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Burrowing megafauna in SCI 3

New Zealand Fisheries Assessment Report 2013/20

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EXECUTIVE SUMMARY

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Data on benthic species that occur within scampi grounds were collated from biodiversity and fisheries survey research voyages, from both physical samples and photographic data, and also Ministry for Primary Industries observer records from fishing vessels targeting scampi. The species lists generated were examined to identify species that could be potential burrow formers, and available literature was examined to evaluate whether burrows were likely to be confused with what are considered to be scampi burrows.

A range of known and potential burrowers were identified, and burrow surface features (where known) examined. Only the larger crustaceans would be big enough to generate a comparable sized burrow to that formed by scampi. It remains uncertain as to whether *Munida* burrows, or simply makes use of burrows created by other species in these habitats. Goneplacidea crabs are thought to burrow (one species known to), but their burrows are likely to be of a different shape, and smaller than scampi burrows.

1. INTRODUCTION

Scampi live in burrows in muddy seabed areas, and their vulnerability to trawling varies over daily and seasonal cycles in relation to emergence patterns. Owing to concerns over variability in emergence patterns affecting scampi trawl catchability, photographic surveys (counting burrows) have become a key component of scampi assessments in both Europe and New Zealand (ICES 2007, Tuck & Dunn 2012). The use of burrow counts as an index of scampi abundance avoids any uncertainty over scampi emergence, but introduces uncertainty over burrow detection and burrow occupancy. A number of species are known to generate burrows within scampi grounds, and some may generate burrows that could be mistaken for scampi burrows. Within Europe, the angular crab *Goneplax rhomboides*, has been identified as generating similar, but smaller burrows to *Nephrops* (Rice & Chapman 1971, Atkinson 1974), but no species known to generate burrows similar to scampi have yet been identified in New Zealand. However, if such a species did occur, and was to change in abundance relative to scampi (perhaps because of different vulnerability to fishing), then the relationship between the burrows counted and the scampi population (q photo) would change.

This project aims to investigate the available data on other species present within scampi grounds, and identify potential burrow formers, as a first attempt to evaluate the extent to which other species are generating burrows that are counted as scampi burrows. This work has been limited to data from the SCI 3 fishery area. Megafaunal burrowing communities may be different in other areas.

The objective of the study was to:
Identify burrowing megafauna in SCI 3 from scampi survey images, trawl bycatch and other available data.

2. METHODS

A range of data are available on the benthic community within the SCI 3 scampi fishery area. The data sources likely to be most useful in identifying scampi sized burrowing animals are considered to be i) seabed images (from scampi surveys in 2001, 2009 and 2010 and OS2020 sampling in 2007), ii) benthic faunal sampling (from OS2020 in 2007 and other relevant trips), iii) bycatch from trawl surveys conducted in the area, and iv) bycatch recorded by Ministry of Fisheries (now Ministry for Primary Industries) observers from commercial scampi fishing operations in the area. Each of the data sources is discussed in more detail below.

Having identified the larger benthic fauna in the area, existing knowledge on life history characteristics will be used to identify potential burrowers, and assess the likelihood that burrows could be mistaken for scampi burrows. Most New Zealand studies on burrowers have focussed on intertidal crabs (Jones 1976) and thalassinid shrimps (Berkenbusch et al. 2007), and so details of other burrowers will be drawn from the international literature. Spatial and temporal patterns in the abundance of relevant species will be examined where possible. Although some finfish species are known to be active burrowers (Atkinson 1977, Nash 1980, Able et al. 1982), and similar species occur in New Zealand waters (e.g. *Ceploa aotea*), these species or families have not been recorded on the Chatham Rise, and finfish have been excluded from the analysis. Where burrowing fish and scampi species coexist elsewhere e.g. the snake blenny *Lumpenus lampretaeformis*, and the Norway lobster *Nephrops norvegicus*, the burrows are considered to be quite different (Atkinson 1986). Hagfish have also been observed inhabiting burrows with conspicuous, volcano–like mounds (Foss 1962), but again, these are quite different from scampi burrows.

Benthic faunal sampling
Benthic faunal sampling was conducted within the OS2020 surveys (Bowden 2011), and similar data are also available from a recent Tangaroa voyage in the area (TAN1116). Species abundance lists are available for each station sampled, and have been examined.

Within the OS2020 voyages, benthic sampling was conducted across a number of sites within the Chatham Rise. Only one site fell within the currently surveyed scampi grounds (Figure 1), but previous examination of these seabed images (Tuck et al. 2011) suggests that a number of these sites represent typical scampi habitat. Within the OS2020 voyages, sites were sampled with DTIS (simultaneously collecting high resolution video and still images) and either a small beam trawl or a small epibenthic sled (seamount sled). Sites at which scampi were recorded with any of the sampling approaches were taken as potentially representative of the benthic communities within scampi

grounds. Across these sampling approaches scampi were recorded at sites ranging from 271–1231 m in depth. Given that the scampi fishery (and scampi surveys) focus on the 300–500 m depth range, and that benthic communities considerably deeper than this are likely to be quite different, sites deeper than 600 m were excluded. The distribution of the sites shallower than 600 m where scampi were recorded are presented in relation to SCI 3 survey strata in Figure 1.

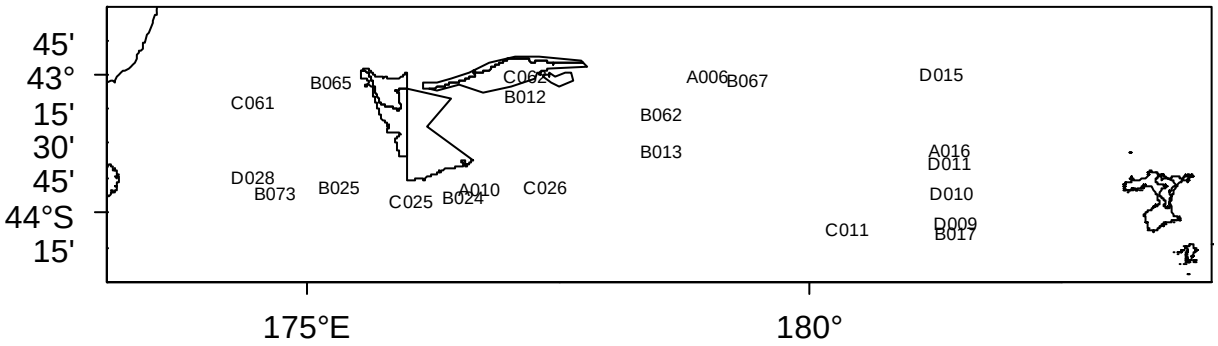

Figure 1: OS2020 survey sites shallower than 600 m where scampi were recorded, and SCI 3 survey strata (as used in recent scampi photographic and trawl surveys).

During the TAN1116 voyage, benthic sampling was conducted across a range of sites on the Chatham Rise with a beam trawl. As with the OS2020 voyages, only one site fell within the currently surveyed scampi grounds, but scampi were recorded at six sites in total (Figure 2), and the benthic communities at these sites has been examined.

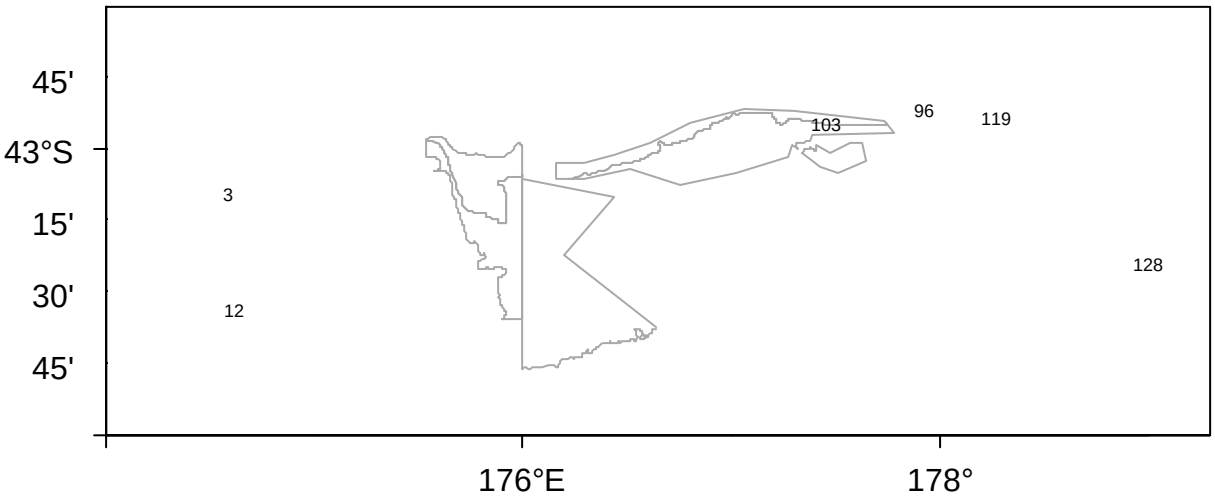

Figure 2: TAN1116 stations where scampi were recorded, and SCI 3 survey strata. Numbers on figure represent station numbers.

Seabed images

Scampi photographic surveys have been conducted in SCI 3 in 2001, 2009 and 2010. From these surveys over 5000 seabed images have been recorded. Images have already been analysed to estimate readable area and quantify scampi and their burrows, but other species have not been recorded. Within this study we have randomly selected 10 images from each of the 158 scampi photographic survey stations, and identified larger visible benthic organisms.

Video and still images were collected around the Chatham Rise during the OS2020 surveys in 2007, and benthic species have already been quantified from these records (for all the video and some of the still image stations). These data have also been examined, from the sites identified in Figure 1.

Trawl survey bycatch

Scampi and middle depths (hoki, hake and ling) trawl survey sampling has been conducted within scampi grounds on the Chatham Rise. Bycatch has been quantified on these surveys, and the information is available at the station level. All scampi trawl survey stations have been within scampi grounds, and are included in the analysis (Figure 3). Middle depth trawl survey stations within the vicinity of the main scampi grounds in SCI 3 have been examined to identify the main bycatch species. The locations of stations included in the analysis are presented in Figure 3.

Commercial fishery bycatch

Ministry of Fisheries (now Ministry for Primary Industries) observers collect information on fish and benthic material bycatch as part of their standard sampling protocol. These data are stored at the individual tow level on the *cod* database. The benthic data recorded from vessels targeting scampi within the vicinity of the main scampi grounds within SCI 3 have been extracted and examined to identify the main bycatch species. The locations of tows included in the analysis are presented in Figure 4.

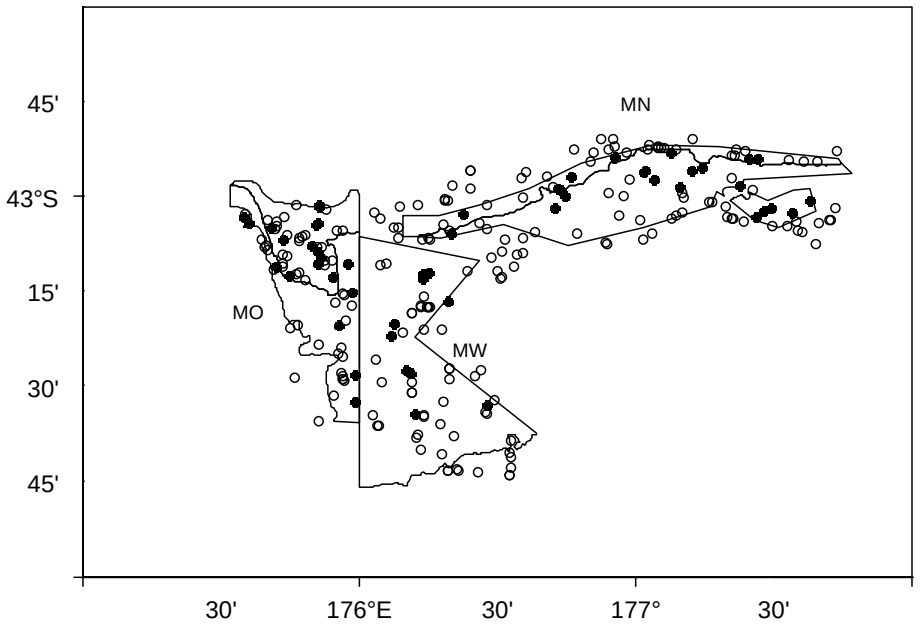

Figure 3: Location of scampi (solid symbols) and middle depth (hollow symbol) trawl survey stations within the vicinity of the main scampi grounds in SCI 3, in relation to SCI 3 survey strata. MN, MO and MW represent three subareas within the fishery.

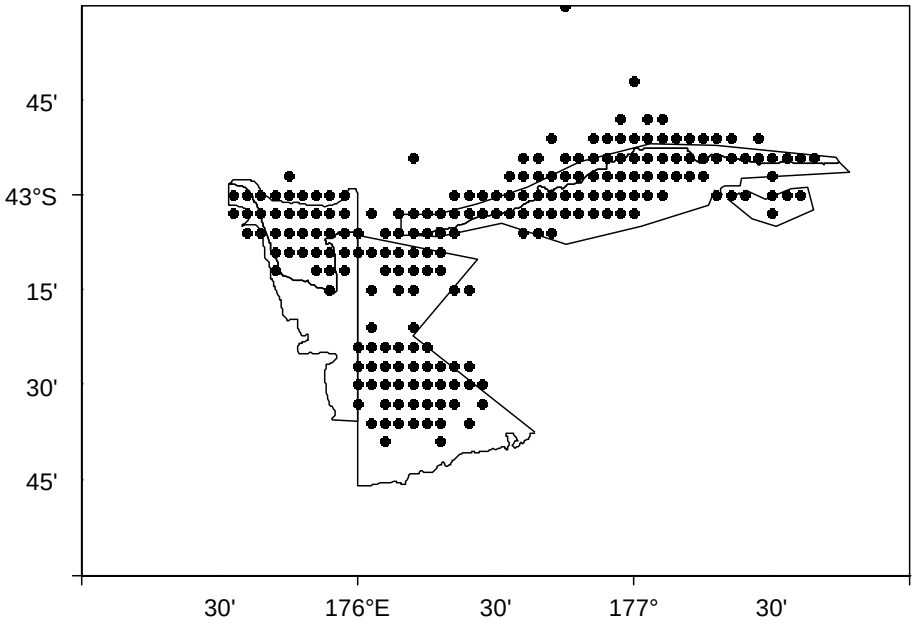

Figure 4: Location (truncated to the tenth of a degree) of commercial tows with observer data recorded, in relation to SCI 3 survey strata.

3. RESULTS

The individual datasets are briefly described below, and an overall list of species identified for further examination is provided.

3.1 Benthic faunal sampling

A full species list by site for the OS2020 beam trawl and sled sampling is provided in Appendix 1. A full species list for the TAN1116 sampling is provided in Appendix 2. A wide range of species were recorded using both sampling approaches. The OS2020 voyages sampled throughout the 24 hour period, while the beam trawl sampling on TAN1116 was conducted during daylight hours.

3.2 Seabed images

A full species list by site for the OS2020 DTIS video sampling is provided in Appendix 3. A full species list by site for the OS2020 DTIS still image sampling, and larger species and features by subarea and year from scampi photographic surveys are provided in Appendix 4. The OS2020 voyages sampled throughout the 24 hour period, while scampi photographic survey work is conducted during hours of daylight. The DTIS system is generally deployed closer to the seabed than the scampi survey system, and also has a higher still image resolution, making direct comparison of data from the two systems difficult (Tuck et al. 2011). A wide range of species were recorded using both the video and still image data from DTIS. The additional analysis of the scampi survey images conducted within this project focussed on larger bodies species.

3.3 Trawl survey bycatch

A full benthic species list by subarea and year for the scampi trawl survey sampling is provided in Appendix 5, with an equivalent benthic species list for the middle depth research trawling provided in Appendix 6. Both of these surveys only sample during the hours of daylight. While the trawl used in the scampi survey is designed for scampi, the middle depths trawl is designed for fish, and the larger groundgear may mean that benthic invertebrates are poorly sampled.

3.4 Commercial fishery bycatch

A full benthic species list for observer sampling from scampi targeted tows within the study area is provided in Appendix 7. While observer sampling has been undertaken since the early 1990s, sampling of benthic bycatch appears to have been variable, and the level of taxonomic identification has also varied considerably over time, generally improving in recent years.

3.5 Species potentially generating burrows that may be confused with scampi

Although a wide range of benthic species have been recorded from the main scampi fishery area within SCI 3, most of these can be discounted as permanent burrow formers. Of the phyla recorded, only Annelida, Arthropoda and Hemichordata are known to form permanent burrows. Some echinoderms, anemones, bivalves and gastropods burrow or live within the surface layers of the sediment, but do not form permanent burrow structures. Polychaete burrows are far smaller than any features likely to be associated with scampi, and so only the some of the crustaceans and the hemichordate species recorded in the study area are considered for further examination. The recent checklist of New Zealand Decapoda (Yaldwyn & Webber 2011) was particularly useful in collating general ecological information on this group. Scampi burrows showing the key identification characteristics of a crescent-shaped entrance with smooth flat bottom, a shallow tunnel and well maintained "tracks" are shown in Figure 5 for comparison with other types of burrows.

Amphipoda & Isopoda
Species of both amphipods and isopods are known to form permanent burrows, but given their generally small body size, the burrow openings tend to be quite small. Amphipods have been found in complex burrow systems of multiple interconnected U-shaped narrow elliptical tunnels, with up to 70 slit-like openings (Atkinson et al. 1982).

The predatory and scavenging isopods recorded from the Chatham Rise are thought to spend most of their time within burrows (Wagele & Sieg 1991, Bruce 2009), which may be quite similar to those found for isopods with similar lifestyles elsewhere (Taylor & Moore 1995). These are quite simple vertical shafts or Y-shaped with funnel shaped openings.

