Illuminating Biodiversity of the Ningaloo Canyons FK200308 Final Report

Submitted by:

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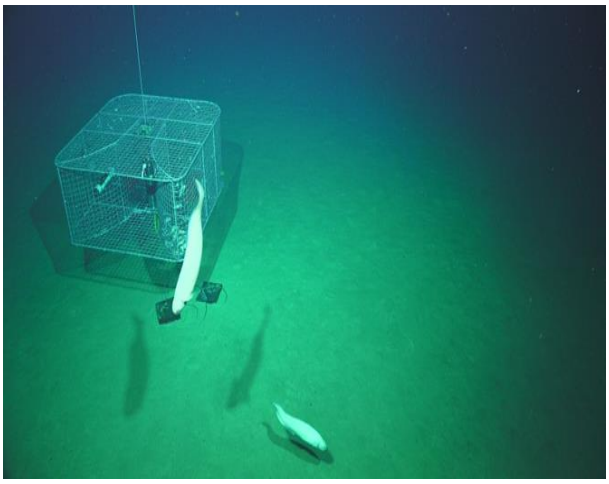

Figure 1. Fish traps deployed during Ningaloo Canyons cruise. Photo SOI.

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2 Project Overview

2.1 Project Description

The Ningaloo Canyons expedition, which took place from 8th March – 8th April 2020, sought to document biodiversity in two deep-sea canyons in the Gascoyne Marine Park off Ningaloo, Western Australian. The methods used to achieve these goals were diverse and included sampling targeted deep-sea specimens directly using ROV *SuBastian* and traps and indirectly through the use of eDNA, as well as deploying autonomous reef monitoring structures or ARMS for long-term collecting opportunities. New mapping to better understand habitat of deep-sea marine life in the area was achieved via multibeam and sediment collections. All specimen samples (1018) across taxon groups were fully digitized onboard the vessel. Lastly, imagery (still and video) was collected to further document the marine life in the canyons. Twenty ROV dives were undertaken across 16 stations (12 in Cape Range and 4 in Cloates) with the deepest dive being to 4,439 m. Twenty-two science staff (11 onboard) from eight institutions were involved to achieve the wide diversity of project objectives.

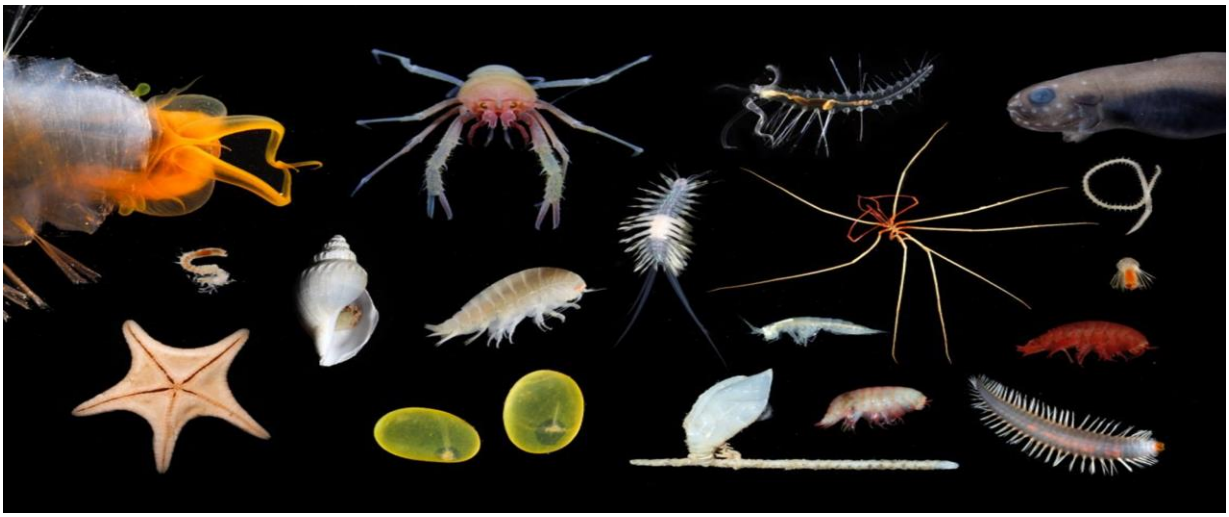


Figure 2. Plate assembled by Alex Ingle based on photos taken by Nerida Wilson, Greg Rouse, Glenn Moore & Andrew Hosie.

2.2 Authorizations/Permits

A permit to conduct research in the Gascoyne Marine Park was obtained from the relevant authorities.

Table 1. Permit required for this expedition.

Permit name	Permit no. and Permittee	Permitted Activity	Park and Permit Area	Duration
Australian Marine Park Activity Permit	PA2019-00114-1: Diana Jones, Executive Director, Collections and Research WA Museum	Scientific Research – ROV sampling to characterise deep sea benthos, seabed mapping and environmental DNA collection for sections 354354A of the Environment Protection and Biodiversity Conservation Act 1999 and regulation/s 12.10 of the Environment Protection and Biodiversity Conservation Regulations 2000.	Gascoyne Marine Park; Gascoyne Marine Park: National Park Zone 1 Habitat Protection Zone 2 Multiple Use Zone 3 as specified in the North-west Marine Parks Network Management Plan 2018 for the Gascoyne Marine Park available at the Federal Register of Legislation.	8 March 2020-8 April 2020

The full copy of this permit can be found in Appendix B in Post, A., Przeslawski, R., Huang, Z., Smith, D., Kirkendale, L. and N. Wilson. (2020). Gascoyne Marine Park - Post Survey Report, RV Falkor, FK200308.

2.3 Proposed Objectives

The aims of the expedition were to 1. Sample targeted deep-sea specimens using ROV *SuBastian* and baited traps, 2. Undertake water collections for environmental DNA, 3. Deploy autonomous reef monitoring structures, 4. Map habitat via multibeam and sediment collections 5. Obtain underwater imagery to further document the marine life in the Cape Range and Cloates Canyons and 6. Share the expedition with the world through live narration of deep-sea dives.

3 Expedition Accomplishments

In total, over 1000 specimens were captured and curated during the expedition and these samples have been registered into the Western Australian (WA) Museum databases. This includes data on locality, imagery (both in situ and in vivo) and preservation, including tissue subsampling for genetic analysis. Highlights of these collections include the deepest fish records for Western Australia (4,470m), the first giant hydroids collected in Australia, significant communities of glass sponges discovered in Cape Range Canyon and a siphonophore that is putatively regarded as the longest animal in the world. This latter discovery led to intense media interest, but the final measurements still need to be completed. Along with new distribution and depth records of known species, this research also led to the discovery of up to 30 new species of marine animals. The deployment of 5 ARMS in Cape Range Canyon at 5 sites was noteworthy because it is the first time ARMS have been deployed at abyssal depths. They will yield future quantifiable biodiversity returns when they are retrieved, and extend our research through sampling of small, cryptic fauna not captured by other means. To screen water for eDNA and to extend the reach of the biodiversity sampling undertaken by traditional methods,10 CTDs were completed with filtration of 2070 litres of water. Additionally, 20 sediment push cores were collected enabling grain size and some infauna to be investigated. Twelve

video transects were completed in Cape Range Canyon, which will serve as an important trial for habitat mapping and monitoring in marine parks in Australia. Completion of 11,318 km^2 of multibeam bathymetry occurred, providing new data for Gascoyne Marine Park understanding and management. Enabling student experiences and training was another goal of the expedition and 3 PhD and 1 high school student were able to participate and contribute to the success of the expedition. The inclusion of an indigenous high school student (Follow the Dream) from a nearby regional community (Geraldton) was significant as a high school student has not participated on a R/V Falkor cruise before.

The onset of the global coronavirus pandemic set off unusual challenges to planning and carrying out the expedition. Many planned outreach activities (ship tours, school ship-to-shores) were cancelled or modified, and there were high levels of uncertainty around the continuity of personnel (both ship and science party). However, the high level of professionalism displayed by all personnel resulted in an almost normal continuation of science objectives and activities, despite a slightly diminished number of personnel onboard for leg 2 (including loss of science communication officer). Post-cruise work in general was significantly hampered by the Covid-19 global pandemic, which began to impact from March 2020, with lockdowns in Australia often restricting access to samples and laboratories. Border closures and consequent flight disruptions also made the freight of sensitive samples challenging. Significant media followed the completion of the cruise (please see below for detailed tally of these interactions).

Figure 3. Participants showcasing appropriate spacing onboard FK200308. Photo SOI.

Further, the expedition won the Chevron Science Engagement Initiative of the Year category at the Western Australian Premier's Science Awards in 2020, and findings of the expedition are a permanent fixture of the Leeuwin Journey exhibit at Boola Bardip in the Wildlife Gallery (WA Museum Exhibition Space).

3.1 Cruise Participation

R/V *Falkor* departed Fremantle Port on 08 March 2020 and docked at Port Broome at the end of the mission on 08 April 2020. The following scientific personnel from Australian and American institutions participated in this research cruise either for a single leg (with departure via small craft at Exmouth, WA) or the full period (with departure at Broome, WA).

Onboard science crew including additional participants-

Dr. Nerida Wilson (Chief Scientist, Western Australian Museum)
Dr. Lisa Kirkendale (Principal Investigator, Western Australian Museum)
Dr. Glenn Moore (co-Principal Investigator, Western Australian Museum)
Dr. Andrew Hosie (co-Principal Investigator, Western Australian Museum)
Dr. Rachel Przeslawski (co-Principal Investigator, Geoscience Australia)
Dr. Greg Rouse (Scripps Institution of Oceanography)
Ms. Jenelle Ritchie (Western Australian Museum)
Mr. David Juskiewicz (Curtin University)
Dr. Georgia Nester (Curtin University)
Mr. Liam Cook (Geraldton Senior High School)
Ms. Kaycee Handley (Macquarie University)

Figure 4. Dr. Andrew Hosie photographing a squat lobster. Photo SOI.

Non-survey participants (due to Covid-19 constraints)

Dr. Zoe Richards (co-Principal Investigator, Curtin University)
Dr. Michael Bunce (co-Principal Investigator, Curtin University)
Dr. Mark Allen (Western Australian Museum)
Mr. Oliver Gomez (Western Australian Museum)
Ms. Michelle Childs (Geraldton Senior High School)
Ms. Ana Hara (Western Australian Museum)
Dr. Peter Kohnert (Bavarian State Collection of Zoology)
Dr. Alix Post (Geoscience Australia)
Dr. Mandy Reid (Australian Museum)
Ms. Shanae Tesling (Geraldton Senior High School)
Mr. Corey Whisson (Western Australian Museum)

SOI crew and additional participants

SOI engaged Captain Peter Reynolds and the R/V *Falkor* crew, as well as ROV *SuBastian* pilots Russell Coffield, Kris Ingram, Cody Peyres and Jason Rodriguez. Alex Ingle was our multimedia correspondent and was present for the first half of the cruise.

3.2 Geographic setting

The 'West' geographic region has the largest area of blind submarine canyons in Australia (Huang et al. 2014). No less than 46 canyons incise the Cuvier margin, and the largest of these is Cape Range Canyon, with a length of 140 km and maximum incision depth of 1,300 m (Daniell et al 2010). Its headwall is in 1,500 m and lower reaches terminate near the foot of the slope in 4,600 m.

During geological characterization (Geosciences Australia, R/V *Sonne* 2008-09), samples from the Cape Range Canyon yielded a variety of rock types (Daniell et al. 2010). This indicated a variety of hard substrate habitats were present in the canyon, expected to house a diversity of macro-organisms.

Additionally, the submarine canyons adjacent to the Ningaloo region sit along the narrowest part of Australia's continental shelf and the canyons that extend toward the abyss are recognised as a Key Ecological Feature by the federal government.

The submarine Cape Range Canyon has its upper reaches in a multiple use zone of the Gascoyne Marine Park, of which only 44% is mapped; very little is known about biodiversity in its deep-water habitats (Daniell et al. 2010). However, its lower reaches are close to a proposed mining lease, in a habitat protection zone, which prohibits mining. Understanding what biodiversity occurs in these zones is paramount to activating effective management processes.

Outlined below are the benthic diversity outcomes from major sampling events at 12 stations in Cape Range Canyon, with the deepest overall dive to 4,439 m.

3.3 Onboard operations for specimen capture

3.3.1 Cape Range Canyon ROV

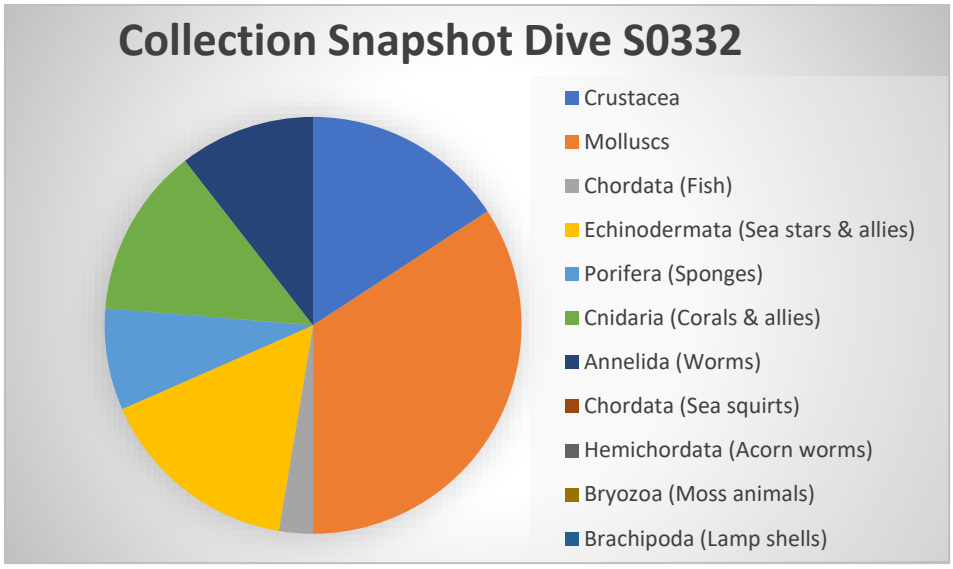
3.3.1.1 *Dive S0332 CR1: 3/11/2020*

ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at 2,022.42 m. ROV *SuBastian* deployed four push cores. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 2, Figure 5 below). Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses at 1,745.35 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending from 1,692.34 m to the surface. Overall, 38 specimens representing 12 orders/classes and seven phyla were selectively sampled from across the tree of life by ROV *SuBastian* during the dive.

Table 2. Biological samples from Dive S0332 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75559	Arthropoda	Lepadiformes	Poecilasmatidae	*Glyptelasma* cf. *rectum*	1	Stalked barnacle	1766
C75560	Arthropoda	Decapoda	Munidae	*Munida* cf. *manqingae*	1	Squat lobster	1776
C75561	Arthropoda	Decapoda	Munidae	*Munida* cf. *manqingae*	1	Squat lobster	1767
C75562	Arthropoda	Decapoda	Hippolytidae	*Lebbeus* sp. 1	1	Shrimp	1767
C75563	Arthropoda	Decapoda	Nematocarcinidae	*Nematocarcinus* cf. *tenuipes*	1	Shrimp	1767
C75564	Arthropoda	Decapoda	Homolidae	*Lamoha* cf. *longirostris*	1	Carrier crab	1761
Z100601	Echinodermata	Crinoidea			1	Feather star	1767
Z100602	Porifera	Hexactinellida			1	Glass sponge	1767
Z100603	Cnidaria	Anthozoa	Homanthiidae	*Paraphelliactis*	1	Sea anemone	1772
Z100604	Porifera	Hexactinellida	Ferreidae		1	Glass sponge	1772
Z100605	Echinodermata	Holothuroidea	Synallactidae	cf. *Bathyplotes*	1	Sea cucumber	1763
Z100606	Cnidaria	Anthozoa			1	Sea Anemone	1761
Z100607	Cnidaria	Anthozoa	Caryophylliidae	*Desmophyllum*	1	Hard coral	1738
Z100608	Cnidaria	Anthozoa	Cerianthidae	*Cerianthus*	1	Tube anemone	1822
Z100609	Echinodermata	Ophiuroidea			2	Brittle star	1762
Z100610	Echinodermata	Asteroidea	Pterasteridae	*Hymenaster* sp.	1	Sea star	1766
Z100611	Porifera	Hexactinellida	Farreidae		1	Glass sponge	1767
Z100612	Cnidaria	Anthozoa	Cerianthidae	*Cerianthus*	1	Tube anemone	1767
Z100613	Echinodermata	Asteroidea	Brisingidae	*Freyastera* sp.	1	Sea star	1731
S112000	Mollusca	Gastropoda	cf. Trochidae		2	Snail	1766
S112001	Mollusca	Gastropoda	Epitoniidae	*Amaea* sp.	1	Wentletrap snail	1822
S112002	Mollusca	Bivalvia	Propeamussidae		1	Glass scallop	1822
S112003	Mollusca	Bivalvia	Propeamussidae		1	Glass scallop	1822
S112004	Mollusca	Gastropoda	Trochidae	*Ginebis* sp.	1	Snail	1766
S112005	Mollusca	Gastropoda	Trochidae	*Margarites* sp.	1	Snail	1762
S112006	Mollusca	Gastropoda	Trochidae		1	Snail	1762
S112007	Mollusca	Gastropoda	Margaritidae	*Margarites* sp.	1	Snail	1812
S112008	Mollusca	Gastropoda	Raphitomidae	*Gymnobela* sp.	1	Snail	1812
S112009	Mollusca	Gastropoda	Trochidae	*Ginebis* sp.	1	Snail	1761
S112010	Mollusca	Gastropoda	Trochidae		1	Snail	1761
S112011	Mollusca	Bivalvia	Pectinidae		1	Glass scallop	1761
V9804	Annelida	Polychaeta	Acrocirridae	*Teuthidodrilus*	1	Squid worm	2176
V9805	Annelida	Polychaeta	Acrocirridae	*Teuthidodrilus*	1	Squid worm	2176
V9806	Annelida	Polychaeta	Polynoidae		1	Scale worm	1761
V9809	Annelida	Polychaeta	Oweniidae	*Myriowenia*	1	Worm	1822
P.35075-001	Chordata	Osteichthyes	Halosauridae	*Aldrovandia affinis*	1	Fish	1708

Figure 5. Snapshot of samples from Dive S0332 in Cape Range Canyon.



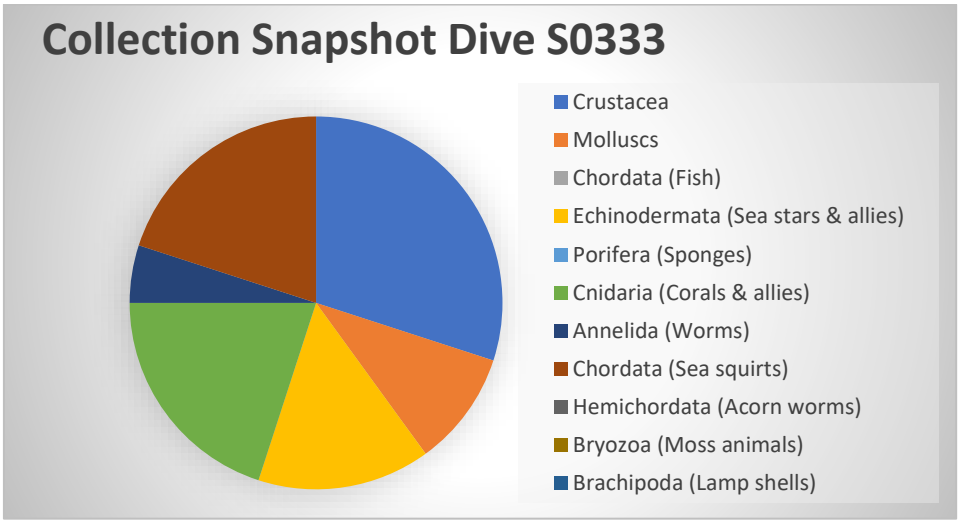
3.3.1.2 *Dive S0333 CR2: 3/12/2020*

ROV *SuBastian* fired two Niskin bottles to obtain water samples at approximately 2028 m. ROV *SuBastian* deployed one push core. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 3, Figure 6 below). Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 20 specimens representing 12 orders/classes and six phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive.

Table 3. Biological samples from Dive S0333 collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order, Class or Family	Family	Genus and species	No.	Common name	Depth (m)
C75580	Arthropoda	Amphipoda			4	Sideswimmers	2081
C75581	Arthropoda	Scalpellomorpha	Scalpellidae	*Amigdoscalpellum manum*	1	Stalked barnacle	2081
C75582	Arthropoda	Decapoda	Munididae	*Munida* cf. *mangingae*	1	Squat lobster	1924
Z100614	Cnidaria	Rhodaliidae			1	Benthic siphonophore	2001
Z100615	Echinodermata	Echinoidea	Cidaridae		1	Sea urchin	2081
Z100616	Cnidaria	Anthozoa	Chrysogorgiidae	*Chrysogorgia*	1	Soft coral	1938
Z100617	Echinodermata	Ophiuroidea			1	Brittle star	1938
Z100618	Echinodermata	Holothuroidea	Synallactinidae	*Paelopatides*	1	Sea cucumber	2012
Z100619	Cnidaria	Hydrozoa			1	Hydroid	1890
Z100620	Cnidaria	Hydrozoa			1	Hydroid	1905
Z100621	Chordata	Ascidiacea	Octacnemidae		1	Sea squirt	2012
Z100622	Chordata	Ascidiacea	Octacnemidae		1	Sea squirt	2012
Z100623	Chordata	Ascidiacea	Octacnemidae		1	Sea squirt	2012
Z100624	Chordata	Ascidiacea	Octacnemidae		1	Sea squirt	2011
S112012	Mollusca	Bivalvia	Arcidae		2	Ark shell	1855
V9810	Annelida	Polychaeta	Polynoidae		1	Scale worm	1892

Figure 6. Snapshot of samples from Dive S0333 in Cape Range Canyon.



3.3.1.3 *Dive S0335 CR4: 3/14/2020*

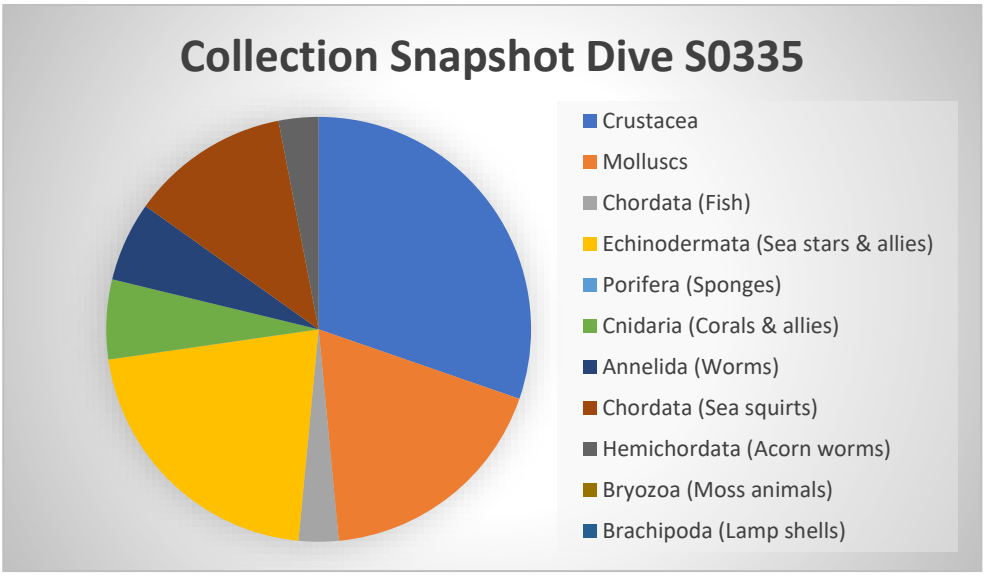
ROV *SuBastian* fired two Niskin bottles to obtain water samples at 2,160 m and deployed one push core. Targeted biodiversity samples were made while completing a

500 m quantitative video transect (see Table 4 , Figure 7 below). Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* deployed another push core (Number 1). ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 33 specimens representing 13 orders/classes and seven phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive.

