INT2022-03 Identification, storage and genetics of cold-water coral bycatch specimens (1 July 2022 – 30 June 2023)

Milestone 3 Final Annual Report

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Climate, Freshwater & Ocean Science

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At sea digital image of Bubblegum coral Paragorgia sp. Caught by bottom trawl targeting black oreo in FMA 6 (SUB – Subantarctic incl. Bounty Is and Pukaki Rise). [Observer, FNZ].

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Executive summary

Many protected coral species occur as bycatch in commercial fisheries around New Zealand. The Conservation Services Programme (CSP) of the Department of Conservation (DOC) recognise that Government Fisheries Observers on commercial fishing vessels are not always able to identify this bycatch at sea with high precision (especially to species level), with the confirmation of species requiring identification from a coral taxonomist in many cases. For this reason, a research project "Identification and storage of cold-water coral bycatch specimens" was initiated in 2016 (INT201503 – DOC16307), continued in 2020, (INT201904 – DOC20303), and 2022 (INT2022-03 – DOC23303), to determine, through the examination of returned coral specimens and specimen images, the taxon, provenance and, for the current project, the genetics of corals bycaught in New Zealand fisheries.

This report, covering the first year of a three-year contract, summarises the sample and image identifications of all observed coral bycatch collected under the project during the period 1 July 2022 to 30 June 2023. A total of 12 physical specimens in 11 samples were collected by Observers and returned for identification during the reporting period. Sub-samples from each live-caught specimen were taken for future genetic studies (n=9) not all specimens had sufficient live tissue for subsampling. Additionally, there were 49 historical physical samples (67 specimens) collected by Observers with revised higher-level identifications made during the reporting period. A total of 20 research trawl-collected specimens in 19 samples are also reported here. Corrected identifications (where the Observer identification is revised by a coral expert), have been made where necessary in the COD database, with both the original and amended identifications retained. All raw data are provided in the Appendices and as separate excel files.

There were 2854 specimens identified from 382 digital images of catch reported as coral during the reporting period; 2595 were identified by experts as protected coral taxa. The remaining 259 specimens in images were of other non-coral taxa. Observers provided a label showing trip and tow number information for 172 of the 382 processed images and all except one of the remaining images were able to be georeferenced.

Data summaries of protected coral bycatch occurring in New Zealand region fisheries are presented by Fisheries Management Areas (FMA), fishing method, and target fishery. The greatest number of protected coral specimen counts by images came from the South-East (SOE, FMA4) and South-East Coast (SEC, FMA3) regions. Most were taken by bottom trawl operations targeting orange roughy and scampi. Similarly, most protected corals identified from physical specimens came from South-East (SOE, FMA4) bottom trawl operations targeting orange roughy.

While no formal analyses of accuracy have been carried out during this reporting period, between Observer and NIWA expert identifications, brief non-statistical summaries of accuracy are provided to help inform Observers.

We have continued to provide information to brief Observers and give input into coral guide resources, including the updated and revised Deepsea Coral Guide, and MPI's new Benthic Materials Observer training module to help improve overall accuracy of protected coral species identification at-sea. We stress in our recommendations to Observers the use of labels when images are taken, and consistency in specimen label and benthic form recording processes.

An additional objective of this project was to assess the utility of genetic or genomic methods of identifying and discriminating both known and undescribed protected corals. In the first year it was

agreed with CSP that effort should focus on determining the relationship of a tentative new family of gorgonian octocorals that was first discovered in CSP project BCBC2020-26 *Octocoral bycatch diversity on the Chatham Rise*. All eight available specimens of this unknown taxon were DNA-sequenced using genomic methods, to produce a genealogy that demonstrated that they belonged to a unique group that was distinct from morphologically similar gorgonians, including the bamboo, golden and primnoid corals. A comparison of these results to the literature indicates this taxon either belongs to a new family or to a described family that has not been reported from New Zealand. A morphological analysis of the eight specimens is required before either scenario can be definitive.