Thalassinidae
Mud and ghost shrimps form a range of burrow types, based on feeding patterns and environmental constraints, (Nickell & Atkinson 1995, Bird & Poore 1999). Surface openings tend to be small (approximately 1–2cm in diameter), and may be funnel shaped from the surface with a vertical tunnel, or within an exhalent volcano-like feature.

Galatheids
Squat lobsters are common on scampi grounds, both in Europe and New Zealand, and are frequently observed within the entrances to burrows. Some species of *Munida* are thought to regularly excavate shelters under rocks, but it remains unclear as to whether they are capable of actually generating a burrow themselves, or simply make use of burrows created by other species (Gramitto & Froglia 1998, Huguet et al. 2005), and they are frequently found within burrows known to be created by other species (Atkinson et al. 1974). Within scampi survey images, *Munida* are often observed walking free on the surface, but when they are associated with burrows, they range considerably in size and form, and do not have the "well maintained" appearance typical of those burrows thought to be associated with scampi (Figure 6).

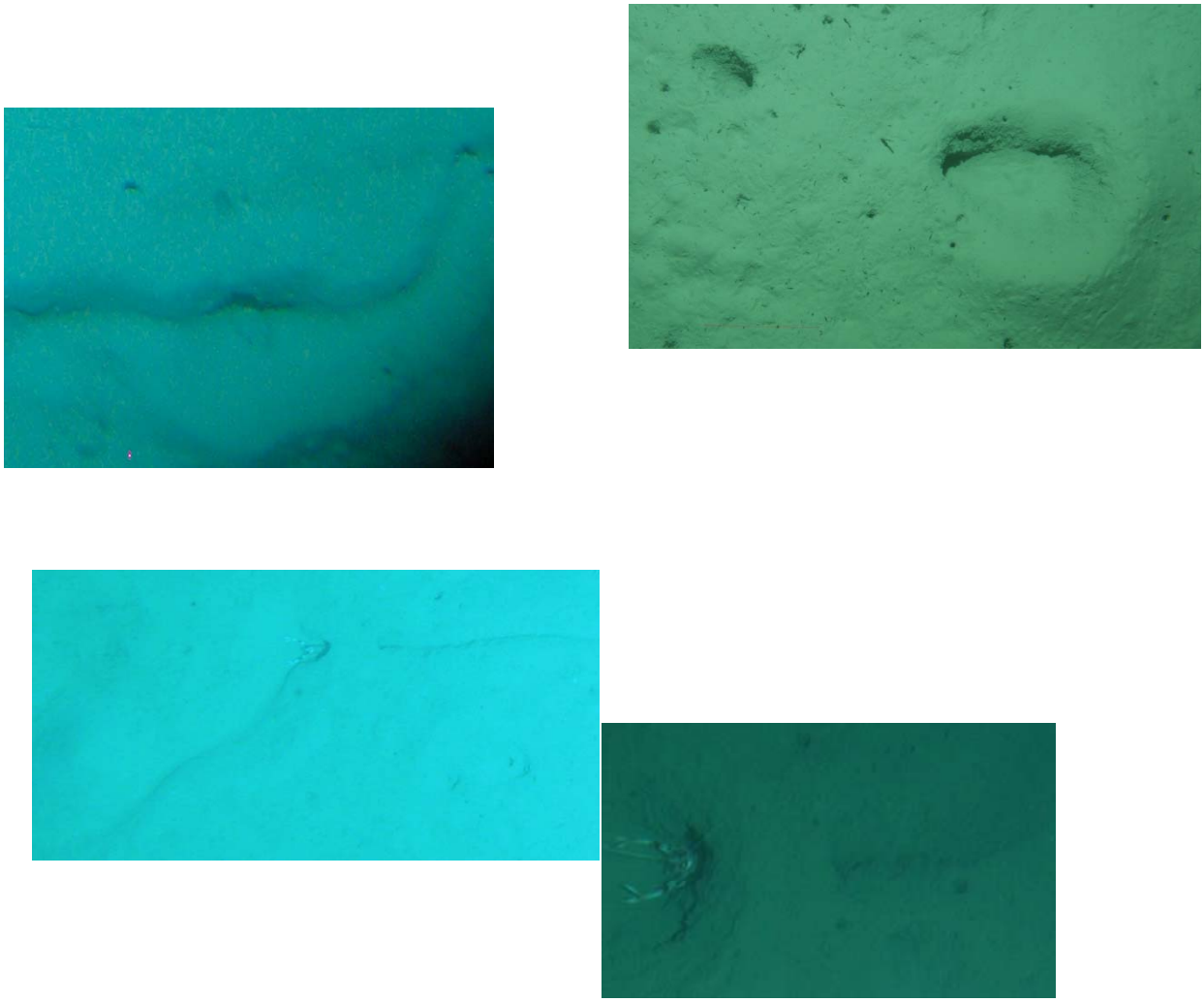

Figure 5: Scampi burrows showing key identification characteristics.

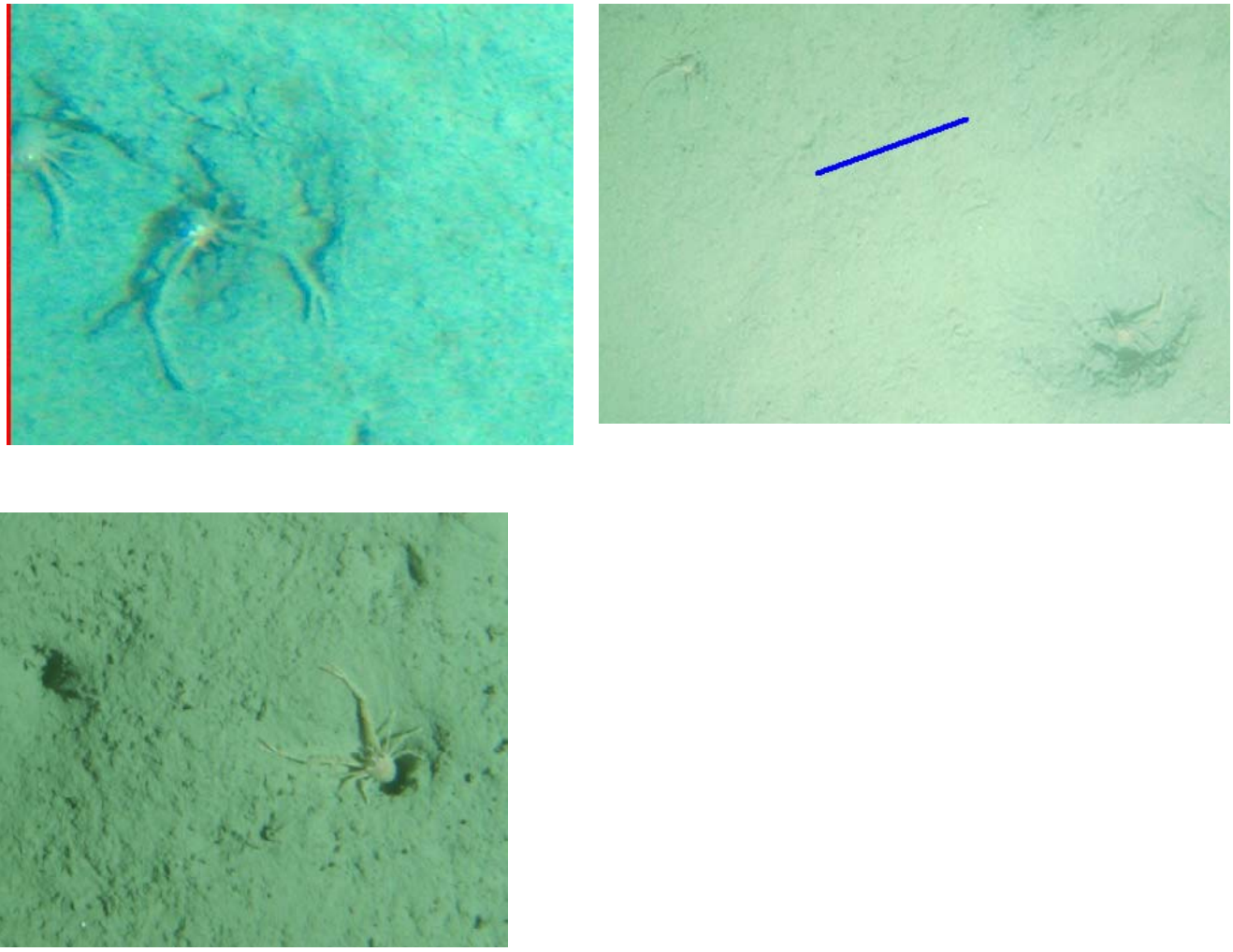

Figure 6: *Munida* associated with different types of burrows within scampi grounds.

Crabs

No deeper water New Zealand crabs have been reported to generate burrows (Yaldwyn & Webber 2011), although both *Pycnoplax* (*Carcinoplax*) *victoriensis* and *Neommatocarcinus huttoni* (not recorded within the data collated for this area, but reported from elsewhere on the Chatham Rise) are members of the Goneplacidae family, which also includes *Goneplax rhomboides*, a crab known to dig burrows in *Nephrops* grounds in Europe. Images of *Goneplax rhomboides*, *Neommatocarcinus huttoni*, and *Pycnoplax victoriensis* are shown in Figure 7.

Morphologically, *N. huttoni* is similar to the European *G. rhomboides* (elongated eyes and eye penducles, wide, transversely rectangular and relatively short carapace) (Castro 2007), suggesting that it may fill a similar burrowing niche (P. Castro, California State Polytechnic University, pers. com.), although in shallower sandy habitats it is reported to make temporary furrows (rather than burrows), leaving the long eye penducles protruding from the sediment (McLay 1988). Elongate eye penducles are considered an adaptation to a burrowing mode of life in brachyuran crabs (Barnes 1968).

Pycnoplax victoriensis has a more rounded body and lacks elongated eye penducles (Figure 7), suggesting that it may not be a burrower, although it is observed within burrow entrances on scampi surveys (Figure 8). It is observed associated with a range of burrow types, and may make burrows and/or make use of burrows generated by other species. On the southern flank of the Chatham Rise, *P. victoriensis* is very abundant, and appears to be associated with small (approximately 25 mm diameter) circular openings (D. Bowden, NIWA, pers. com.). Other

scampi grounds have not been examined within this investigation, but *Pycnoplax victoriensis* appears to be more abundant in SCI 3 than other areas (IDT, pers. obs. and B. Hartill, NIWA, pers. com.).

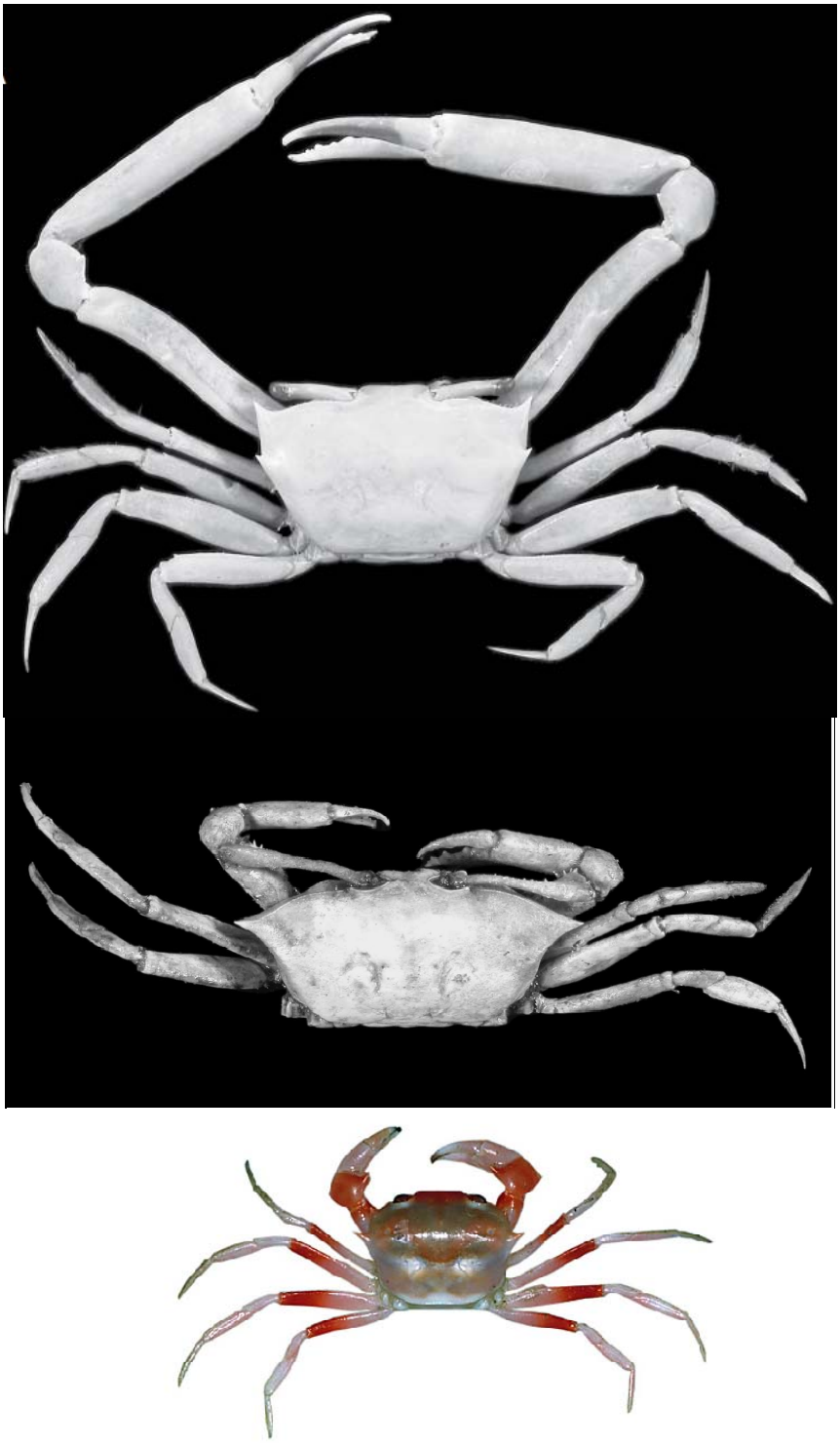

Figure 7: Images of *Gonelpax rhomboides* (European - top), *Neommatocarcinus huttoni* (NZ similar species - middle) and *Pycnoplax victoriensis* (observed in SCI 3 scampi grounds - bottom). Images sources from Castro (2007) and Tracey et al. (2011).

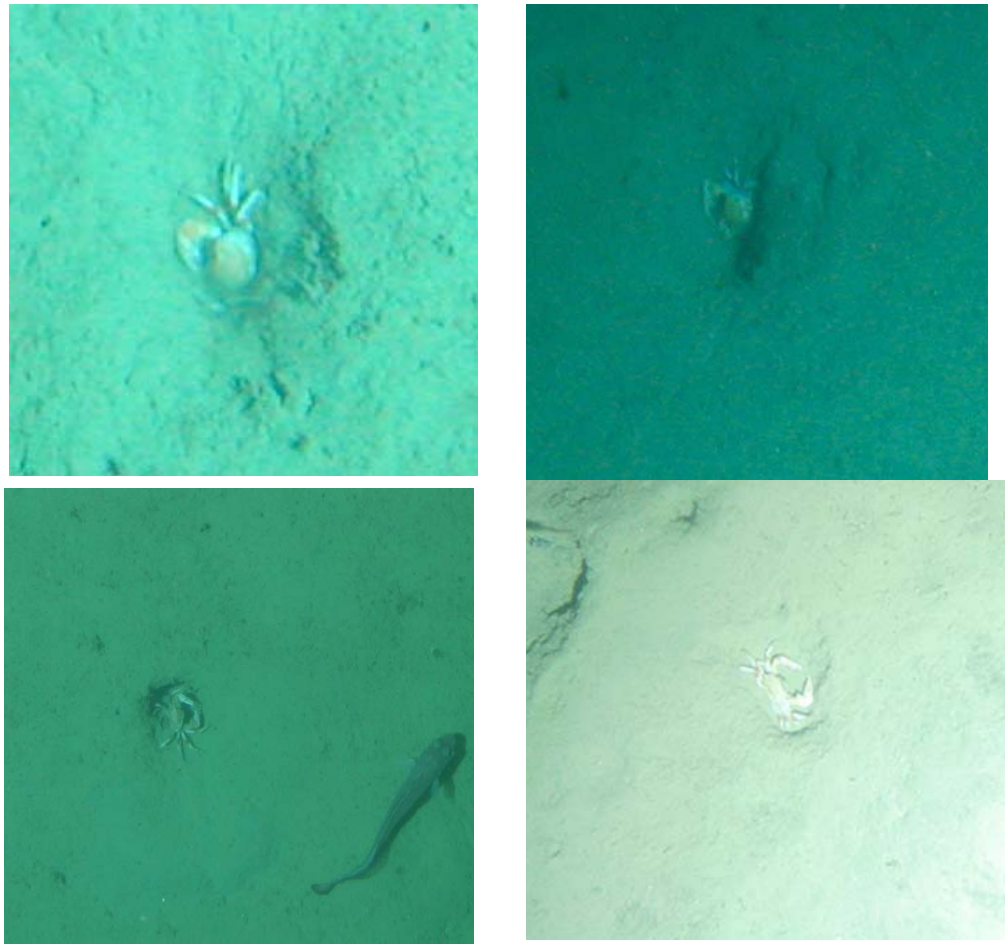

Figure 8: Burrows and surface features associated with *Pycnoplax victoriensis*.