Table 4. Biological samples from Dive S0335 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species or other	No.	Common name	Depth (m)
C75605	Arthropoda	Verrucamorpha	Verrucidae	*Gibbosaverruca* sp. 3	1	Wart barnacle	2040
C75606	Arthropoda	Scalpellomorpha	Scalpellidae	*Arcoscalpellum michellottianum*	1	Stalked barnacle	1974
C75607	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma orientale*	5	Stalked barnacle	1974
C75608	Arthropoda	Decapoda	Parapaguridae	*Parapagurus* cf. *furici*	1	Hermit crab	2145
C75609	Arthropoda	Decapoda	Munididae	*Munidopsis* cf. *nitida*	1	Squat lobster	1979
C75610	Arthropoda	Scalpellomorpha	Scalpellidae	*Catherinum* sp. 1	1	Stalked barnacle	2182
Z100626	Cnidaria	Anthozoa			1	Soft coral?	2041
Z100627	Hemichordata	Enteropneusta	Torquaratoridae	*Tergivelum* sp.	1	Acorn worm	2150
Z100628	Echinodermata	Ophiuroidea			1	Brittle star	1974
Z100629	Echinodermata	Echinoidea			1	Sea urchin	2183
Z100630	Echinodermata	Echinoidea			1	Sea urchin	2177
Z100631	Echinodermata	Crinoidea	Pentametrocrinidae	*Pentametracrinus* sp.	1	Feather star	1979
Z100632	Cnidaria	Anthozoa	Protoptilidae	*Protoptilum*	1	Sea Pen	2166
Z100633	Echinodermata	Echinoidea	Aspidodiadematidae	*Aspidodiadema* sp.	1	Sea urchin	2104
Z100634	Echinodermata	Echinoidea	Echinothuriidae	*Araeosoma*	1	Sea urchin	1933
Z100635	Echinodermata	Crinoidea			1	Feather star	1988
Z100636	Chordata	Ascidiacea	Octacnemidae	*Dicopia* sp.	1	Sea squirt	2176
Z100637	Chordata	Ascidiacea	Octacnemidae	*Dicopia* sp.	1	Sea squirt	2176
S112032	Mollusca	Gastropoda	Pleurobranchaeidae	*Pleurobranchaea*	1	Sea slug	1977
S112033	Mollusca	Gastropoda	Velutinidae	cf. *Marseniopsis*	1	Sea slug	2085
S112034	Mollusca	Gastropoda	Velutinidae	cf. *Marseniopsis*	1	Sea slug	2176
S112035	Mollusca	Bivalvia	Arcidae	*Bentharca asperula*	1	Ark shell	2175
S112036	Mollusca	Bivalvia	Arcidae	*Bentharca asperula*	1	Ark shell	2175
S112037	Mollusca	Bivalvia	Arcidae	*Bentharca asperula*	5	Ark shell	2175
S112038	Mollusca	Gastropoda			1		1979
S112039	Mollusca	Gastropoda	cf. Trochidae		1	Top shell	2175
S112040	Mollusca	Gastropoda	Raphitomidae		1	Snail	2065
V9823	Annelida	Polychaeta	Polynoidae		1	Scale worm	1988
V9824	Annelida	Polychaeta	Polynoidae		1	Scale worm	2041
P.35079-001	Chordata	Osteichthyes	Ophidiidae	*Acanthonus armatus*	1	fish	2162

Figure 7. Snapshot of samples from Dive S0335 in Cape Range Canyon.



3.3.1.4 *Dive S0336 CR5: 3/15/2020*

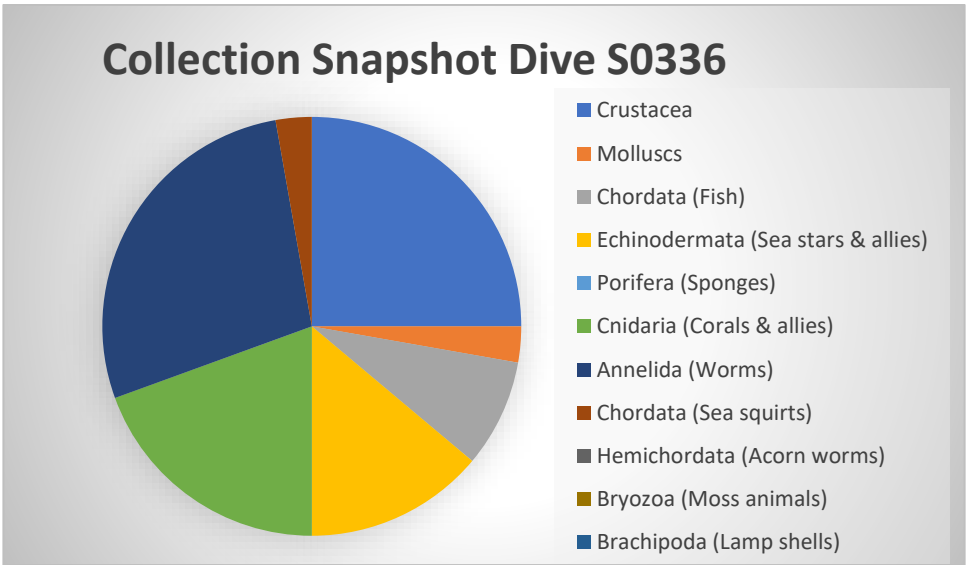
ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at 2,523.88 m. ROV *SuBastian* deployed one push core. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 5, Figure 8 below). Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses at 2,471.83 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 36 specimens representing 13 orders/classes and six phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive.

Table 5. Biological samples from Dive S0336 hand collected by ROV *SuBastian* and registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75614	Arthropoda	Decapoda	Munididae	*Galacantha rostrata*	1	Squat lobster	2358
C75615	Arthropoda	Copepoda			1	Copepod	2519
C75616	Arthropoda	Scalpellomorpha	Scalpellidae	*Neoscalpellum* cf. *phantasma*	1	Stalked barnacle	2519
C75617	Arthropoda	Verrucamorpha	Verrucidae	*Gibbosaverruca* sp. 2	2	Wart barnacle	2467
C75618	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Poecilasma* sp. 1	3	Stalked barnacle	2464
C75619	Arthropoda	Decapoda	Nematocarcinidae	*Nigmatullinus* sp.	1	Shrimp	2418
P.35080-001	Chordata	Osteichthyes	Moridae	*Antimora rostrata*	1	Fish	1524
P.35080-002	Chordata	Osteichthyes	Ophidiidae	*Acanthonus armatus*	1	Fish	1524

P.35081-001	Chordata	Osteichthyes	Ophidiidae	*Bassozetus galatheae*	1	Fish	1540
Z100638	Echinodermata	Asteroidea	Pterasteridae	*Hymenaster* sp.	1	Sea star	2432
Z100639	Echinodermata	Asteroidea	Pterasteridae	*Hymenaster* sp.	1	Sea star	2430
Z100640	Cnidaria	Anthozoa	Schizopathidae	*Alternatipathes* sp.	1	Black coral	2421
Z100641	Echinodermata	Asteroidea			1	Sea star	2520
Z100642	Echinodermata	Holothuroidea	Synallactinidae		1	Sea cucumber	2513
Z100643	Chordata	Ascidiacea	Octacnemidae	*Megalodicopia sp.*	1	Sea squirt	2505
Z100644	Cnidaria	Anthozoa	Primnoidae	*Calyptrophora sp.*	1	Soft coral?	2505
Z100645	Cnidaria	Anthozoa	Isididae		1	Bamboo coral	2467
Z100646	Echinodermata	Crinoidea			1	Feather star	
Z100647	Cnidaria	Anthozoa	Umbellulidae	*Umbellula* sp	1	Sea pen	2524
Z100648	Cnidaria	Hydrozoa	Corymorphidae	*Branchiocerianthus* sp.	1	Giant hydroid	2496
Z100649	Cnidaria	Hydrozoa			2	Hydroid	2513
S112042	Mollusca	Gastropoda	Raphitomidae	*Gymnobela* sp. 1	1	Snail	2422
V9817	Annelida	Polychaeta	Goniadidae		1	Segmented worm	2497
V9818	Annelida	Polychaeta	Dorveileidae	*Dorvillea*	1	Segmented worm	2497
V9819	Annelida	Polychaeta	Scalibregmatidae	*Axiokebuita*	1	Segmented worm	2497
V9820	Annelida	Polychaeta	Travisiidae	*Travisia*	1	Segmented worm	2497
V9821	Annelida	Polychaeta	Chaetopteridae	*Chaetopterus*	1	Segmented worm	2496
V9825	Annelida	Polychaeta	Syllidae		1	Segmented worm	2497
V9826	Annelida	Polychaeta	Goniadidae		1	Segmented worm	2497
V9827	Annelida	Polychaeta	Trichobranchidae		1	Segmented worm	2497
V9828	Annelida	Polychaeta	Opheliidae		1	Segmented worm	2497
V9829	Annelida	Polychaeta	Acrocirridae	*Swima tawitawiensis*	1	Segmented worm	2497

Figure 8. Snapshot of samples from Dive S0336 in Cape Range Canyon.



3.3.1.5 *Dive S0337 CR6: 3/16/2020*

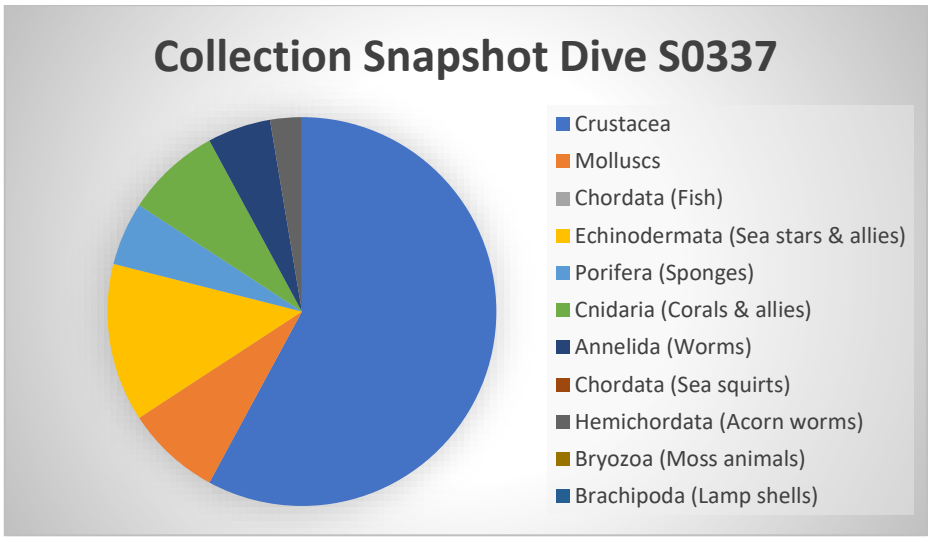
ROV *SuBastian* fired three Niskin bottles to obtain water samples for eDNA analyses at 2,537.22 m. ROV *SuBastian* deployed two push cores. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 6, Figure 9 below). Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses at 2,451.6 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 38 specimens representing 15 orders/classes and seven phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive.

Table 6. Biological samples from Dive S0337 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75620	Arthropoda	Scalpellomorpha	Calanticidae	*Scillaelepas* sp. nov.	1	Stalked barnacle	2528
C75621	Arthropoda	Scalpellomorpha	Calanticidae	*Scillaelepas* sp. nov.	1	Stalked barnacle	2528
C75622	Arthropoda	Scalpellomorpha	Calanticidae	*Scillaelepas* sp. nov.	1	Stalked barnacle	2528
C75623	Arthropoda	Scalpellomorpha	Calanticidae	*Scillaelepas* sp. nov.	1	Stalked barnacle	2528
C75624	Arthropoda	Scalpellomorpha	Calanticidae	*Scillaelepas* sp. nov.	6	Stalked barnacle	2528
C75625	Arthropoda	Decapoda	Parapaguridae	*Parapagurus* cf. *furici*	1	Hermit crab	2428
C75626	Arthropoda	Amphipoda			1	Side swimmer	2453
C75627	Arthropoda	Isopoda	Arcturidae		3	Sea slater	2458
C75628	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma* cf. *rectum*	7	Stalked barnacle	2458
Z100650	Porifera	Hexactinellida			1	Glass sponge	2459
Z100651	Echinodermata	Asteroidea			1	Sea star	2453

Z100652	Cnidaria	Hydrozoa	Corymorphidae	*Branchiocerianthus* sp.	1	Giant hydroid	2453
Z100653	Echinodermata	Holothuroidea	Synallactinidae	*Paelopatides*	1	Sea cucumber	2492
Z100654	Porifera	Demospongiae			1	Sponge	2436
Z100655	Echinodermata	Asteroidea	Goniasteridae	*Evoplosoma*	1	Sea star	2535
Z100656	Echinodermata	Holothuroidea	Laetmogonidae	*Benthogone sp.*	1	Sea cucumber	2535
Z100657	Cnidaria	Hydrozoa	Apolemiidae	*Apolemia* sp.	1	hydroid	627
Z100658	Echinodermata	Holothuroidea	Psychropotidae	*Benthrodytes* sp.	1	Sea cucumber	2492
Z100659	Hemichordata	Enteropneusta	Torquaratoridae	*Tergivelum* sp.	1	Acorn worm	2455
Z100660	Cnidaria	Anthozoa			1	Soft coral?	2429
S112043	Mollusca	Coleoidea			1	Squid	2537
S112044	Mollusca	Gastropoda	cf. Pyramidellidae		1	Snail	2528
S112045	Mollusca	Vetigastropoda	Solariellidae	*Solariella* sp.	1	Snail	2528
V9830	Annelida	Polychaeta	Polynoidae	*Macellicephalus* sp.	1	Scale worm	2444
V9831	Annelida	Polychaeta	Acrocirridae	*Teuthidodrilus* cf. *samae*	1	Squid worm	2450

Figure 9. Snapshot of samples from Dive S0337 in Cape Range Canyon.



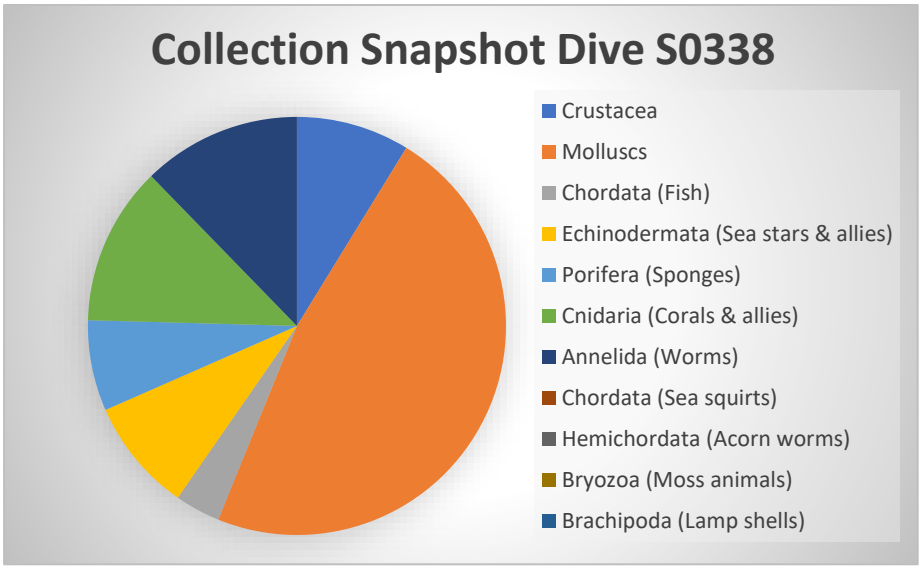
3.3.1.6 *Dive S0338 CR7: 3/17/2020*

ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at 2,906.08 m. ROV *SuBastian* deployed one push core. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 7, Figure 10 below). One Autonomous Reef Monitoring System (ARMS) was deployed at 2,905.68 m and additional infaunal collection device. Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses at 2916.38 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 57 specimens representing 15 orders/classes and seven phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive.

Table 7. Biological samples from Dive S0338 hand collected by ROV *SuBastian* registered into WA Museum collection.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75632	Arthropoda	Decapoda	Munidopsidae	*Munidopsis* cf. *subsquamosa*	1	Squat lobster	2911
C75633	Arthropoda	Akentrogonida	Thompsoniidae	*Thompsonia* sp.	1	Parasitic barnacle	2911
C75634	Arthropoda	Decapoda	Munidopsidae	*Munidopsis* cf. *subsquamosa*	1	Squat lobster	2907
C75635	Arthropoda	Amphipoda	Epimeriidae	*Epimeria* cf. *rafaeli*	1	Sideswimmer	2916
C75637	Arthropoda	Amphipoda			1	Sideswimmer	2920
P.35082-001	Chordata	Osteichthyes	Ipnopidae	*Ipnops*	1	Fish	2912
P.35083-001	Chordata	Osteichthyes	Ophidiidae	*Bassozetus galatheae*	1	Fish	2902
Z100661	Porifera	Hexactinellida	Euplectellidae	*Saccocalyx sp.*	1	Glass sponge	2914
Z100662	Echinodermata	Holothuroidea			1	Sea cucumber	2914
Z100663	Echinodermata	Holothuroidea	Psychropotidae	*Benthodytes*	1	Sea cucumber	2682
Z100664	Porifera	Demospongiae	cf. Cladorhizidae		1	Carnivorous sponge	2914
Z100665	Echinodermata	Asteroidea			1	Sea star	2914
Z100666	Cnidaria	Hydrozoa			1	Hydroid	2914
Z100667	Cnidaria	Anthozoa			1	Soft coral?	2916
Z100668	Echinodermata	Crinoidea			1	Feather star	2905
Z100669	Cnidaria	Hydrozoa			1	Hydroid	2914
Z100670	Porifera	Demospongiae	Cladorhizidae		1	Carnivorous sponge	2914
Z100671	Porifera	Demospongiae	Cladorhizidae		1	Carnivorous sponge	2914
Z100672	Cnidaria	Anthozoa	Antipathidae	*Stichopathes sp.*	1	Black coral	2906
Z100673	Cnidaria	Anthozoa	Schizopathidae	*Alternatipathes venusta*	1	Black coral	2906
Z100674	Echinodermata	Holothuroidea			1	Sea cucumber	2914
Z100675	Cnidaria	Hydrozoa			1	Hydroid	2914
Z100676	Cnidaria	Hydrozoa			1	Hydroid	2914
S112046	Mollusca	Aplacophora	Neomeniomorpha		1	Aplacophoran	2914
S112047	Mollusca	Gastropoda	Raphitomidae	*Daphnella* sp. 2	1	Snail	2886
S112048	Mollusca	Gastropoda	Skeneidae	*Liotella* sp.	1	Snail	2914
S112049	Mollusca	Gastropoda	Skeneidae	cf. *Munditiella* sp.	1	Snail	2914
S112050	Mollusca	Gastropoda	Pectinodontidae	cf. *Bathyacmaea* sp.	1	Snail	2914
S112051	Mollusca	Gastropoda	cf. Pectinodontidae		11	Snail	2914
S112052	Mollusca	Gastropoda	cf. Pectinodontidae		8	Snail	2914
S112053	Mollusca	Gastropoda	Pectinodontidae	*Bathyacmaea* cf. *subnipomea*	1	Snail	2914
S112054	Mollusca	Gastropoda	cf. Pectinodontidae		1	Snail	2914
S112055	Mollusca	Coleoidea	Histioteuthidae	*Stigmatoteuthis* cf. *hoylei*	1	Flower vase squid	1015
V9833	Annelida	Polychaeta	Eunicidae	*Marphysa* sp.	1	Segmented worm	2902
V9834	Annelida	Polychaeta	Polynoidae		1	Scale worm	2916
V9837	Annelida	Polychaeta	Sabellidae		1	Feather duster worm	2914
V9838	Annelida	Polychaeta	Polynoidae		1	Scale worm	2914
V9839	Annelida	Polychaeta	Polynoidae		1	Scale worm	2916
V9840	Annelida	Polychaeta	Siboglinidae		1	Segmented worm	2905
V9841	Annelida	Polychaeta	Serpulidae		1	Tube worm	2914

Figure 10. Snapshot of samples from Dive S0338 in Cape Range Canyon.



3.3.1.7 *Dive S0339 CR8: 3/18/2020*

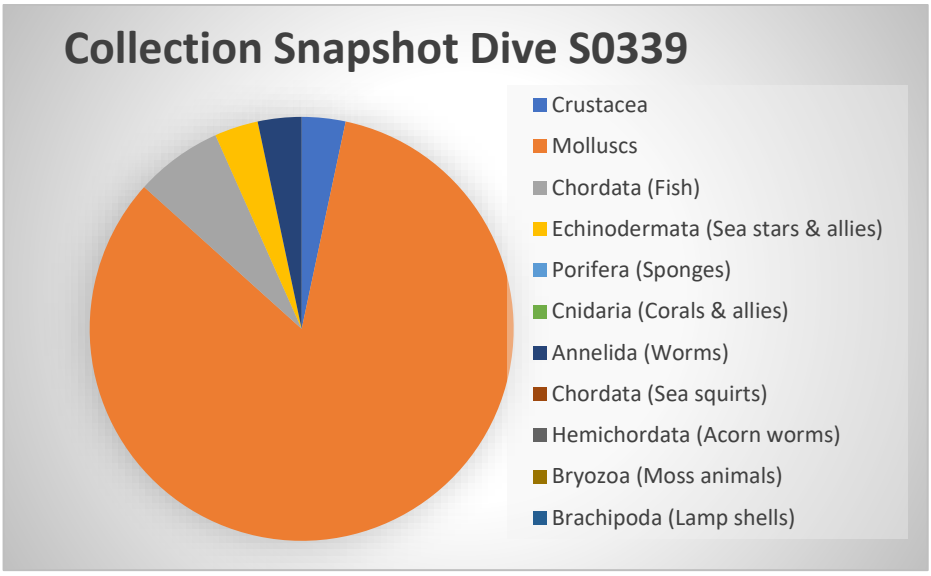
ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at ~3,032.45 m. ROV *SuBastian* did not deploy push cores. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 8, Figure 11 below). Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* fired three more Niskin bottles to obtain water samples for eDNA analyses at ~2,921.08 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 30 specimens representing six orders/classes and five phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive.

Table 8. Biological samples from Dive S0339 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75636	Arthropoda	Decapoda	Solenoceridae	*Gordonella kensleyi*	1	Prawn	2920
P.35086-001	Chordata	Osteichthyes	Ophidiidae	*Bassozetus galatheae*	1	Fish	2916
P.35087-001	Chordata	Osteichthyes	Ipnopidae	*Bathypterois*	1	Fish	2908
Z100677	Echinodermata	Holothuroidea	Elpidiidae	*Peniagone sp.*	1	Sea cucumber	2915
S112055	Mollusca	Cephalopoda	Histioteuthidae	*Stigmoteuthis* cf. *hoylei*	1	Flower vase squid	1015
S112056	Mollusca	Bivalvia	Xylophagaidae		3	Boring clams	2912
S112057	Mollusca	Bivalvia	Xylophagaidae		3	Boring clams	2912

S112058	Mollusca	Bivalvia	Xylophagaidae		3	Boring clams	2912
S112059	Mollusca	Bivalvia	Xylophagaidae		2	Boring clams	2912
S112060	Mollusca	Bivalvia	Xylophagaidae		3	Boring clams	2912
S112061	Mollusca	Bivalvia	Xylophagaidae		10	Boring clams	2912
V9842	Annelida	Polychaeta	Polynoidae	*Macellicephala* sp.	1	Scale worm	2915

Figure 11. Snapshot of samples from Dive S0339 in Cape Range Canyon.



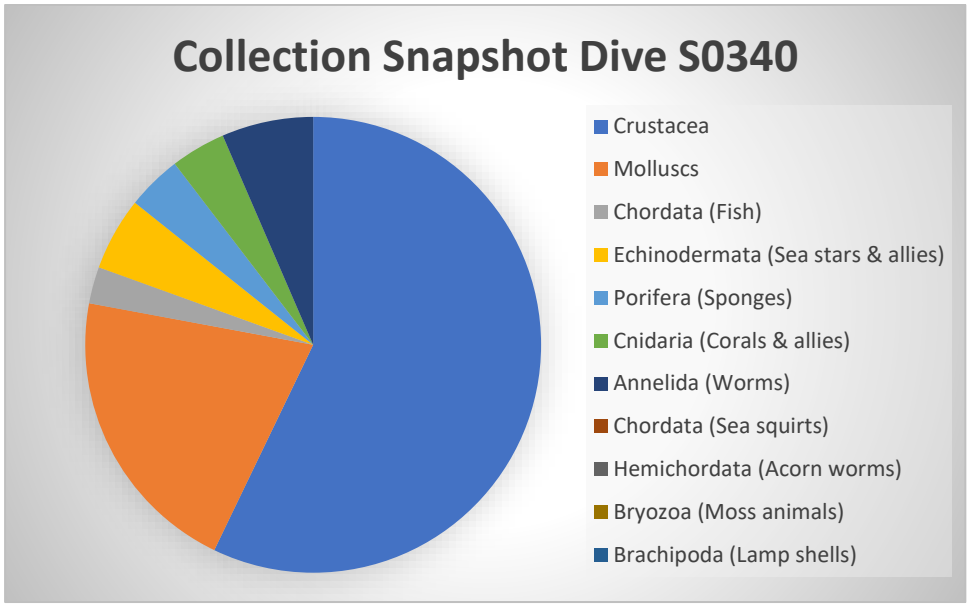
3.3.1.8 *Dive S0340 CR9: 3/19/2020*

ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at ~3,886.67 m. ROV *SuBastian* deployed one push core. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 9, Figure 12 below). Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses at ~3,734 m. Push cores were also deployed to sample animal traces/burrows (*Lebensspuren*) at 3,726.06 m (xenophyophore), 3,734 m ('spider trace') and ~3,713 m (ampharetid worm). ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 77 specimens representing 16 orders/classes and six phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive. This was the most taxonomically diverse and heavily sampled dive of the expedition.