1 Background

Deep-sea protected coral samples taken as bycatch in commercial fishery operations are collected by government Observers on commercial fishing vessels. Under the New Zealand Wildlife Act (1953) protected corals are deemed to be protected whether they are dead or alive. Protected coral and other invertebrate bycatch are also photographed by Observers as part of their at sea reporting. Over time, NIWA has received these physical coral bycatch samples and has been contracted to provide identifications. In addition to identifying returned physical coral samples, experts also identify coral specimens from digital images collected by Observers. All such corals are identified by experts to the lowest feasible taxonomic level, counted, and the information reported in the relevant databases. Since 2016, this information, along with associated fishing data including fishing method, fishery area, and target species, have been presented in reports. All raw data have also been provided to CSP in spreadsheet form.

Data from this research helps to better characterise interactions between protected corals and commercial fishing activities (Tracey et al. 2011; Clark et al. 2019). It provides vital baseline information that can help to better inform research underpinning marine protection planning including habitat suitability modelling (e.g., Anderson et al. 2014; Rowden et al. 2017; Georgian et al. 2019), benthic risk assessments (Clark et al. 2014), and management of benthic marine protected species. It also helps to pave the way forward towards a more comprehensive mitigation framework to be implemented to protect cold-water corals in New Zealand waters.

The research has a similar focus to earlier CSP Projects (INT2015-03 – DOC16307 and INT2019-04 – DOC0303 *Identification and storage of cold-water coral bycatch specimens*) and to Fisheries New Zealand (FNZ) Projects DAE201804 and BEN202103 *Identification of benthic invertebrate samples from research trawls and observer trips*, (Mills et al. 2020; Schnabel et al. 2021), all of which provide the identification and enumeration of benthic invertebrate bycatch in New Zealand waters. The purpose is to continually improve information on the nature of coral bycatch reported and collected through the Observer Services Programme.

For this three-year contract (INT2022-03 – DOC23303 *Identification, storage and genetics of cold-water coral bycatch specimens*) for CSP NIWA has, along with carrying out the identification of specimens, also provided:

- the identification and georeferenced labelling of images and the digital storage there-of, and
- the sub-sampling of protected coral tissue material for genetic studies (see Bilewitch, 2022 and Bilewitch & Tracey 2020a, 2020b), and
- genetic analysis on archival or recent tissue samples.

The contract provides for up to 200 protected coral samples (physical specimens) and 200 specimen images to be identified per annum. For this project, where time allowed, a backlog of historical coral samples collected by Observers were identified, but priority was first given to recent Observer collected samples from within New Zealand's Exclusive Economic Zone (EEZ), for the current year and historical, followed by research trawl survey samples, then high-sea samples.

This project does not report on coral specimens by images photographed from the high-seas.

Throughout the report we refer to specimens and samples, for clarity we provide the following explanation of these terms:

- Specimens – Individual animals or colonies
- Specimens from images – Individual animals/colonies captured in a digital image.
- Samples – a bag or jar of one or more individual specimens/colonies collected from one location.

Octocoral taxonomy has recently been revised by McFadden et al. (2022). Alcyonacea is no longer accepted as an order. Octocorallia has been elevated to class, and protected corals fall into two new orders: Scleralcyonacea and Malacalcyonacea. See Table 1-1 for a summary of higher-level changes to the Anthozoa group. We use this revised taxonomy for all corals in this report.

Table 1-1: Summary of higher-level changes to Anthozoa group phylogeny.

Name	Old taxonomy	Current taxonomy
Anthozoa	Class	Sub-Phylum
Hexacorallia	Subclass	Class
Octocorallia	Subclass	Class
Malacalcyonacea	(Alcyonacea+Gorgonacea)	Order
Scleralcyonacea	(Alcyonacea+Gorgonacea)	Order
Alcyonacea	Order	(Malacalcyonacea+Scleralcyonacea)
Gorgonacea	Order	(Malacalcyonacea+Scleralcyonacea)
Pennatulacea	Order	Super-Family Pennatuloidea (w/in O. Scleralcyonacea)

2 Objectives

This project forms part of the Conservation Services Programme (CSP) and is part of a long-term series of analyses that began in 2016. The purpose of this research is to continually improve information on the nature of coral bycatch reported and collected through the Fisheries Observer Programme.