Hemichordata

Enteropneusta form U-shaped burrows in soft sediment, with narrow openings. No Echiuran (spoon) worms were reported in the data examined, although they are likely to be found in muddy seabed areas, and they were reported from other areas within the OS2020 voyages. Echiuran burrows generally have a small surface opening and a narrow neck through which the proboscis extends, the burrow becoming wider below the surface (Hughes et al. 1993, Nickell et al. 1995). Feeding traces (Figure 9) by the proboscis often leave lines radiating out from the burrow opening (Ohta 1984).

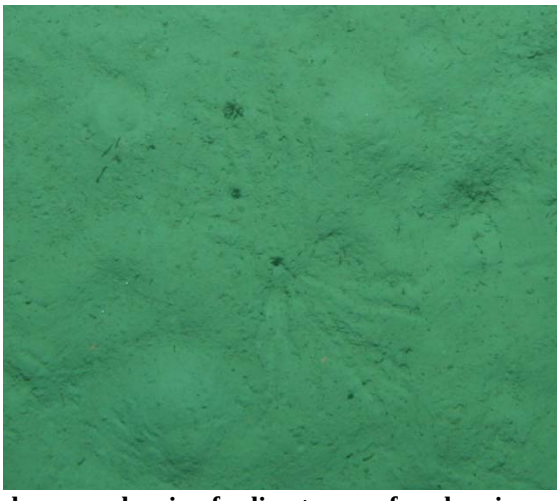

Figure 9: Surface trace of Echiuran burrow, showing feeding traces of proboscis.

4. DISCUSSION

The burrows of scampi, *Metanephrops challengeri*, are considered quite distinctive (Figure 5), and following development of the photographic survey approach in New Zealand, a burrow identification protocol was developed from a "library" of images in which *M. challengeri* could be seen associated with burrows (Cryer et al. 2002). The criteria used in survey analysis for defining and counting animals and burrows are provided in Appendix 8. Key characteristics of major burrow openings (those used in the abundance index) are a crescent-shaped entrance with smooth flat bottom, over 50 mm wide at the base, with a shallow rather than vertical tunnel, well maintained "tracks", typically leading away at right angles from the burrow, fans of excavated sediment and an associated minor opening positioned to form a linear system.

Of the potential other burrowers recorded, only the larger crustaceans (crabs and galatheids) are potentially big enough to generate a comparable burrow. Although the various data sources examined each have potential selectivity issues (sampling during daylight will not collect or observe nocturnal emergers, trawl sampling may miss smaller individuals, visual sampling does not provide a physical specimen to identify), by combining the approaches we should have sampled species of comparable size to scampi that emerge at some time during the day.

It remains unclear as to whether the galatheids recorded in the area excavate burrows, or simply use (and potentially modify) existing ones, but when *Munida* appears associated with a burrow, it does not show the typical scampi burrow features described in Appendix 8. *P. victoriensis* is also observed associated with burrows, but it does not appear to be a "typical burrower" morphologically, and where it has been recorded in high densities, it is associated with a small circular burrow quite different from scampi burrows. *N. huttoni* shows all the morphometric characteristics of a burrowing crab, and may well generate burrows within scampi grounds on the Chatham Rise (although we have no record of it in this specific area yet). However, like *G. rhomboides*, the wide and relatively short carapace means that even at maximum size (approximately 40 mm carapace width; Tracey et al. 2011), burrow openings would only be 30 mm wide, somewhat smaller than that counted for scampi.

Given the reliance on comparison with overseas species, it would be very useful to undertake aquarium studies on some of the species considered within this study, which may help clarify issues over burrowing abilities and burrow morphology.

5. CONCLUSIONS

A range of sources of data on species distributions on the Chatham Rise have been examined to identify the burrowing megafauna within scampi grounds in SCI 3. While a large number of species were recorded in the area, relatively few of them are likely to form permanent burrows of appropriate size to be confused with scampi, and of these, none are actually known to generate burrows. Both galatheids and goneplacids occur on scampi grounds, and are observed within a range of burrows, but galatheids are known to be opportunistic users of other burrows (Atkinson et al. 1974), and if goneplacids do form burrows (probably for *N. huttoni*, given its similar morphology to *G. rhomboides*, uncertain for *P. victoriensis*) it appears unlikely they would be big enough, or have the appropriate characteristics to be counted as scampi burrows.

6. ACKNOWLEDGMENTS

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APPENDIX 1: BENTHIC SPECIES FROM BEAM TRAWL AND SLED (OS2020)

Benthic species recorded by site (Figure 1) from beam trawl and sled sampling within OS2020 voyages.

Phylum	Class	Order	Species	B073	B025	B024	A010	B017	A016	B067	A006	B013	B062	C062	B012	B065	D028	C061
Annelida	Polychaeta	Amphinomida	Chloeia	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Annelida	Polychaeta	Amphinomida	Chloeia inermis	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Eunicida	Eunice	0	0	0	0	0	0	0	0	0	2	0	0	5	0	0
Annelida	Polychaeta	Eunicida	Hyalinoecia longibranchiata	12	0	3	0	0	1	0	0	2	1	0	0	1	40	0
Annelida	Polychaeta	Eunicida	Kinbergonuphis proalopus	5	8	4	1	0	0	0	3	0	0	0	0	0	0	3
Annelida	Polychaeta	Eunicida	Lumbrineridae	0	2	3	0	1	0	0	1	0	0	0	0	3	0	0
Annelida	Polychaeta	Eunicida	Oenonidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Annelida	Polychaeta	Eunicida	Onuphis onuphis-A	1	0	0	6	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Eunicida	Rhamphobrachium averincevi	0	0	0	0	0	1	1	0	1	0	1	0	1	0	0
Annelida	Polychaeta	Phyllodocida	Aglaophamus	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0
Annelida	Polychaeta	Phyllodocida	Aglaophamus macroura	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Glycera	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Glycera knoxi	1	4	1	1	0	0	0	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Phyllodocida	Glyceridae	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Goniada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Phyllodocida	Goniadidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Nephtyidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Aphrodita talpa	0	0	0	3	0	6	0	0	2	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Euphione squamosa	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	Polychaeta	Phyllodocida	Panthalis novaezealandiae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Polynoidae	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Sthenolepis magellanica	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Syllidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Sabellida	Frenulata (was Pogonophora)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Annelida	Polychaeta	Sabellida	Galathowenia australis	2	0	1	38	0	0	0	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Sabellida	Oweniidae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Sabellida	Sabellidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Annelida	Polychaeta	Sabellida	Serpulidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Annelida	Polychaeta	Scolecida	Asychis trifilosus	4	3	7	36	0	0	0	0	0	4	0	0	0	0	8
Annelida	Polychaeta	Scolecida	Lumbriclymene cylindricauda	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Scolecida	Maldane theodori	2	3	1	8	0	0	0	1	0	0	1	0	0	0	3
Annelida	Polychaeta	Scolecida	Metasychis Metasychis-A	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Scolecida	Notoproctus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Scolecida	Ophelina	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Scolecida	Phylo novazealandiae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Spionida	Chaetopteridae	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Spionida	Paraprionospio coora	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Terebellida	Cirratulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Terebellida	Ampharetidae	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
Annelida	Polychaeta	Terebellida	Lanice	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Annelida	Polychaeta	Terebellida	Terebellidae	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Annelida	Polychaeta	Terebellida	Terebellides	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Annelida	Polychaeta	Terebellida	Trichobranchidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Arthropoda	Malacostraca	Amphipoda	Byblisoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Arthropoda	Malacostraca	Amphipoda	Camacho	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Arthropoda	Malacostraca	Amphipoda	Pardaliscidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Alainopasiphaea australis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Arthropoda	Malacostraca	Decapoda	Bellidilia cheesmani	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Arthropoda	Malacostraca	Decapoda	Brachyura	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Arthropoda	Malacostraca	Decapoda	Campylonotus rathbunae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Ebalia tuberculosa	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Arthropoda	Malacostraca	Decapoda	Lophopagurus lacertosus	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Arthropoda	Malacostraca	Decapoda	Metacrangon knoxi	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Metanephrops challengeri	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Munida gracilis	0	0	1	0	0	0	0	1	2	6	2	0	3	1	1
Arthropoda	Malacostraca	Decapoda	Pycnoplax victoriensis	0	0	0	0	3	2	2	13	1	9	2	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Stereomastis suhmi	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Sympagurus dimorphus	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Trichopeltarion fantasticum	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0
Arthropoda	Malacostraca	Isopoda	Arcturides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Arthropoda	Malacostraca	Isopoda	Bathygnathia	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Isopoda	Serolidae	1	0	0	0	1	0	0	1	0	0	0	0	0	2	1
Arthropoda	Maxillopoda	Pedunculata	Arcoscalpellum affibricatum	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0
Arthropoda	Maxillopoda	Pedunculata	Smilium acutum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Brachiopoda	Articulata	Terebratulida	Gyrothyris mawsoni	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Bitectipora retepora	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Celleporaria emancipata	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Cornucopina	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Melicerita chathamensis	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Schizosmittina	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Chordata	Thaliacea		Thaliacea [Salps]	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Cnidaria	Anthozoa	Actiniaria	Actiniaria	0	0	1	0	0	0	0	1	0	0	0	0	0	2	0
Cnidaria	Anthozoa	Actiniaria	Hormathiidae	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Cnidaria	Anthozoa	Alcyonacea	Taiaroa tauhou	1	0	0	1	1	0	0	0	11	1	0	0	4	6	0
Cnidaria	Anthozoa	Gorgonacea	Radicipes	0	0	0	0	0	0	0	2	1	0	0	0	0	0	33
Cnidaria	Anthozoa	Gorgonacea	Thouarella	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Anthoptilum	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Funiculina quadriangularis	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Halipteris	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Stylatula	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cnidaria	Anthozoa	Telestacea	Telesto	0	0	0	2	0	0	0	0	0	1	0	0	0	0	2
Cnidaria	Hydrozoa	Leptothecata	Aglaopheniidae	0	0	0	0	1	0	0	4	0	2	0	2	6	1	3
Cnidaria	Hydrozoa	Leptothecata	Stegolaria	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Pseudechinaster rubens	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Zoroaster spinulosus	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Astropectinidae	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Echinodermata	Asteroidea	Paxillosida	Dipsacaster magnificus	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Plutonaster sp. B	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Proserpinaster neozelanicus	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Psilaster acuminatus	0	0	0	0	0	2	0	0	1	0	1	2	0	0	0
Echinodermata	Asteroidea	Valvatida	Mediaster sladeni	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Echinodermata	Echinoidea	Echinothurioida	Phormosoma bursarium	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Echinodermata	Echinoidea	Echinothurioida	Sperosoma	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Echinodermata	Echinoidea	Spatangoida	Brissopsis oldhami	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Echinoidea	Spatangoida	Echinocardium lymani	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0
Echinodermata	Echinoidea	Spatangoida	Hemiaster expergitus ssp. gibbosus	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Echinodermata	Echinoidea	Spatangoida	Spatangus multispinus	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Bathyplotes	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Echinodermata	Holothuroidea	Dactylochirotida	Ypsilothuria bitentaculata	3	0	0	0	3	0	0	1	0	0	0	0	0	0	0

Echinodermata	Holothuroidea	Dendrochirotida	Heterothyone alba	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Dendrochirotida	Neoamphicyclus	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Echinodermata	Holothuroidea	Dendrochirotida	Neothyonidium armatum	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Echinodermata	Holothuroidea	Dendrochirotida	Pentadactyla longidentis	0	2	0	0	0	0	0	0	8	0	0	0	0	0	0
Echinodermata	Holothuroidea	Elasipodida	Laetmogone violacea	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Holothuroidea	Holothuroidea	0	0	0	2	0	0	0	0	0	0	0	0	0	7	0
Echinodermata	Holothuroidea	Molpadiida	Heteromolpadia pikei	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Molpadiida	Molpadia antarctica	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Molpadiida	Molpadia musculus	1	0	1	3	3	0	0	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Molpadiida	Paracaudina chilensis	0	2	0	0	4	2	1	2	0	0	0	0	1	0	0
Echinodermata	Ophiuroidea	Ophiurida	Amphioplus (A.) ctenacantha	0	1	1	0	1	0	0	1	0	0	0	0	0	0	1
Echinodermata	Ophiuroidea	Ophiurida	Amphiura	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Amphiura dikellacantha	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Amphiura lanceolata	1	6	6	1	1	0	0	6	0	8	0	0	2	0	0
Echinodermata	Ophiuroidea	Ophiurida	Ophiacantha otagoensis	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Ophiomyxa brevirima	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Ophiura irrorata	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Foraminifera	Foraminifera		Foraminifera	0	0	8	26	0	0	0	1	0	0	0	0	1	0	24
Mollusca	Bivalvia	Myoida	Cuspidaria	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Mollusca	Bivalvia	Myoida	Cuspidaria fairchildi	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Mollusca	Bivalvia	Myoida	Cuspidaria tuhua	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Mollusca	Bivalvia	Myoida	Pendaloma micans	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Bivalvia	Nuculoidea	Neilo wairoana delli	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Bivalvia	Nuculoidea	Poroleda lanceolata	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Bivalvia	Nuculoidea	Varinucula gallinacea	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Bivalvia	Ostreoida	Veprichlamys kiwaensis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Mollusca	Bivalvia	Pholadomyoida	Euciroa galatheae	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0
Mollusca	Bivalvia	Pterioida	Pododesmus zelandicus	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Mollusca	Bivalvia		Bivalvia	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda		Gastropoda	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Mollusca	Gastropoda	Cephalaspidea	Scaphander otagoensis	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Nudibranchia	Nudibranchia	0	0	0	0	0	0	1	0	0	1	0	2	0	0	0
Mollusca	Gastropoda	Mesogastropoda	Falsilunatia powelli	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Mesogastropoda	Falsilunatia subperforata	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Bathytoma parengonius	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Mollusca	Gastropoda	Neogastropoda	Splendrillia benthicola	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Volutomitra banksi	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Mollusca	Gastropoda	Neotaenioglossa	Fusitriton laudandus	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0
Mollusca	Gastropoda	Neotaenioglossa	Galeodea triganceae	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Mollusca	Gastropoda	Stenoglossa	Aeneator recens	0	0	0	0	0	1	0	0	0	0	0	2	2	0	0
Mollusca	Gastropoda	Stenoglossa	Alcithoe wilsonae	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Mollusca	Gastropoda	Stenoglossa	Coluzea mariae	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0
Mollusca	Gastropoda	Stenoglossa	Cominella alertae	1	0	0	2	0	1	0	0	3	0	0	0	0	8	0
Mollusca	Gastropoda	Stenoglossa	Cominella mirabilis canturiensis	0	0	0	0	0	0	0	0	2	0	0	11	6	0	0
Mollusca	Gastropoda	Stenoglossa	Nassarius ephamillus	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0
Mollusca	Gastropoda	Stenoglossa	Penion chathamensis	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Mollusca	Gastropoda	Stenoglossa	Poirieria zelandica	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Mollusca	Gastropoda	Vetigastropoda	Archiminolia meridiana	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Mollusca	Scaphopoda	Dentaliida	Fissidentalium zelandicum	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0
Mollusca	Scaphopoda		Scaphopoda	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Nemertea	Nemertea	Nemertea	Nemertea	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Porifera	Demospongiae	Poecilosclerida	Biemna	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Porifera	Demospongiae	Poecilosclerida	Fibulia	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Porifera	Demospongiae	Poecilosclerida	Ophlitaspongia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Porifera	Demospongiae	Poecilosclerida	Tedania	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Porifera	Demospongiae	Spirophorida	Fangophilina	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0
Porifera	Hexactinellida	Lyssacinosida	Hyalascus	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Sipuncula	Sipunculidea		Sipunculidea	5	1	1	2	0	0	0	1	0	0	0	0	2	0	1

APPENDIX 2: BENTHIC SPECIES FROM BEAM TRAWL (TAN1116)

Benthic species recorded by site (Figure 2) from beam trawl sampling within TAN1116.