Table 9. Biological samples from Dive S0340 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75638	Arthropoda	Scalpellomorpha	Scalpellidae	*Trianguloscalpellum gigas*	3	Stalked barnacle	3709
C75639	Arthropoda	Verrucamorpha	Verrucidae	*Gibbosaverruca* sp. 2	20	Wart barnacle	3709
C75640	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma* cf. *rectum*	1	Stalked barnacle	3709
C75641	Arthropoda	Scalpellomorpha	Scalpellidae	*Trianguloscalpellum gigas*	1	Stalked barnacle	3709
C75642	Arthropoda	Scalpellomorpha	Scalpellidae	*Trianguloscalpellum gigas*	1	Stalked barnacle	3709
C75643	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma* cf. *rectum*	1	Stalked barnacle	3709
C75644	Arthropoda	Amphipoda	Amphipoda		1	Sideswimmer	3732
C75645	Arthropoda	Isopoda	Cryptoniscidae	*Cryptoniscus* sp.	2	Isopod	3709
C75646	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma* cf. *rectum*	12	Stalked barnacle	3884
C75647	Arthropoda	Decapoda	Acanthephyridae	*Acanthephyra* sp.	1	Prawn	3711
C75648	Arthropoda	Decapoda	Solenoceridae	*Haliporus thetis*	1	Prawn	3868
Z100678	Porifera	Hexactinellida			1	Glass sponge	3709
Z100679	Cnidaria	Anthozoa			1	Soft coral?	3709
Z100680	Echinodermata	Holothuroidea	Elpidiidae	*Peniagone* sp.	1	Pelagic sea cucumber	3710
Z100681	Cnidaria	Anthozoa			1	Soft coral?	3731
Z100682	Echinodermata	Crinoidea			1	Feather star	3791
Z100683	Echinodermata	Asteroidea	Brisingidae	*Freyastera* sp.	1	Sea star	3734
Z100684	Cnidaria	Anthozoa	Schizopathidae	*Alternatipathes* cf. *alternata*	1	Black coral	3885
Z100685	Porifera	Demospongiae	Cladorhizidae		1	Carnivorous sponge	3733
Z100686	Porifera	Poecilosclerida			1	Sponge	3733
Z100688	Echinodermata	Holothuroidea			1	Sea cucumber	3731
S112063	Mollusca	Coleiodea			1	Squid	919
S112064	Mollusca	Gastropoda	Raphitomidae	*Daphnella sp.*	1	Snail	3885
S112065	Mollusca	Gastropoda	Fissurellidae		1	Keyhole limpet	3732
S112066	Mollusca	Bivalvia	Propeamussidae		1	Glass scallop	3731
S112067	Mollusca	Gastropoda			1	Snail	3731
S112068	Mollusca	Gastropoda	Pseudomelatomidae	cf. *Leucosyrinx* sp.	1	Snail	3707
S112069	Mollusca	Gastropoda	Patellogastropoda		1	Limpet	3704
S112070	Mollusca	Gastropoda	Patellogastropoda		3	Limpet	3704
S112071	Mollusca	Bivalvia	Xylophagaidae		1	Boring clams	3704
S112072	Mollusca	Bivalvia	Xylophagaidae		5	Boring clams	3704
V9843	Annelida	Polychaeta	Melinnidae	*Melinniopsis?* sp.	1	Segmented worm	3713
V9844	Annelida	Polychaeta	Polynoidae	*Macellicephala* sp.	1	Scale worm	3885
V9845	Annelida	Polychaeta	Polynoidae	*Macellicephala* sp.	1	Scale worm	3733
V9854	Annelida	Polychaeta	Maldanidae		1	Segmented worm	4192
V9857	Annelida	Polychaeta	Polynoidae	*Macellicephala* sp.	1	Scale worm	3733

Figure 12. Snapshot of samples from Dive S0340 in Cape Range Canyon.



3.3.1.9 *Dive S0341 CR11: 3/20/2020*

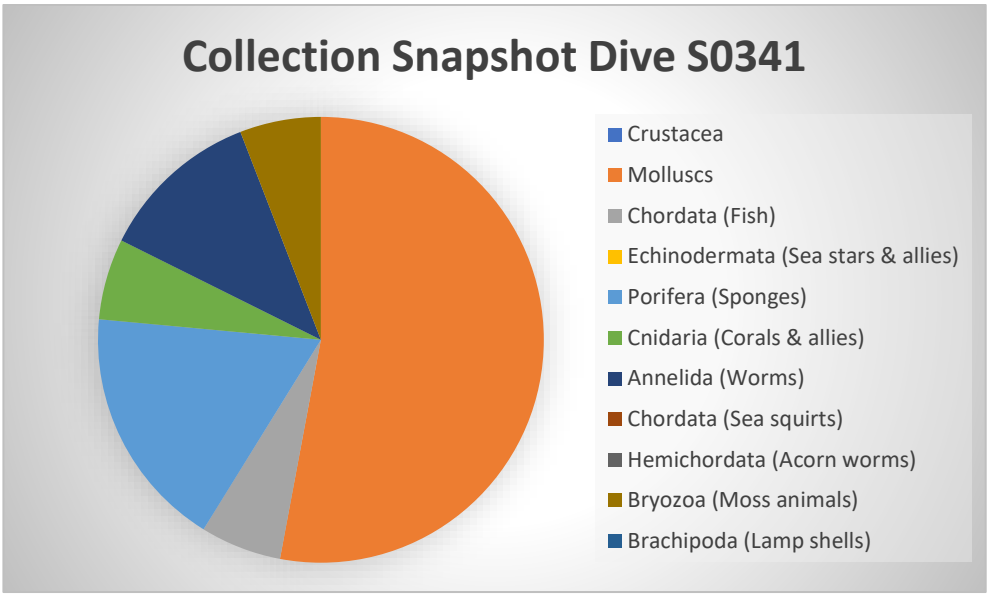
ROV *SuBastian* fired three Niskin bottles to obtain water samples for eDNA analyses at ~4,358.61 m. ROV *SuBastian* did not deploy any push cores. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 10, Figure 13 below). ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 16 specimens representing eight orders/classes and six phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive.

Table 10. Biological samples from Dive S0341 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
P.35089-001	Chordata	Osteichthyes	Ophidiidae	*Typhlonus nasus*	1	Fish	4355
Z100687	Porifera	Demospongiae			1	Sponge	4186
Z100689	Cnidaria	Anthozoa	Umbellulidae	*Umbellula monocephalus*	1	Sea pen	4359
Z100690	Porifera	Demospongiae	Cladorhizidae	*Abyssocladia* sp.	1	Carnivorous sponge	4186
Z100691	Porifera	Demospongiae	Cladorhizidae	*Abyssocladia* sp.	1	Carnivorous sponge	4359
Z100692	Bryozoa				1	Lace coral	4357
S112073	Mollusca	Cephalopoda	Histioteuthidae	*Stigmoteuthis* cf. *hoylei*	1	Flower vase squid	694
S112074	Mollusca	Polyplacophora			1	Chiton	4213
S112076	Mollusca	Gastropoda	Raphitomidae	*Veprecula*	1	Snail	4200

S112077	Mollusca	Gastropoda	cf. Raphitomidae		1	Snail	4330
S112078	Mollusca	Gastropoda			1	Snail	4331
S112079	Mollusca	Gastropoda	Fissurellidae	*Fissurisepta* sp.	1	Keyhole limpet	4356
S112080	Mollusca	Polyplacophora			1	Chiton	4331
S112081	Mollusca	Gastropoda	cf. Fissurellidae		1	Keyhole limpet	4355
S112082	Mollusca	Gastropoda			1	Snail	4200
V9855	Annelida	Polychaeta	Polynoidae		1	Scale worm	4331
V9856	Annelida	Polychaeta	Acrocirridae	*Flabelligena*	1	Worm	4186

Figure 13. Snapshot of samples from Dive S0341 in Cape Range Canyon.



3.3.1.10 *Dive S0342 CR11: 3/21/2020*

ROV *SuBastian* fired three Niskin bottles to obtain water samples for eDNA analyses at ~4,168.74 m. ROV *SuBastian* deployed one push core. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 11, Figure 15 below). Approximately midway through the dive and at the completion of the video transect, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses at ~3,757 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 20 specimens representing twelve orders/classes and six phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive.

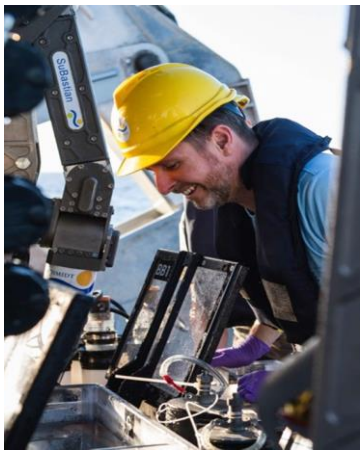
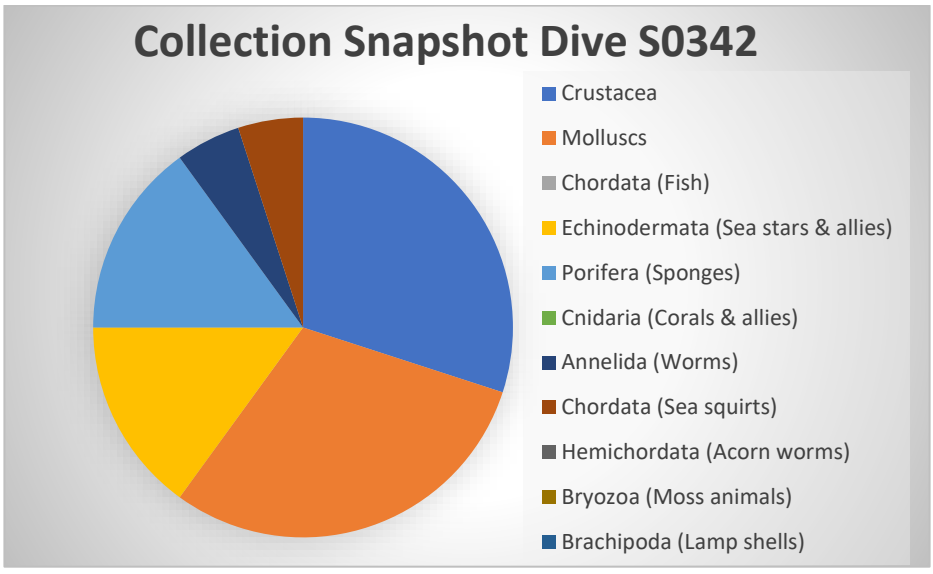


Figure 14. Dr. Andrew Hosie removing samples from the biobox post-dive. Photo SOI.

Table 11. Biological samples from Dive S0342 hand collected by ROV *SuBastian* registered into WA Museum collection.

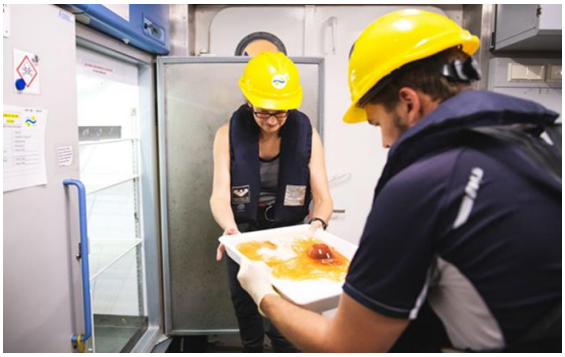
WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75649	Arthropoda	Amphipoda	Amphipoda		2	Sideswimmer	3818
C75650	Arthropoda	Verrucamorpha	Verrucidae	*Gibbosaverruca* sp. 2	1	Wart barnacle	3818
C75651	Arthropoda	Decapoda	Munidopsidae	*Munidopsis gladiola*	1	Squat lobster	3818
C75652	Arthropoda	Decapoda	Munidopsidae	*Munidopsis gladiola*	1	Squat lobster	3876
C75653	Arthropoda	Decapoda	Munidopsidae	*Munidopsis gladiola*	1	Squat lobster	3818
Z100693	Porifera	Hexactinellida	Rossellidae?		1	Glass sponge	3818
Z100694	Porifera	Demospongiae			1	Glass sponge	3812
Z100695	Echinodermata	Asteroidea			1	Sea star	3819
Z100696	Chordata	Ascidiacea	Octacnemidae	*Megaladicopia*	1	Sea squirt	3951
Z100697	Echinodermata	Crinoidea			1	Feather star	3820
Z100698	Echinodermata	Crinoidea			1	Feather star	3818
Z100699	Porifera	Hexactinellida	Ferreidae		1	Glass sponge	3877
S112075	Mollusca	Gastropoda	Eulimidae		1	Parasitic snail	3818
S112083	Mollusca	Gastropoda	Eulimidae		1	Parasitic snail egg masses	3818
S112084	Mollusca	Gastropoda	Eulimidae		1	Parasitic snail	3818
S112085	Mollusca	Gastropoda	cf. Archtitectonicidae		1	Snail	3819
S112086	Mollusca	Polyplacophora	Ischnochitonidae		1	Chiton	3819
S112087	Mollusca	Vetigastropoda	Fissurellidae	*Fissurisepta* sp.	1	Keyhole limpet	3819
V9859	Annelida	Polychaeta	Polynoidae		1	Scale worm	3818

Figure 15. Snapshot of samples from Dive S0342 in Cape Range Canyon.



3.3.1.11 *Dive S0343 CR10: 3/22/2020*

ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at ~4,403.11 m. ROV *SuBastian* deployed one push core. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 12, Figure 17



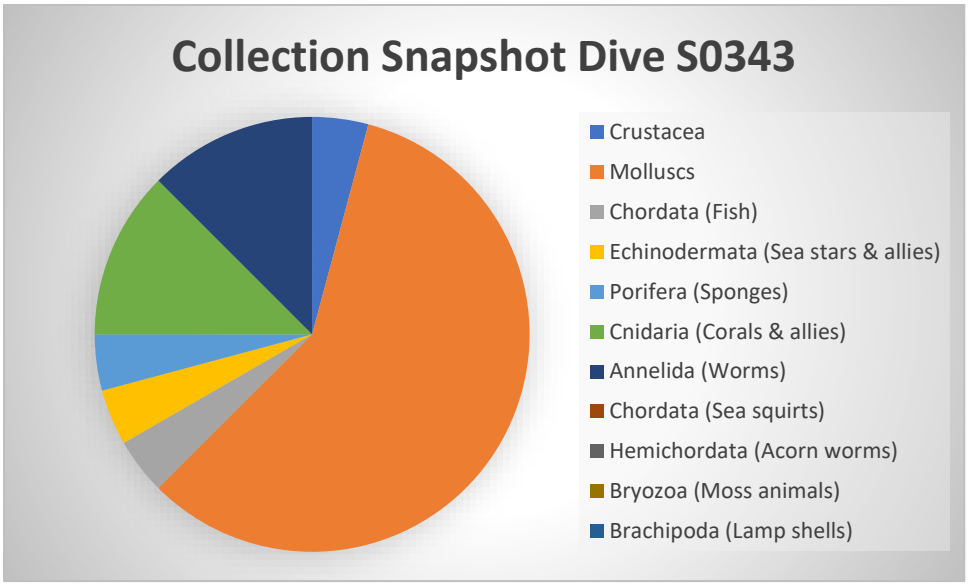
below). One Autonomous Reef Monitoring System (ARMS) was deployed at 4,398.67 m. Near the end of the dive and at the completion of the video transect, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses at 4,226.09 m. ROV *SuBastian* sampled one fish before ascending to the surface. Overall, 24 specimens representing ten orders/classes and eight phyla were selectively sampled from across the tree of life by ROV *SuBastian* during this dive. This station was significant as it was our second deepest ROV dive of the expedition.

Figure 16. Dr. Nerida Wilson (left) and Mr. David Juskiewicz (right) placing samples in the fridge to cool. Photo SOI.

Table 12. Biological samples from Dive S0343 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75663	Crustacea	Isopoda			1	Sea slater	4389
P.35091-001	Chordata	Osteichthyes	Ophidiidae	*Bassozetus*	1	Fish	4256
Z100700	Cnidaria	Anthozoa			1	Soft coral?	4472
Z100701	Cnidaria	Anthozoa	Schizopathidae	*Abyssopathes* cf. *lyra*	1	Black Coral	4451
Z100702	Echinodermata	Holothuroidea	Synallactinidae	cf. *Paelopatides*	1	Sea cucumber	4392
Z100703	Bryozoa				1	Moss animal	4433
Z100704	Porifera	Demospongiae	Cladorhizidae		1	Sponge	4436
Z100705	Cnidaria	Anthozoa			1	Soft coral?	4435
S112088	Mollusca	Bivalvia	Pectinidae		1	Scallop	4457
S112089	Mollusca	Gastropoda	Raphitomidae		1	Snail	4462
S112090	Mollusca	Gastropoda	Raphitomidae	*Gymnobela sp.*	1	Snail	4462
S112091	Mollusca	Gastropoda	Epitoniidae		1	Parasitic snail	4389
S112092	Mollusca	Bivalvia	Propeamussiidae	cf. *Cyclopecten* sp.	1	Scallop	4435
S112094	Mollusca	Bivalvia	Xylophagaidae		1	Boring bivalve	4473
S112095	Mollusca	Bivalvia	Xylophagaidae		1	Boring bivalve	4473
S112096	Mollusca	Cephalopoda	Octopoteuthidae	*Taningia danae*	1	Octopus squid	1547
S112097	Mollusca	Gastropoda	Epitoniidae	cf. *Acirsa* sp.	2	Parasitic snail	4389
S112098	Mollusca	Gastropoda	Epitoniidae		4	Parasitic snail	4389
V9846	Annelida	Polychaeta	Sabellaridae	*Gesaia* sp.	1	Tube worm	4451
V9847	Annelida	Polychaeta	Sabellaridae	*Lygdamis* sp.	1	Tube worm	4451
V9848	Annelida	Polychaeta	Serpulidae		1	Tube worm	4458

Figure 17. Snapshot of samples from Dive S0343 in Cape Range Canyon.



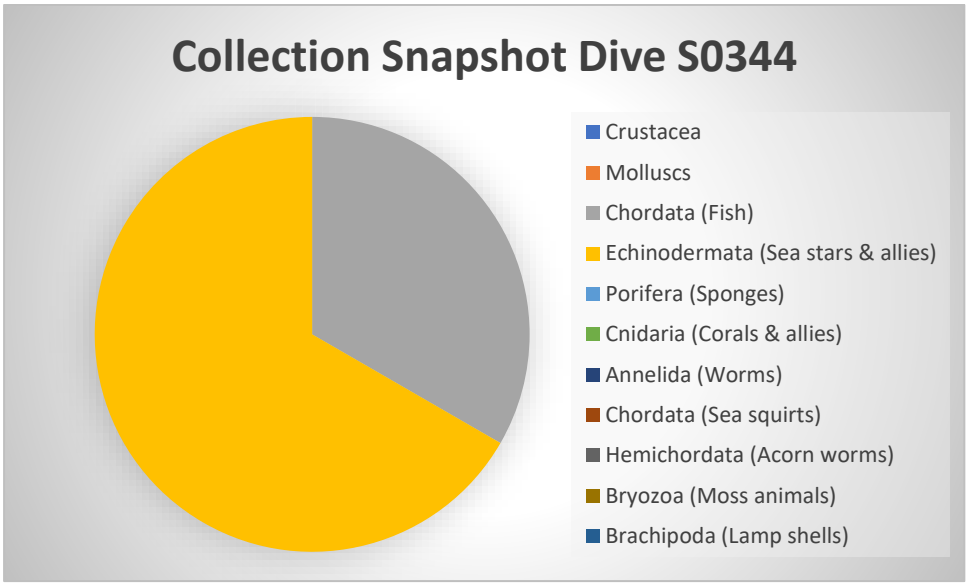
3.3.1.12 *Dive S0344 CR11: 3/24/2020*

No Niskin bottles were fired by ROV *SuBastian* to obtain water samples for eDNA analyses during this dive. ROV *SuBastian* deployed one push core. Three specimens representing three orders/classes and two phyla were selectively sampled by ROV *SuBastian* (see Table 13, Figure 18 below). Dive was then aborted.

Table 13. Biological samples from Dive S0344 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
P.35092-001	Chordata	Osteichthyes	Ophidiidae	*Penopus*	1	Fish	4177
Z100706	Echinodermata	Holothuroidea			1	Sea cucumber	4374
Z100707	Echinodermata	Echinoidea			1	Sea urchin	4374

Figure 18. Snapshot of samples from Dive S0344 in Cape Range Canyon.



3.3.1.13 *Dive S0345 CR11: 3/25/2020*

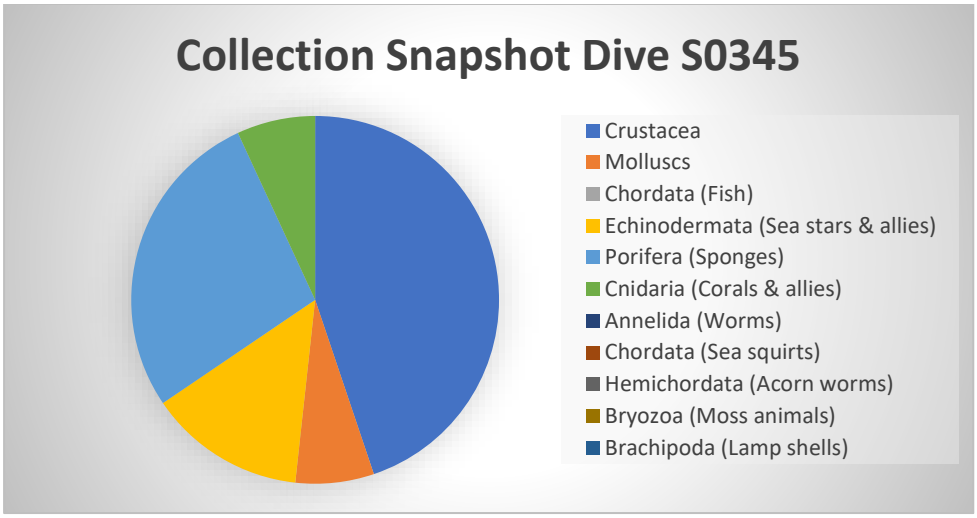
ROV *SuBastian* deployed one push core. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 14, Figure 19 below). Near the end of the dive and at the completion of the video transect, ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at ~4,005.69 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 29 specimens representing ten orders/classes and five phyla were selectively sampled from across the tree of life by ROV *SuBastian*.

Table 14. Biological samples from Dive S0345 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75669	Arthropoda	Decapoda	Munidopsidae	*Munidopsis* cf. petila	1	Squat lobster	4068
C75670	Arthropoda	Amphipoda	Ischyroceridae	*Siphonoecetes* sp.	1	Sideswimmer	4068
C75671	Arthropoda	Amphipoda	Ischyroceridae	*Siphonoecetes* sp.	7	Sideswimmer	4068
C75672	Arthropoda	Amphipoda			2	Sideswimmer	4370
C75674	Arthropoda	Isopoda			2	Sea slater	4075
Z100708	Echinodermata	Holothuroidea	Psychropotidae	*Psychropotes longicauda*	1	Sea cucumber	4376
Z100709	Cnidaria	Anthozoa			1	Soft coral?	4373
Z100710	Porifera	Demospongiae			1	Sponge	4067
Z100711	Porifera	Hexactinellida			1	Glass sponge	4067
Z100712	Porifera	Hexactinellida	Rossellidae?		1	Glass sponge	4068
Z100713	Echinodermata	Asteroidea	Porcellanasteridae	*Hyphalaster*	1	Sea star	4328

Z100714	Porifera	Demospongiae			1	Sponge	4067
Z100715	Echinodermata	Holothuroidea			1	Sea cucumber	4097
Z100716	Echinodermata	Crinoidea	Bourgueticrinidae		1	Feather star	4068
Z100717	Porifera	Demospongiae			1	Glass sponge	4067
Z100718	Porifera	Hexactinellida			1	Glass sponge	4067
Z100719	Porifera	Hexactinellida			1	Glass sponge	4067
Z100720	Porifera	Hexactinellida	Farreidae	*Lonchiphora* sp.	1	Glass sponge	4076
Z100721	Cnidaria	Anthozoa			1	Soft coral?	4371
S112111	Mollusca	Cephalopoda	Chiroteuthidae	cf. *Chiroteuthis* sp.	1	Squid	842
S112112	Mollusca	Cephalopoda	Cranchiidae		1	Glass squid	1009
S112113	Mollusca	Gastropoda	Eulimidae		1	Parasitic snail	

Figure 19. Snapshot of samples from Dive S0345 in Cape Range Canyon.



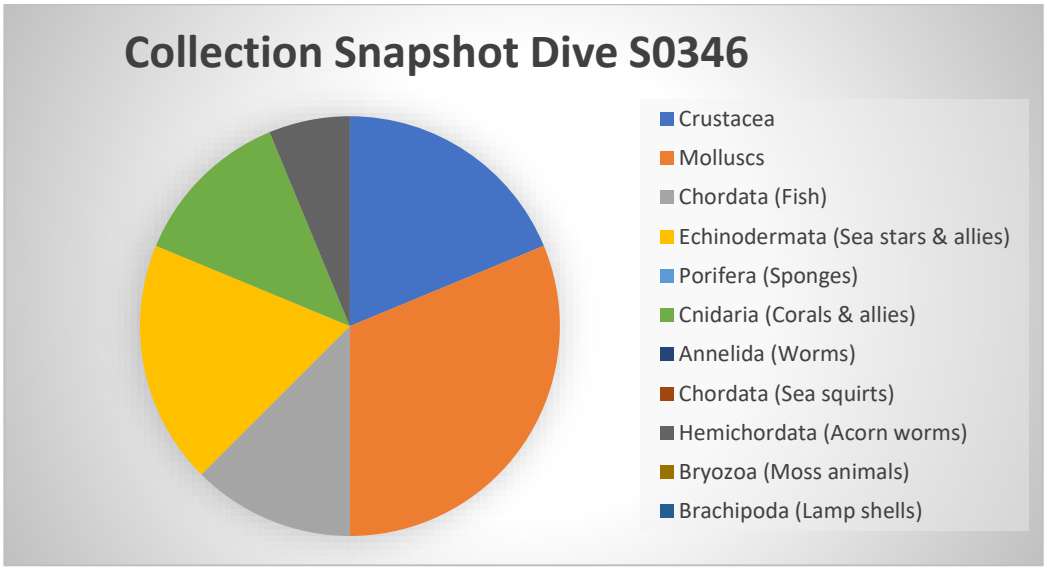
3.3.1.14 *Dive S0346 CR12: 3/26/2020*

ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at the start of this dive at ~4,158.2 m. ROV *SuBastian* deployed one push core. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 15, Figure 20 below). Near the end of the dive and at the completion of the video transect, ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at ~3882.75 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 16 specimens representing 13 orders/classes and six phyla were selectively sampled from across the tree of life by ROV *SuBastian*.

