.6360733	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP208`	PASS
BMR18193	33904	CRD0039	-21.20864837	119.7192427	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP209`	PASS
BMR18197	33626	CRD0073	-21.39796396	119.6970093	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP209`	PASS
BMR17749	33472	CRD0034	-21.36956732	119.6983596	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP210`	PASS
BMR17970	33599	CRD0058	-21.28038751	119.721959	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP211`	PASS
BMR17974	32275	CRD0139	-21.43942535	119.6990289	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP211`	PASS
BMR18184	33766	CRD0086	-21.28044342	119.7220056	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP211`	PASS
BMR18186	33499	CRD0087	-21.2684484	119.7164567	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP211`	PASS
BMR18276	37449	CRD0108	-21.30039334	119.7079855	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP211`	PASS
BMR17976	33872	CRD0112	-21.38005385	119.6856536	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP212`	PASS
BMR16437	36536	CRD0005	-21.47060065	119.6630292	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP221`	PASS
BMR16439	36589	CRD0108	-21.30039334	119.7079855	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP211`	PASS
BMR16441	36588	CRD0034	-21.36956732	119.6983596	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP210`	PASS
BMR16451	35402	CRD0108	-21.30039334	119.7079855	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP209`	PASS

BMR16453	35409	CRD0034	-21.36956732	119.6983596	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP211`	PASS
BMR16455	35392	CRD0016	-21.45920358	119.6360733	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP208`	PASS
BMR16457	35374	CRD0016	-21.45920358	119.6360733	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP208`	PASS
BMR16467	34950	CRD0073	-21.39796396	119.6970093	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP209`	PASS
BMR16469	35127	CRD0005	-21.47060065	119.6630292	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP221`	PASS
BMR16471	35038	CRD0005	-21.47060065	119.6630292	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP221`	PASS
BMR16474	31484	CRD0073	-21.39796396	119.6970093	Microcerberidae `sp. indet.`	Microcerberidae `sp. Biologic-ISOP211`	PASS
BMR18188	37463	CRD0103	-21.4076039	119.687077	*Pygolabis* `sp. indet.`	*Pygolabis* `sp. Biologic-ISOP213`	PASS
Maxillopoda							
Calanoida: Ridgewayiidae							
BMR18286	37105	CRD0108	-21.30039334	119.7079855	*Stygoridgewayia* `sp. indet.`	*Stygoridgewayia* `sp. Biologic-CALA011`	PASS
Cyclopoida: Cyclopidae							
BMR17743	32346	CRD0016	-21.45920358	119.6360733	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL104`	PASS
BMR17956	33846	CRD0016	-21.45920358	119.6360733	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL104`	PASS
BMR17967	33517	CRD0039	-21.20864837	119.7192427	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR17986	33618	CRD0139	-21.43942535	119.6990289	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR18178	32216	CRD0073	-21.39796396	119.6970093	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR18185	37432	CRD0103	-21.4076039	119.687077	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR16444	36613	CRD0108	-21.30039334	119.7079855	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR16448	36628	CRD0103	-21.4076039	119.687077	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR16450	37443	CRD0139	-21.43942535	119.6990289	*Diacyclops* `sp. indet.`	*Thermocyclops* `sp. Biologic-CYCL106`	PASS
BMR16460	35436	CRD0073	-21.39796396	119.6970093	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR16462	29762	CRD0048	-21.39571272	119.6992619	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR16464	35378	CRD0112	-21.38005385	119.6856536	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR16466	35390	CRD0073	-21.39796396	119.6970093	*Diacyclops* `sp. indet.`	*Diacyclops* `sp. Biologic-CYCL105`	PASS
BMR17969	37063	CRD0039	-21.20864837	119.7192427	*Pescecyclops* `sp. indet.`	*Pescecyclops* `sp. Biologic-CYCL107`	PASS
BMR18180	33627	CRD0073	-21.39796396	119.6970093	*Pescecyclops* `sp. indet.`	*Pescecyclops* `sp. WAM-CYLP001`	PASS