Phylum	Class	Order	species	3	12	96	103	119	128
Annelida	Polychaeta	Amphinomida	Chloeia inermis	0	0	0	1	0	0
Annelida	Polychaeta	Eunicida	Hyalinoecia	0	26	0	0	0	0
Annelida	Polychaeta	Phyllodocida	Aphrodita	0	0	0	1	0	0
Annelida	Polychaeta	Phyllodocida	Polynoidae	2	0	0	0	0	0
Annelida	Polychaeta		Polychaeta	6	2	1	16	0	3
Arthropoda	Malacostraca	Amphipoda	Amphipoda	0	0	0	1	0	4
Arthropoda	Malacostraca	Amphipoda	Oedicerotidae	1	4	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Campylonotus rathbunae	69	9	13	7	46	34
Arthropoda	Malacostraca	Decapoda	Caridea	0	1	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Crangonidae	0	13	0	43	0	13
Arthropoda	Malacostraca	Decapoda	Gastroptychus novaezelandiae	1	0	0	0	1	0
Arthropoda	Malacostraca	Decapoda	Goreopagurus poorei	0	1	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Lipkius holthuisi	0	0	0	0	14	0
Arthropoda	Malacostraca	Decapoda	Majidae	0	1	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Metacrangon	0	15	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Metanephrops challengeri	6	1	7	7	3	1
Arthropoda	Malacostraca	Decapoda	Munida	0	0	1	0	0	0
Arthropoda	Malacostraca	Decapoda	Munida gracilis	201	64	60	26	18	174
Arthropoda	Malacostraca	Decapoda	Notocrangon	16	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Notopandalus magnoculus	0	0	0	13	18	83
Arthropoda	Malacostraca	Decapoda	Pasiphaea	70	26	19	9	42	0
Arthropoda	Malacostraca	Decapoda	Phylladiorhynchus	4	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Polycheles	1	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Polychelidae	0	0	2	0	12	0
Arthropoda	Malacostraca	Decapoda	Prionocrangon curvicaulus	1	0	0	2	0	7
Arthropoda	Malacostraca	Decapoda	Propagurus deprofundis	2	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Pteropeltarion novaezelandiae	0	0	0	1	0	0
Arthropoda	Malacostraca	Decapoda	Pycnoplax	123	0	23	41	6	1
Arthropoda	Malacostraca	Decapoda	Sergestes	0	3	1	1	0	0
Arthropoda	Malacostraca	Decapoda	Sympagurus dimorphus	5	0	0	0	1	2
Arthropoda	Malacostraca	Decapoda	Teratomaia	0	0	1	0	0	1
Arthropoda	Malacostraca	Decapoda	Thalassinidea	2	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Trichopeltarion fantasticum	1	0	0	0	0	0
Arthropoda	Malacostraca	Isopoda	Aegidae	0	1	0	0	0	0
Arthropoda	Malacostraca	Isopoda	Brucerolis	795	61	363	17	326	60
Arthropoda	Malacostraca	Isopoda	Isopoda	0	0	0	0	1	0
Arthropoda	Malacostraca	Isopoda	Sphaeromatidae	0	0	0	0	0	12
Arthropoda	Malacostraca	Mysida	Mysida	3	2	12	0	22	0
Brachiopoda			Brachiopoda		0	0			
Bryozoa			Bryozoa	0	0	0	0	0	17
Chordata	Ascidiacea		Tunicates	0	2	2	9	0	14
Cnidaria	Anthozoa	Actiniaria	Actiniaria	0	1	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Actinostolidae	1	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Bolocera	1	0	0	0	0	0
Cnidaria	Anthozoa	Alcyonacea	Alcyonacea	0	0	0	0	0	3
Cnidaria	Anthozoa	Alcyonacea	Anthomastus zealandicus	1	0	0	0	0	0
Cnidaria	Anthozoa	Alcyonacea	Taiaroa tauhou	0	0	0	1	0	7
Cnidaria	Anthozoa	Gorgonacea	Radicipes	3	0	0	0	1	0
Cnidaria	Anthozoa	Gorgonacea	Thouarella	0	0	0	0	0	3
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea	4	3	0	0	0	0
Cnidaria	Anthozoa	Scleractinia	Caryophyllia	0	0	0	0	0	12
Cnidaria	Anthozoa	Scleractinia	Flabellum	0	1	0	0	0	4
Echinodermata	Asteroidea	Forcipulatida	Asteriidae	0	0	0	0	0	1
Echinodermata	Asteroidea	Forcipulatida	Zoroaster	0	0	0	13	0	2
Echinodermata	Asteroidea	Notomyotida	Benthopecten	0	0	0	0	0	2
Echinodermata	Asteroidea	Paxillosida	Astropectinidae	0	0	1	0	0	3
Echinodermata	Asteroidea	Paxillosida	Plutonaster knoxi	0	0	0	0	1	0
Echinodermata	Asteroidea	Paxillosida	Psilaster	0	2	1	2	0	0
Echinodermata	Asteroidea	Spinulosida	Henricia	0	1	0	0	0	0
Echinodermata	Asteroidea	Velatida	Crossaster	0	0	0	0	1	0
Echinodermata	Asteroidea	Velatida	Pterasteridae	0	0	0	0	0	1
Echinodermata	Asteroidea		Asteroidea	2	0	0	0	0	0
Echinodermata	Echinoidea	Cidaroida	Cidaridae	2	0	0	0	0	2
Echinodermata	Echinoidea	Cidaroida	Goniocidaris parasol	1	0	0	0	0	3
Echinodermata	Echinoidea	Echinothurioida	Phormosoma	0	30	0	0	0	0
Echinodermata	Echinoidea	Echinothurioida	Phormosoma bursarium	2	0	1	0	9	9
Echinodermata	Echinoidea	Spatangoida	Brissopsis	0	0	0	20	0	0
Echinodermata	Echinoidea	Spatangoida	Brissopsis oldhami	0	0	5	0	0	0
Echinodermata	Echinoidea	Spatangoida	Echinocardium	0	0	0	0	0	67
Echinodermata	Echinoidea	Spatangoida	Echinocardium lymani	0	0	3	0	0	0
Echinodermata	Echinoidea	Spatangoida	Hemiaster	0	0	10	0	0	0

Echinodermata	Echinoidea	Spatangoida	Spatangidae	0	0	0	0	0	20
Echinodermata	Echinoidea	Spatangoida	Spatangus multispinus	0	0	0	0	0	105
Echinodermata	Echinoidea	Temnopleuroida	Pseudechinus flemingi	0	3	0	0	0	1
Echinodermata	Echinoidea		Echinoidea	1	0	0	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Bathyplotes	0	8	0	0	0	0
Echinodermata	Holothuroidea	Dendrochirotida	Psolidae	0	0	0	0	0	9
Echinodermata	Holothuroidea	Elasipodida	Laetmogonidae	0	0	0	0	0	1
Echinodermata	Holothuroidea	Molpadiida	Molpadia	0	0	0	2	0	0
Echinodermata	Holothuroidea	Molpadiida	Molpadia musculus	0	0	1	0	0	0
Echinodermata	Holothuroidea	Molpadiida	Molpadiidae	2	0	0	0	0	0
Echinodermata	Ophiuroidea	Euryalinida	Astrothorax	0	0	0	1	0	0
Echinodermata	Ophiuroidea		Ophiuroidea	5	0	8	45	0	27
Hyrozoa	Hydrozoa	Anthoathecata	Calyptopora	0	0	0	0	0	3
Hyrozoa	Hydrozoa		Hydrozoa	0	0	2	0	0	1
Mollusca	Bivalvia	Myoida	Cuspidaria	0	4	0	5	0	0
Mollusca	Bivalvia	Ostreoida	Pectinidae	0	0	0	0	0	13
Mollusca	Bivalvia		Bivalvia	3	0	0	2	0	0
Mollusca	Cephalopoda	Octopoda	Octopodidae	0	0	0	0	0	1
Mollusca	Cephalopoda	Octopoda	Octopus mernoo	2	0	0	0	0	0
Mollusca	Cephalopoda	Sepiida	Sepioloidea	0	0	0	0	0	1
Mollusca	Cephalopoda	Teuthida	Teuthida	0	1	1	0	0	0
Mollusca	Gastropoda		Gastropoda	14	1	1	3	0	1
Mollusca	Gastropoda	Cephalaspidea	Scaphander	0	0	0	1	0	0
Mollusca	Gastropoda	Nudibranchia	Nudibranchia	0	0	0	0	4	3
Mollusca	Gastropoda	Neogastropoda	Turridae	0	0	0	1	0	1
Mollusca	Gastropoda	Neotaenioglossa	Fusitriton magellanicus	4	0	0	0	0	0
Mollusca	Gastropoda	Stenoglossa	Coluzea	0	0	0	1	0	0
Mollusca	Polyplacophora	Ischnochitonida	Chitonidae	0	0	0	0	0	1
Mollusca	Scaphopoda		Scaphopoda	0	0	0	2	0	0
Porifera	Demospongiae	Astrophorida	Thenea	5	0	0	0	0	1
Porifera	Demospongiae	Hadromerida	Suberites	0	0	0	0	0	2
Porifera	Demospongiae		Demospongiae	0	0	0	0	0	2
Porifera	Hexactinellida	Lyssacinosida	Hyalascus	0	0	0	0	0	1
Porifera			Porifera	0	0	0	0	0	4
Sipuncula			Sipuncula		0	0			

APPENDIX 3: BENTHIC SPECIES FROM DTIS VIDEO (OS2020)

Benthic species recorded by site (Figure 1) from DTIS video sampling within OS2020 voyages (other stations below). Counts standardised to 1000m transect (1.5m wide).

Phylum	Class	Order	Species	B073	B025	C025	B024	A010	C026	C011	B017	A016	D009	D010
Annelida	Polychaeta	Aciculata	Quill worm	64.78	0	160.53	32.25	10.6	633.09	3.45	0	0	2.77	0
Arthropoda	Malacostraca	Decapoda	Atelecyclidae	4.63	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Carcinoplax victoriensis	0	0.71	0.86	0	0	4.92	0	1.24	1.04	0.92	5.81
Arthropoda	Malacostraca	Decapoda	Crustacean (crab)	6.61	0.71	0	0	0	0.61	0.86	1.24	0	0	1.94
Arthropoda	Malacostraca	Decapoda	Crustacean (galatheid)	0.66	0	0	0	0.63	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Crustacean (lobster)	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Crustacean (pagurid)	32.39	14.9	55.24	27.12	30.78	81.75	19	8.06	26.2	39.72	0
Arthropoda	Malacostraca	Decapoda	Crustacean (scampi)	0	0	0	0	2.15	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Crustacean (shrimp)	0.66	0.71	0	0.73	1.7	0.61	0	0	2.36	0	0
Arthropoda	Malacostraca	Decapoda	Galatheidae	7.27	0	0	5.86	29.71	0	0	5.58	4.73	4.62	0
Arthropoda	Malacostraca	Decapoda	Goneplacidae	0.66	0	0	0	0	0	0	0.62	0	0	0.97
Arthropoda	Malacostraca	Decapoda	Inachidae	0	0	0	0	0.63	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Lithodidae	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Metanephrops challengeri	0.66	2.84	2.59	1.47	4.04	1.23	1.73	2.48	1.04	5.54	0.97
Arthropoda	Malacostraca	Decapoda	Munida gracilis	0.66	8.51	12.95	0.73	0	3.07	8.64	0	0	95.14	1.94
Arthropoda	Malacostraca	Decapoda	Nematocarcinus sp.	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Teratomaia richardsoni	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Trichopeltarion fantasticum	0	0	0.86	1.47	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Isopoda	Acutiserolis spp	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Isopoda	Isopoda	4.63	0	0	0.73	0	0	0	0	0	0	0
Brachiopoda			Brachiopods	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Bryozoans	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Bryzoan - Branched coral-like	0	0	5.18	1.47	4.93	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Bryzoan - bushy form	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Bryzoan - Lacy fan forms	0	0	0	0	0	0	0	0	0	0	0
Chordata	Ascidiacea		Ascidians (solitary)	0	0	0	0	0	0	0	0	0	0	0
Chordata	Thaliacea		Salp	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anemones	0.66	0.71	2.59	4.4	30.34	5.53	0.86	0	8.13	2.77	0.97
Cnidaria	Anthozoa	Actiniaria	Anenome uni 11	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 12	0	0	0	0	0	1.23	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 16	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 2	1.32	0	1.73	2.93	10.86	65.77	1.73	0	26.85	0	0.97
Cnidaria	Anthozoa	Actiniaria	Anenome uni 3	0	0.71	0	0	0	4.3	26.78	0	18.35	0	0.97
Cnidaria	Anthozoa	Actiniaria	Anenome uni 4	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 5	3.97	0	0	0	3.41	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 7	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 8	0	0	0	0	0	0	0	0	1.04	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 9	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Alcyonacea	Alcyonacea	26.44	0	5.18	0	11.33	0	0	0	3.97	0	3.87
Cnidaria	Anthozoa	Alcyonacea	Anthomastus sp.	0.66	0	107.88	0	6.74	5.53	0	0	0	0	0
Cnidaria	Anthozoa	Alcyonacea	Taiaroa tauhou	26.44	0	5.18	0	0	0	0	0	3.97	0	0
Cnidaria	Anthozoa	Ceriantheria	Ceriantharia spp	0.66	0	4.32	2.2	5.04	0	0	3.1	2.36	10.16	0

Cnidaria	Anthozoa	Corallimorpharia	Corallimorpharia	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Corallimorpharia	Corallimorpharia 1	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Corallimorpharia	Corallimorpharia 3	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Gorgonacea	Coralliidae	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Gorgonacea	Gorgonacea	0.66	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Gorgonacea	Isididae	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Gorgonacea	Radicipes spp	0.66	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea	0	0	0	0	0	0	0	0	0	0	0.97
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 1	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 2	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 3	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 4	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 5	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Scleractinia	Stephanocyathus spp.	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Scleractinia	Desmophyllum/Caryophyllia	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Scleractinia	Flabellum	15.2	0	45.74	25.65	241.77	0.61	2.59	1.24	0	9.24	0
Cnidaria	Anthozoa	Scleractinia	Flabellum loure kexeii	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Scleractinia	Flabellum rubrum	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Zoanthidea	Zoanthidea	0	0	1.73	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa		Corals (hard)	0	0	0.86	0	0	0	0	0	0	0	0
Echinoderamata	Asteroidea	Brisingida	Brisingida	0.66	0	0	0	1.7	0	0	0	0	0	0
Echinoderamata	Asteroidea		Asteroid	0.66	0	1.73	0	5.74	0.61	2.59	0.62	0	2.77	0.97
Echinoderamata	Echinoidea		Echinoid	0	0.71	0	0	1.7	0	0	0	1.32	3.69	4.84
Echinoderamata	Holothuroidea		Holothurian	0.66	0	0	1.47	0	0	0	0	0	0	0
Echinoderamata	Ophiuroidea		Ophiuroid	0	0	0	0	1.26	0	0	0	0	0	0
Echinodermata	Asteroidea	Brisingida	Brisingid 1	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Brisingida	Brisingid 3	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Brisingida	Brisingid 4	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Asteriidae	0	0	0	0	0	0	0	0	0	0.92	0
Echinodermata	Asteroidea	Forcipulatida	Zoroaster sp	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Zoroasteridae	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Zoroasteridae/Asteriidae	0	3.55	5.18	0.73	1.7	0	0.86	1.24	3.4	9.24	5.81
Echinodermata	Asteroidea	Notomyotida	Benthopectinidae	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Astromesites/Psilaster/Proserpinaster	0	0	0	0	0	0	0	0	3.97	0	0
Echinodermata	Asteroidea	Paxillosida	Astropectinidae	1.32	0	0	0	0	0	0	6.82	0	0	0
Echinodermata	Asteroidea	Paxillosida	Dipsacaster magnificus	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Plutonaster/Dytaster	0	0	0	0	0	0	0	1.86	0	5.54	31.93
Echinodermata	Asteroidea	Paxillosida	Radiasteridae	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Spinulosida	Crossaster multispinus	0	0	0	0	30.3	0	0	0	0	0	0
Echinodermata	Asteroidea	Spinulosida	Echinasteridae	0	0	0.86	0	0	0.61	0.86	0	0	0	0
Echinodermata	Asteroidea	Spinulosida	Solaster torulatus	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Spinulosida	Solasteridae	4.63	0	48.33	101.14	48.74	3.07	0	4.34	0	11.08	17.42
Echinodermata	Asteroidea	Valvatida	Goniasteridae	0.66	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Valvatida	Lithosoma novazealandiae	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Valvatida	Lithosoma/Pseudarchaster	1.32	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Valvatida	Mediaster sp	0	0	0	0	0	0	0	0	1.04	0	0
Echinodermata	Asteroidea	Valvatida	Pillsburiaster sp	0	0	0	0	0.63	0	0	0	0	0	0
Echinodermata	Asteroidea	Valvatida	Plinthaster/Ceramaster	0	0	0	0	0.63	0	0	0	0	0	0
Echinodermata	Crinoidea	Comatulida	Crinoidea (motile)	0	0	0	0	0	0	0	0	0	0	0

Echinodermata	Echinoidea	Cidaroida	Cidaridae	3.97	45.4	6.04	0	5.11	4.3	0	1.86	0	0	0
Echinodermata	Echinoidea	Cidaroida	Goniocidaris sp	0	0	0	7.33	0	0	0	0	0	39.72	0
Echinodermata	Echinoidea	Cidaroida	Ogmocidaris benhami	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Echinoidea	Echinoida	Echinoida	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Echinoidea	Echinoida	Gracilechinus multidentatus	0	0	0	0	0	0.61	0	0	0	3.69	0
Echinodermata	Echinoidea	Echinothurioida	Echinothuriidae/Phormosomatidae	0	0	0	0	2.15	0	131.29	2.48	1.04	0.92	15.48
Echinodermata	Echinoidea	Echinothurioida	Phormosoma bursarium	0	0	18.99	11.73	13.19	0.61	5.18	11.17	18.92	14.78	47.42
Echinodermata	Echinoidea	Spatangoida	Spatangidae	9.92	170.94	9.49	17.59	9.52	0	0	13.03	0	110.85	124.83
Echinodermata	Echinoidea	Spatangoida	Spatangus sp	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Bathyplotes moseleyi	0.66	0	0	0	0.63	0	0	0	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Bathyplotes sulcatus	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Pseudostichopus mollis	0.66	0	0	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Synallactidae	0	7.09	0	0	0.63	0	0	0	0	0	0
Echinodermata	Holothuroidea	Elasipodida	Deimatidae	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Elasipodida	Enypniastes eximia	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Elasipodida	Laetmogone sp	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Elasipodida	Laetmogonidae	0	0	1.73	0	0	0	0	0	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Ophiomyxa brevirima	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Ophiurida unspecified	9.92	5.67	0.86	5.13	0	4.3	0	0	0	0	0
Foraminifera			Foram (giant)	0	0	0	0	0	0	0	0	0	0	0
Hemichordata	Enteropneusta		Hemichordate	0	0	0	0	0	1.84	0	0	0	0	0
Hyrozoa	Hydrozoa	Leptothecatae	Hydroids	1.32	0	106.16	0.73	114.52	1.23	0	66.37	3.4	36.02	12.58
Mollusca	Cephalopoda	Octopoda	Graneledone sp	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Cephalopoda	Octopoda	Octopodinae	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Cephalopoda	Teuthida	Squid	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Cephalopoda		Octopod	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Archaeogastropoda	Calliostoma alertae	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Buccinidae	0	0	3.45	1.47	0	12.29	5.18	0	4.73	0	0
Mollusca	Gastropoda	Neogastropoda	Olividae	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Penion sp	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Turbinellidae	0	0	0	0	0	0.61	0	0	1.04	0	0
Mollusca	Gastropoda	Neogastropoda	Turridae	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Volutidae	3.97	0.71	5.18	0	1.26	0	0	0	2.36	0.92	0
Mollusca	Gastropoda	Neotaenioglossa	Cassidae	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neotaenioglossa	Fusitriton magellanicus	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neotaenioglossa	Ranellidae	5.29	0.71	0	0	0	0	0	0.62	0	0	0
Mollusca	Gastropoda		Mollusc (gastropod)	6.61	0	1.73	0	4.93	1.23	0	0.62	0	1.85	0
Mollusca			Mollusc (opisthobranch)	0	0	0	0	0	0	0	0	0	0	0
Mollusca			Molluscs (bivalves)	0	0	0.86	0	0.63	0	0	0	0	0.92	0
Mollusca			Scaphopoda	0	0	0.86	0	0	0	0	0	0	0	0
Porifera	Demospongiae	Astrophorida	Astrophorid	0	0	0	0	0	0	0	0	0	0	0
Porifera	Demospongiae	Astrophorida	Geodia regina	0	0	0	0	0	0	0	0	0	0.92	0
Porifera	Demospongiae	Astrophorida	Geodinella vestigifera	0	0	0	0	0	0	0	0	0	0	0
Porifera	Demospongiae	Hadromerida	Suberites affinis	0	0	0	0	0	0.61	0	0	0	1.85	0
Porifera	Demospongiae	Lithistida	Awhiowhio sepulchrum	0	0	0	0	0	0	0	0	0	0	0
Porifera	Demospongiae	Lithistida	Lithistid	0	0	0	0	0	0	0	0	0	0	0
Porifera	Demospongiae	Spirophorida	Tetilla leptoderma	0	0	0	0	0	0	0	0	0	0	0
Porifera	Demospongiae		Encrusting sponges	0	0	0	0	0	0	0	0	0	0	0
Porifera	Demospongiae		Sponge (demospongiae)	0.66	0	0.86	0.73	0	0	0.86	0.62	0	9.24	0