Table 15. Biological samples from Dive S0346 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75675	Arthropoda	Decapoda	Solenoceridae	*Haliporus* sp.	1	Prawn	4200
C75676	Arthropoda	Tanaidacea			1	Tanaid	3939
C75677	Arthropoda	Scalpellomorpha	Scalpellidae	*Amigdoscalpellum elegans*	1	Stalked barnacle	4003
P.35094-001	Chordata	Osteichthyes	Ophidiidae	*Porogadus*	1	Fish	4212
P.35095-001	Chordata	Osteichthyes	Ophidiidae		1	Fish	3960
Z100723	Cnidaria	Hydrozoa			1	Hydroid	4210
Z100724	Echinodermata	Asteroidea	Brisingidae		1	Sea star	4192
Z100725	Echinodermata	Holothuroidea	Molpadiodemidae	*Molpadiodemas*	1	Sea cucumber	4158
Z100726	Echinodermata	Echinoidea			1	Sea urchin	3964
Z100727	Hemichordata	Enteropneusta	Torquaratoridae	*Tergivelum* sp.	1	Acorn worm	3911
Z100728	Cnidaria	Scyphozoa			1	Sea jelly	4205
S112115	Mollusca	Coleoidea	Magnapinnidae	*Magnapinna* sp.	1	Bigfin Squid	1937
S112116	Mollusca	Coleoidea	Cranchiidae		1	Glass squid	700
S112117	Mollusca	Bivalvia	cf. Limopsidae		1	Clam	4203
S112118	Mollusca	Gastropoda	Raphitomidae		1	Snail	3939
S112119	Mollusca	Gastropoda	Raphitomidae	*Gymnobela* sp. 2	1	Snail	3979

Figure 20. Snapshot of samples from Dive S0346 in Cape Range Canyon.



3.3.1.15 *Dive S0347 CR13: 3/27/2020*

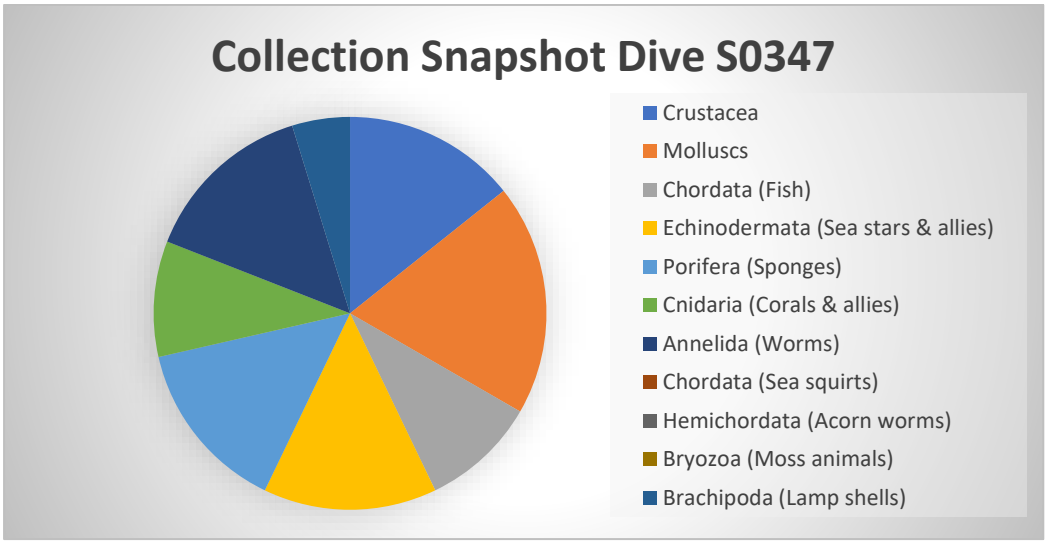
ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at the start of this dive at ~4,423.13 m. ROV *SuBastian* deployed two push cores. Targeted biodiversity samples were made while completing a 500 m quantitative video transect (see Table 16, Figure 21 below). Near the end of the dive and at the completion

of the video transect, ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at ~4,440.4 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 21 specimens representing eleven orders/classes and eight phyla were selectively sampled from across the tree of life by ROV *SuBastian*. This station was significant as it was the deepest ROV dive of the expedition, with samples collected up to 4514 m.

Table 16. Biological samples from Dive S0347 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75678	Arthropoda	Scalpellomorpha	Scalpellidae	*Trianguloscalpellum darwinii*	1	Stalked barnacle	4514
C75678	Arthropoda	Scalpellomorpha	Scalpellidae	*Trianguloscalpellum darwinii*	1	Stalked barnacle	4514
C75680	Arthropoda	Decapoda	Crangonidae	*Parapontophilus* cf. *longirostris*	1	Shrimp	4491
P.35096-001	Chordata	Osteichthyes	Zoarcidae	*Pachycara*	1	Fish	4456
P.35097-001	Chordata	Osteichthyes	Ophidiidae	*Barathrites iris*	1	Fish	4470
Z100729	Cnidaria	Hydrozoa	Corymorphidae	*Branchiocerianthus* sp.	1	Hydroid	4493
Z100730	Cnidaria	Anthozoa	Schizopathidae	*Alternatipathes* cf. *alternata*	1	Black coral	4512
Z100731	Echinodermata	Holothuroidea	Psychropotidae	*Psychropotes longicauda*	1	Sea cucumber	4438
Z100732	Echinodermata	Holothuroidea	Gephyrothuriidae	cf. *Paroriza*	1	Sea cucumber	4485
Z100733	Echinodermata	Holothuroidea	Psychropotidae	*Psychropotes* lsp.	1	Sea cucumber	4491
Z100734	Porifera	Demospongiae	Cladorhizidae		1	Carnivorous sponge	4514
Z100735	Porifera	Hexactinellida	Cladorhizidae		1	Carnivorous sponge	4514
Z100736	Porifera	Demospongiae	Cladorhizidae		1	Carnivorous sponge	4514
Z100737	Brachiopoda				1	Lamp shell	4514
S112120	Mollusca	Gastropoda	cf. Fissurellidae		1	Snail	4511
S112121	Mollusca	Bivalvia	cf. Galeommatidae		1	Bivalve	4511
S112122	Mollusca	Gastropoda	cf. Fissurellidae		1	Snail	4511
S112123	Mollusca	Bivalvia	cf. Xylophagidae		1	Boring bivalve	4511
V9867	Annelida	Polychaeta	Polynoidae		1	Scale worm	4491
V9868	Annelida	Polychaeta	Dorvilleidae		1	Segmented worm	4485
V9869	Annelida	Polychaeta	Dorvilleidae		1	Segmented worm	4485

Figure 21. Snapshot of samples from Dive S0347 in Cape Range Canyon.



3.3.2 Cloates Canyon ROV

A limited number of sites were explored at Cloates Canyon, due to time and weather constraints, however, early indications suggest a different fauna in comparison to Cape Range. Like Cape Range Canyon, Cloates Canyon functions to link the abyssal plain with the adjacent continental shelf within Gascoyne Marine Park and as such functions to serve as a conduit of sedimentary and biological material into the deep-sea environment. Further work in Cloates Canyon is recommended to more fully document initial faunal differences observed between Cloates and Cape Range Canyons in this survey work.

Four dives were completed at Cloates Canyon. No quantitative video transects were completed in Cloates Canyon due to the limited number of dives.

3.3.2.1 *Dive S0348 CL14: 3/28/2020*

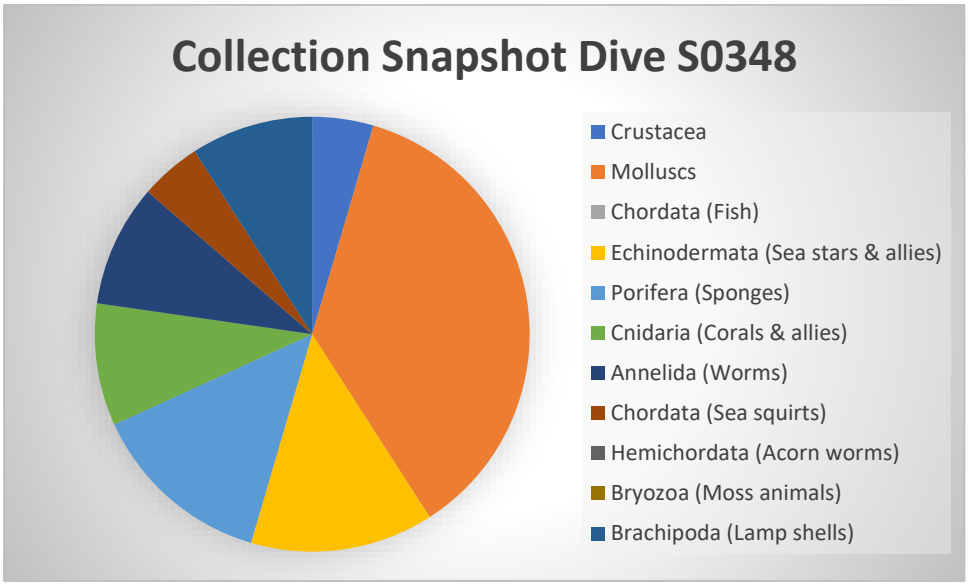
ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at the start of this dive (2,076.02 m). Targeted biodiversity samples were then made (see Table 17, Figure 22 below). Overall, 22 specimens representing eight orders/classes and seven phyla were selectively sampled from across the tree of life by ROV *SuBastian*.

Table 17. Biological samples from Dive S0348 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75687	Crustacea	Decapoda	Parapaguridae	*Parapagurus* cf. *furici*	1	Hermit crab	

Z100738	Echinodermata	Asteroidea			1	Sea star	2101
Z100739	Cnidaria	Anthozoa	Alcyoniidae	*Anthomastus?*	1	Soft coral	2101
Z100740	Echinodermata	Holothuroidea	Pelagothuriidae	*Enypniastes* sp.	1	Sea cucumber	2071
Z100741	Echinodermata	Holothuroidea	Mesothuriidae	cf. Mesothuria *sp.*	1	Sea cucumber	2098
Z100742	Brachiopoda				1	Lamp shell	2101
Z100743	Cnidaria	Anthozoa			1	Soft coral	2101
Z100744	Brachiopoda				1	Lamp shell	2101
Z100745	Chordata	Ascidiacea	Octacnemidae	*Megalodicopia* sp.	1	Carnivorous sea squirt	2100
S112124	Mollusca	Gastropoda	Turridae	*Ptychosyrinx* cf. *bisinuata*	1	Snail	2097
S112125	Mollusca	Bivalvia	Xylophagaidae		1	Boring bivalve	2101
S112127	Mollusca	Bivalvia	Xylophagaidae		1	Boring bivalve	2101
S112128	Mollusca	Bivalvia	Cuspidariidae		1	Carnivorous bivalve	2097
S112129	Mollusca	Bivalvia	Arcidae	*Bentharca asperula*	1	Ark shell	2097
S112130	Mollusca	Bivalvia	Limopsidae		1	Bivalve	2097
S112131	Mollusca	Bivalvia	Mytilidae		1	Mussel	2097
S112132	Mollusca	Bivalvia	Xylophagaidae		1	Boring bivalve	2101
V9870	Annelida	Polychaeta	Polynoidae		1	Scale worm	2100
V9871	Annelida	Polychaeta	Polynoidae		1	Scale worm	2100

Figure 22. Snapshot of samples from Dive S0348 in Cloates Canyon.



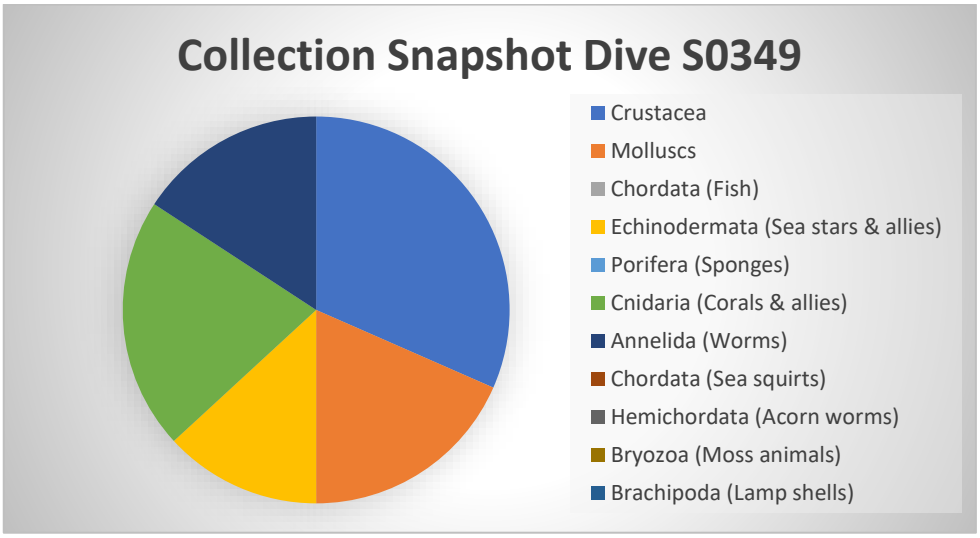
3.3.2.2 *Dive S0349 CL15: 4/02/2020*

ROV *SuBastian* deployed one push core at the start of the dive. Targeted biodiversity samples were then made (see Table 18, Figure 23 below). Near the end of the dive, ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at 2614.04 m. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 38 specimens representing eleven orders/classes and five phyla were selectively sampled from across the tree of life by ROV *SuBastian*.

Table 18. Biological samples from Dive S0349 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75692	Arthropoda	Amphipoda			1	Sideswimmer	2460
C75693	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma orientale*	5	Stalked barnacle	2460
C75694	Arthropoda	Amphipoda			1	Sideswimmer	2460
C75695	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma orientale*	1	Stalked barnacle	2460
C75696	Arthropoda	Amphipoda			1	Sideswimmer	2652
C75697	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma orientale*	3	Stalked barnacle	2652
Z100746	Echinodermata	Holothuroidea			1	Sea cucumber	2645
Z100747	Cnidaria	Anthozoa	Chrysogorgiidae	*Chrysogorgia*	1	Sea fan	2645
Z100748	Cnidaria	Anthozoa	Isididae		1	Bamboo coral	2542
Z100749	Echinodermata	Crinoidea			1	Feather star	2542
Z100750	Cnidaria	Anthozoa	Chrysogorgiidae	*Iridogorgia*	1	Soft coral	2461
Z100751	Cnidaria	Anthozoa	Primnoidae	*Calytrophora* sp.	1	Soft coral	2652
Z100752	Cnidaria	Anthozoa	Primnoidae	*Calytrophora* sp.	1	Soft coral	2652
Z100753	Cnidaria	Anthozoa			1	Soft coral?	2646
Z100754	Echinodermata	Ophiuroidea			1	Brittle star	2646
Z100755	Cnidaria	Anthozoa	Primnoidae	*Calyptrophora* sp.	1	Soft coral	2542
Z100756	Echinodermata	Ophiuroidea			1	Brittle star	2542
Z100757	Echinodermata	Ophiuroidea			1	Brittle star	2542
Z100758	Cnidaria	Hydrozoa			1	Hydroid	2461
S112133	Mollusca	Cephalopoda			1	Squid	627
S112134	Mollusca	Cephalopoda			1	Squid	1089
S112135	Mollusca	Cephalopoda	Cranchiidae		1	Glass squid	1093
S112136	Mollusca	Bivalvia	cf. Xylophagaidae		1	Boring bivalve	2644
S112137	Mollusca	Bivalvia	Nuculanidae	*Ledella ultima*	1	Bivalve	2645
S112138	Mollusca	Gastropoda	Epitoniidae		1	Parasitic snail	2652
S112139	Mollusca	Bivalvia	cf. Xylophagaidae		1	Boring bivalve	2644
V9872	Annelida	Polychaeta	Acrocirridae	*Swima* sp.	1	Worm	2543
V9873	Annelida	Polychaeta	Acrocirridae	*Swima* sp.	1	Worm	2485
V9874	Annelida	Polychaeta	Acrocirridae	*Swima* sp.	1	Worm	2485
V9875	Annelida	Polychaeta	Sabellidae		1	Tube worm	2644
V9876	Annelida	Polychaeta	Acrocirridae	*Swima* sp.	1	Worm	2543
V9881	Annelida	Polychaeta	Polynoidae		1	Scale worm	2645

Figure 23. Snapshot of samples from Dive S0349 in Cloates Canyon.



3.3.2.3 *Dive S0350 CL19: 4/04/2020*

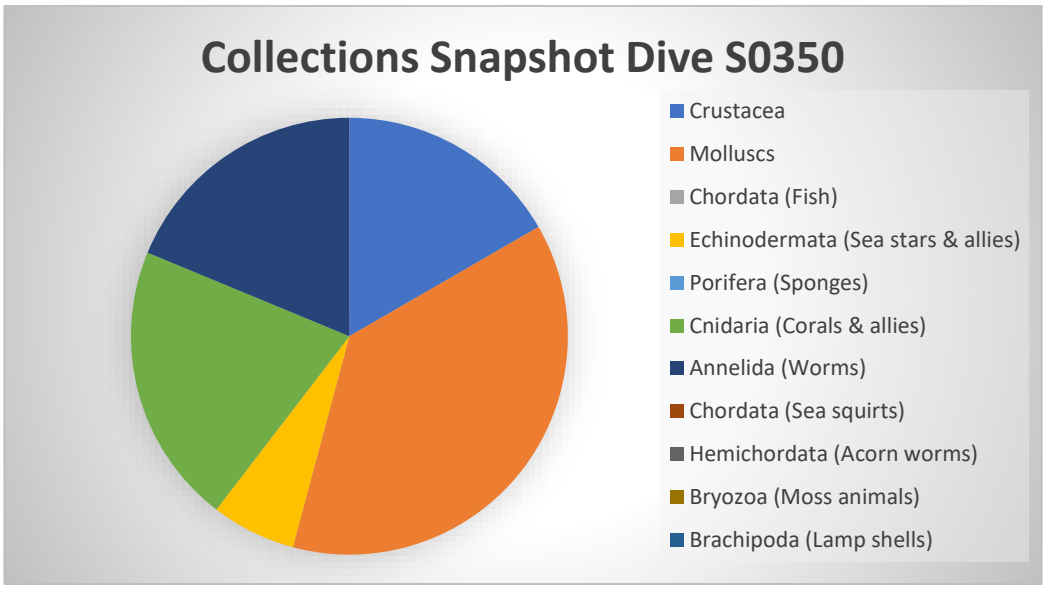
ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses at the and one push core at the start of this dive (~3,300 m). Targeted biodiversity samples were then made (see Table 19, Figure 23 below). One Autonomous Reef Monitoring System (ARMS) was deployed. Near the end of the dive, ROV *SuBastian* fired two more Niskin bottles to obtain water samples for eDNA analyses. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Overall, 48 specimens representing nine orders/classes and five phyla were selectively sampled from across the tree of life by ROV *SuBastian*.

Table 19. Biological samples from Dive S0350 hand collected by ROV SuBastian registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75698	Arthropoda	Scalpellomorpha	Scalpellidae	*Trianguloscalpellum darwinii*	1	Stalked barnacle	3307
C75699	Arthropoda	Scalpellomorpha	Scalpellidae	*Trianguloscalpellum gigas*	1	Stalked barnacle	3307
C75700	Arthropoda	Scalpellomorpha	Scalpellidae	*Trianguloscalpellum gigas*	1	Stalked barnacle	3307
C75701	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma* cf. *rectum*	1	Stalked barnacle	3307
C75702	Arthropoda	Scalpellomorpha	Poecilasmatidae	*Glyptelasma* cf. *rectum*	2	Stalked barnacle	3307
C75703	Arthropoda	Amphipoda			1	Sideswimmer	3307
C75713	Arthropoda	Amphipoda			1	Sideswimmer	3420
Z100763	Cnidaria	Anthozoa	Cladopathidae	*Heteropathes*	1	Black coral	3324
Z100764	Cnidaria	Anthozoa	Schizopathidae	*Bathypathes*	1	Black coral	3405

Z100765	Cnidaria	Anthozoa	Corallimorphidae	*Corallimorphis* sp.	1	Corallimorph	3417
Z100766	Cnidaria	Anthozoa	Schizopathidae	*Bathypathes* cf. *patula*	1	Black coral	3291
Z100767	Cnidaria	Anthozoa	Primnoidae	*Narella* sp.	1	Soft coral	3259
Z100768	Cnidaria	Anthozoa			1	Soft coral?	3259
Z100769	Cnidaria	Anthozoa	Primnoidae	*Narella* sp.	1	Soft coral	3260
Z100770	Cnidaria	Anthozoa			1	Soft coral?	3251
Z100771	Echinodermata	Crinoidea			1	Feather star	3251
Z100772	Echinodermata	Ophiuroidea			1	Brittle star	3308
Z100773	Cnidaria	Anthozoa			1	Soft coral?	3260
Z100774	Cnidaria	Anthozoa			1	Soft coral?	3260
Z100775	Echinodermata	Ophiuroidea			1	Brittle star	3420
S112126	Mollusca	Gastropoda	Epitoniidae		1	Parasitic snail	3307
S112140	Mollusca	Bivalvia	Xylophagaidae		10	Boring bivalve	3419
S112141	Mollusca	Gastropoda	Raphitomidae	*Daphnella* sp.	1	Snail	3309
S112142	Mollusca	Gastropoda	cf. Raphitomidae		1	Snail	3417
S112143	Mollusca	Gastropoda	Architectonidae		1	Snail	3404
S112144	Mollusca	Gastropoda			1	Snail	3404
S112145	Mollusca	Gastropoda			1	Snail	3404
S112146	Mollusca	Gastropoda			1	Snail	3385
S112147	Mollusca	Gastropoda			1	Snail	3413
V9877	Annelida	Polychaeta	Acrocirridae	*Swima* sp.	1	Worm	3331
V9878	Annelida	Polychaeta	Acrocirridae	*Swima* sp.	1	Worm	3386
V9879	Annelida	Polychaeta	Dorvilleidae		1	Worm	3386
V9880	Annelida	Polychaeta	Polynoidae		1	Scale worm	3386
V9882	Annelida	Polychaeta	Polynoidae		1	Scale worm	3259
V9883	Annelida	Polychaeta	Polynoidae		2	Scale worm	3259
V9884	Annelida	Polychaeta	Polynoidae		2	Scale worm	3259

Figure 24. Snapshot of samples from Dive S0350 in Cloates Canyon.



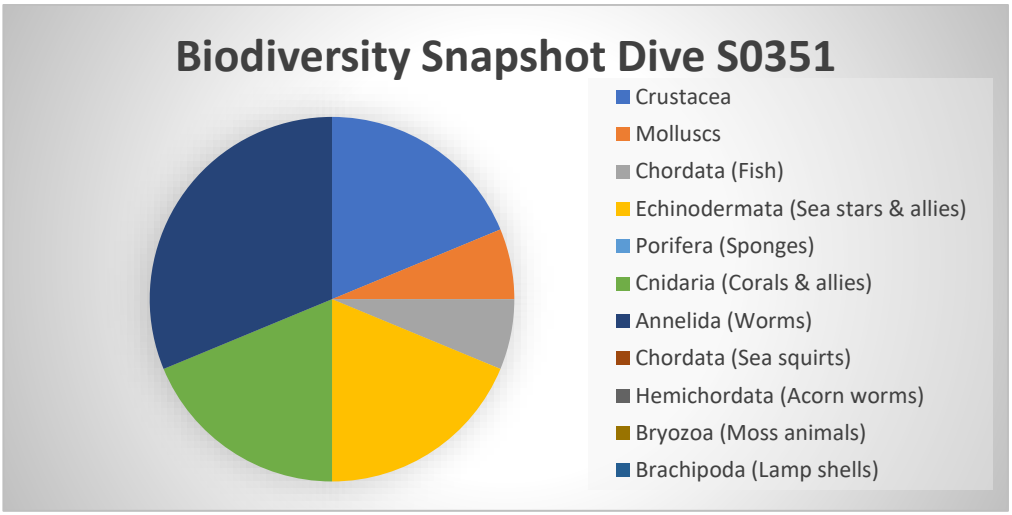
3.3.2.4 *Dive S0351 CL17: 4/05/2020*

ROV *SuBastian* fired two Niskin bottles to obtain water samples for eDNA analyses and deployed one push core at the start of this dive (~2,600m). Targeted biodiversity samples were then made (see Table 20, Figure 25 below). One Autonomous Reef Monitoring System (ARMS) was deployed. ROV *SuBastian* continued to sample biological specimens from the benthos before ascending to the surface. Sixteen specimens representing eight orders/classes and six phyla were selectively sampled from across the tree of life by ROV *SuBastian*.

Table 20. Biological samples from Dive S0351 hand collected by ROV *SuBastian* registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Depth (m)
C75714	Arthropoda	Decapoda	Chirostylidae	*Uroptychus gracilimanus*	1	Squat lobster	2676
C75715	Arthropoda	Decapoda	Chirostylidae	*Uroptychus gracilimanus*	1	Squat lobster	2707
C75716	Arthropoda	Decapoda	Homolidae	*Lamoha* cf. *longirostris*	1	Carrier crab	2672
P.35102-001	Chordata	Osteichthyes	Macrouridae	*Coryphaenoides rudis*	1	Fish	2707
Z100776	Cnidaria	Anthozoa	Chrysogorgiidae	*Chrysogorgia*	1	Sea fan	2707
Z100777	Echinodermata	Echinoidea			1	Sea urchin	2708
Z100778	Echinodermata	Asteroidea	Pterasteridae	*Hymenaster*	1	Sea star	2716
Z100779	Echinodermata	Crinoidea			1	Feather star	2707
Z100780	Cnidaria	Anthozoa			1	Soft coral?	2672
Z100781	Cnidaria	Anthozoa	Chrysogorgiidae	*Chrysogorgia*	1	Sea fan	2676
S112148	Mollusca	Cephalopoda	Cranchiidae		1	Glass squid	1464
V9885	Annelida	Polychaeta	Endomyoztomidae		1	Parasitic worm	2707
V9886	Annelida	Polychaeta	Endomyoztomidae		1	Parasitic worm	2707
V9887	Annelida	Polychaeta	Polynoidae		1	Scale worm	2708
V9888	Annelida	Polychaeta	Polynoidae		1	Scale worm	2676
V9889	Annelida	Polychaeta	Polynoidae		1	Scale worm	2676

Figure 25. Snapshot of samples from Dive S0351 in Cloates Canyon.