The specific objectives for this project (INT2022-03 - DOC23303) are:

Specific Objectives

1. To confirm or update identifications of coral bycatch reported by Fisheries Observers to the lowest taxonomic level (i.e., to assign codes to coral specimens at the species level wherever possible, or to genus or family level if not possible).
2. To record all identified coral specimens and their metadata (including haplotype/genetic data) and ensure storage of the physical specimens in an appropriate taxonomic collection.
3. To update relevant government coral identification and observer databases.

4. To determine whether genetic taxonomic assessment of coral ID is an efficient means to determine or improve image-based or morphological coral ID, and to use genetic data to better understand coral bycatch.

5. To update and provide input into coral-relevant resources for Fisheries Observers, including reference material and material for observer training.

There are several milestones for this project and Milestone 1 has already been completed (see Connell et al. 2023). Here we report on Milestone 2: Draft Final Annual Report detailing methods and results for each specific objective for all corals identified from physical samples and images assessed for the period 1 July 2022 - 30 June 2023.

3 Methods

3.1 Objective 1

To confirm or update identifications of coral bycatch reported by Fisheries Observers to the lowest taxonomic level (i.e., to assign codes to coral specimens at the species level wherever possible, or to genus or family level if not possible).

There are two key activities for specific objective 1:

3.1.1 Identification of returned protected coral specimens

The deep-sea coral bycatch that could not be identified by Observers at sea were retained (whole specimens or sub-samples of the specimens) and delivered to NIWA for identification. A similar method used to process bycatch of invertebrates (excluding protected corals) collected by Observers under a Fisheries New Zealand (FNZ) project (*DAE2018-04,* now *BEN202103)* (Mills et al. 2020; Schnabel et al. 2021), was followed and is summarised.

The corals were thawed, sorted into main groups and initially identified to coarse taxonomic level (mostly to order and family level), then returned to frozen storage, fixed in ethanol, or dried where appropriate. The tasks of fixing and preserving samples, providing containment (jar or pail storage), documenting samples (station numbering, labelling) and high level sorting (dividing samples into major or minor taxonomic groups in the laboratory), were all carried out under the FNZ Data Custodianship Services project DAT2016-01P. Sample data were entered into the web-interfaced NIWA Observer Samples Database (OSD) (version 2.4.1; 2024).

High-seas samples were not differentiated from within-EEZ samples at the time of arrival at NIWA for processing. Trip data are provided on sacks of frozen material but no information on general location is given at this stage. Once the frozen sacks have thawed it is most efficient to process all of their contents rather than separating and refreezing high-seas samples. As such, high-seas samples are partially processed within this project. The high-seas samples are a very useful contribution to habitat suitability modelling exercises in the high-seas (e.g., see Georgian et al. 2019).

Data from OSD were uploaded into the NIWA Invertebrate Collection (NIC) Specify database *niwainvert* where the specimens are curated for long-term storage and formal taxonomic identification.

Experts then identified all corals to the species level wherever possible and when this was not possible, to genus or family level, and assigned the most appropriate three-letter Ministry for

Primary Industries (MPI) code (noting that coral codes have not yet been allocated for all coral taxa recognised by experts). Specimen handling followed NIWA procedures for identifying specimens housed in the NIC. NIWA currently manages specimens according to the "Guidelines for the care of natural history collections" (Committee on Common Philosophies and Objectives, 2010). NIWA also has its own collection policy document: "NIWA Marine Invertebrate Collection Policy and Procedures", which also guided the process. Specimens retained in the NIC are held in stewardship for DOC.