Porifera	Hexactinellida	Amphidiscosida	Hyalonema sp	0	0	0	0	0	0	0	0	0	0	0
Porifera	Hexactinellida	Hexactinosida	Hexactinosida	0	0	0	0	0	0	0	0	0	0	0
Porifera	Hexactinellida	Lyssacinosida	Hyalascus n. sp	0	0	3.45	0	0	0	0	0.62	0	2.77	0
Porifera	Hexactinellida		Sponge (hexactinellidae)	0	0	0	0	0	0	0	0.62	0	0	0

Phylum	Class	Order	Species	D011	D015	B067	A006	B013	B062	C062	B012	B065	D028	C061
Annelida	Polychaeta	Aciculata	Quill worm	0	0	0	0.79	4.84	0	0.78	0	0	0	0.74
Arthropoda	Malacostraca	Decapoda	Atelecyclidae	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Carcinoplax victoriensis	0	0	0	40.99	0.97	0	0	0	9.07	6	20.83
Arthropoda	Malacostraca	Decapoda	Crustacean (crab)	0	0	0	1.84	0	0.78	0	0	3.02	0	0
Arthropoda	Malacostraca	Decapoda	Crustacean (galatheid)	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Crustacean (lobster)	0	0.95	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Crustacean (pagurid)	2.46	8.21	7.84	2.63	2.9	5.48	0	3.88	0	107.25	5.95
Arthropoda	Malacostraca	Decapoda	Crustacean (scampi)	0	0	0	1.84	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Crustacean (shrimp)	0.82	4.68	1.74	8.7	2.9	3.91	0	1.94	0	3.75	2.98
Arthropoda	Malacostraca	Decapoda	Galatheidae	0	0.95	0	0	0	2.35	0	0	1.51	0	0
Arthropoda	Malacostraca	Decapoda	Goneplacidae	0	0	0.87	0	0	4.69	5.48	0	0	0.75	5.21
Arthropoda	Malacostraca	Decapoda	Inachidae	0	0	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Lithodidae	0	0	0	0.92	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Metanephrops challengeri	4.09	3.52	0.87	10.41	2.9	4.69	26.61	0.65	1.51	0.75	9.67
Arthropoda	Malacostraca	Decapoda	Munida gracilis	49.12	0	0	8.31	48.4	100.9	19.57	5.82	16.63	36	8.93
Arthropoda	Malacostraca	Decapoda	Nematocarcinus sp.	0	4.75	0	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Teratomaia richardsoni	0	0	0.87	0	0	0	0	0	0	0	0
Arthropoda	Malacostraca	Decapoda	Trichopeltarion fantasticum	0	0	0	0	1.94	0	0	0	0	12.75	0.74
Arthropoda	Malacostraca	Isopoda	Acutiserolis spp	0	0	0	0	0	0	0	0	0	0	0.74
Arthropoda	Malacostraca	Isopoda	Isopoda	0	0	0	0	0	0	0	0	0	0	0
Brachiopoda			Brachiopods	0	0	0	0	0	2.35	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Bryozoans	0.82	0	0	0	0	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Bryzoan - Branched coral-like	0	0	0	0	0	3.91	0	0	0	0.75	0
Bryozoa	Gymnolaemata	Cheilostomata	Bryzoan - bushy form	0	44.05	2.61	26.1	0	0	0	0	0	0	0
Bryozoa	Gymnolaemata	Cheilostomata	Bryzoan - Lacy fan forms	0	0	0	0	0	0.78	0	0	0	0	0
Chordata	Ascidiacea		Ascidians (solitary)	0	0	0	0	0	32.85	0	0	0	0	0
Chordata	Thaliacea		Salp	0	0	0	1.71	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anemones	3.27	3.66	0	1.84	2.9	1.56	0	0	0	4.5	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 11	0	0	0	0	0	0	0	1.29	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 12	0	0	0	0	0	0	0.78	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 16	0	0.88	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 2	1.64	0	0	0	0	0	1.57	0	0	1.5	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 3	20.46	0	0	0	0.97	6.26	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 4	0	0	0	0	1.94	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 5	0	4.41	0	2.51	2.9	1.56	0	3.23	0	3.75	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 7	0	0	4.35	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 8	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Actiniaria	Anenome uni 9	0	1.9	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Alcyonacea	Alcyonacea	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Alcyonacea	Anthomastus sp.	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Alcyonacea	Taiaroa tauhou	0	0	0	0	0	0	0	0	0	1.5	0
Cnidaria	Anthozoa	Ceriantheria	Ceriantharia spp	0	0.88	0	6.72	0.97	2.35	0.78	0	0	4.5	3.72
Cnidaria	Anthozoa	Corallimorpharia	Corallimorpharia	0	1.9	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Corallimorpharia	Corallimorpharia 1	0	2.85	0	0.92	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Corallimorpharia	Corallimorpharia 3	0	0.88	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Gorgonacea	Coralliidae	0	0	0.87	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Gorgonacea	Gorgonacea	0	2.64	4.35	0.92	0	0.78	0.78	0	0	0.75	11.16
Cnidaria	Anthozoa	Gorgonacea	Isididae	0	5.29	1.74	3.55	0	0	0	0	0	0	5.21

Cnidaria	Anthozoa	Gorgonacea	Radicipes spp	0	40.53	92.32	54.45	0	0	0	0	0	0.75	5.21
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea	0	1.76	1.74	6.86	0	0	0	0	0	4.5	0
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 1	0	6.24	0.87	78.1	0	0	0	0	0	10.5	4.46
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 2	0	28.19	135.87	84.49	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 3	0	1.76	0	0	0	0	0	0	0	0	6.7
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 4	0	0	0	0.92	0	0	0	0	0	0	0
Cnidaria	Anthozoa	Pennatulacea	Pennatulacea 5	0	13.22	222.1	5.01	0	0	13.3	0	0	0.75	7.44
Cnidaria	Anthozoa	Scleractinia	Stephanocyathus spp.	0	0	0	0	0	0.78	0	0	0	0	0
Cnidaria	Anthozoa	Scleractinia	Desmophyllum/Caryophyllia	0	0	0	0	0	10.17	0	0	0	0	0
Cnidaria	Anthozoa	Scleractinia	Flabellum	2.46	0.95	0.87	0	1.94	0.78	0	0	0	0	0
Cnidaria	Anthozoa	Scleractinia	Flabellum loure kexeii	0	0	0	0	0	0	0	0	0	0.75	0
Cnidaria	Anthozoa	Scleractinia	Flabellum rubrum	0	0	0	0	0	0	0	0	0	2.25	0
Cnidaria	Anthozoa	Zoanthidea	Zoanthidea	0	2.85	0	0	0	0	0	0	0	0	0
Cnidaria	Anthozoa		Corals (hard)	0	0	0	0	0	0	0	0	0	0	0
Echinoderamata	Asteroidea	Brisingida	Brisingida	0	0	0	0	0	0	0	0	0	0	0
Echinoderamata	Asteroidea		Asteroid	0.82	1.83	0.87	0	0	0.78	0.78	3.88	4.54	0.75	0.74
Echinoderamata	Echinoidea		Echinoid	0.82	0	0	0	0	0	0	0	0	0	0
Echinoderamata	Holothuroidea		Holothurian	0.82	1.76	3.48	3.17	0	0	0	4.53	1.51	0	0
Echinoderamata	Ophiuroidea		Ophiuroid	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Brisingida	Brisingid 1	0	0.95	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Brisingida	Brisingid 3	0	0	0	0.79	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Brisingida	Brisingid 4	0	5.29	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Asteriidae	0	0	0	0	0	3.91	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Zoroaster sp	0	0	0	0	1.94	0	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Zoroasteridae	0	0	0	0	0	2.35	0	0	0	0	0
Echinodermata	Asteroidea	Forcipulatida	Zoroasteridae/Asteriidae	9.82	1.76	0.87	0	0	19.56	0	0	0	0	0
Echinodermata	Asteroidea	Notomyotida	Benthopectinidae	0	0.95	0	0	0	0	0	0	0	0	0.74
Echinodermata	Asteroidea	Paxillosida	Astromesites/Psilaster/Proserpinaster	0.82	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Astropectinidae	0.82	0	1.74	0	1.94	0	0.78	3.88	0	0.75	0.74
Echinodermata	Asteroidea	Paxillosida	Dipsacaster magnificus	0	0	0	0.92	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Plutonaster/Dytaster	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Paxillosida	Radiasteridae	0	0.88	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Spinulosida	Crossaster multispinus	0	0.88	0	0.79	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Spinulosida	Echinasteridae	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Spinulosida	Solaster torulatus	0	0.88	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Spinulosida	Solasteridae	0	0	0	0	0	0.78	0	0	0	0	0
Echinodermata	Asteroidea	Valvatida	Goniasteridae	0.82	0	0	0	0	0	0	0	0	0.75	0
Echinodermata	Asteroidea	Valvatida	Lithosoma novazealandiae	0	0.88	0	0	0	0	0	0.65	0	0	0
Echinodermata	Asteroidea	Valvatida	Lithosoma/Pseudarchaster	0	0	0	0	0	0	0	1.29	0	0	0
Echinodermata	Asteroidea	Valvatida	Mediaster sp	1.64	0	0	0	9.68	0	0	0	0	0	0
Echinodermata	Asteroidea	Valvatida	Pillsburiaster sp	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Asteroidea	Valvatida	Plinthaster/Ceramaster	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	Crinoidea	Comatulida	Crinoidea (motile)	0.82	0	0	0	0	0	0	0	0	0	0
Echinodermata	Echinoidea	Cidaroida	Cidaridae	0.82	0.88	0	0	0	0.78	0	0	0	0	0
Echinodermata	Echinoidea	Cidaroida	Goniocidaris sp	18.01	1.76	0	0	0	0	0	0	0	0	1.49
Echinodermata	Echinoidea	Cidaroida	Ogmocidaris benhami	0	0	0	0	0	1.56	0	0	0	0	0.74
Echinodermata	Echinoidea	Echinoida	Echinoida	0.82	0	0	0	0	0	0	0	0	0	0
Echinodermata	Echinoidea	Echinoida	Gracilechinus multidentatus	0	101.66	0	0	0	0	0	0	0	0	0
Echinodermata	Echinoidea	Echinothurioida	Echinothuriidae/Phormosomatidae	0	6.65	0	10.56	0	0	0	0	0	0	0

Echinodermata	Echinoidea	Echinothurioida	Phormosoma bursarium	1.64	0	0	0	0	0	0	0	0	6	1.49
Echinodermata	Echinoidea	Spatangoida	Spatangidae	0	0	0	0	0	0	0	0	1.51	0	0
Echinodermata	Echinoidea	Spatangoida	Spatangus sp	0	0	0	0	84.22	0.78	0	14.87	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Bathyplotes moseleyi	0	0	0	0	2.9	0	0	0	0	0	0.74
Echinodermata	Holothuroidea	Aspidochirotida	Bathyplotes sulcatus	0	0	0	0	0	0	0	10.99	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Pseudostichopus mollis	0	0	0	0	0	0	0	0.65	0	0	0
Echinodermata	Holothuroidea	Aspidochirotida	Synallactidae	6.55	0	0	0	0	0	0	0.65	6.05	0	0
Echinodermata	Holothuroidea	Elasipodida	Deimatidae	0	0	18.29	0	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Elasipodida	Enypniastes eximia	0	0	0	0.79	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Elasipodida	Laetmogone sp	0	8.27	0	91.8	0	0	0	0	0	0	0
Echinodermata	Holothuroidea	Elasipodida	Laetmogonidae	0	14.1	0	0	0	0	0	0	0	0	1.49
Echinodermata	Ophiuroidea	Ophiurida	Ophiomyxa brevirima	0	0	0	0	0	0	0	25.87	0	0	0
Echinodermata	Ophiuroidea	Ophiurida	Ophiurida unspecified	0	28.5	0.87	0	1.94	0.78	0	2.59	0	0.75	0.74
Foraminifera			Foram (giant)	0	3.8	0	1.84	0	7.82	0	0	0	0	0
Hemichordata	Enteropneusta		Hemichordate	0	0	0	0	0	0	0	0	0	0	0
Hyrozoa	Hydrozoa	Leptothecatae	Hydroids	7.37	21.15	8.71	3.43	0	0.78	0	0	0	30	0.74
Mollusca	Cephalopoda	Octopoda	Graneledone sp	0	0	0	0	0	0	1.57	0	0	0	0
Mollusca	Cephalopoda	Octopoda	Octopodinae	0.82	0	0	0	0	0	0	0	0	0	0
Mollusca	Cephalopoda	Teuthida	Squid	0	0.88	0	0	0	0	0	0	0	0	0
Mollusca	Cephalopoda		Octopod	0	0	0	1.84	0	0	0	0	0	0	0
Mollusca	Gastropoda	Archaeogastropoda	Calliostoma alertae	0	0	0	0	0.97	0.78	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Buccinidae	0	0	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Olividae	0	0	0	0	0	0	0	0.65	0	0	0
Mollusca	Gastropoda	Neogastropoda	Penion sp	0	0	0	0	0	0.78	0	0	0	0.75	0
Mollusca	Gastropoda	Neogastropoda	Turbinellidae	0	0	0	0	0.97	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Turridae	0	0.95	0	0	0	0	0	0	0	0	0
Mollusca	Gastropoda	Neogastropoda	Volutidae	0	0	0	0	0	0	0	0	0	7.5	0.74
Mollusca	Gastropoda	Neotaenioglossa	Cassidae	0	0	0	0	0	0	0	0.65	0	0	0.74
Mollusca	Gastropoda	Neotaenioglossa	Fusitriton magellanicus	0	0	0	0	0	0	0	0	0	7.5	0
Mollusca	Gastropoda	Neotaenioglossa	Ranellidae	0	0	0	0	0	0	0	0	0	0.75	0
Mollusca	Gastropoda		Mollusc (gastropod)	0	4.54	0.87	2.38	9.68	9.39	0.78	5.82	1.51	27.75	2.98
Mollusca			Mollusc (opisthobranch)	0	0	0	0.92	0	0	1.57	5.82	0	0	0
Mollusca			Molluscs (bivalves)	0	0	0	0	0	1.56	0	0	0	0	0
Mollusca			Scaphopoda	0	0	0	0	0	0.78	0	0.65	9.07	0	0
Porifera	Demospongiae	Astrophorida	Astrophorid	1.64	0	0	0	0	0	0	0	0	0	0
Porifera	Demospongiae	Astrophorida	Geodia regina	7.37	0	0	0	0	3.13	0	0	0	0	0
Porifera	Demospongiae	Astrophorida	Geodinella vestigifera	0	0	0	0	0	2.35	0	0	0	0	0
Porifera	Demospongiae	Hadromerida	Suberites affinis	0	0	0	0	0	0	0	0	0	0	0
Porifera	Demospongiae	Lithistida	Awhiowhio sepulchrum	0	0	0	0	0	3.13	0	0	0	0	0
Porifera	Demospongiae	Lithistida	Lithistid	0	0	0	0	0	1.56	0	0	0	0	0
Porifera	Demospongiae	Spirophorida	Tetilla leptoderma	0	0	0	0	0	0.78	0	0	0	0	0
Porifera	Demospongiae		Encrusting sponges	0.82	0	0	0	0	13.3	0	0	0	0	0
Porifera	Demospongiae		Sponge (demospongiae)	0.82	0.88	0	0	0	9.39	0	0	0	0	0
Porifera	Hexactinellida	Amphidiscosida	Hyalonema sp	0	0.88	0	0	0	0	0	0	0	0	0
Porifera	Hexactinellida	Hexactinosida	Hexactinosida	0	0	0	0	0	0.78	0	0	0	0	0
Porifera	Hexactinellida	Lyssacinosida	Hyalascus n. sp	0	0	0	0	0	0.78	0	0	0	0	0
Porifera	Hexactinellida		Sponge (hexactinellidae)	0	0	0	0	0	3.13	0	0	0	0	0