3.4 Large fish traps (and amphipod traps)

Figure 26. Large fish trap being deployed by deck crane with a syntatic float. Photo SOI.

A single large commercial fish trap was deployed six times. The trap was modified to fit a SIO-owned acoustic release, weighted with sacrificial steel ballast and floatation provided by a 40” syntactic float. The trap was 1,630 mm x 1,630 mm x 780 mm high with a large single funnel entrance and was wrapped in ‘budgie-wire’ (~10 mm mesh). It was baited with a combination of tuna heads, bait fish and fish offal from a commercial fish processor. Mounted inside the trap were two funnel traps for the first three deployments to catch small scavenging crustaceans that would otherwise not be retained by the larger trap. The funnel traps consisted of a 400 mm long, 80 mm diameter PVC pipe with an inverted funnel (aperture ~20 mm) and 1 mm mesh at each end. The trap was deployed from the deck crane and recovered by tender and deck crane. Reported soak times are from ‘on bottom’ to ‘off bottom’, excluding descent/ascent.

3.4.1 Deployments

FTR/001: 12/03/2020. 2041m. Soak time 17:37 (12/03) – 15:08 (13/03) [21:31 hrs].
FTR/002: 17/03/2020. 2453m. Soak time 19:24 (15/03) – 05:01 (17/03) [33:37 hrs].
FTR/003: 20/03/2020. 4266m. Soak time 08:28 (20/03) – 03:44 (22/03) [31:16 hrs].
FTR/004: 25/03/2020. 4418m. Soak time 22:17 (25/03) – 15:39 (27/03) [41:22 hrs].
FTR/005: 28/03/2020. 2600m. Soak time 17:02 (28/03) – 13:24 (01/04) [92:22 hrs].
FTR/006: 01/04/2020. 3380m. Soak time 19:59 (01/04) – 15:28 (04/04) [67:29 hrs].

Figure 27. Dr. Glenn Moore working on a fish trap. Photo SOI.

3.4.2 Catch summary

Table 21. Samples from traps deployed onboard during FK200308 registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Deployment
C75584	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldaror*	3	Sideswimmer	FTR/001
C75585	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldaror*	13	Sideswimmer	FTR/001
C75586	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldaror*	14	Sideswimmer	FTR/001
C75629	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldaror*	3	Sideswimmer	FTR/002
C75630	Arthropoda	Amphipoda	Alicellidae	*Tectavolpsis cf. fusilus*	10	Sideswimmer	FTR/002
C75631	Arthropoda	Amphipoda	Tryphosidae?		7	Sideswimmer	FTR/002
C75654	Arthropoda	Amphipoda	Alicellidae	*Tectavolpsis cf. fusilus*	11	Sideswimmer	FTR/003
C75655	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* sp.	3	Sideswimmer	FTR/003
C75656	Arthropoda	Amphipoda			3	Sideswimmer	FTR/003
C75685	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *sigmiferus*	1	Sideswimmer	FTR/004
C75686	Arthropoda	Amphipoda			1	Sideswimmer	FTR/004
C75708	Arthropoda	Decapoda	Munidopsidae	*Munidopsis pallida*	1	Squat lobster	FTR/006
C75709	Arthropoda	Decapoda	Munidopsidae	*Munidopsis pallida*	1	Squat lobster	FTR/006
C75710	Arthropoda	Decapoda	Munidopsidae	*Munidopsis cf. aries*	1	Squat lobster	FTR/006
C75711	Arthropoda	Decapoda	Munidopsidae	*Munidopsis cf. aries*	1	Squat lobster	FTR/006
C75712	Arthropoda	Decapoda	Benthesicymidae	*Bathicaris seymouri*	1	Prawn	FTR/006
P.35084-001	Chordata	Osteichthyes	Zoarcidae	*Seleniolycus*	5	Fish	FTR/002
P.35099-001	Chordata	Osteichthyes	Zoarcidae	*Pachycara*	1	Fish	FTR/005
P.35099-002	Chordata	Osteichthyes	Zoarcidae	*Seleniolycus*	1	Fish	FTR/005
P.35101-001	Chordata	Osteichthyes	Zoarcidae	*Pachycara*	1	Fish	FTR/006
P.35101-002	Chordata	Osteichthyes	Ophidiidae	*Acanthonus armatus*	1	Fish	FTR/006

Figure 28. Design of small fish traps before wrapping in fine mesh. Photo SOI.

The last deployment, FTR/006, included a small fish trap and a commercial plastic craypot attached by wire cables so that they were resting on the seafloor. The two species of squat lobsters were caught in these traps and had not been seen or collected during ROV dive, demonstrating how utilising multiple methods increases the documented biodiversity.

Of the three species of fishes collected by the large trap, only one was also seen or collected by ROV, making this method an important addition to our sampling regime. Both species are likely to be undescribed.

3.5 Lander (lobster traps, amphipod traps, small fish traps)

A single large lander was deployed seven times. The lander was fitted with an acoustic release, weighted with sacrificial steel ballast and floatation provided by a syntactic float (see Figure). The lander platform was fitted with two crustacean traps, two small fish traps and two funnel traps. The crustacean traps were commercial plastic lobster trap (780 mm x 640 mm x 380 mm high with a top funnel entrance with an internal fine mesh lining (0.5 mm). The small fish traps were custom box-style traps (300mm x 600mm x 300mm high) with a funnel entrance on one end, wrapped in ‘budgie-wire’ (~10mm mesh). All were baited with a combination of tuna heads, bait fish and fish offal from a commercial fish processor. Mounted to the lander frame were two funnel traps (see Figure) to catch small scavenging crustaceans that would otherwise not be retained by the larger trap. The lander was deployed from the deck crane and recovered by tender and deck crane. Reported soak times are from ‘on bottom’ to ‘off bottom’, excluding descent/ascent.

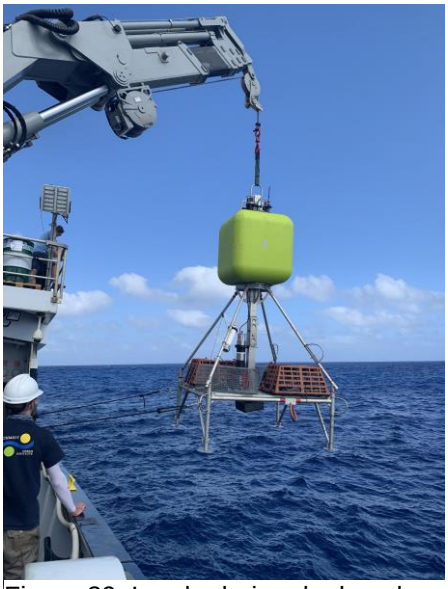


Figure 29. Lander being deployed showing crustacean and small fish traps. Photo SOI.

3.5.1 Deployments

LDR/001: 11/03/2020. 2080m. Soak time 21:43 (12/03) – 04:30 (13/03) [06:47 hrs].
LDR/002: 12/03/2020. 2025m. Soak time 16:50 (12/03) – 15:18 (13/03) [22:28 hrs].
LDR/003: 14/03/2020. 2508m. Soak time 20:14 (14/03) – 05:00 (15/03) [08:46 hrs].
LDR/004: 20/03/2020. 4364m. Soak time 08:55 (22/03) – 03:45 (22/03) [18:50 hrs].
LDR/005: 25/03/2020. 4292m. Soak time 22:56 (25/03) – 16:00 (27/03) [41:04 hrs].
LDR/006: 28/03/2020. 2626m. Soak time 17:22 (28/03) – 13:46 (01/04) [92:24 hrs].

LDR/007: 01/04/2020. 3355m. Soak time 19:54 (01/04) – 15:45 (04/04) [67:51 hrs].

3.5.2 Catch summary

Table 22. Samples from lander deployed onboard during FK200308 registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Deployment
	Arthropoda	Amphipoda					LDR/001
C75565	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	6	Sideswimmer	LDR/001
C75566	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	6	Sideswimmer	LDR/001
C75567	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes cf. thurstoni*	1	Sideswimmer	LDR/001
C75568	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	1	Sideswimmer	LDR/001
C75569	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	1	Sideswimmer	LDR/001
C75570	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	1	Sideswimmer	LDR/001
C75571	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	5	Sideswimmer	LDR/001
C75572	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoro*	5	Sideswimmer	LDR/001
C75573	Arthropoda	Amphipoda	Tryphosidae		1	Sideswimmer	LDR/001
C75574	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	1	Sideswimmer	LDR/001
C75575	Arthropoda	Amphipoda			15	Sideswimmer	LDR/001
C75576	Arthropoda	Amphipoda	Tryphosidae	*Orchomene*? sp.	10	Sideswimmer	LDR/001
C75577	Arthropoda	Amphipoda	Tryphosidae?		10	Sideswimmer	LDR/001
C75578	Arthropoda	Amphipoda			Many	Sideswimmer	LDR/001
C75579	Arthropoda	Amphipoda			Many	Sideswimmer	LDR/001
C75587	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	31	Sideswimmer	LDR/002
C75590	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	20	Sideswimmer	LDR/002
C75591	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis*	10	Sideswimmer	LDR/002
C75592	Arthropoda	Cumacea			1	Comma Shrimp	LDR/002
C75593	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	1	Sideswimmer	LDR/002
C75594	Arthropoda				2	Sideswimmer	LDR/002
C75595	Arthropoda				4	Sideswimmer	LDR/002

C75596	Arthropoda				1	Sideswimmer	LDR/002
C75597	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	17	Sideswimmer	LDR/002
C75598	Arthropoda	Amphipoda	Lyssianassidae		1	Sideswimmer	LDR/002
C75599	Arthropoda				3	Sideswimmer	LDR/002
C75600	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* sp. 2	3	Sideswimmer	LDR/002
C75601	Arthropoda				2	Sideswimmer	LDR/002
C75602	Arthropoda				1	Sideswimmer	LDR/002
C76511	Arthropoda	Amphipoda			Many	Sideswimmer	LDR/003
C75612	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	4	Sideswimmer	LDR/003
C75613	Arthropoda	Amphipoda	Tryphosidae?		8	Sideswimmer	LDR/003
C75752	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	2	Sideswimmer	LDR/003
C75657	Arthropoda	Amphipoda	Hyperiidae		3	Sideswimmer	LDR/004
C75658	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	16	Sideswimmer	LDR/004
C75659	Arthropoda	Amphipoda	Tryphosidae?		8	Sideswimmer	LDR/004
C75660	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	3	Sideswimmer	LDR/004
C75661	Arthropoda	Amphipoda			1	Sideswimmer	LDR/004
C75662	Arthropoda	Amphipoda			8	Sideswimmer	LDR/004
C75681	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	1	Sideswimmer	LDR/005
C75682	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	2	Sideswimmer	LDR/005
C75683	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *sigmiferous*	10	Sideswimmer	LDR/005
C85684	Arthropoda	Amphipoda	Tryphosidae?		10	Sideswimmer	LDR/005
C75688	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes*	13	Sideswimmer	LDR/006
C75689	Arthropoda	Amphipoda	Tryphosidae?		2	Sideswimmer	LDR/006
C75690	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	2	Sideswimmer	LDR/006
C75691	Arthropoda	Amphipoda			8	Sideswimmer	LDR/006
C75753	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *maldoror*	4	Sideswimmer	LDR/006
C75704	Arthropoda	Amphipoda	Eurytheneidae	*Eurythenes* cf. *sigmiferous*	3	Sideswimmer	LDR/007
C75705	Arthropoda	Amphipoda	Alicellidae	*Tectavolopsis* cf. *fusilus*	3	Sideswimmer	LDR/007
C75706	Arthropoda	Amphipoda	Tryphosidae?		8	Sideswimmer	LDR/007
C75707	Arthropoda	Decapoda	Munidopsidae	*Munidopsis* cf. aries	1	Squat lobster	LDR/007
P.35076-001	Chordata	Osteichthyes	Zoarcidae	*Seleniolycus*	1	Fish	LDR/002
P.35098-001	Chordata	Osteichthyes	Ophididae	*Barathrites iris*	3	Fish	LDR/005
P.35100-001	Chordata	Osteichthyes	Zoarcidae	*Seleniolycus*	2	Fish	LDR/006

The fine mesh of the crustacean traps retained large numbers of scavenging amphipods from all deployments, with some bulk samples yet to be fully sorted and identified. The single squat lobster specimen, *Munidopsis* cf. *aries,* was clinging to the outside of one of the small fish traps. The scavenging amphipods will have entered the traps by swimming, and the paucity of crawling crustaceans is likely due to the traps being lifted up off the seafloor by the lander platform.

Of the two species of fishes collected by the lander traps, only one was also seen or collected by ROV, making this method an important addition to our sampling regime. That species likely to be undescribed.

3.6 Plankton samples

Plankton sampling was undertaken three times. A weighted Double Bongo net (500µm) was lowered from the surface through a layer visible on the ship's sounders and retrieved using a deck crane twice and a blue water dive, with sampling of the water column, took place opportunistically following an ROV dive.

3.6.1 Deployments

PLK/001: 13/03/2020. 0–150m. Start time 15:30.
PLK/002: 23/03/2020. 0–684m. Start time 15:50.
FK200308/334/CR2a: 13/03/2020. 278 m.

3.6.2 Catch summary

Table 23. Samples from plankton nets deployed onboard during FK200308 registered into WA Museum collections.

WAM No.	Phylum	Order or Class	Family	Genus and species	No.	Common name	Deployment
C75603	Arthropoda	Decapoda	Luciferidae	*Lucifer*	10	Prawn	PLK/001
C75604	Arthropoda	Cyclopoida	Sapphrinidae	*Copilia mirabilis*	1	Copepod	PLK/001
C75664	Arthropoda	Amphipoda	Hyperiidae		1		PLK/002
C75665	Arthropoda	Decapoda	Luciferidae	*Lucifer*	1	Prawn	PLK/002
C75666	Arthropoda	Cyclopoida	Sapphrinidae	*Copilia mirabilis*	8	Copepod	PLK/002
C75668	Arthropoda	Amphipoda	Hyperiidae		1		PLK/002
V9813	Annelida	Phyllodocida	Tomopteridae	*Tomopteris*	1	Segmented worms	PLK/001
V9814	Annelida	Phyllodocida	Alciopidae		2	Segmented worms	PLK/001
V9815	Annelida	Phyllodocida	Alciopidae		1	Segmented worms	PLK/001
V9816	Annelida	Phyllodocida	Chrysopetalidae		1	Segmented worms	PLK/001
V9860	Annelida	Phyllodocida	Polynoidae		1	Segmented worms	PLK/002
V9861	Annelida	Phyllodocida	Alciopidae		1	Segmented worms	PLK/002
V9862	Annelida	Phyllodocida	Polynoidae		1	Segmented worms	PLK/002
V9863	Annelida	Phyllodocida	Tomopteridae		1	Segmented worms	PLK/002
V9864	Annelida	Polychaeta			1	Segmented worms	PLK/002
V9865	Annelida	Phyllodocida	Syllidae		1	Segmented worms	PLK/002
V9866	Annelida	Polychaeta			1	Segmented worms	PLK/002
P.35078-001	Chordata	Osteichthyes		Unidentified larvae	3	Fish	PLK/001
P.35093-001	Chordata	Osteichthyes		Unidentified larvae	10	Fish	PLK/002
P.35093-002	Chordata	Osteichthyes	Ophididae	Unidentified larva	1	Fish	PLK/002
S112013	Mollusca	Gastropoda	cf. Cavolinidae		1	Sea butterfly	334/CR2a
S112014	Mollusca	Cephalopoda			1	Squid	PLK/001
S112015	Mollusca	Cephalopoda			1	Squid	PLK/001
S112016	Mollusca	Cephalopoda			1	Squid	PLK/001
S112017	Mollusca	Gastropoda	cf. Cavolinidae		1	Sea butterfly	PLK/001
S112018	Mollusca	Gastropoda	cf. Cavolinidae		1	Sea butterfly	cf. Cavolinidae
S112019	Mollusca	Bivalvia			1	Clam	PLK/001
S112020	Mollusca	Gastropoda	Cavoliniidae		1	Sea butterfly	PLK/001
S112021	Mollusca	Gastropoda			1	Snail	PLK/001
S112022	Mollusca	Gastropoda	cf. Naticidae		1	Snail	PLK/001
S112023	Mollusca	Gastropoda	Eulimidae		1	Snail	PLK/001
S112024	Mollusca	Gastropoda			1	Snail	PLK/001
S112025	Mollusca	Gastropoda			1	Snail	PLK/001
S112026	Mollusca	Gastropoda			1	Snail	PLK/001

S112027	Mollusca	Gastropoda			1	Snail	PLK/001
S112028	Mollusca	Gastropoda			1	Snail	PLK/001
S112029	Mollusca	Gastropoda			1	Snail	PLK/001
S112030	Mollusca	Gastropoda			1	Snail	PLK/001
S112031	Mollusca	Gastropoda			1	Snail	PLK/001
S112099	Mollusca	Gastropoda			1	Snail	PLK/002
S112100	Mollusca	Gastropoda			1	Snail	PLK/002
S112101	Mollusca	Gastropoda			1	Snail	PLK/002
S112102	Mollusca	Gastropoda			1	Snail	PLK/002
S112103	Mollusca	Gastropoda			1	Snail	PLK/002
S112104	Mollusca	Gastropoda			1	Snail	PLK/002
S112105	Mollusca	Gastropoda			1	Snail	PLK/002
S112106	Mollusca	Gastropoda			1	Snail	PLK/002
S112107	Mollusca	Gastropoda			1	Snail	PLK/002
S112108	Mollusca	Gastropoda			1	Snail	PLK/002
S112109	Mollusca	Gastropoda			1	Snail	PLK/002
S112110	Mollusca	Gastropoda			1	Snail	PLK/002

3.7 Innovative Methods

The skill and ingenuity of the ROV team coupled with a scientific need for new tools led to noteworthy advances in specimen sampling or capture. The first was the utilisation of a common household brush to attempt non-invasive genetic sampling (dubbed the Kitchen Brush of Science, KBOS) of cephalopods and resulted in 5 unsuccessful and 1 successful sampling events. The successful attempts resulted in clean sequence data for the targeted genetic marker to aid in species level identification of midwater squid.

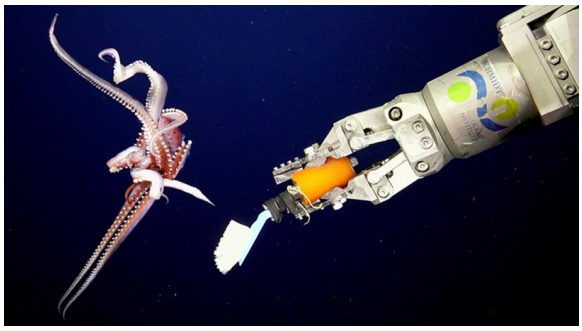


Figure 30. ROV *SuBastian* enticing a flowervase squid with the KBOS. Photo SOI.

Secondly, the capture of fish using nets held by the ROV arm was unprecedented and resulted in the acquisition of 10 significant specimens that were completely unexpected.

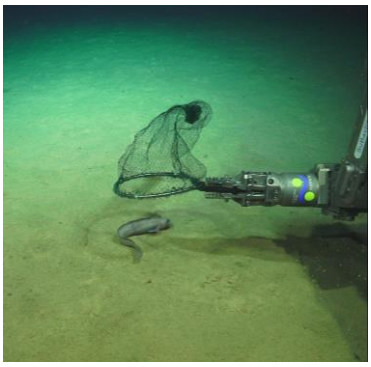


Figure 31. ROV *SuBastian* expertly manipulating a hand net to capture a fish. Photo SOI.

3.8 Autonomous Reef Monitoring Structures (ARMS) deployments

ARMS were deployed to allow small organisms not caught by other means to settle on the surfaces and utilize the cavities. The intent is then to return and sample the entire structure to assess faunal composition within the 'hotel'. The deployment of three ARMS in Cape Range Canyon, one at CR7 during Dive 338, one at CR11 during Dive 341 and one at CR10 during Dive 343 and as well as two ARMS in Cloates Canyon at CL19 during Dive 350 and CL17 during Dive 351 was noteworthy because it is the first time ARMS have been deployed at abyssal depths. They will yield future quantifiable biodiversity returns when they are retrieved, and extend our research through sampling of small, cryptic fauna not possible with the use of *ROV SuBastian*'s manipulator arms. They have been deployed around the world and will also yield comparative data between the deep sea and shallow reefs.

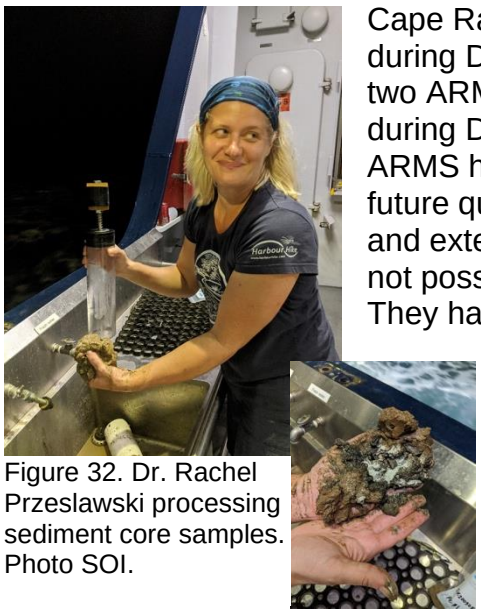


Figure 32. Dr. Rachel Przeslawski processing sediment core samples. Photo SOI.

3.9 Video transect surveys

Twelve quantitative video transects were completed in Cape Range Canyon, which will serve as an important trial for monitoring marine parks in Australia (Post et al. 2022).

3.10 Sediment cores

Sediment sampling resulted in 20 push cores sampled for grain size and some infauna, although the latter yielded very few specimens including no indication of what organism made the mysterious 'spider trace' Przeslawski 2023).

3.11 Genetic barcode data

Select specimens had small tissue subsamples taken for genetic sequencing purposes onboard RV *Falkor*. Marine invertebrates were then sequenced for the barcode gene back at the WA Museum Molecular Systematics Unit. Additionally, fish had sequencing completed through the Australian National Fish Collection (Barcode of Life Database). These data will be used for insight into phylogenetic relationships, identification of cryptic species and new species descriptions. These data can also be used to provide a library for eDNA work in the area. The

Figure 33. Mr. David Juskiewicz taking tissue subsamples. Photo SOI.

sequences will be uploaded to GenBank on completion of scientific study and publication of results.

Table 24. Sequences from specimens collected during FK200308.

Phylum	Number of sequences to October 2023
Annelida	33
Arthropoda	73
Cnidaria	43
Echinodermata	32
Hemichordata	3
Mollusca	51
Porifera	12
Fish	36

3.12 eDNA sampling and analysis

Figure 34. Dr. Georgia Nester filtering water samples for eDNA capture. Photo SOI.

Another aim of the expedition was to screen water for eDNA to extend the reach of the biodiversity sampling using traditional methods. To this end, 10 CTDs were completed with 150 Niskins fired, and 57 ROV Niskins were also fired enabling filtration of 2,070 litres of water (1,500L CTD and 570L ROV) by Dr. Georgia Nester, who was then a Curtin University PhD student supported on the Student-of-Opportunity program of SOI.

See link to her experience on the cruise and overview of her research aims while onboard R/V *Falkor* expedition to Ningaloo Canyons at - https://schmidtocean.org/cruise-log-post/new-discoveries-experiences-and-friendships/

Two eDNA metabarcoding assays (COI Leray and 16S Fish) were applied to 178 ten-litre water samples collected across 5 depths: surface, 200 m 500 m, 1,000 m, and bottom (1,750 m – 4,540 m). The application of these assays unveiled 226 species spanning 129 families, with each canyon detecting unique species. Notably, we identified 109 putative new species, new records, or range extensions, including potential new species of the monotypic ctenophore *Velamen* aff. *parallelum*, new records of the elusive giant squid *Architeuthis dux*, as well as several migratory mammal species such as the deep-diving Pygmy Sperm whale (*Kogia breviceps*).

4 Scientific Outcomes and Impact

4.1 Publicly available data

All data will ultimately become publicly available from this expedition, with much data publicly available now. All data outlined in the following section (Section 4. Data and Sample Storage) are publicly available, and links are included to facilitate searching these online repositories.

5 Data and Sample Storage

5.1 Hydrographic and bathymetric data

Data on hydrography and bathymetry can be accessed via the expedition webpage found here: https://schmidtocean.org/cruise/illuminating-biodiversity-of-ningaloo-canyons/#data

Survey Bathymetry data is archived at AusSeaBed data portal.

ADCP data has been processed and archived by UHDAS.

5.2 Physical and chemical composition of the water column

Environmental sensor data and fluid Chemistry, CTD, Navigation and Eventlogger documentation collected by ROV *SuBastian* can also be accessed via the expedition webpage found here: https://schmidtocean.org/cruise/illuminating-biodiversity-of-ningaloo-canyons/#data

Environmental sensor data collected by RV *Falkor* is archived at Rolling Deck to Repository.