BMR16446	36742	CRD0073	-21.39796396	119.6970093	*Pescecyclops* `sp. indet.`	*Pescecyclops* `sp. WAM-CYLP001`	PASS
BMR17960	32096	CRD0027	-21.3741487	119.69074	*Thermocyclops* `sp. indet.`	*Thermocyclops* `sp. Biologic-CYCL014`	PASS
BMR17975	28429	CRD0085	-21.30179065	119.7066507	*Thermocyclops* `sp. indet.`	*Thermocyclops* `sp. Biologic-CYCL106`	PASS
BMR18274	31368	CRD0108	-21.30039334	119.7079855	*Thermocyclops* `sp. indet.`	*Thermocyclops* `sp. Biologic-CYCL106`	PASS
Harpacticoida: Canthocamptidae							
BMR17750	32149	CRD0034	-21.36956732	119.6983596	*Elaphoidella* `sp. indet.`	*Elaphoidella* `sp. Biologic-HARP103`	PASS
BMR17985	32472	CRD0139	-21.43942535	119.6990289	*Elaphoidella* `sp. indet.`	*Elaphoidella* `sp. Biologic-HARP103`	PASS
BMR18179	31858	CRD0073	-21.39796396	119.6970093	*Elaphoidella* `sp. indet.`	*Elaphoidella* `sp. Biologic-HARP103`	PASS
BMR18281	37446	CRD0112	-21.38005385	119.6856536	*Elaphoidella* `sp. indet.`	*Elaphoidella* `sp. Biologic-HARP103`	PASS
Harpacticoida: Parastenocarididae							
BMR18189	32841	CRD0103	-21.4076039	119.687077	Parastenocarididae `sp. indet.`	*Parastenocaris* `sp. Biologic-HARP105`	PASS
BMR16663	20425	CRD0064	-21.30171943	119.706693	Parastenocarididae `sp. indet.`	*Parastenocaris* `sp. Biologic-HARP104`	PASS
BMR18196	32098	CRD0064	-21.30171943	119.706693	*Parastenocaris* `sp. indet.`	*Parastenocaris* `sp. Biologic-HARP104`	PASS
BMR17959	32176	CRD0023	-21.44436422	119.6746365	*Parastenocaris* `sp. indet.`	*Parastenocaris* `sp. Biologic-HARP106`	PASS
Ostracoda							
Podocopida: Candonidae							
BMR17746	33762	CRD0016	-21.45920358	119.6360733	*Deminutiocandona* `sp. indet.`	*Deminutiocandona* `sp. Biologic-OSTR139`	PASS
BMR17752	33899	CRD0016	-21.45920358	119.6360733	*Deminutiocandona* `sp. indet.`	*Deminutiocandona* `sp. Biologic-OSTR139`	PASS
BMR18190	33842	CRD0064	-21.30171943	119.706693	*Deminutiocandona* `sp. indet.`	*Deminutiocandona* `sp. Biologic-OSTR139`	PASS
BMR17968	32202	CRD0058	-21.28038751	119.721959	*Deminutiocandona* `sp. indet.`	*Deminutiocandona* `sp. Biologic-OSTR141`	PASS
BMR18277	37396	CRD0108	-21.30039334	119.7079855	*Deminutiocandona* `sp. indet.`	*Deminutiocandona* `sp. Biologic-OSTR141`	PASS
BMR17965	32180	CRD0034	-21.36956732	119.6983596	*Deminutiocandona* `sp. indet.`	*Leicacandona* `sp. Biologic-OSTR140`	PASS
BMR16458	32538	CRD0004	-21.45979468	119.6372147	*Deminutiocandona* `sp. indet.`	*Deminutiocandona* `sp. Biologic-OSTR139`	PASS
BMR16468	35103	CRD0034	-21.36956732	119.6983596	*Deminutiocandona* `sp. indet.`	*Leicacandona* `sp. Biologic-OSTR140`	PASS
BMR18280	37096	CRD0112	-21.38005385	119.6856536	*Leicacandona* `sp. indet.`	*Leicacandona* `sp. Biologic-OSTR140`	PASS
BMR18181	33648	CRD0073	-21.39796396	119.6970093	*Leicacandona* `sp. indet.`	*Leicacandona* `sp. Biologic-OSTR142`	PASS
BMR18174	32213	CRD0072	-21.29815754	119.720516	*Leicacandona* `sp. indet.`	*Leicacandona* `sp. Biologic-OSTR146`	PASS

Podocopida: Limnocytheridae							
BMR17977	33791	CRD0103	-21.4076039	119.687077	*Gomphodella* `sp. indet.`	*Gomphodella* `sp. Biologic-OSTR143`	PASS
BMR18199	37062	CRD0048	-21.39571272	119.6992619	*Gomphodella* `sp. indet.`	*Gomphodella* `sp. Biologic-OSTR143`	PASS
BMR17987	33898	CRD0139	-21.43942535	119.6990289	*Gomphodella* `sp. indet.`	*Gomphodella* `sp. Biologic-OSTR144`	PASS
BMR18176	33477	CRD0072	-21.29815754	119.720516	*Gomphodella* `sp. indet.`	*Gomphodella* `sp. Biologic-OSTR145`	PASS
BMR16452	35391	CRD0103	-21.4076039	119.687077	*Gomphodella* `sp. indet.`	*Gomphodella* `sp. Biologic-OSTR143`	PASS
BMR16454	35401	CRD0073	-21.39796396	119.6970093	*Gomphodella* `sp. indet.`	*Gomphodella* `sp. Biologic-OSTR143`	PASS
BMR16456	35365	CRD0073	-21.39796396	119.6970093	*Gomphodella* `sp. indet.`	*Gomphodella* `sp. Biologic-OSTR143`	PASS