APPENDIX 4: BENTHIC SPECIES FROM DTIS STILL IMAGE (OS2020)

Benthic species recorded by site (Figure 1) from DTIS still image sampling within OS2020 voyages (other stations below). Densities per m^2.

phylum	Class	order	species	B025	A010	C011	B017	A016	D015	A006	B062	B012	C061
Annelida	Polychaeta	Canalipalpata	Sabellid	0.0000	0.0000	0.0000	0.0000	0.0000	0.0473	0.0000	0.0731	0.0000	0.0000
Annelida	Polychaeta	Eunicida	Hyalinoecia	0.0000	0.0481	0.0000	0.0240	0.0000	0.0684	0.0000	0.0000	0.0000	0.0000
Annelida	Polychaeta		Errant polychaete	0.0000	0.0218	0.0517	0.0000	0.0000	0.0000	0.0073	0.0000	0.0000	0.0000
Annelida			Worm (indet.)	0.0000	0.0243	0.0000	0.0000	0.0000	0.0351	0.0000	0.0000	0.1071	0.0000
Arthropoda	Malacostraca	Amphipoda	Amphipoda	0.0000	0.0000	0.0000	0.0202	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Malacostraca	Decapoda	Brachyura	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0186	0.0000	0.0000	0.0000
Arthropoda	Malacostraca	Decapoda	Campylonotus rathbunae	0.0000	0.0000	0.0126	0.0000	0.0000	0.0000	0.0187	0.0000	0.0000	0.0139
Arthropoda	Malacostraca	Decapoda	Galatheidae	0.0000	0.0000	0.0252	0.0000	0.0000	0.0000	0.0000	1.1221	0.0579	0.0000
Arthropoda	Malacostraca	Decapoda	Galatheidae white.	0.0355	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Malacostraca	Decapoda	Galatheoidea	0.0000	0.0000	0.0265	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Malacostraca	Decapoda	Metanephrops challengeri	0.0000	0.0000	0.0180	0.0157	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Malacostraca	Decapoda	Munida gracilis	0.1110	0.0600	0.0644	0.0426	0.0592	0.0000	0.0471	0.2965	0.0000	0.0170
Arthropoda	Malacostraca	Decapoda	Natant decapod (General shrimp)	0.0268	0.0421	0.1383	0.0000	0.0422	0.0302	0.0352	0.0522	0.1661	0.2744
Arthropoda	Malacostraca	Decapoda	Pagurid	0.0210	0.0193	0.1030	0.0000	0.0211	0.5069	0.0000	0.0000	0.0180	0.0000
Arthropoda	Malacostraca	Decapoda	Pycnoplax victoriensis	0.0000	0.0000	0.0132	0.0311	0.0231	0.0000	0.0687	0.0000	0.0000	0.0635
Arthropoda	Malacostraca	Isopoda	Acutiserolis spp	0.0396	0.2490	0.0570	0.1613	0.0503	0.0000	0.0457	0.0458	0.0000	0.2104
Arthropoda	Pycnogonida	Pantopoda	Pycnogonid indet	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0114	0.0000	0.0000	0.0000
Echinodermata	Asteroidea	Brisingida	Brisingid 4	0.0000	0.0000	0.0000	0.0000	0.0137	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Asteroidea	Forcipulatida	Asteriidae	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0365	0.0000	0.0000
Echinodermata	Asteroidea	Forcipulatida	Cosmasterias dyscrita	0.0000	0.0000	0.0000	0.0000	0.0088	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Asteroidea	Forcipulatida	Zoroasteridae/Asteriidae	0.0000	0.0000	0.0263	0.0000	0.0000	0.0000	0.0000	0.0220	0.0000	0.0000
Echinodermata	Asteroidea	Spinulosida	Crossaster multispinus	0.0000	0.0281	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Asteroidea		Asteroids	0.0190	0.0000	0.0263	0.0000	0.0342	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Echinoidea	Cidaroida	Goniocidaris sp	0.0199	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Echinoidea	Echinoida	Gracilechinus multidentatus	0.0000	0.0000	0.0000	0.0000	0.0000	0.0888	0.0000	0.0000	0.0000	0.0000
Echinodermata	Echinoidea	Echinothurioida	Echinothuriidae/Phormosomatidae	0.0000	0.0000	0.0000	0.0000	0.0068	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Echinoidea	Spatangoida	Paramaretia peloria	0.0000	0.0000	0.1026	0.0000	0.5290	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Echinoidea	Spatangoida	Spatangidae	0.1435	0.0000	0.0126	0.0000	0.0070	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Echinoidea		Echinoids	0.0268	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Holothuroidea		holothurian indet.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0113	0.0368	0.0356	0.0000	0.0275
Echinodermata	Holothuroidea		Holothurians	0.0000	0.0145	0.0000	0.0000	0.0000	0.0000	0.0081	0.0000	0.0000	0.0000
Echinodermata	Ophiuoroidea	Ophiurida	Ophiuridae	0.0387	0.0183	0.0846	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Ophiuoroidea		Ophiuoroids	0.0000	0.0000	0.0000	0.0000	0.0000	0.0220	0.0000	0.0000	0.0000	0.0000
Mollusca	Bivalvia		Bivalves	0.0000	0.0109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Cephalopoda	Octopoda	Cirroteuthididae/Luteuthididae	0.0000	0.0000	0.0000	0.0000	0.0085	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Cephalopoda	Octopoda	Octopodinae	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0154	0.0130
Mollusca	Gastropoda	Archaeogastropoda	Callostomatidae	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0229	0.0000	0.0000
Mollusca	Gastropoda	Neogastropoda	Buccinidae	0.0000	0.0000	0.0000	0.0298	0.0000	0.2762	0.0000	0.0000	0.0000	0.0000
Mollusca	Gastropoda	Neogastropoda	Coluzea sp	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0154	0.0000
Mollusca	Gastropoda	Neogastropoda	Olividae	0.0000	0.0000	0.0000	0.0000	0.0000	0.0275	0.0000	0.0000	0.0000	0.0275
Mollusca	Gastropoda	Neogastropoda	Turbinellidae	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0333	0.0000	0.0000
Mollusca	Gastropoda	Neogastropoda	Volutidae	0.0000	0.0000	0.0106	0.0112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Gastropoda	Neotaenioglossa	Cassidae	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0482	0.0000

Mollusca	Gastropoda	Neotaenioglossa	Naticidae	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0793
Mollusca	Gastropoda	Neotaenioglossa	Ranellidae	0.0000	0.0000	0.0000	0.0000	0.0000	0.1524	0.0000	0.0000	0.0000	0.0000
Mollusca	Gastropoda		Gastropods	0.1010	0.0302	0.1050	0.0000	0.0490	0.0000	0.0605	0.0000	0.0000	0.0530
Mollusca	Gastropoda		Opisthobrancia	0.0000	0.0000	0.0252	0.0000	0.0000	0.0000	0.0000	0.0417	0.0000	0.0000

Larger features and benthic species recorded by subarea and year (Figure 3) from scampi photographic surveys. Densities per m^2.

	2001	2009	2010	2001	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
	902	902	902	903	903	903	902A	902A	902B	902B	902C	902C	903A	903A
Scampi burrow openings	0.1143	0.0474	0.0313	0.2674	0.0397	0.0743	0.0581	0.0549	0.0481	0.0875	0.0364	0.0512	0.0284	0.0790
Visible scampi	0.0233	0.0231	0.0078	0.0638	0.0192	0.0086	0.0302	0.0210	0.0285	0.0224	0.0084	0.0128	0.0112	0.0159
Squat lobsters	0.0205	0.0107	0.0234	0.0134	0.0068	0.0041	0.0363	0.0314	0.0050	0.0195	0.0049	0.0128	0.0022	0.0000
Crabs	0.0037	0.0000	0.0013	0.0116	0.0045	0.0044	0.0017	0.0063	0.0022	0.0005	0.0000	0.0035	0.0023	0.0017
Sea pens	0.0115	0.0067	0.0220	0.0032	0.0096	0.0212	0.0235	0.0347	0.0012	0.0109	0.0000	0.0000	0.0175	0.0092
Holothurians	0.0067	0.0088	0.0026	0.0016	0.0000	0.0000	0.0028	0.0032	0.0012	0.0000	0.0080	0.0000	0.0000	0.0000

APPENDIX 5: BENTHIC SPECIES FROM SCAMPI TRAWL SURVEYS (KAHAROA)

Benthic species recorded by subarea (Figure 3) and year from scampi research trawling. Average catch standardised to kg.h^{-1}.

Phylum	Common name	Scientific name	Code	2001_MO	2009_MO	2010_MO	2009_MN	2010_MN	2009_MW	2010_MW
Annelida	Aphrodita spp.	Aphrodita spp.	ADT	0	0	0	0	0.025	0	0
Arthropoda	Sabre prawn	Camplyonotus rathbunae	CAM	0.02150	0	0	0	0.0328	0	0.0333
Arthropoda	Crab		CRB	0	0	0	0.0938	0	0	0.1
Arthropoda	Two-spined crab	Pycnoplax victoriensis	CVI	0	0.0318	0.15	0	0	0.0242	0
Arthropoda	Antlered crab	Dagnaudus petterdi	DAP	0	0.0333	0	0.0091	0.148	0.3333	0.5167
Arthropoda	Paguroidea	Diacanthurus rubricatus	DIR	0	0	0.1127	0.01	0.0167	0.0734	0.2322
Arthropoda	Garrick's masking crab	Leptomithrax garricki	GMC	0	0	0	0	0	0	0.1129
Arthropoda	Jackknife prawn	Haliporoides sibogae	HSI	0	0	0	0	0.0079	0	0
Arthropoda	isopod		ISO	0	0	0	0	0.0083	0	0
Arthropoda	Squat lobster	Munida spp.	MNI	0	0	0	0	0	0.025	0
Arthropoda	Squat lobster	Munida gregaria	MUN	0	0	0.05	0	0	0	0.0321
Arthropoda	Hermit crab	Paguroidea	PAG	0	0	0	0	0.0122	0	0.0164
Arthropoda	Paralomis dawsoni	Paralomis dawsoni	PDA	0	0	0	0.02	0	0	0
Arthropoda	scampi	Metanephrops challengeri	SCI	29.39985	6.489	9.9786	10.2142	14.5911	28.3727	15.1417
Arthropoda	Spiny masking crab	Teratomaia richardsoni	SMK	0	0	0	0	0	0.125	0
Arthropoda	Spider crab		SPI	0	0	0	0	0.0238	0	0
Arthropoda	Giant masking crab	Leptomithrax australis	SSC	0	0.0159	0	0	0	0	0
Arthropoda	Frilled crab	Trichopeltarion fantasticum	TFA	0	0.0308	4.0404	0	0.0164	0.0909	0.2425
Chordata	Sea squirt	Ascidiacea	ASC	0	0	0	0.0097	0	0	0
Chordata		Salps	SAL	0	0	0	0.0476	0	0	0
Cnidaria	Deepsea anemone	Actinostolidae	ACS	0	0.0833	0	0	0	0.2417	0
Cnidaria	Anemones	Anthozoa	ANT	0	0	0	0.0095	0	0	0
Cnidaria	Black coral	Antipatharia (Order)	COB	0	0	0	2.1538	0	0	0
Cnidaria	Flabellum coral	Flabellum spp.	COF	0	0	0	0.4615	0	0	0
Cnidaria		Desmophyllum dianthus	DDI	0	0	0.0462	0	0	0	0.6667
Cnidaria	Bushy hard coral	Goniocorella dumosa	GDU	0	0	0.4918	0	0	0	0.082
Cnidaria	Hydroid	Hydrozoa (Class)	HDR	0	0.0164	0	0.01	0	0	0
Cnidaria	Deepsea Anemone	Hormathiidae	HMT	0	0	0.0833	0	0	0	0
Cnidaria	Purple sea pen	Pennatula spp.	PNN	0	0	0	0	0.1833	0	0
Cnidaria	Sea pen	Pennatulacea (Order)	PTU	0	0	0.0167	0.02	0.0583	0	0.05
Echinodermata	Starfish		ASR	0	0	0.5	0.0581	0.4833	0	0.573
Echinodermata		Astrothorax waitei	AWA	0	0	0.0333	0	0	0	0
Echinodermata	Benthopecten spp.	Benthopecten spp.	BES	0	0	0.0154	0	0	0	0
Echinodermata	Sun star	Crossaster multispinus	CJA	0	0	0.05	0	0	0	0
Echinodermata		Dipsacaster magnificus	DMG	0	0.1475	0.2872	0.0695	0.3468	0.025	1.0017
Echinodermata		Gorgonocephalus spp.	GOR	0	0.0333	0.0303	0	0	0	0
Echinodermata	Sea urchin	Goniocidaris parasol	GPA	0	0	0	0.0203	0	0	0
Echinodermata	Sea cucumber	Holothurian unidentified	HTH	0	0.0333	0	0.01	0	0.0246	0
Echinodermata	Trojan starfish	Hippasteria phrygiana	HTR	0	0	0.0794	0	0	0	0
Echinodermata	Rock Star	Lithosoma novaezelandiae	LNV	0	0	0	0.0185	0	0.05	0
Echinodermata	Starfish	Mediaster sladeni	MSL	0	0	0.2269	0	0.0325	0.1212	0.415
Echinodermata	Ophiuroid		OPH	0	0	0	0.0091	0	0.025	0
Echinodermata		Proserpinaster neozelanicus	PNE	0	0	1.9333	0	0	0	0.8128
Echinodermata		Pseudechinaster rubens	PRU	0	0	0	0.08	0	0	0
Echinodermata	Geometric star	Psilaster acuminatus	PSI	0	0.3164	0.4505	0.1974	0.3878	1.1387	0.6746
Echinodermata	Cross-fish	Sclerasterias mollis	SMO	0	0	0.0317	0.05	0	0	0
Echinodermata	Heart urchin	Spatangus multispinus	SPT	0	0	39.3871	0	0	0.375	0.5833
Echinodermata	Rat-Tail star	Zoroaster spp.	ZOR	0	0	0	0.1116	0	0.1	0
Mollusca		Bivalvia	BIV	0	0	0	0.01	0	0	0
Mollusca		Coluzea mariae	CMR	0	0	0	0	0.025	0	0.0167
Mollusca		Euciroa galatheae	EGA	0	0	0	0	0.0712	0	0.0321
Mollusca		Fusitriton magellanicus	FMA	0	0.0305	0	0.0577	0	0	0.0492
Mollusca	Gastropods	Gastropoda	GAS	0	0	0.05	0	0.0619	0	0.3157
Mollusca		Nudibranchia	NUD	0	0	0	0	0	0.025	0.0317
Mollusca	Octopus	Pinnoctopus cordiformis	OCT	3.4770	0	0	0	0	0	0
Mollusca		Penion chathamensis	PCH	0	0.0833	0	0.09	0.1167	0.0769	0.05
Porifera	Sponges	Porifera (Phylum)	ONG	0	0.4333	0	0.6962	0.1667	0	0

APPENDIX 6: BENTHIC SPECIES FROM MIDDLE DEPTH RESEARCH TRAWL SURVEYS (TANGAROA)

Benthic species recorded for subarea MN (Figure 3) and year from middle depth research trawling. Average catch standardised to kg.mile^{-1}.