Fluid Chemistry, CTD, Navigation and Eventlogger documentation collected by ROV SuBastian is archived at Marine Geoscience Data Center.

5.3 Sediment samples

Grain size, other sedimentological variables can be accessed through the Marine Sediments Database (MaRS) via AusSeabed (see link above).

Figure 35. Ms. Jenelle Ritchie with a FK200308 specimen lodged in the WA Museum collections. Photo Lisa Kirkendale.

5.4 ROV sample archives

Fauna and sediments collected during the cruise are archived at the Western Australian Museum (WAM) and with Geoscience Australia. See Expedition Accomplishments reported earlier for faunal lists by dive as well as Appendix 1 for an inventory of samples collected by ROV at each dive site and location of collection.

The ROV imagery has been archived on the National Computational Infrastructure (NCI) and can be viewed on the THREDDS Server:
Catalog http://dapds00.nci.org.au/thredds/catalog/fk1/catalog.html (Look for GA4859_CapeRange_FK200308).

Annotated imagery is available in Squidle+. [You may have to create a username and password to access full capabilities]. To view images from this cruise, click SELECT DEPLOYMENTS, and choose FK200308.

Publicly available metadata for specimens sampled during the voyage are available at Atlas of Living Australia (see links in below table organized by faunal group).

Table 25. Samples collected during FK200308 and lodged in the WA Museum with metadata publicly available at the Atlas of Living Australia.

Group	No. of ALA records	Date verified	Hyperlink to each data set
Sponges	30	23/01/2023	Search: Collection: Western Australian Museum Marine Invertebrate Collection | Occurrence records | Atlas of Living Australia (ala.org.au)
Corals (Cnidaria)	51	23/01/2023	Search: Collection: Western Australian Museum Marine Invertebrate Collection | Occurrence records | Atlas of Living Australia (ala.org.au)
Echinoderms	42	23/01/2023	Search: Collection: Western Australian Museum Marine Invertebrate Collection | Occurrence records | Atlas of Living Australia (ala.org.au)
Bryozoans	2	23/01/2023	Search: Collection: Western Australian Museum Marine Invertebrate Collection | Occurrence records | Atlas of Living Australia (ala.org.au)

Ascidians	**6**	**23/01/2023**	**Search: Collection: Western Australian Museum Marine Invertebrate Collection | Occurrence records | Atlas of Living Australia (ala.org.au)**
Molluscs	**93**	**23/01/2023**	**https://biocache.ala.org.au/occurrence/search?q=qid%3A1674451636336&qualityProfile=ALA&fq=species_group%3A%22Molluscs%22&disableQualityFilter=scientific-name**
Crustacea	**114**	**23/01/2023**	**https://biocache.ala.org.au/occurrence/search?q=qid%3A1674444613198&qualityProfile=ALA&disableQualityFilter=scientific-name&fq=species_group%3A%22Crustaceans%22#tab_mapView**
Annelida	**76**	**23/01/2023**	**https://biocache.ala.org.au/occurrence/search?q=qid%3A1674444613198&qualityProfile=ALA&disableQualityFilter=scientific-name&fq=phylum%3A%22Annelida%22#tab_mapView**
Fish	**17**	**06/10/2023**	**https://biocache.ala.org.au/occurrence/search?q=qid%3A1696828190330&qualityProfile=ALA&disableAllQualityFilters=true#tab_recordsView**
Other	**5**	**23/01/2023**	**Search: Collection: Western Australian Museum Marine Invertebrate Collection | Occurrence records | Atlas of Living Australia (ala.org.au)**

5.5 Genetic data

DNA sequences continue to be archived and assigned accession codes at GenBank in an ongoing process as scientific publication occurs. eDNA sequences are archived at Zenodo and can be accessed here fluid Chemistry, CTD, Navigation and Eventlogger documentation collected by ROV *SuBastian* can also be accessed via the expedition webpage found at https://doi.org/10.5281/zenodo.7981207

6 Publications List & Summary

Sharing the findings and outcomes of this expedition is incredibly important to the transfer of knowledge globally. With so little known about benthic marine life in the Gascoyne Marine Park, an area subject to high levels of industrial pressure, these data will result in better management of the inhabitants of this marine park through scientific identification and georeferencing into the future.

6.1 Peer-reviewed publications

Post, A., Przeslawski, R., Nanson, R., Siwabessy, J., Smith, D., Kirkendale, L., and Wilson, N. G. (2022). Modern Dynamics, Morphology and Habitats of Slope-confined Canyons on the Northwest Australian Margin. *Marine Geology,* 443, 106694. [Open access]

Przeslawski, R., Maarten, J. M., and Christenhusz, F. L. S. (2022) Deep-sea discoveries. *Zoological Journal of the Linnean Society*, 194(4): 1037–1043 [Open access]

Przeslawski, R. (2022). Broad distribution of spider-shaped *lebensspuren* along the Australian continental margin. *Frontiers in Marine Science,* doi: 10.3389/fmars.2022.1086193. [This article is published as OPEN ACCESS].

6.2 Other publications

Post, A., Przeslawski, R., Huang, Z., Smith, D., Kirkendale, L. and N. Wilson. (2020). Gascoyne Marine Park - Post Survey Report, RV Falkor, FK200308. *Report filed by Geoscience Australia.* [Open access]

Post, A., Przeslawski, R., Huang, Z., Smith, D., Kirkendale, L., Wilson, N. (2021). *An Eco-Narrative of the Gascoyne Marine Park, North-West Marine Region.* Report to the National Environmental Science Program, Marine Biodiversity Hub. *Geoscience Australia.* [Open access]

Wilson, N., Kirkendale, L., Hosie, A., Moore, G., Rouse, G., Richards, Z., Gomez, O., Hara, A., Horowitz, J., Middelart, P., Morrison, H., Pogonoski, J., Allen, M., Whisson C., Pugh, P., Reid, M., Vecchione, M, Zampogna-Bertrand, R. (2022). An Illustrated Guide to the Fauna of the Ningaloo Canyons. *Western Australian Museum.* [Open access]

Proctor, P. P. (2023). Phylogenetic and Mitogenomic Insights of Acrocirridae (Cirratuliformia; Annelida): A Trans-Pacific Range Extension, New Genus, and Four New Species (MSc dissertation, UC San Diego).

6.3 Publications pending

- Description of four new pelagic polychaetes from the Western Australian margin
- Characterization of the pelagic Cephalopoda of the Ningaloo Canyons area
- Comparing eDNA to other biodiversity survey methods in deep canyons
- Black corals from mesophotic and deep Western Australia
- Cruise overview and synthesis publication

6.4 Conference presentations

Beaman, R., Picard, K., and Miller, A. (2022). RV Falkor Surveys in Australia 2020-2021. *Oral Presentation and Conference Paper,* Hydrospatial 2021 Conference, Australasian Hydrographic Society, Cairns, Australia. [Abstract and presentation are OPEN ACCESS].

Post, A., Przeslawski, R., Nanson, R., Siwabessy, J., Smith, D., Kirkendale, L., Wilson, N. (2021). Modern dynamics, morphology and habitats of slope-confined canyons on the northwest Australian margin. 1 July. Australian Marine Sciences Association Conference, Sydney/online.

Nerida Wilson was invited to deliver Plenary talk at the at International Indian Ocean Expedition II international meeting in Perth, Western Australia. (06 Feb 2023)

6.5 Media Impressions or Stories

Overall, media and press report from Schmidt Ocean Institute with highlights including:

148 articles, videos or news stories
863,550 twitter views of 34 posted videos

19 ROV livestreams with 651,831 views on YouTube

Figure 36. Enormous siphonophore that captivated audiences around the world. Photo SOI.

1. Unsere populärwissenschaftlichen Geschichten von 2020
Nach Welt • December 25, 2020

2. The Wildest Animal News From 2020
The New York Times • December 23, 2020

3. The deep sea discoveries of 2020 are stunning
Mashable • December 23, 2020

4. 2020's top ocean news stories
Mongabay • December 21, 2020

5. THE TOP TEN OCEAN STORIES OF 2020
Smithsonian Magazine • December 17, 2020

6. Where I Work- Greg Rouse
Nature • August 13, 2020

7. Deep Ocean Studies Unlock Hidden Secrets
AltaSea.org • July 31, 2020

8. See what no human eyes have seen before deep in the sea off Western Australia
AEON • June 22, 2020

9. Remote ocean research during COVID-19
CSIRO-Double Helix • June 18, 2020

10. Scientists Capture Rare Footage of Australia's Deep Sea
Yahoo News • June 16, 2020

11. Take a look at these amazing never-before-seen underwater creatures
In the Know Conservation • June 15, 2020

12. Take a look at these amazing never-before-seen underwater creatures
AOL video • June 15, 2020

13. Take a look at these amazing never-before-seen underwater creatures
Yahoo Life • June 15, 2020

14. World's longest animal discovered in Australian waters
Science Focus • June 9, 2020

15. Raised from depths, a feast for the eyes
The Australian • June 6, 2020

16. New Species Discovered During the Exploration of Abyssal Deep Sea Canyons Off Ningaloo
Seven Seas Media • May 30, 2020

17. Hypnotic 4K Video of Life 14,750-Feet Underwater Will Leave You Breathless
Modern Met • May 29, 2020

18. Where I Work- Andrew Hosie
Nature • May 28, 2020

19. Understanding the biodiversity of the Ningaloo Canyons in 4K
The Kid Should See This • May 27, 2020

20. Deep Sea Exploration in the Ningaloo Canyons Unveils Gripping Footage of Undiscovered Aquatic Life
ArtsSLAM • May 26, 2020

21. DEEP SEA EXPLORATION IN THE NINGALOO CANYONS UNVEILS GRIPPING FOOTAGE OF UNDISCOVERED AQUATIC LIFE
Unsorted • May 26, 2020

22. 惊艳迷人！璀璨的深海生物世界
QQ • May 26, 2020

23. Face to Face with Squat Lobsters and swimming worms
Nature • May 26, 2020

24. Deep-Sea Exploration in the Ningaloo Canyons Unveils Gripping Footage of Undiscovered Aquatic Life
Colossal • May 26, 2020

25. Mesmerizing 4K Footage of Deep Sea Creatures that Live in Unexplored Ningaloo Canyon
Petapixel • May 22, 2020

26. Spot on Science: 2020 Aquatic Update
IdeaStream • May 13, 2020

27. Science news in brief: From a deep-space mystery to the longest creature in the ocean
The Independent • April 30, 2020

28. The longest ocean creature may have just been discovered near Australia — and it looks like a giant galactic swirl
Business Insider • April 22, 2020

29. 150-Foot Creature Discovered
BuzzFeed News • April 21, 2020

30. This could be the longest ocean creature ever recorded
EarthSky • April 21, 2020

31. Ocean Wonders Siphonophores
Parley.TV • April 21, 2020

32. Nightly News
Channel 9 • April 21, 2020

33. DEEP SEA EXPLORATION
GWN7 news • April 20, 2020

34. Drive with Richard Glover
ABC Radio • April 20, 2020

35. Deep sea expedition uncovers 30 new species, plus longest-known animal
Daily Times • April 20, 2020

36. Hewan Terpanjang di Dunia Ditemukan di Perairan Australia
National Geographic Indonesia • April 20, 2020

37. Scientists discover what may be the longest animal on Earth in waters off Western Australia
South China Morning Post • April 19, 2020

38. Scientists in Australia Discover Enormous Worm-like Ocean Creature
The Great Courses Daily • April 19, 2020

39. Scientists just discovered the longest animal on Earth – and hardly anyone has ever heard of it
Indy100 • April 19, 2020

40. LONGEST 'SEA WORM' FOUND OFF AUSTRALIA
Divernet • April 19, 2020

41. Descobreixen el que podria ser l'animal més llarg del món
NacióDigital • April 19, 2020

42. This May Be The Longest Animal On Earth – And You've Probably Never Heard Of It
Forbes Magazine • April 18, 2020

43. An estimated 150-foot siphonophore discovered off Australia
Reuters Facebook • April 18, 2020

44. Animal más grande del mundo es descubierto en Australia: ¿mide 46 metros?
La Verdad • April 18, 2020

45. World's longest creature' discovered in ocean depths off Western Australian coast
Canada News • April 18, 2020

46. World's longest sea creature found off Australian coast
Digital Journal • April 18, 2020

47. Australia, ecco l'aniimale più lungo del mondo: la scoperta negli abissi
Il Secolo XIX • April 18, 2020

48. Move Aside Blue Whales! This Spiral Siphonophore May Be The Longest Animal Ever Recorded
Republic World • April 17, 2020

49. A siphonophore measuring an estimated 150 feet was discovered in Australia's deep sea during scientific expeditions diving
Reuters • April 17, 2020

50. Longest animal ever' discovered off Western Australia's coast
SBS • April 17, 2020

51. World's longest creature' discovered in ocean depths off Western Australian coast
AOL • April 17, 2020

52. The Longest Creature In The World Found Off The West Australian Coast!
6PR Radio • April 17, 2020

53. Forscher entdecken das längste Tier der Welt in australischer Tiefsee
Noizz • April 17, 2020

54. 世界最長」46米神祕海洋生物 直擊悠遊深海閃耀銀色微光
Yahoo • April 17, 2020

55. Scoperto un organismo marino da record, è lungo 45 metri
Sky Tg24 • April 17, 2020

56. Australia, scoperta la creatura marina più lunga degli abissi: è un sifonoforo di 46 m
Rai News • April 17, 2020

57. Längsta djuret fångat på bild
Havet • April 17, 2020

58. Animal mais comprido do mundo descoberto na Austrália
TVi24 • April 17, 2020

59. Un organisme marin de 45 m serait le plus long animal vivant
Science & Vie • April 17, 2020

60. Giant string-like creature composed of "millions of interconnected clones" found off the coast of Australia
Boing Boing • April 16, 2020

61. Descoberto animal mais comprido do mundo na costa da Austrália
Planeta • April 16, 2020

62. Близ Австралии обнаружили 47-метровое существо
Korrespondent • April 16, 2020

63. Hewan Terpanjang di Dunia Ditemukan di Laut Australia
Ayobandung • April 16, 2020

64. Tauchexpedition filmt eine 47-Meter-Qualle
Der Standard • April 16, 2020

65. Newsday Radio
BBC • April 16, 2020

66. El animal más largo del mundo y otras 30 nuevas especies
Reconectar • April 16, 2020

67. Scientists 'Blown Away' By Discovery of Longest Animal Ever Recorded—And It's Quite Beautiful
Good News Network • April 16, 2020

68. Siphonophore, believed to be world's longest sea creature, found off Ningaloo Canyons in WA
The Western Australian • April 16, 2020

69. Could the world's longest creature live off the Western Australian coast?
ABC • April 16, 2020

70. This 'really strange' spiralling sea creature may be the longest animal in the ocean
CBC Radio • April 16, 2020

71. Hewan Terpanjang di Dunia Ditemukan, Panjangnya Mencapai 45 Meter!
Hai Grid • April 16, 2020

72. Phát hiện động vật dài nhất hành tinh
Baoh Ha Tinh • April 16, 2020

73. Siphonophore, considéré comme la plus longue créature marine du monde, découvert au large des canyons de Ningaloo en WA
Urban Fusions • April 16, 2020

74. பெருங்கடலில் மிதக்கும் உலகின் மிகப்பெரிய ராட்சஸ உயிரனம் கண்டுபிடிப்பு! வியப்பில் ஆழ்த்திய உருவம்!
Tamil Gizbot • April 16, 2020

75. The Longest Creature Ever Discovered Was Found in the Deep of the Australian Coast
Gentside • April 16, 2020

76. Phát hiện loài vật dài nhất đại dương, gần 50m
tuoi tre • April 16, 2020

77. Scientists Have Found the Longest Marine Organism on Australia's Western Edge
The Swaddle • April 16, 2020

78. Stunning! 47m-long siphonophore discovered off Australian coast
CGTN • April 16, 2020

79. Siphonophore, believed to be world's longest sea creature, found off Ningaloo Canyons in WA
Perth Now • April 16, 2020

80. Researchers Discover Longest Sea Organism Ever in Deep Canyons of Western Australia
The Weather Channel • April 16, 2020

81. V austrálskych vodách objavili najdlhšieho živočícha na Zemi. Meria takmer 46 metrov
Interez • April 16, 2020

82. In Australia's Deep: 'We Couldn't Believe What We Were Seeing'
Newser • April 15, 2020

83. Une créature de 47 mètres de long découverte au large de l'Australie
Metro Time • April 15, 2020

84. Ilmuwan Temukan Hewan Terpanjang di Dunia di Laut Dalam Australia
Manando Tribune • April 15, 2020

85. Con la suspensión de los safaris por la COVID-19, surge la amenaza de la caza furtiva
National Geographic Spain • April 15, 2020

86. La "plus longue créature" du monde repérée au large de l'Australie
7sur7 • April 15, 2020

87. Científicos Descubren un 'OVNI' parecidos a la Criatura En Aguas Australianas, Potencialmente más largo del Mundo Animal
Loving Valencia • April 15, 2020

88. Ilmuwan Temukan Binatang Terpanjang di Dunia, Capai 45 Meter
Suara.com • April 15, 2020

89. It's 150 feet long– and we're not talking about a flying car!
WRBL • April 15, 2020

90. Odkrili najdaljše znano bitje na svetu, ki je videti kot »spiralni NLP«
Svet24 • April 15, 2020

91. 'Like a spiral UFO': world's longest animal discovered in Australian waters
The Guardian • April 15, 2020

92. Ανακαλύφθηκε στα βάθη της θάλασσας το μακρύτερο ζώο στη Γη
Huffington Post Greece • April 14, 2020

93. New Species Discovered during Exploration of Abyssal Deep Sea Canyons off Ningaloo
ROV Planet • April 14, 2020

94. Siphonophores: the longest animals on the planet – in pictures
The Guardian • April 14, 2020

95. The Longest Animal Ever Has Just Been Discovered
Dual Dove • April 14, 2020

96. 'Longest animal ever' discovered off Australia's coast
Fox News • April 14, 2020

97. Hewan Terpanjang Sedunia Ditemukan di Laut Dalam Australia
Kompas • April 14, 2020

98. Este es el segundo animal más largo del mundo: mide casi 50 metros
La Vanguardia • April 14, 2020

99. World's 'Longest Animal' Discovered in Australia's Deep Ocean
EcoWatch • April 14, 2020

100. Deep sea expedition uncovers 30 new species, plus longest-known animal
New Atlas • April 14, 2020

101. Scientists discover 'longest living' creature off Australian coast
The Jerusalem Post • April 14, 2020

102. This Might Be the Longest Creature Ever Seen in the Ocean

The New York Times • April 14, 2020

103. 120 metrelik dünyanın en uzun canlısı keşfedildi
dokuz8HABER • April 14, 2020

104. Descubren 30 nuevas especies submarinas en Australia
Muy Interesante • April 14, 2020

105. Staatsqualle: Forscher filmen gigantische Meereskreatur vor Australien
Stern • April 14, 2020

106. The longest animal ever discovered in the Indian Ocean
Tech Explorist • April 13, 2020

107. この線みたいなやつ、生きてます
Yahoo Japan • April 13, 2020

108. Longest animal ever' discovered in deep-sea canyon off Australian coast
Live Science • April 13, 2020

109. VÍDEO El animal más largo jamás registrado, filmado en el fondo del Índico
Europa Press • April 13, 2020

110. A 390-foot, string-like sea creature was spotted off the coast of Australia
Matador Network • April 13, 2020

111. The longest animal ever discovered in the Indian Ocean
Tech Explorist • April 13, 2020

112. Bizarre, Borg-Like Deep Sea Predator is Composed of Millions of Clones
SyFy • April 12, 2020

113. New species discovered during exploration of abyssal deep sea canyons off Ningaloo
Science Daily • April 12, 2020

114. Watch What Scientists Believe Is Longest-Ever Organism
Sputnik News • April 11, 2020

115. Une énorme créature lumineuse à tentacules découverte dans les fonds marins: les scientifiques en disent plus sur «ce truc filandreux» de 46 mètres!
Sudinfo • April 10, 2020

116. L'OVNI des océans : une mystérieuse créature filmée au large de la côte ouest australienne

L'Independant • April 10, 2020

117. Australie : une gigantesque créature aperçue au large des côtes
Le Point • April 10, 2020

118. Qué es el extraño y gigante ser hallado flotando en el Océano Índico
ABC ES • April 10, 2020

119. Berbentuk Spiral dan Mirip UFO, Hewan Unik Ini Berhasil Diamati Ilmuwane
Hitekno • April 10, 2020

120. ऑस्ट्रेलिया: समुद्र के नीच दिखा UFO-जैसा क्रिएचर, जानें क्या होता है Siphonophore
India Times • April 10, 2020

121. Un Ovni marin découvert en Australie
Futura Planete • April 10, 2020

122. Scientists May Have Just Discovered the Longest Animal And it is Found in the Indian Ocean
News 18 • April 10, 2020

123. Scientists May Have Just Discovered the Longest Animal And it is Found in the Indian Ocean
DB Post • April 10, 2020

124. This 50-Foot-Wide Spiral Shaped Creature Feeding 2,000 Feet Deep Is Totally Not An Alien, You Guys
brobilble • April 10, 2020

125. Giant string-like creature "Siphonophores" spotted near Australian coast
TeCake • April 10, 2020

126. Massive, deep-sea 'entity' leaves ocean scientists 'blown away'
Global News • April 9, 2020

127. Alien-Like Sea Creature Could Be Longest Animal Ever Discovered
International Buisness Times • April 9, 2020

128. Watch This Giant, Eerie, String-Like Sea Creature Hunt for Food in the Indian Ocean
Smithsonian Magazine • April 9, 2020

129. Giant Alien-like String Creature Found On The Hunt. What is it?
ITech • April 9, 2020

130. Australian Scientists Discover Massive Deep Sea Predator That Looks Like Silly String
DOGO News • April 9, 2020

131. Giant Ocean Creature Looks like UFO
The Weather Channel • April 9, 2020

132. This Freaky Spiral Thing is Alive
Gizmodo • April 9, 2020

133. Longest Giant Stringy Sea Creature Ever Recorded Looks like It Belongs in Outer Space
Interesting Engineering • April 9, 2020

134. Watch: Gigantic Deep-Sea Siphonophore Filmed Off Western Australia
Dive Photo Guide • April 9, 2020

135. Stories worth watching 4/8/20
CNN 10 • April 8, 2020

136. Mærkeligt dyr i havet: 47 meter langt
Ekstra Bladet • April 8, 2020

137. Scientists spot giant ocean creature that looks like silly string hunting in 'galaxy-like spiral'
USA Today • April 8, 2020

138. Scientists Discover Giant String-Like Sea Creature
Medical Daily • April 8, 2020

139. Wow! Scientists Discover Massive Creature in the Indian Ocean
WSPA • April 8, 2020

140. Giant sea creature—154 feet—filmed off Australia coast. It's a jelly species
The Sacramento Bee • April 8, 2020

141. Посмотрите на огромную ленту из соединенных зооидов, живущих в океане у Австралии
XANTEK • April 8, 2020

142. Massive Silly String-like creature spotted in Indian Ocean
Syracruse • April 8, 2020

143. Scientists Blown Away by Bizarre 150 feet Long String-Like Sea Organism Spotted in Australia

Infosurhoy • April 8, 2020

144. Wat is dit Voor Vreemde Hypnotiserende Slinger die in de Oceaan Drijft?
welingelichtekringen • April 8, 2020

145. Mysterious Sea Monster Thrills Researchers
Webby Feed • April 7, 2020

146. The carnivorous creature is 47 meters long in the deep sea
VN Express • April 8, 2020

147. Captan un gigantesco sifonóforo de 47 metros flotando en el océano
RT • April 8, 2020

148. Mad Minute stories from April 7th
NBC KHQ 6 • April 7, 2020

149. Scientists find massive 'silly string' creature in the deep sea
KXLY • April 7, 2020

150. Scientists find huge ocean creature that looks like silly string
AZ Family • April 7, 2020

151. Animal Stories with Dan Green: a giant siphonophore
KSBW 8 • April 8, 2020

152. What the Heck Is This Long Hypnotic Stringy Floating in the Ocean
Science Alert • April 8, 2020

153. Mysterious 150-foot deep sea is actually millions of tiny clones
Metro UK • April 8, 2020

154. Creepy 154 foot long silly string creature found in the deep sea
The Weather Network • April 8, 2020

155. Giant stringy creature
Bing • April 8, 2020

156. Giant Ocean Creature Found Hundreds of Meters Underwater Off Australian Coast
Yahoo • April 7, 2020

157. Mysterious 'stinging tentacle' creature filmed off coast of Australia looks like giant 'ocean string'
The Sun • April 8, 2020

158. Scientists spot giant ocean creature that looks like silly string hunitn in ‘galaxy like spiral’
MSN • April 8, 2020

159. Scientists spot giant ocean creature that looks like silly string hunitn in ‘galaxy like spiral’
USA Today • April 8, 2020

160. Scientists have found a giant ‘silly string-like creature’ in the ocean
Fox 8 • April 7, 2020

161. Scientists discover massive ‘silly string’ creature in the ocean
WHP • April 7, 2020

162. Ученые засняли гигантскую сифонофору
Popular Mechanics Russia • April 7, 2020

163. Scientists discover giant ‘silly-string’-like sea creature
9 News Perth • April 7, 2020

164. Scientists find giant ocean creature that looks like silly string
NBC Tampa • April 7, 2020

165. Video: Scientists find huge ocean creature that looks like silly string
WFSB • April 7, 2020

166. Video: Scientists find huge ocean creature that looks like silly string
Fox Carolina • April 7, 2020

167. Otherworldly 150 foot long string like organism spotted in Deep Sea is made up of ‘millions of interconnected clones’
Newsweek • April 7, 2020

168. This incredible jellyfish seems to come from a science fiction film
Huff Post • April 7, 2020

169. This Deep Sea ‘Giant’ is Actually Made up of Millions of ‘Clones’
New York Post • April 7, 2020

170. Massive ‘Silly String-like’ creature spotted in Indian Ocean
Penn Live • April 7, 2020

171. Ningaloo Canyons deep sea mission reminds us where the true nightmares live
Slash Gear • April 7, 2020

172. Scientists find massive 'silly string' creature in deep sea
CNN • April 7, 2020

173. See a giant siphonophore, a bizarre ocean creature that looks like silly string
CNet • April 6, 2020

174. This sea creature looks like a beautiful flower
MSN GeoBeats • March 22, 2020

175. Perth Researchers Head to Uncharted Waters
7NEWS Perth • March 7, 2020

176. Australian Scientists to View Underwater Ningaloo Canyons for First Time
AZo Cleantech • March 6, 2020

177. Illuminating the biodiversity of the Ningaloo Canyons
Western Australian Museum News • March 4, 2020

6.6 Imagery from the Work including software and technology utilized

R/V *Falkor's* multibeam sonar systems (Kongsberg EM 302 and 710) were engaged each night with data processed in 'real-time' to generate bathymetric maps that determined all ROV dive site selections. The multibeam echo-sounder data was processed onboard using Qimera software. Following data correction and cleaning, a digital terrain model (DTM) was generated at 30 m resolution for each canyon. The DTMs were exported in ASCII ESRI format and analysed with ArcGIS 10.5.

SOI staff, led by Deb Smith, contributed to enhanced mapping of the area with 11,318 km2 of multi-beam bathymetry completed, providing new data for Gascoyne Marine Park.

The ROV *SuBastian* also captured high-resolution video imagery during each dive using both HD and 4K cameras approximating 160 hours of footage and recorded ~510 GB of stills (Squiddle Framegrabs). The resolution was so sharp and detailed that some images have enabled species-level identification, often only possible with a specimen in hand (cephalopods including squid).

6.7 IP claims that SOI needs to be aware of

None.

7 Societal Impact

The onset of a global pandemic as this cruise prepared to set sail from Perth, Western Australia as the second expedition led by R/V *Falkor* in Australian waters in 2020,

Figure 37. Dr. Lisa Kirkendale and family onboard R/V *Falkor* prior to setting sail. Photo Nerida Wilson.

created some planning challenges. Major changes had to be quickly responded to and appropriate procedures and protocols put in place to safeguard crew and staff health and safety (please see link to what it was like onboard R/V *Falkor* expedition to Ningaloo Canyons while a global pandemic developed at - https://schmidtocean.org/cruise-log-post/science-in-the-time-of-covid-19/). Due to the pandemic and global lockdowns, more people than usual were interacting with media as remote learning and working from home was commonplace. R/V *Falkor* deep-sea imagery captivated a large online audience that greatly benefited from exciting discoveries narrated each day by experts. The chats were extraordinary places of sharing and learning and offered a much-needed respite from fear and uncertainty. As a result, more people were exposed to the concept of exploration and discovery in Western Australia than we probably could have ever imagined.

7.1 Why should the public care about your work?

In Australia it is estimated that >70% of biodiversity is still undescribed. While large vertebrates are well known, it is the invertebrates, species without a backbone that are the least well characterized. The areas of the country that are most likely to yield new diversity include remote, unexplored regions, like the deep sea. Many species already known to Western science, are still undocumented from the Indian ocean, which is less well known than the Pacific Ocean. Every dive we discussed and reinforced new records for our state, for Australia and also discussed the possibility of finding new species. Taxonomic identification is often the first step in knowing and is a science that brings together ecological, evolutionary and life history information about a species. This fundamental work, once in place, facilitates communication and sharing that then ushers in the next phase of study, such as discovery of new medicines and therapies or other commercial uses that further benefit society.

7.2 New Discoveries & New Species

Highlights of the collections include the deepest fish records for WA (4470m), the first giant hydroids collected in Australia, significant communities of glass sponges discovered in Cape Range Canyon and a siphonophore that is putatively regarded as the longest animal in the world. This latter discovery led to intense media interest but the final measurements still need to be completed. Other important contributions include the development of methodology for monitoring marine parks in Australia with Geoscience Australia. The deepest water samples screened for eDNA in the Indian Ocean were collected on the expedition by then PhD student Dr. Georgia Nester. Descriptions of two new species of the bomber and squid worms (family Acrocirridae) collected during this voyage formed the basis of MSc student Paul Proctor's Master of Science dissertation

(Proctor, 2023). Along with new distribution and depth records of known species, this research also led to the discovery of up to 30 new species, which can now be described. The deployment of 5 Autonomous Reef Monitoring Structures (ARMS) in Cape Range Canyon at 5 sites was noteworthy because it is the first time ARMS have been deployed at abyssal depths. This will passively collect cryptic specimens until we can return and collect and process the devices on a future voyage.

7.3 Importance of Research Outcomes

7.3.1 For policymakers

The discovery and documentation of significant communities of fragile glass sponges in Cape Range Canyon, the development of methodology for monitoring marine parks in Australia with Geoscience Australia, enhanced mapping of the area with 11,318 km^2 of new multibeam bathymetry completed and the publicly accessible records of all faunal collections uploaded to Atlas of Living Australia for managers to review are all important contributions to policymakers. The provision of an econarrative to Marine Parks management team now enables managers to rapidly ascertain the ecological characteristics of a park, and to highlight research or monitoring needs. This document should assist with future Marine Parks planning.

7.3.2 Local communities

The impact of the expedition to local communities will have long lasting benefits. Publicly available photo and video assets accessible on well-known outlets (youtube) to watch, share and enjoy offer a new perspective for many local communities and schools as the once distant deep sea has been brought into their living room or their classroom, new knowledge and pride in the offshore marine park and global interest in the region was initiated through the expedition that could increase tourism and instigate grassroots conservation, better links and communication now exist between local communities of scientists and naturalists and the expedition scientists.

7.4 Evidence of Benefits to the Local Community

Inclusion of a high school student from a regional community near where the expedition took place (with 2 originally planned) was an incredible benefit to the local community of Geraldton. Liam Cook is now a local ambassador and direct spokesperson for the expedition regionally. Ningaloo Canyons Expedition online presentation followed by a Question and Answer with local community group was a benefit to the local community (see community feedback below). There were impacts on regional engagement however, due to covid concerns, there was less ability to travel and give talks in the region following the expedition or to host students in Perth than would have normally transpired. Since the expedition there is certainly a closer tie with the Geraldton community. Dr. Lisa Kirkendale was invited to present a community talk at a Geraldton Climate Forum online because of

my participation and involvement with the Geraldton community as a result of the FK200308 expedition.

7.5 Community Outreach to the Public

7.5.1 Presentations

Figure 38. Cover slide advertising a community talk.

Nerida Wilson gave a talk at the Royal Society of WA's symposium "Western Australia's Marine and Estuarine Environment" at the Ocean's Institute, presenting "Exploring the deep-sea canyons off Ningaloo" (3 Oct 2020).

Nerida Wilson gave a virtual talk at the San Diego Natural History Museum presenting "Exploring the deep-sea canyons off Ningaloo" (10 Dec 2020).

7.5.2 Non-academic Presentations

Nerida Wilson and Lisa Kirkendale participated in Q&A about Ningaloo Canyons Expedition mediated by Cape Conservation Group for the Ningaloo/Exmouth community (7 May 2020).

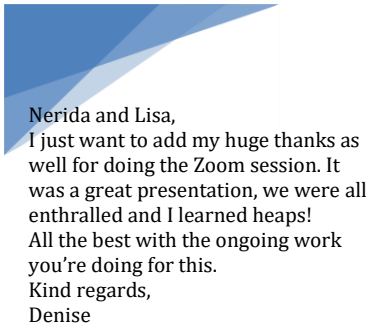
Rachel Przeslawski gave a talk to local school group (Bungendore Public Year 5) (July 2020).

Nerida Wilson, Lisa Kirkendale, Glenn Moore and Andrew Hosie participated in a panel discussion at the Maritime Museum "Deep Blue- Meet the scientists" about the Falkor expedition (18 Aug 2020).

Nerida Wilson & Lisa Kirkendale gave an online talk for the Goodness Festival/National Science week event for Geraldton Museum (19 Aug 2020).

Nerida Wilson & Lisa Kirkendale participated in Virtual Lab for WAM Learning and Engagement, and Science week (21 Aug 2020).

Nerida Wilson gave a talk at the WA Naturalists Society "Exploring the deep-sea canyons off Ningaloo" (4 Sept 2020).


Nerida and Lisa,
I just want to add my huge thanks as well for doing the Zoom session. It was a great presentation, we were all enthralled and I learned heaps!
All the best with the ongoing work you're doing for this.
Kind regards,
Denise

Denise Fitch, Chairperson,
Cape Conservation Group

Figure 39. Testimonial outlining the community impact when sharing the voyage with others.

Lisa Kirkendale delivered an online talk about the Falkor expedition to Victoria Natural History Society meeting in Victoria, British Columbia, Canada. (30 November 2020).

Nerida Wilson, Lisa Kirkendale and Zoe Richards gave presentations at the Zonta Club for Perth, raising awareness for Women and Girls in Science day (11 Feb 2021, talk delayed to 18th due to lockdown)

Nerida Wilson participated in an International Women's Day zoom panel run by the Schmidt Ocean Institute. (9 Mar 2021).

Lisa Kirkendale delivered a student talk about Diving Deep to Year 9 marine science class at Fremantle College for Techtrails program (27 May 2021)

Lisa Kirkendale delivered a talk to graduate students at Australian Marine Science Association retreat that featured some content from Ningaloo Canyons expedition (24 June 2022)

Lisa Kirkendale delivered a talk to primary school students at Roleystone Community College (23 September 2021)

Lisa Kirkendale delivered a remote talk to primary school students Meekatharra School of the Air (12 May 2022)

Figure 40. The Chevron Science Engagement Initiative of the Year Award from 2020 presented to FK200308.

7.5.3 Outreach Activities

The expedition won the Chevron Science Engagement Initiative of the Year category at the Western Australian Premier's Science Awards in 2020.

Figure 41. An iconic image from FK200308 proudly displayed in Boola Bardip. Photo SOI.

The iconic image of a solitary hydroid was put on permanent display in the newly re-opened museum Boola Bardip (21 Nov 2020) Western Australian Museum, Perth, WA.

The expedition and some imagery was featured in the book 'Sharing stories in an ancient land' by Terri-Ann White (2020).

The Schmidt Ocean Institute's short film, The Depths of Ningaloo received a Filmmaker award for 'Outstanding Short Documentary' at the Sherman Oaks Film Festival 2021.

The Australian National Maritime Museum featured the Ningaloo Expedition in their Ocean Wonders exhibit, Sydney, NSW (30 Nov 2021- Oct 2022).

Figure 42. The voyage's inclusion in the 'Sharing stories in an ancient land' book. Photo Lisa Kirkendale.

7.6 Student Projects/Thesis/Dissertations

Including student experiences and training was another goal of the expedition and 3 PhD and 1 high school student were able to participate and contribute to the success of the expedition.

Dr. Georgia Nester, a then Curtin University PhD student supported on the Student-of-Opportunity program of SOI, completed 10 CTD casts with 150 Niskins fired, and 57 ROV Niskins were also fired enabling filtration of 2,070 litres of water (1,500L CTD and 570L ROV). The voyage served as the basis for Chapter 5 of her dissertation, which is now accessible to the public via this link: https://espace.curtin.edu.au/handle/20.500.11937/9348. Currently, this chapter has taken the form of a manuscript and is scheduled for submission for publication in early 2024. The cruise gave Georgia invaluable practical experience both at sea and in project management, representing her first venture into deep-sea exploration. This newfound expertise not only bolstered her qualifications but also broadened her horizons, ultimately paving the way for her transition into the role of a deep-sea molecular ecologist. This career move was a testament to the valuable skills and insights gained during the cruise.

Figure 43. Removing water samples collected for eDNA screening. Photo SOI.

David Juszkiewicz, a Curtin University PhD student who received support through the Student-of-Opportunity program of SOI, acquired invaluable expertise in biological collections and processing protocols. His participation in the FK200308 cruise equipped him with the essential skills for collecting, preserving, and curating marine invertebrates. These acquired skills have not only enhanced his expertise but also paved the way for him to actively contribute and collaborate with the Western Australian Museum Aquatic Zoology team on post-cruise projects.

Andrew Hosie was a Curtin University PhD student during the expedition. Andrew in his role led the crustacean sampling and processing. While the expedition was not directly linked to Andrew's PhD, it has provided ample material for his post-PhD research program investigating deep sea crustacean biodiversity with an emphasis on symbiotic and parasitic evolution.

Specimens provisioned by the research cruise have since been utilized by additional students (2) since completion of the cruise.

The inclusion of an indigenous high school student (Follow the Dream), Mr. Liam Cook from the nearby regional community of Geraldton was significant as a high school student has not participated on a Falkor cruise before. See link to his experience on the cruise while onboard Falkor expedition to Ningaloo Canyons at - https://schmidtocean.org/cruise-log-post/following-the-dream/

Figure 44. High school student Liam Cook onboard R/V *Falkor*. Photo SOI.

Post cruise Liam participated in outreach during Science week (Geraldton festival, August 2020) via online interview with Lisa Kirkendale and Nerida Wilson. Lisa Kirkendale has continued to develop student opportunities with Follow the Dream (Geraldton) coordinator Helen Bell, including visit and tour by new Follow the Dream students to the new museum in Perth, Boola Bardip in 2021. A tailored experience reviewing First Nations content led by Marani Greatorex (WA Museum Boola Bardip as an Aboriginal and Torres Strait Islander Project Officer) was highlight for all. More student initiatives that continued to build on this model will continue annually, all because of the initial linkage that happened as a result of willingness for Schmidt Ocean Institute to consider facilitating high school student inclusion on the expedition to Ningaloo Canyons.

8 Acknowledgements

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10 Appendices

10.1 Inventory of push cores (from Post et al. 2020).

Sample ID	Station number	ROV transect	ROV container	Date collected (UTC)	Time collected (UTC)	Latitude
FK200308/01MC08	1	S0332	MC08	3/11/2020	1:24:29	-21.8882
FK200308/02MC02	2	S0333	MC02	3/12/2020	2:41:41	-21.9687
FK200308/04MC02	4	S0335	MC02	14/03/2020	1:37:36	-21.9421
FK200308/05MC01	5	S0336	MC01	15/03/2020	1:51:59	-21.8861
FK200308/06MC01	6	S0337	MC01	16/03/2020	2:17:14	-21.8352
FK200308/06MC02	6	S0337	MC02	16/03/2020	2:26:33	-21.8352
FK200308/07MC02	7	S0338	MC02	17/03/2020	1:55:48	-21.9035
FK200308/09MC02	9	S0340	MC02	19/03/2020	2:38:26	-21.8627
FK200308/09MC01	9	S0340	MC01	19/03/2020	5:10:15	-21.8579
FK200308/09MC01_foram	9	S0340	MC01	19/03/2020	5:10:15	-21.8579
FK200308/11MC01a	11	S0342	MC01	21/03/2020	0:53:27	-21.8640
FK200308/10MC01	10	S0343	MC01	22/03/2020	3:23:56	-21.8714
FK200308/11MC01b	11	S0344	MC01	24/03/2020	2:30:59	-21.8619
FK200308/11MC01c	11	S0345	MC01	25/03/2020	2:08:24	-21.8620
FK200308/12MC01	12	S0346	MC01	26/03/2020	1:50:55	-21.7745
FK200308/13MC02	13	S0347	MC02	27/03/2020	3:25:40	-21.8197

10.2 List of quantitative transects (from Post et al. 2020).

Station	*ROV* transect	Start/ End	Latitude	Longitude	Depth (m)	Date collected (UTC)	Time collected (UTC)	Distance (m)
1	SO332	Start	-21.8876	113.2935	2009	11/3/2020	1:38:49	
		End	-21.8831	113.2936	1762	11/3/2020	4:41:35	492
2	SO333	Start	-21.9695	113.1718	2047	12/3/2020	2:57:33	
		End	-21.9732	113.1733	1915	12/3/2020	5:14:16	443
4	SO335	Start	-21.9415	113.1206	2165	14/3/2020	3:11:23	
		End	-21.9379	113.1200	1928	14/3/2020	7:34:52	402
5	SO336	Start	-21.8854	113.0135	2513	15/3/2020	2:59:18	
		End	-21.8816	113.0154	2471	15/3/2020	5:30:48	464
6	SO337	Start	-21.8346	112.9264	2525	16/3/2020	4:01:42	

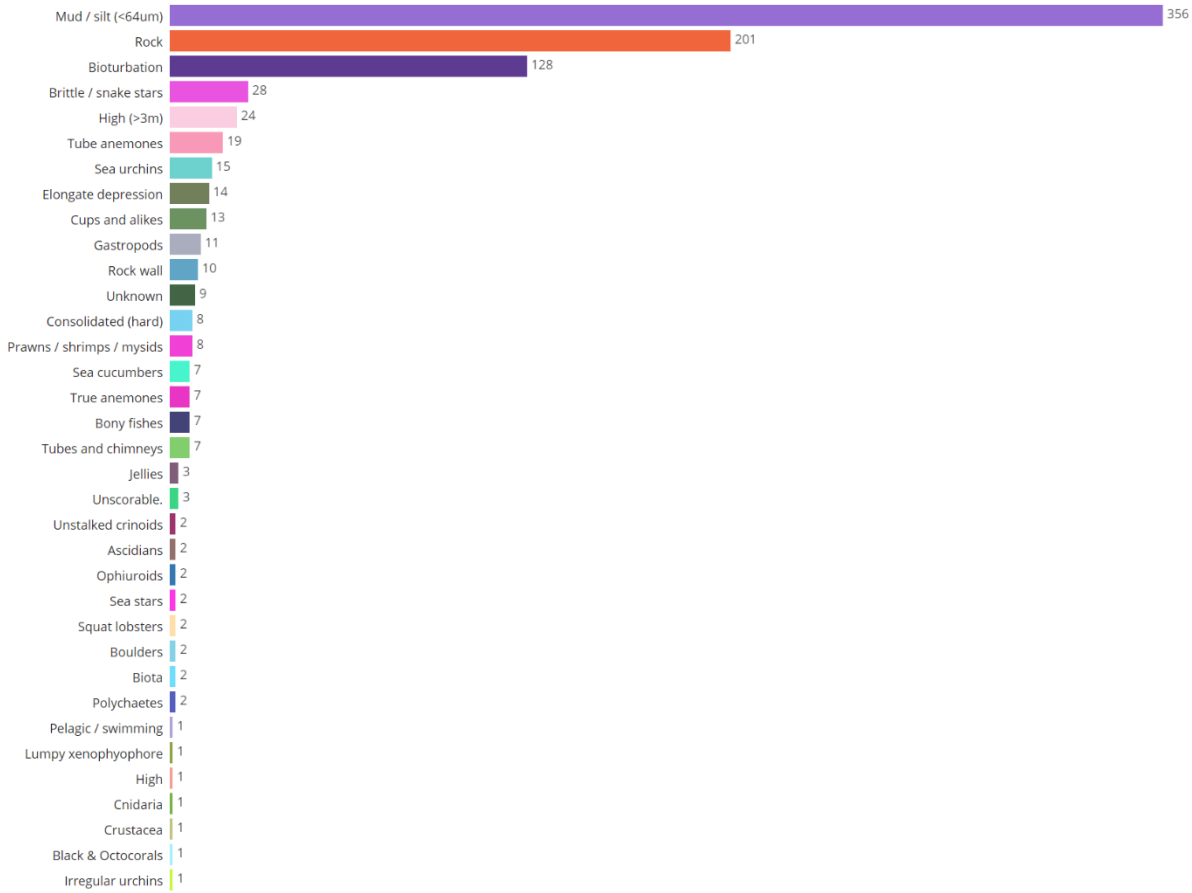
Station	*ROV* transect	Start/ End	Latitude	Longitude	Depth (m)	Date collected (UTC)	Time collected (UTC)	Distance (m)
		End	-21.8301	112.9263	2450	16/3/2020	6:05:47	497
7	SO338	Start	-21.9026	112.9045	2915	17/3/2020	2:38:51	
		End	-21.8980	112.9046	2917	17/3/2020	3:48:29	506
8	SO339	Start	-21.9229	112.8366	3028	18/3/2020	7:58:17	
		End	-21.9274	112.8366	2920	18/3/2020	8:32:52	500
9	SO340	Start	-21.8610	112.7568	3857	19/3/2020	3:32:48	
		End	-21.8575	112.7568	3734	19/3/2020	5:31:50	385
10	SO343	Start	-21.8720	112.7128	4433	22/3/2020	06:58:25	
		End	-21.8734	112.7123	4292	22/3/2020	08:19:11	165
11	SO342	Start	-21.8641	112.6874	4167	21/3/2020	0:57:53	
		End	-21.8672	112.6873	3759	21/3/2020	3:36:19	347
12	SO346	Start	-21.774	112.6126	4187	26/3/2020	04:06:24	
		End	-21.7694	112.6127	3944	26/3/2020	06:42:32	505
13	SO347	Start	-21.8199	112.5094	4490	27/3/2020	03:55:39	
		End	-21.8159	112.5114	4510	27/3/2020	05:59:13	489

10.3 Qualitative summaries of transects (from Post et al. 2020).

Station 1 – S0332

This transect was annotated onboard using a still image acquired every 10 seconds of video.

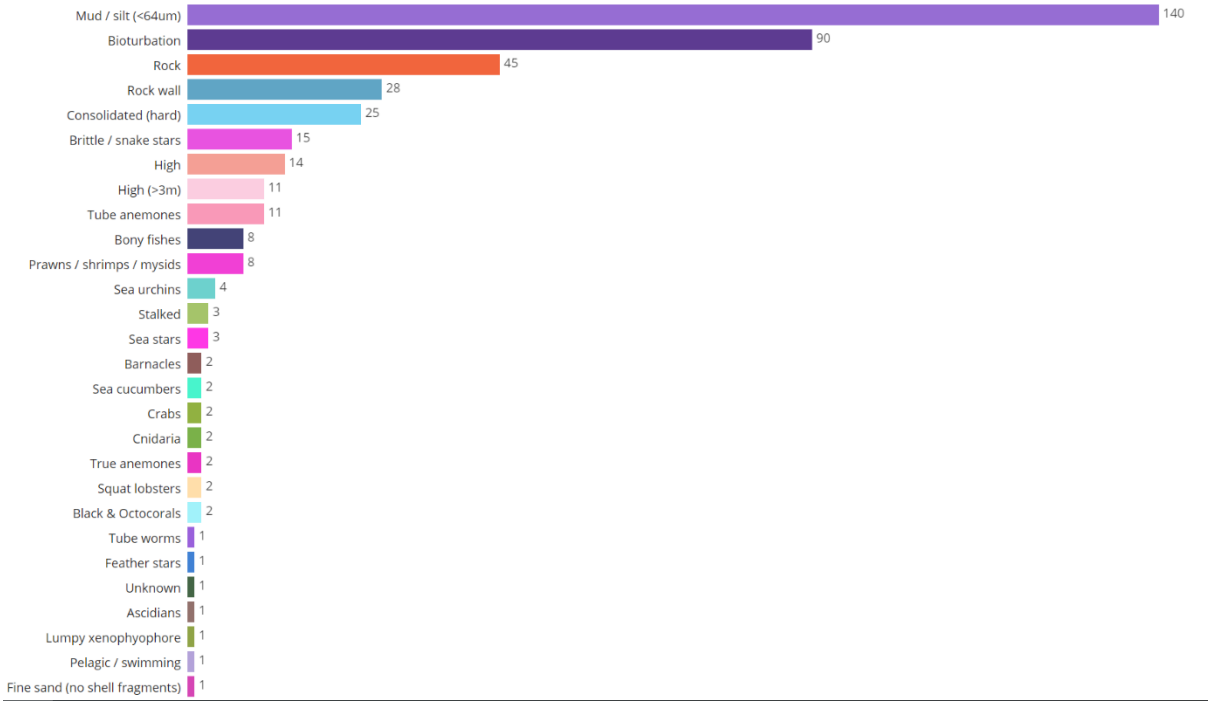
The transect was dominated by bioturbated muddy flat expanses with bioturbation and no ripples. **Distinctive features** on this transect were crevice *Lebensppuren,* which were not observed at all other stations. The rest of the transect was typical of other observed images at this depth in the Cape Range canyons regarding features and fauna.



Station 2 – S0333

This transect was annotated onboard using a still image acquired every 20 seconds of video.