Phylum	Common name	Scientific name	Code	1992_MN	1993_MN	1994_MN	1995_MN	1996_MN	1997_MN	1998_MN	2000_MN	2001_MN	2002_MN
Annelida		Polychaeta	POL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Sabre prawn	Camplyonotus rathbunae	CAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Crab		CRB	0.0084	0.0111	0.0000	0.0000	0.0662	0.0000	0.0000	0.0000	0.0000	0.0412
Arthropoda	Two-spined crab	Carcinoplax victoriensis	CVI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Antlered crab	Dagnaudus petterdi	DAP	0.0000	0.0334	0.1500	0.0000	0.0000	0.0000	0.0000	0.0220	0.0000	0.0000
Arthropoda		Funchalia spp.	FUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Jackknife prawn	Haliporoides sibogae	HSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda		Lipkius holthuisi	LHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0248	0.0000	0.0000	0.0000
Arthropoda	Squat lobster	Munida gregaria	MUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0084	0.0000	0.0000	0.0000
Arthropoda	Decapod		NAT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Paguroidea	PAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Parapagurus dimorphus	PDI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Prawn killer	Ibacus alticrenatus	PRK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	scampi	Metanephrops challengeri	SCI	0.0569	0.0515	0.1496	0.1474	0.2980	0.4649	0.2408	0.1537	0.8101	0.6432
Arthropoda	Hermit crab	Sympagurus dimorphus	SDM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Spiny masking crab	Teratomaia richardsoni	SMK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Giant masking crab	Leptomithrax australis	SSC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Frilled crab	Trichopeltarion fantasticum	TFA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bryozoa	Bryozoa	Bryozoa	COZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata		Pyrosoma atlanticum	PYR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1724
Chordata	Salps		SAL	0.0000	0.0000	0.3504	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Actinostolidae	ACS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Anemone	Anthozoa	ANT	0.0000	0.0223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0443	0.2479	0.0000
Cnidaria	Deepsea anemone	Bolocera spp.	BOC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Coral		COU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0165	0.0000
Cnidaria	Bushy hard coral	Goniocorella dumosa	GDU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Hormathiidae	HMT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen	Pennatulacea	PTU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria		Scleractinia	SIA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen		SPN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0246
Cnidaria	Bottlebrush coral	Thouarella spp.	THO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Araeosoma coriaceum	ACO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish		ASR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000
Echinodermata		Bathyplotes moseleyi	BAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Cosmasterias dyscrita	CDY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sun star	Crossaster multispinus	CJA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Dermechinus horridus	DHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0828	0.0000	0.0000	0.0000
Echinodermata		Dipsacaster magnificus	DMG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata			ECH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin		ECN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Gorgonocephalus spp.	GOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Goniocidaris parasol	GPA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Gracilechinus multidentatus	GRM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea cucumber	Holothurian unidentified	HTH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Echinodermata	Trojan starfish	Hippasteria phrygiana	HTR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Laetmogone spp.	LAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish	Mediaster sladeni	MSL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0330	0.1478
Echinodermata	Pentagonal tooth star	Odontaster spp.	ODT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0828
Echinodermata		Pannychia moseleyi	PAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pillsburiaster aoteanus	PAO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Pseudechinus flemingi	PFL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0111	0.0000
Echinodermata	Abyssal star	Plutonaster knoxi	PKN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Plutonaster spp.	PLT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudostichopus mollis	PMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Paramaretia peloria	PMU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Proserpinaster neozelanicus	PNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudechinaster rubens	PRU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Geometric star	Psilaster acuminatus	PSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0495	0.0493
Echinodermata	Sea cucumber	Stichopus mollis	SCC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0165	0.0000
Echinodermata	Starfish	Asteroidea & ophiuroidea	SFI	0.0000	0.1108	0.0056	0.0163	0.0993	0.0666	0.0992	0.0000	0.0000	0.0000
Echinodermata	Cross-fish	Sclerasterias mollis	SMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Spatangus multispinus	SPT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Echinothuriidae & Phormosomatidae	TAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Rat-Tail star	Zoroaster spp.	ZOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0330	0.1724
Mollusca	Maurea	Calliostoma selectum	CSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Fusitriton magellanicus	FMA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Gastropods	Gastropoda	GAS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Molluscs		MOL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus		OCP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0166
Mollusca	Octopus	Pinnoctopus cordiformis	OCT	0.0000	0.0000	0.0000	0.0165	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Octopus mernoo	OME	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Umbrella octopus	Opisthoteuthis spp.	OPI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1444	0.0000
Mollusca		Penion chathamensis	PCH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Veprichlamys kiwaensis	VKI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Knobbly sandpaper sponge	Ancorina novaezelandiae	ANZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Glass sponge		GLS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Floppy tubular sponge	Hyalascus sp.	HYA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Sponges	Porifera	ONG	0.0000	0.0513	0.0000	0.0000	0.0000	0.1833	0.0000	0.0000	0.0000	0.0000
Porifera	Fleshy club sponge	Suberites affinis	SUA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Phylum	Common name	Scientific name	species	2003_MN	2004_MN	2005_MN	2006_MN	2007_MN	2008_MN	2010_MN	2011_MN	2012_MN
Annelida		Polychaeta	POL	0.0055	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Sabre prawn	Camplyonotus rathbunae	CAM	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Crab		CRB	0.0109	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Two-spined crab	Carcinoplax victoriensis	CVI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Antlered crab	Dagnaudus petterdi	DAP	0.0219	0.0000	0.0248	0.0000	0.0000	0.0000	0.0000	0.0233	0.0000
Arthropoda		Funchalia spp.	FUN	0.0000	0.0000	0.0000	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000
Arthropoda	Jackknife prawn	Haliporoides sibogae	HSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda		Lipkius holthuisi	LHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Squat lobster	Munida gregaria	MUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Decapod		NAT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Paguroidea	PAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0083
Arthropoda	Hermit crab	Parapagurus dimorphus	PDI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Prawn killer	Ibacus alticrenatus	PRK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	scampi	Metanephrops challengeri	SCI	0.5321	0.1836	0.1994	0.0662	0.1638	0.0500	0.3000	0.0401	0.1578
Arthropoda	Hermit crab	Sympagurus dimorphus	SDM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0233	0.0000
Arthropoda	Spiny masking crab	Teratomaia richardsoni	SMK	0.0000	0.0000	0.0083	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000
Arthropoda	Giant masking crab	Leptomithrax australis	SSC	0.0000	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Frilled crab	Trichopeltarion fantasticum	TFA	0.0055	0.0000	0.0000	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000
Bryozoa	Bryozoa	Bryozoa	COZ	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata		Pyrosoma atlanticum	PYR	0.3606	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata	Salps		SAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Actinostolidae	ACS	0.0000	0.0000	0.0000	0.0000	0.0833	0.1333	0.0000	0.0000	0.0000
Cnidaria	Anemone	Anthozoa	ANT	0.0778	0.0000	0.0417	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Bolocera spp.	BOC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Coral		COU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Bushy hard coral	Goniocorella dumosa	GDU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0658
Cnidaria	Deepsea anemone	Hormathiidae	HMT	0.0000	0.0000	0.0000	0.0331	0.0100	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen	Pennatulacea	PTU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria		Scleractinia	SIA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen		SPN	0.0000	0.0000	0.0166	0.0000	0.0251	0.0167	0.0000	0.0000	0.0166
Cnidaria	Bottlebrush coral	Thouarella spp.	THO	0.0219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Araeosoma coriaceum	ACO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish		ASR	0.0282	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Bathyplotes moseleyi	BAM	0.0055	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0233	0.0000
Echinodermata		Cosmasterias dyscrita	CDY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sun star	Crossaster multispinus	CJA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Dermechinus horridus	DHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Dipsacaster magnificus	DMG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0167	0.0000	0.0000	0.0000
Echinodermata			ECH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin		ECN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Gorgonocephalus spp.	GOR	0.0000	0.0000	0.1242	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Goniocidaris parasol	GPA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Gracilechinus multidentatus	GRM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea cucumber	Holothurian unidentified	HTH	0.0000	0.0167	0.0000	0.0331	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Trojan starfish	Hippasteria phrygiana	HTR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Laetmogone spp.	LAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish	Mediaster sladeni	MSL	0.0055	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Pentagonal tooth star	Odontaster spp.	ODT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Echinodermata		Pannychia moseleyi	PAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pillsburiaster aoteanus	PAO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0169	0.0000
Echinodermata	Sea urchin	Pseudechinus flemingi	PFL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Abyssal star	Plutonaster knoxi	PKN	0.0000	0.0000	0.0000	0.0000	0.0084	0.0000	0.0000	0.0000	0.0000
Echinodermata		Plutonaster spp.	PLT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudostichopus mollis	PMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Paramaretia peloria	PMU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Proserpinaster neozelanicus	PNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudechinaster rubens	PRU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Geometric star	Psilaster acuminatus	PSI	0.0219	0.0000	0.0332	0.1987	0.0584	0.0333	0.0000	0.0465	0.0177
Echinodermata	Sea cucumber	Stichopus mollis	SCC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish	Asteroidea & ophiuroidea	SFI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Cross-fish	Sclerasterias mollis	SMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Spatangus multispinus	SPT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Echinothuriidae & Phormosomatidae	TAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Rat-Tail star	Zoroaster spp.	ZOR	0.0055	0.0000	0.0415	0.0000	0.0184	0.0167	0.0000	0.0676	0.0673
Mollusca	Maurea	Calliostoma selectum	CSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Fusitriton magellanicus	FMA	0.0109	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.0000	0.0094
Mollusca	Gastropods	Gastropoda	GAS	0.0219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Molluscs		MOL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus		OCP	0.0000	0.0000	0.0000	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus	Pinnoctopus cordiformis	OCT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Octopus mernoo	OME	0.0055	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Umbrella octopus	Opisthoteuthis spp.	OPI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Penion chathamensis	PCH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Veprichlamys kiwaensis	VKI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Knobbly sandpaper sponge	Ancorina novaezelandiae	ANZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0333	0.0000	0.7907	0.0000
Porifera	Glass sponge		GLS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Floppy tubular sponge	Hyalascus sp.	HYA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Sponges	Porifera	ONG	0.1311	0.0000	0.1073	0.0000	0.0000	0.0000	0.0333	0.0000	0.0000
Porifera	Fleshy club sponge	Suberites affinis	SUA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0169	0.0000

Benthic species recorded for subarea MO (Figure 3) and year from middle depth research trawling. Average catch standardised to kg.mile^{-1}.

Phylum	Common name	Scientific name	species	1992_MO	1993_MO	1994_MO	1995_MO	1996_MO	1997_MO	1998_MO	1999_MO
Annelida		Polychaeta	POL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Sabre prawn	Camplyonotus rathbunae	CAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Crab		CRB	0.0089	0.0166	0.0066	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Two-spined crab	Carcinoplax victoriensis	CVI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Antlered crab	Dagnaudus petterdi	DAP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda		Funchalia spp.	FUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Jackknife prawn	Haliporoides sibogae	HSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda		Lipkius holthuisi	LHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Squat lobster	Munida gregaria	MUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Decapod		NAT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0175	0.0000
Arthropoda	Hermit crab	Paguroidea	PAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Parapagurus dimorphus	PDI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Prawn killer	Ibacus alticrenatus	PRK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	scampi	Metanephrops challengeri	SCI	0.0380	0.0582	0.0597	0.0000	0.0000	0.1166	0.1200	0.2318
Arthropoda	Hermit crab	Sympagurus dimorphus	SDM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Spiny masking crab	Teratomaia richardsoni	SMK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Giant masking crab	Leptomithrax australis	SSC	0.0000	0.0000	0.0066	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Frilled crab	Trichopeltarion fantasticum	TFA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bryozoa	Bryozoa	Bryozoa	COZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata		Pyrosoma atlanticum	PYR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata	Salps		SAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Actinostolidae	ACS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Anemone	Anthozoa	ANT	0.0000	0.0000	0.0000	0.3333	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Bolocera spp.	BOC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Coral		COU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0877	0.0000
Cnidaria	Bushy hard coral	Goniocorella dumosa	GDU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Hormathiidae	HMT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen	Pennatulacea	PTU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria		Scleractinia	SIA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen		SPN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Bottlebrush coral	Thouarella spp.	THO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Araeosoma coriaceum	ACO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish		ASR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Bathyplotes moseleyi	BAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Cosmasterias dyscrita	CDY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sun star	Crossaster multispinus	CJA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Dermechinus horridus	DHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Dipsacaster magnificus	DMG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata			ECH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin		ECN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Gorgonocephalus spp.	GOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Goniocidaris parasol	GPA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Gracilechinus multidentatus	GRM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea cucumber	Holothurian unidentified	HTH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Trojan starfish	Hippasteria phrygiana	HTR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Laetmogone spp.	LAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Echinodermata	Starfish	Mediaster sladeni	MSL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Pentagonal tooth star	Odontaster spp.	ODT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pannychia moseleyi	PAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pillsburiaster aoteanus	PAO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Pseudechinus flemingi	PFL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Abyssal star	Plutonaster knoxi	PKN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Plutonaster spp.	PLT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudostichopus mollis	PMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Paramaretia peloria	PMU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Proserpinaster neozelanicus	PNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudechinaster rubens	PRU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Geometric star	Psilaster acuminatus	PSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea cucumber	Stichopus mollis	SCC	0.0000	0.0414	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish	Asteroidea & ophiuroidea	SFI	0.0000	0.0250	0.0859	0.0000	0.0000	0.0502	0.0000	0.0000
Echinodermata	Cross-fish	Sclerasterias mollis	SMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Spatangus multispinus	SPT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Echinothuriidae & Phormosomatidae	TAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Rat-Tail star	Zoroaster spp.	ZOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Maurea	Calliostoma selectum	CSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Fusitriton magellanicus	FMA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Gastropods	Gastropoda	GAS	0.0000	0.0000	0.0132	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Molluscs		MOL	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus		OCP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus	Pinnoctopus cordiformis	OCT	0.0000	0.0000	0.0000	0.0000	1.9414	0.0000	0.0000	0.0000
Mollusca		Octopus mernoo	OME	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Umbrella octopus	Opisthoteuthis spp.	OPI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Penion chathamensis	PCH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Veprichlamys kiwaensis	VKI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Knobbly sandpaper sponge	Ancorina novaezelandiae	ANZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Glass sponge		GLS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Floppy tubular sponge	Hyalascus sp.	HYA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Sponges	Porifera	ONG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Fleshy club sponge	Suberites affinis	SUA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Phylum	Common name	Scientific name	species	2000_MO	2001_MO	2002_MO	2003_MO	2006_MO	2007_MO	2009_MO	2010_MO	2012_MO
Annelida		Polychaeta	POL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Sabre prawn	Camplyonotus rathbunae	CAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Crab		CRB	0.0000	0.0000	0.0111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Two-spined crab	Carcinoplax victoriensis	CVI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0068	0.0000	0.0000
Arthropoda	Antlered crab	Dagnaudus petterdi	DAP	0.0000	0.0500	0.0000	0.0000	0.0333	0.0000	0.0000	0.0000	0.0111
Arthropoda		Funchalia spp.	FUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0196	0.0000	0.0000
Arthropoda	Jackknife prawn	Haliporoides sibogae	HSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda		Lipkius holthuisi	LHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Squat lobster	Munida gregaria	MUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Decapod		NAT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Paguroidea	PAG	0.0000	0.0000	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Parapagurus dimorphus	PDI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Prawn killer	Ibacus alticrenatus	PRK	0.0000	0.0000	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	scampi	Metanephrops challengeri	SCI	0.0997	0.2333	0.1445	0.2990	0.0333	0.0333	0.0067	0.0111	0.0221
Arthropoda	Hermit crab	Sympagurus dimorphus	SDM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Spiny masking crab	Teratomaia richardsoni	SMK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0133	0.0000	0.0110
Arthropoda	Giant masking crab	Leptomithrax australis	SSC	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Frilled crab	Trichopeltarion fantasticum	TFA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0294	0.0000	0.0110
Bryozoa	Bryozoa	Bryozoa	COZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata		Pyrosoma atlanticum	PYR	0.0000	0.0000	0.0838	0.1329	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata	Salps		SAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Actinostolidae	ACS	0.0000	0.0000	0.0000	0.0000	0.0833	0.0000	0.1024	0.0000	0.1439
Cnidaria	Anemone	Anthozoa	ANT	0.0556	0.0000	0.1618	0.0332	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Bolocera spp.	BOC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Coral		COU	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0110
Cnidaria	Bushy hard coral	Goniocorella dumosa	GDU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Hormathiidae	HMT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0200	0.0000	0.0111
Cnidaria	Sea pen	Pennatulacea	PTU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0111	0.0000
Cnidaria		Scleractinia	SIA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen		SPN	0.0000	0.0000	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Bottlebrush coral	Thouarella spp.	THO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Araeosoma coriaceum	ACO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish		ASR	0.0978	0.0000	0.0111	0.0332	0.0000	0.0000	0.0000	0.0000	0.0111
Echinodermata		Bathyplotes moseleyi	BAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0667	0.0265	0.0501	0.0000
Echinodermata		Cosmasterias dyscrita	CDY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sun star	Crossaster multispinus	CJA	0.0000	0.0167	0.0056	0.0000	0.0000	0.0000	0.0132	0.0111	0.0000
Echinodermata	Sea urchin	Dermechinus horridus	DHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Dipsacaster magnificus	DMG	0.0000	0.1667	0.0000	0.0000	0.0000	0.1667	0.0736	0.0000	0.0111
Echinodermata			ECH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin		ECN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Gorgonocephalus spp.	GOR	0.0000	0.0000	0.0000	0.0000	0.0333	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Goniocidaris parasol	GPA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Gracilechinus multidentatus	GRM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0067	0.0000	0.0000
Echinodermata	Sea cucumber	Holothurian unidentified	HTH	0.0000	0.0000	0.0000	0.0997	0.0167	0.0000	0.0000	0.0000	0.0664
Echinodermata	Trojan starfish	Hippasteria phrygiana	HTR	0.0000	0.0000	0.0000	0.1993	0.0000	0.0000	0.0861	0.0332	0.0000
Echinodermata		Laetmogone spp.	LAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish	Mediaster sladeni	MSL	0.0000	0.0000	0.3777	0.0664	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Pentagonal tooth star	Odontaster spp.	ODT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Echinodermata		Pannychia moseleyi	PAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pillsburiaster aoteanus	PAO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Pseudechinus flemingi	PFL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0111
Echinodermata	Abyssal star	Plutonaster knoxi	PKN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0933	0.0000	0.0000
Echinodermata		Plutonaster spp.	PLT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudostichopus mollis	PMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Paramaretia peloria	PMU	0.0000	0.0000	0.0556	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Proserpinaster neozelanicus	PNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0111
Echinodermata		Pseudechinaster rubens	PRU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0251	0.0000
Echinodermata	Geometric star	Psilaster acuminatus	PSI	0.0000	0.1000	0.0557	0.0332	0.0833	0.0000	0.0200	0.0251	0.0110
Echinodermata	Sea cucumber	Stichopus mollis	SCC	0.0664	0.0000	0.0892	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish	Asteroidea & ophiuroidea	SFI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Cross-fish	Sclerasterias mollis	SMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Spatangus multispinus	SPT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0752	0.0000
Echinodermata	Tam O Shanter	Echinothuriidae & Phormosomatidae	TAM	0.0000	0.0000	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Rat-Tail star	Zoroaster spp.	ZOR	0.0000	0.0000	0.1056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0664
Mollusca	Maurea	Calliostoma selectum	CSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Fusitriton magellanicus	FMA	0.0000	0.0000	0.0000	0.0000	0.0167	0.0000	0.0067	0.0000	0.0000
Mollusca	Gastropods	Gastropoda	GAS	0.0000	0.0000	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Molluscs		MOL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus		OCP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0111
Mollusca	Octopus	Pinnoctopus cordiformis	OCT	0.0112	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Octopus mernoo	OME	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Umbrella octopus	Opisthoteuthis spp.	OPI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Penion chathamensis	PCH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0199	0.0000	0.0110
Mollusca		Veprichlamys kiwaensis	VKI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Knobbly sandpaper sponge	Ancorina novaezelandiae	ANZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Glass sponge		GLS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Floppy tubular sponge	Hyalascus sp.	HYA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Sponges	Porifera	ONG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Fleshy club sponge	Suberites affinis	SUA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0790	0.0000	0.0000

Benthic species recorded for subarea MW (Figure 3) and year from middle depth research trawling. Average catch standardised to kg.mile^{-1}.