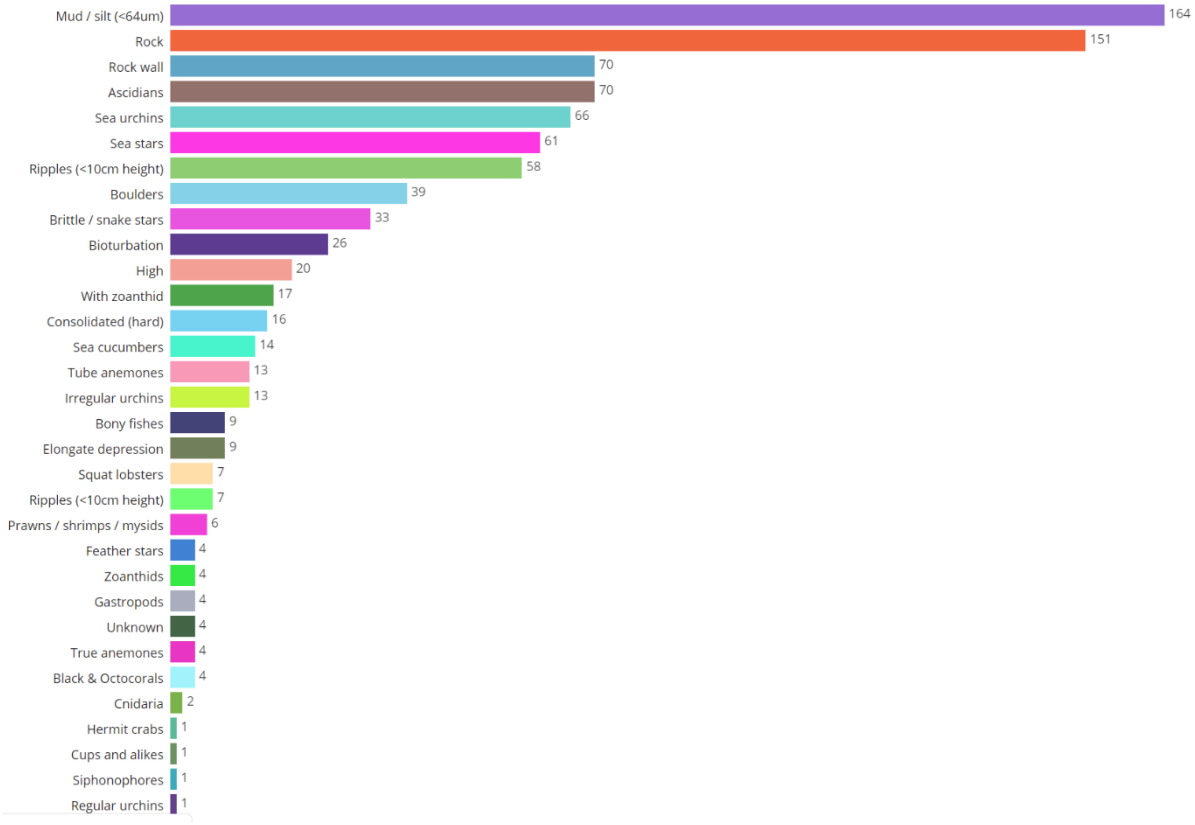
It was dominated by muddy flat expanses, with no ripples. **Distinctive features** were large smooth outcrops of siltstone or silt-crusted rock towards the middle of the transect. There were localised areas of moderate-density brittlestars on the muddy expanses and evidence of bioturbation throughout most of the transect. The rest of the transect was typical of other observed images at this depth in the Cape Range canyons regarding features and fauna.



Station 4 – SO335

This transect was annotated onboard using a still image acquired every 20 seconds of video.

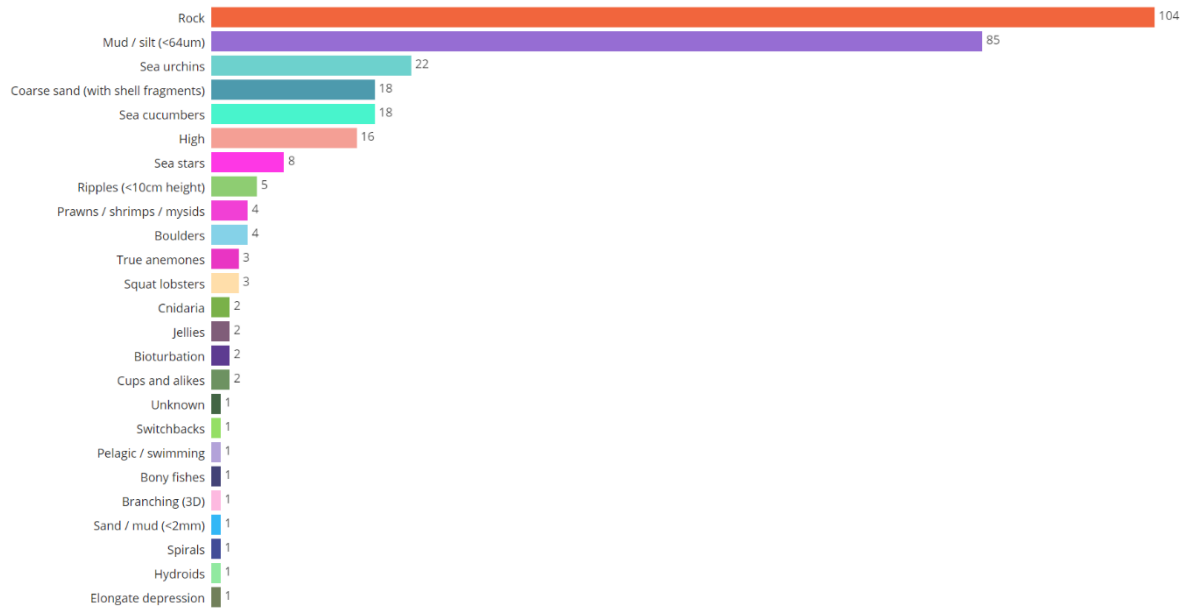
Distinctive features on this transect were 3-dimensional ripples in the muddy flat expanses. Partway through, there was an area of large, pock-marked rounded ledges and attached boulders interspersed with muddy flat corridors on the slope. At the end of the transect, there was a high barren vertical rock face at the top of which was a flat mud expanse. **Distinctive fauna** common on this transect were hermit crabs with red anemones, heart urchins within the first half of the transect, regular urchins, and clear carnivorous ascidians that clung to hard rock faces towards the latter half of the transect. As we neared the top of the wall, brisingid seastars and ophiuroids dominated, with very high densities at the crest.



Station 5 – S0336

This transect began with a muddy expanse with minimal bioturbation and no ripples. It rapidly transitioned into rocky outcrops with small patches of low-relief mud or sandier shell hash. **Distinctive features** on this transect with rocky outcrops and boulders with sheer faces and patches of shell hash distinctive from surrounding rock and mud. **Distinctive fauna** on this transect were shaggy-dog sea cucumbers (covered in hydroids) that were specific to rocky outcrops, long-spiked sea urchins in higher abundance than previous transects, and very low abundance of fish.

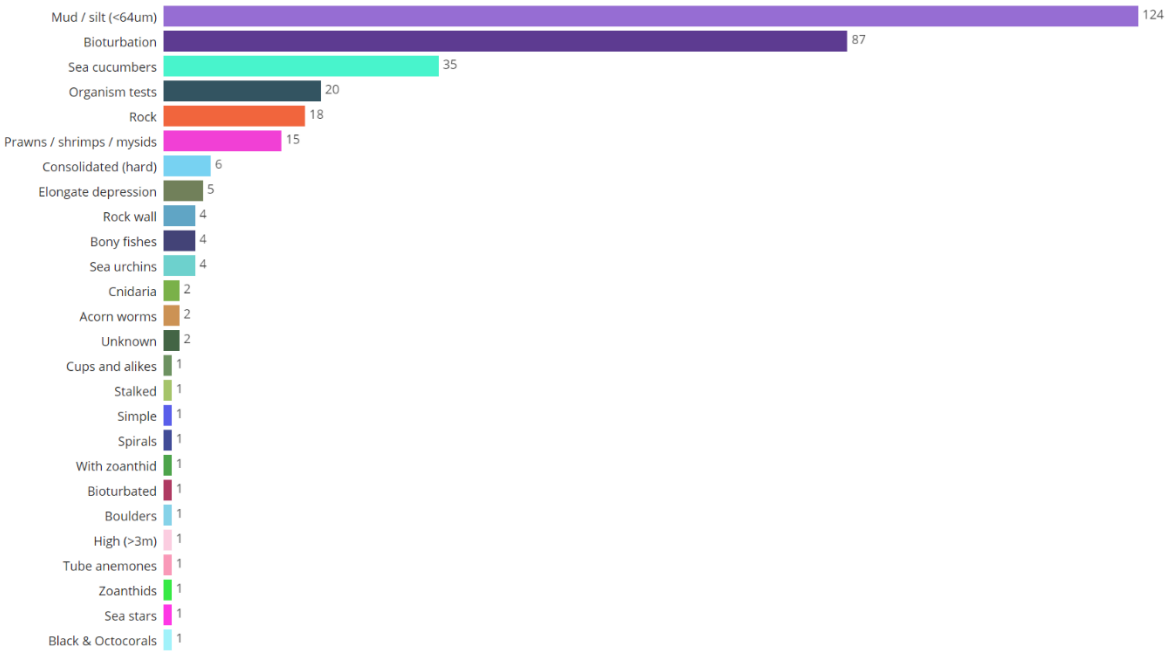
This transect was annotated onboard using a still image acquired every 20 seconds of video.



Station 6 – S0337

This transect began with a muddy expanse with moderate to high levels of bioturbation and no ripples. There was a vertical rock wall midway through the transect followed by another muddy low-relief expanse which ended up on a steep but still low-relief slope. Unlike Station 4, the crest of this rock wall did not have any obvious biota on it. After the transect finished, there were a few other vertical walls of a few metres, rather like the occasional step up the muddy expanses. There were no obvious distinctive features which matched those found in earlier sites. **Distinctive fauna** were a few tulip-shaped glass sponges anchored in the sediment, flat sponge-like flattened erect sediment tests (likely xenophyophore) which hadn't been seen in shallower sites, and multiple species of holothurian.

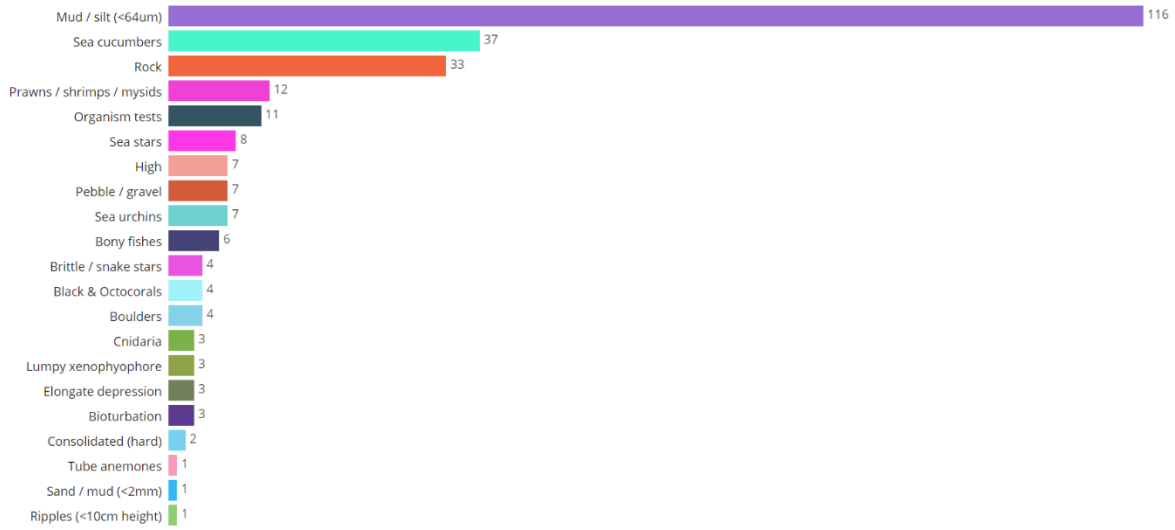
This transect was annotated onboard using a still image acquired every 20 seconds of video.



Station 7 – S0338

The transect began with strips of exposed high-relief rock interspersed with large expanses of mud with minimal bioturbation. The muddy expanses were undulating, almost like dunes with rocky outcrops beneath. **Distinctive features** include patches of gravel and rubble between a high-relief rocky ridge seen towards the middle of the transect and minimal bioturbation compared to most other previous sites. **Distinctive fauna** included a wavy xenophyophore test composed of sediment and multiple species of holothurian.

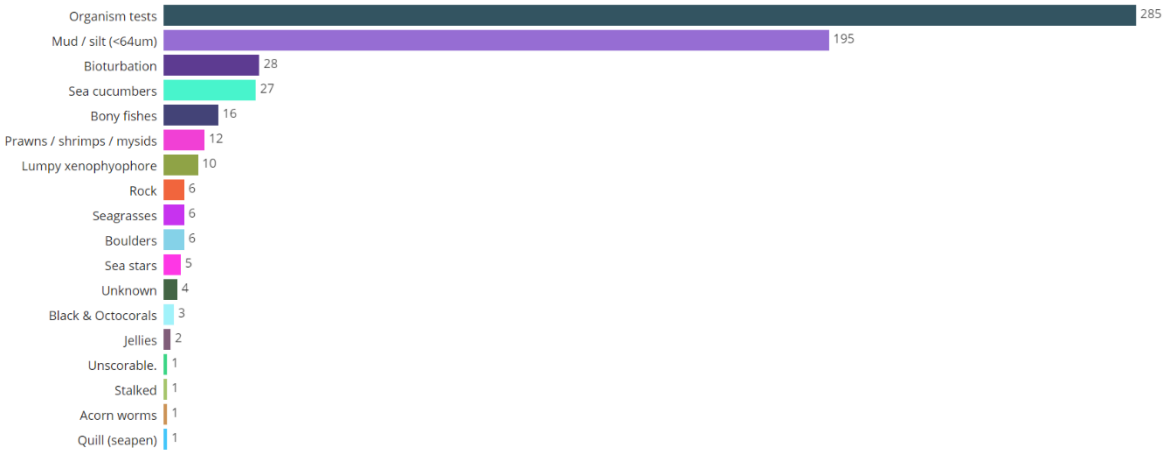
This transect was annotated onboard using a still image acquired every 20 seconds of video.



Station 8 – S0339

Distinctive features included almost exclusively muddy substrate with only the occasional rock (including a boulder with odd gouging). **Distinctive organisms** included very high abundances of the wavy xenophyophore test previously only seen at Station 7 in low abundances, some lumpy xenophyophores, sporadic seagrass blades, and a conspicuous grideye fish (*Ipnops* sp.).

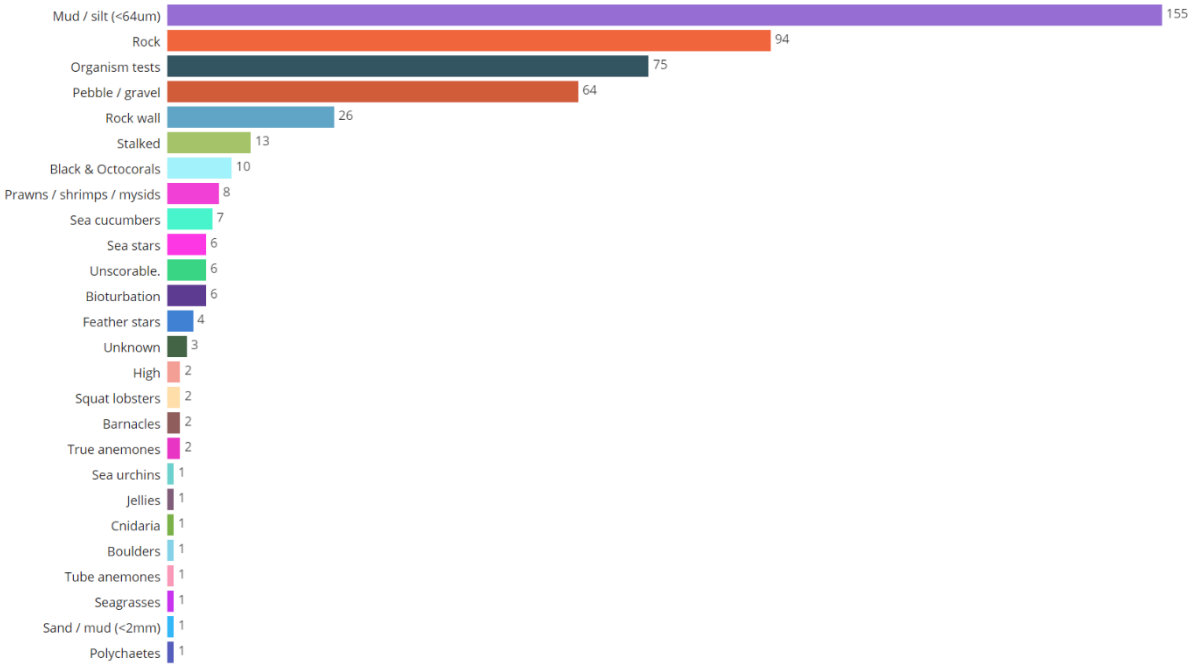
This transect was annotated onboard using a still image acquired every 10 seconds of video, as the ROV pilots travelled faster on this transect (~0.4 knots) due to reduced dive time.



Station 9 – S0340

Distinctive features included muddy expanses with minimal bioturbation, and patches of large gravel and pebbles. **Distinctive fauna** include stalked glass sponges throughout the soft sediment (including dead but persisting stalks upon which other macrofauna lives) and moderate abundances of the wavy xenophyophore tests.

This transect was annotated onboard using a still image acquired every 20 seconds of video for the first part of the transect, and then every 10 seconds for some of the latter part in the low relief areas, as the ROV sped up to 0.4 knots in these habitats towards the end.

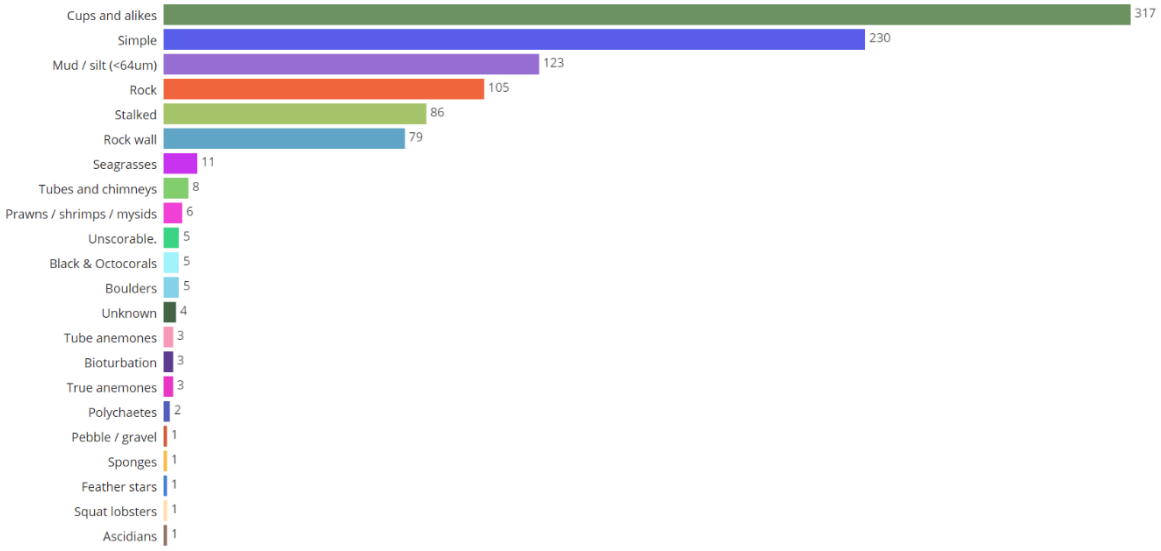


Station 11 – S0342

Distinctive features include steps of muddy slopes with minimal bioturbation alternating with vertical or very steep rock walls as well as some overhang. **Distinctive fauna** include glass sponge gardens of multiple species on overhangs of vertical rock walls, the almost complete lack of biota and bioturbation on the steep muddy slopes, and prevalence of seagrass blades at the beginning of the transect.

There was a small break in the transect towards the latter half, as the ROV was having technical issues with the imagery feed and maintaining safe operations over the rock wall.

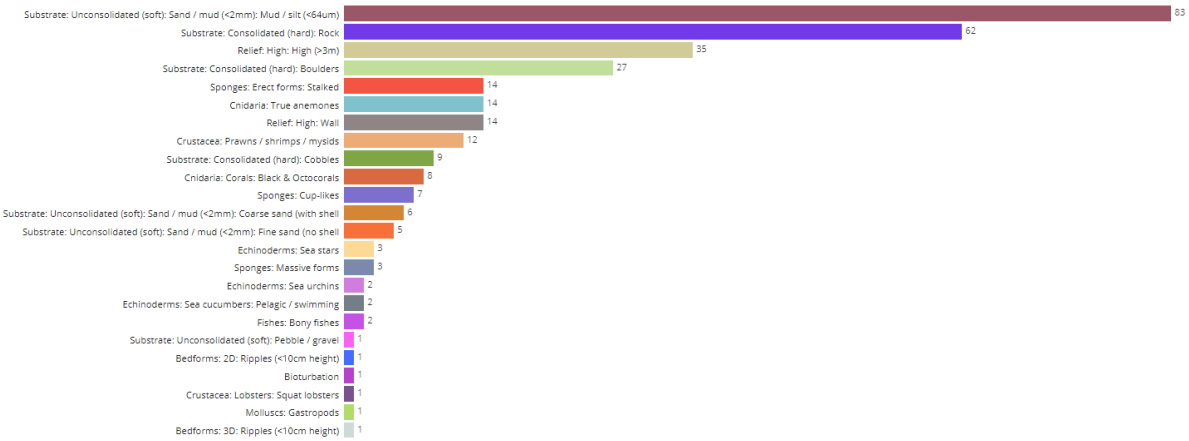
This transect was annotated onboard using a still image acquired every 20 seconds of video.



Station 10 – S0343

Distinctive features included steep sediment-covered canyon walls interspersed with bare rocks (uncommon) or sediment-covered rocks (common). Towards the steeper part of the transect, conglomerated sediment protrusions jutted out from the canyon slope (scored as 'boulders). Some parts of the transect appeared to be vertical walls of consolidated sediment. These had odd vertical tube structures which may have been biogenic but were not annotated due to uncertainty. **Dinstinctive fauna** included highly localised abundances of carnivorous sponges and anemones, communities of which were found each on a single rock. There was very little evidence of bioturbation.

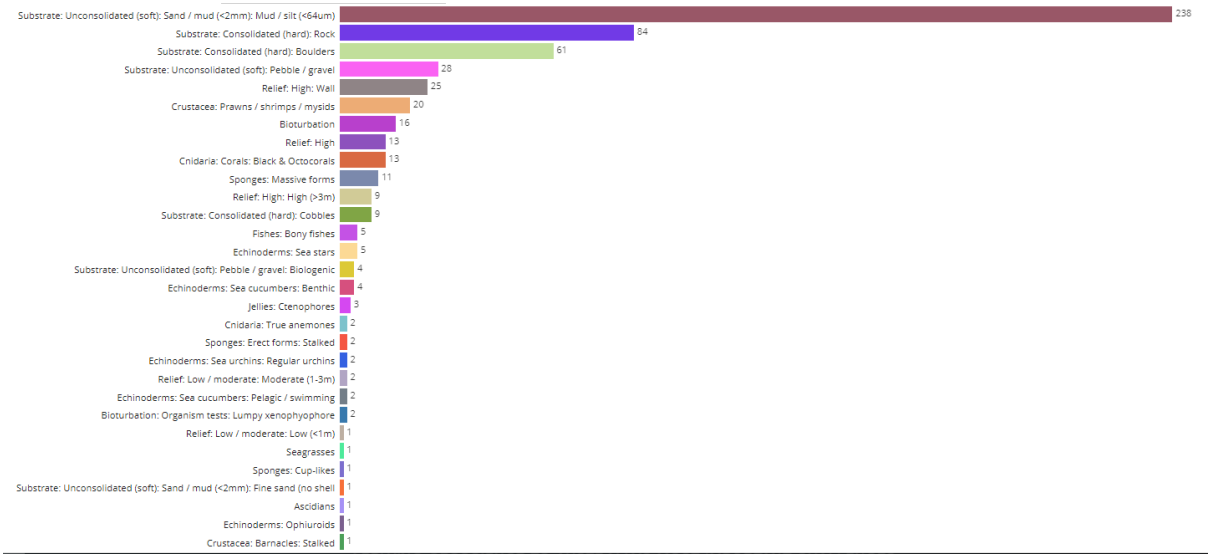
This transect was annotated post-survey (July 2020) using a still image acquired every 20 seconds of video.



Station 12 – S0346

Distinctive features included a muddy slope at the start of the transect, followed by a steep rocky slope with patches of mud, gravel, and jagged boulders. **Dinstinctive fauna** include circles in the sediment with a gelatinous organism on the circumference seen at the beginning of the transect at the muddy crest of a rocky berm (currently unlabelled annotations). Translucent organisms were seen on the surface of the muddy sediment expanse after the first major rock wall; these were tentatively identified as benthic ctenophores. Scattered black corals which seemed to be the same species occurred in the muddy sediment plains.

This transect was annotated post-survey (June 2020) using a still image acquired every 20 seconds of video most of the transect but every 10 seconds during and immediately after the rock walls to account for the increase in speed to ~0.4 knots.



Station 13 – S0347

Distinctive features include an almost completely homogenous abyssal plain. There was sign of a sediment-veneer slope in the first half of the transect, but only a couple of images showed exposed rocks. **Distinctive fauna** included a common oddly-shaped sea cucumber with a large translucent tube parachuting off the top of the main body – most individuals were purple, but some were golden. Small round globules were seen towards the latter part of the transect; these were annotated as ‘organism tests’ because they had a similar shape to xenophyhore globules seen in previous video from GA2476, but these were not covered in sediment and may instead have been benthic ctenophores. There were some mounds of sediment observed throughout the transect that may have been buried heart urchins or sea cucumbers, but these were not annotated due to strong uncertainty. There was only a single fish observed.

This transect was annotated post-survey (June 2020) using a still image acquired every 20 seconds of video.