Phylum	Common name	Scientific name	species	1992_MW	1993_MW	1994_MW	1995_MW	1996_MW	1997_MW	1998_MW	1999_MW	2000_MW	2001_MW	2002_MW
Annelida		Polychaeta	POL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Sabre prawn	Camplyonotus rathbunae	CAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Crab		CRB	0.0000	0.0102	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0334	0.0200	0.0056
Arthropoda	Two-spined crab	Carcinoplax victoriensis	CVI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Antlered crab	Dagnaudus petterdi	DAP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0066	0.0000
Arthropoda		Funchalia spp.	FUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Jackknife prawn	Haliporoides sibogae	HSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda		Lipkius holthuisi	LHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Squat lobster	Munida gregaria	MUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Decapod		NAT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Paguroidea	PAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Parapagurus dimorphus	PDI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0133	0.0000
Arthropoda	Prawn killer	Ibacus alticrenatus	PRK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	scampi	Metanephrops challengeri	SCI	0.0527	0.0502	0.1156	0.1110	0.0112	0.0330	0.0831	0.1342	0.0333	0.2595	0.3357
Arthropoda	Hermit crab	Sympagurus dimorphus	SDM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Spiny masking crab	Teratomaia richardsoni	SMK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Giant masking crab	Leptomithrax australis	SSC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0067	0.0721
Arthropoda	Frilled crab	Trichopeltarion fantasticum	TFA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bryozoa	Bryozoa	Bryozoa	COZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata		Pyrosoma atlanticum	PYR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0333
Chordata	Salps		SAL	0.0000	0.0000	0.0415	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0132
Cnidaria	Deepsea anemone	Actinostolidae	ACS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Anemone	Anthozoa	ANT	0.0000	0.0133	0.0000	0.0000	0.1785	0.0000	0.0000	0.0549	0.0000	0.3997	0.1056
Cnidaria	Deepsea anemone	Bolocera spp.	BOC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Coral		COU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Bushy hard coral	Goniocorella dumosa	GDU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Hormathiidae	HMT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen	Pennatulacea	PTU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria		Scleractinia	SIA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen		SPN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0166
Cnidaria	Bottlebrush coral	Thouarella spp.	THO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Araeosoma coriaceum	ACO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish		ASR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0121	0.1171	0.0000	0.0443
Echinodermata		Bathyplotes moseleyi	BAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Cosmasterias	CDY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0933	0.0000

		dyscrita												
Echinodermata	Sun star	Crossaster multispinus	CJA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1533	0.0111
Echinodermata	Sea urchin	Dermechinus horridus	DHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Dipsacaster magnificus	DMG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0733	0.0000
Echinodermata			ECH	0.0000	0.0000	0.0083	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin		ECN	0.0000	0.0105	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0067	0.0000
Echinodermata		Gorgonocephalus spp.	GOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0067	0.0056
Echinodermata	Sea urchin	Goniocidaris parasol	GPA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Gracilechinus multidentatus	GRM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea cucumber	Holothurian	HTH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Trojan starfish	Hippasteria phrygiana	HTR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000
Echinodermata		Laetmogone spp.	LAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish	Mediaster sladeni	MSL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0266	0.1232
Echinodermata	Pentagonal tooth star	Odontaster spp.	ODT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pannychia moseleyi	PAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pillsburiaster aoteanus	PAO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Pseudechinus flemingi	PFL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Abyssal star	Plutonaster knoxi	PKN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Plutonaster spp.	PLT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudostichopus mollis	PMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Paramaretia peloria	PMU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Proserpinaster neozelanicus	PNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudechinaster rubens	PRU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Geometric star	Psilaster acuminatus	PSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0865	0.1347
Echinodermata	Sea cucumber	Stichopus mollis	SCC	0.0000	0.0133	0.0000	0.0000	0.0221	0.0000	0.0000	0.0000	0.0000	0.0400	0.0431
Echinodermata	Starfish		SFI	0.0000	0.1005	0.1327	0.1099	0.0888	0.1336	0.0334	0.0417	0.0000	0.0267	0.0000
Echinodermata	Cross-fish	Sclerasterias mollis	SMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Spatangus multispinus	SPT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Echinothuriidae & Phormosomatidae	TAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1133	0.0000
Echinodermata	Rat-Tail star	Zoroaster spp.	ZOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0733	0.0000
Mollusca	Maurea	Calliostoma selectum	CSS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Fusitriton magellanicus	FMA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0134	0.0000
Mollusca	Gastropods	Gastropoda	GAS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Mollusca	Molluscs		MOL	0.0000	0.0100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus		OCP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus	Pinnoctopus cordiformis	OCT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6400	0.0000
Mollusca		Octopus mernoo	OME	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Umbrella octopus	Opisthoteuthis spp.	OPI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Penion chathamensis	PCH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Veprichlamys kiwaensis	VKI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Knobbly sandpaper sponge	Ancorina novaezelandiae	ANZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Glass sponge		GLS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Floppy tubular sponge	Hyalascus sp.	HYA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Sponges	Porifera	ONG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1933	0.0000
Porifera	Fleshy club sponge	Suberites affinis	SUA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Phylum	Common name	Scientific name	species	2003_MW	2004_MW	2005_MW	2006_MW	2007_MW	2008_MW	2009_MW	2010_MW	2011_MW	2012_MW
Annelida		Polychaeta	POL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Sabre prawn	Camplyonotus rathbunae	CAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0055	0.0000	0.0000
Arthropoda	Crab		CRB	0.0074	0.0167	0.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Two-spined crab	Carcinoplax victoriensis	CVI	0.0000	0.0000	0.0000	0.0083	0.0000	0.0000	0.9333	0.0000	0.0000	0.0000
Arthropoda	Antlered crab	Dagnaudus petterdi	DAP	0.0148	0.0000	0.0000	0.0166	0.0000	0.0000	0.0000	0.0055	0.0000	0.0000
Arthropoda		Funchalia spp.	FUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Jackknife prawn	Haliporoides sibogae	HSI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0164	0.0000
Arthropoda		Lipkius holthuisi	LHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Squat lobster	Munida gregaria	MUN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Decapod		NAT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Paguroidea	PAG	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Hermit crab	Parapagurus dimorphus	PDI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Prawn killer	Ibacus alticrenatus	PRK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	scampi	Metanephrops challengeri	SCI	0.4016	0.1667	0.1167	0.1337	0.1333	0.0836	0.1026	0.0776	0.0332	0.1482
Arthropoda	Hermit crab	Sympagurus dimorphus	SDM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0243
Arthropoda	Spiny masking crab	Teratomaia richardsoni	SMK	0.0000	0.0000	0.0000	0.0000	0.0167	0.0000	0.0000	0.0055	0.0000	0.0000
Arthropoda	Giant masking crab	Leptomithrax australis	SSC	0.0037	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Arthropoda	Frilled crab	Trichopeltarion fantasticum	TFA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0115	0.0111	0.0166	0.0166
Bryozoa	Bryozoa	Bryozoa	COZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Chordata		Pyrosoma atlanticum	PYR	0.1993	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0055	0.0000	0.0243
Chordata	Salps		SAL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Actinostolidae	ACS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.0000	0.0000
Cnidaria	Anemone	Anthozoa	ANT	0.0773	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Bolocera spp.	BOC	0.0000	0.0000	0.0000	0.0084	0.0000	0.0000	0.0000	0.0000	0.0111	0.0000
Cnidaria	Coral		COU	0.0369	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Bushy hard coral	Goniocorella dumosa	GDU	0.0000	0.0000	0.0000	0.0000	0.1833	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Deepsea anemone	Hormathiidae	HMT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cnidaria	Sea pen	Pennatulacea	PTU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0166	0.0164	0.0000
Cnidaria		Scleractinia	SIA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0115	0.0000	0.0000	0.0000
Cnidaria	Sea pen		SPN	0.0110	0.0167	0.0000	0.0000	0.0167	0.0000	0.0000	0.0111	0.0000	0.0000
Cnidaria	Bottlebrush coral	Thouarella spp.	THO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Araeosoma coriaceum	ACO	0.0110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish		ASR	0.0405	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Bathyplotes moseleyi	BAM	0.0000	0.0000	0.0000	0.0000	0.0833	0.0000	0.1132	0.0111	0.0000	0.1456
Echinodermata		Cosmasterias dyscrita	CDY	0.0000	0.0000	0.0000	0.0498	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sun star	Crossaster multispinus	CJA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Dermechinus horridus	DHO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Dipsacaster magnificus	DMG	0.0000	0.0667	0.0000	0.0000	0.0667	0.0502	0.0000	0.0166	0.0000	0.0000
Echinodermata			ECH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin		ECN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Gorgonocephalus spp.	GOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Goniocidaris parasol	GPA	0.0000	0.0000	0.0000	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Gracilechinus multidentatus	GRM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea cucumber	Holothurian unidentified	HTH	0.0406	0.0167	0.0333	0.0759	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Trojan starfish	Hippasteria phrygiana	HTR	0.0074	0.0000	0.0000	0.0000	0.0000	0.0669	0.0000	0.0000	0.0000	0.0000
Echinodermata		Laetmogone spp.	LAG	0.0000	0.0000	0.0000	0.0000	0.0333	0.0000	0.0000	0.0442	0.2467	0.0000

Echinodermata	Starfish	Mediaster sladeni	MSL	0.0000	0.0167	0.0000	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Pentagonal tooth star	Odontaster spp.	ODT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pannychia moseleyi	PAM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0334	0.0000	0.0000	0.0000	0.1942
Echinodermata		Pillsburiaster aoteanus	PAO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Sea urchin	Pseudechinus flemingi	PFL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Abyssal star	Plutonaster knoxi	PKN	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0055	0.0000	0.0000
Echinodermata		Plutonaster spp.	PLT	0.0000	0.0000	0.0000	0.0000	0.1833	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Pseudostichopus mollis	PMO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0166
Echinodermata	Heart urchin	Paramaretia peloria	PMU	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata		Proserpinaster neozelanicus	PNE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0229	0.0333	0.0000	0.0000
Echinodermata		Pseudechinaster rubens	PRU	0.0000	0.0000	0.0000	0.0000	0.0000	0.0502	0.0000	0.0000	0.0166	0.0000
Echinodermata	Geometric star	Psilaster acuminatus	PSI	0.0329	0.0000	0.0000	0.1255	0.1000	0.0000	0.0222	0.0332	0.0331	0.1546
Echinodermata	Sea cucumber	Stichopus mollis	SCC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Starfish	Asteroidea & ophiuroidea	SFI	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Cross-fish	Sclerasterias mollis	SMO	0.0000	0.0000	0.0000	0.0000	0.0667	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Heart urchin	Spatangus multispinus	SPT	0.0000	0.0000	0.0000	0.0000	0.0333	0.0000	0.0000	0.0000	0.0000	0.0000
Echinodermata	Tam O Shanter	Echinothuriidae & Phormosomatidae	TAM	0.0185	0.0167	0.0000	0.0499	0.0000	0.2007	0.0494	0.0000	0.0000	0.0243
Echinodermata	Rat-Tail star	Zoroaster spp.	ZOR	0.0330	0.0000	0.0000	0.0924	0.0167	0.0669	0.3924	0.0110	0.0000	0.1073
Mollusca	Maurea	Calliostoma selectum	CSS	0.0000	0.0000	0.0000	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Fusitriton magellanicus	FMA	0.0037	0.0000	0.0000	0.0166	0.0000	0.0000	0.0000	0.0000	0.0166	0.0000
Mollusca	Gastropods	Gastropoda	GAS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Molluscs		MOL	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Octopus		OCP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0056	0.0000	0.0000
Mollusca	Octopus	Pinnoctopus cordiformis	OCT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca		Octopus mernoo	OME	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mollusca	Umbrella octopus	Opisthoteuthis spp.	OPI	0.0000	0.0000	0.0000	0.0000	0.2833	0.0000	0.0000	0.0000	0.3947	0.0000
Mollusca		Penion chathamensis	PCH	0.0000	0.0000	0.0000	0.0000	0.0333	0.0000	0.0000	0.0166	0.0000	0.0332
Mollusca		Veprichlamys kiwaensis	VKI	0.0000	0.0000	0.0000	0.0000	0.0167	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Knobbly sandpaper sponge	Ancorina novaezelandiae	ANZ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Porifera	Glass sponge		GLS	0.0000	0.0000	0.0000	0.0498	0.0000	0.0000	0.0556	0.0000	0.0000	0.0000
Porifera	Floppy tubular sponge	Hyalascus sp.	HYA	0.0000	0.0000	0.0000	0.0000	0.0000	83.6120	0.0000	0.0000	0.0000	12.1359
Porifera	Sponges	Porifera	ONG	21.4054	0.0000	0.0000	0.0000	0.0000	0.0000	4.7601	0.0000	0.0000	0.0000
Porifera	Fleshy club sponge	Suberites affinis	SUA	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

APPENDIX 7: BENTHIC SPECIES FROM MPI OBSERVERS

Benthic species recorded for SCI 3 (Figure 3) by MFish observers on commercial scampi vessels.

Phylum	Common name	Scientific name	Code
Arthropoda	crab		CRB
Arthropoda	Antlered crab	Dagnaudus petterdi	DAP
Arthropoda	pagurid	Diacanthurus rubricatus	DIR
Arthropoda	Frilled crab	Trichopeltarion fantasticum	TFA
Arthropoda	Jackknife prawn	Haliporoides sibogae	HSI
Arthropoda	scampi	Metanephrops challengeri	SCI
Arthropoda	Prawn killer	Ibacus alticrenatus	PRK
Arthropoda	Shovelnosed lobster	Scyllarus sp.	SHL
Echinodermata	Proserpinaster neozelanicus	Proserpinaster neozelanicus	PNE
Echinodermata	Heart urchin	Spatangus multispinus	SPT
Echinodermata	Tam O Shanter urchin	Echinothuriidae & Phormosomatidae	TAM
Mollusca	molluscs		MOL
Mollusca	gastropods	Gastropoda	GAS
Mollusca	Golden Volute	Provocator mirabilis	GVO

APPENDIX 8: SCAMPI BURROW IDENTIFICATION CRITERIA

Summary of characteristics of "highly characteristic" and "probable" burrows of *Metanephrops* as at October 2001 (based on all previous work and discussions) (Cryer et al. 2002).

- "Major" and "minor" openings to burrows are almost always different and separately characteristic. The major opening is defined as the one where any visible scampi would be expected to be seen.

- Most burrows seem to be linear, have two openings, and have covered tunnels 100–700 mm long. Burrows with more than two openings are rare. The width and length of the tunnel are only loosely correlated.

- Major openings tend to have the following characteristics (in approximate rank order):
  - well-maintained "tracks" on the sediment; the most characteristic of which lead away at right angles.
  - shallow rather than vertical tunnels
  - "fans" of excavated sediment (that may be a different colour or texture from surrounding sediments)
  - crescent-shaped entrance way
  - part of a linear system with an associated minor opening
  - smooth, flat bottoms
  - usually 50–180 mm wide at the base (increasing with occupant size)

- Minor opening tend to have the following characteristics (in approximate rank order):
  - often slit- or trench-like
  - lie directly in line with a major opening
  - well-maintained linear "tracks" on the sediment
  - smooth (not necessarily flat) bottoms
  - clean, linear sides (especially in highly characteristic burrows)
  - shallow rather than vertical tunnels (though many seem to be steep)
  - usually about half as wide as the major opening

- Burrows with single (major) openings are often deep or "sunken". One to several small, steep holes can often be seen to the rear of these deep burrows but these holes are often not characteristic slit-like openings and may not appear to be regularly maintained nor large enough for use as an opening by an adult scampi.

- A linear tunnel with distinct major and minor openings, combined with a sediment "fan" at the major opening and runs on the sediment surface (especially if these run at a wide angle from the major opening and almost in line with the axis of the burrow from the minor opening) seems to be the most reliable combination of features to identify the burrows of *M. challengeri*.

- To be classed as "highly characteristic", an opening should have most of the characters (especially those that are ranked highly) of a specified opening type (major or minor) and should be in a good to excellent apparent state of repair. State of repair is inferred from smooth, flat floors, and sharp edges to tunnels, openings, and tracks.

- To be classed as "probable", an opening should seem more likely than not to be a scampi burrow, have some of the characteristics (especially those ranked highly) but may lack several. They may be in a moderate, but not poor, state of repair (as defined above).

- To avoid volatility in the burrow indices caused by changes in emergence or other behaviour, the presence of a scampi or other animal in or near a burrow should not influence the decision to count a burrow nor its characterization as highly characteristic as opposed to probable.

- All openings and scampi within a defined "countable area" are included in counts. Excluded from the countable area are areas too dark, too burnt out, or too occluded by suspended sediment to discern whether the apparent state of repair of a putative burrow (e.g., whether there is a fan of sediment or the bottom of the tunnel is flat and smooth).

- To account for edge effects, partly-visible scampi on the bottom and left edges of the image are ignored, those on the top and right edges are included. All partly-obscured burrow openings are ignored. Animals are treated differently from openings because counts of animals are used to calculate absolute (minimum) estimates of abundance and biomass whereas openings are used only to calculate relative indices.