Expert identification of the samples was carried out and updated species names and counts were entered into *niwainvert*. See Table 3-1 for the list of experts that carried out identifications.

Table 3-1: Experts, their affiliation and their speciality.

Expert	Affiliation	Taxon Group
Di Tracey	NIWA	Scleractinia, gorgonian octocorals
Peter Marriott	NIWA	Stylasteridae (hydrocorals)
Rob Stewart	NIWA	Antipatharia (black corals)
Jaret Bilewitch	NIWA	Paramuriceidae, Acanthogorgiidae, other gorgonian octocoral groups
Marcelo Kitahara	University of São Paulo, Brazil	Scleractinia (stony corals)
Stephen Cairns	Smithsonian Institution, USA	Scleractinia (stony corals)
Michelle Taylor	University of Essex, UK	Primnoidae (octocorals)
Dennis Gordon	NIWA	Bryozoa
Caroline Chin	NIWA	Hydrozoa
Diana Macpherson	NIWA	Hydrozoa

3.1.2 Processing and identification of corals from images

A document prepared for Observers collecting coral data at sea was provided to CSP and, following their approval, forwarded to the Observer Services Unit of the FNZ Observer Programme in early 2017 (*Instructions to observers when carrying out at-sea protected coral data collection* (Tracey & Mills 2016)). Specifically, it was emphasised that images were to be captured in a well-lit area using a plain grey background if possible, and a reference size scale, with a specimen label showing trip, species code, and tow numbers and the Observer's name included in the image. The name of the Observer taking the image was to be retained, as this is important for feedback, training, and acknowledgement.

The digital images and metadata collected by Observers for this reporting period were obtained from the FNZ Observer Programme by a CSP Team programme coordinator and transferred to NIWA, in September 2023, with a further, complete set delivered in March 2024.

Identifications of the specimens and their associates, such as another coral attached to the specimen, shown in the images were carried out by coral and non-coral experts (Table 3-1). Since images are identified in a separately timed process to the identification of physical specimens, all images are identified by experts regardless of whether a physical specimen associated with an image was returned or not.

The location of the specimens captured in the images were determined (where possible), using the trip and tow numbers shown on the label in the image to extract tow coordinates from COD. Specimens in images that were determined to be from outside New Zealand's EEZ (i.e., collected within high-sea Fishery Management Area's: Extra-territorial (ET) and Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) management area) were not identified by experts, with the exception of a few images that were identified prior to georeferencing. Protected coral specimens identified from images outside New Zealand's EEZ were not included in further analysis.

Efforts were made to determine tow numbers, if they were not shown on the labels in the Observer images, by using the trip number and the date and time stamp of images (extracted from the digital image properties) together with the FNZ photographic logs and 'Benthic Materials' forms. Location details were extracted for the trip and the likely tow number from the COD database. By applying these methods, we were, with a reasonable degree of confidence, able to assign a tow number to the majority of such images and therefore produce georeferenced images. Metadata for the images, including provenance data, were then assembled manually in a spreadsheet. The following metadata were embedded into each image file where available:

- expert ID in the form of taxonomic name (species, genus or family level);
- trip and tow number;
- initial Observer ID and expert ID in the form of three-letter MPI species code;
- specimen count,
- specimen comments,
- keywords,
- the NIWA Invertebrate Collection catalogue number (where applicable),
- image rating (where the best rating is 1 (very good quality) and the worst is 5 (very poor quality)).

An image rating classification was developed specifically for this research programme as there is no universal standard (International Press Telecommunications Council 2019). Image ratings help indicate the quality and usefulness of an image and, as part of the workflow, enable the images to be sorted and filtered at a later point in time. Table 3-2 shows the image rating classification used and outlines the factors taken into consideration when assigning a rating to an image.

Table 3-2: The classification system used to assign a rating to an image.

Image rating	Classification
1	Very good quality. The specimen is in focus and the whole specimen has been photographed. Good lighting and background. The image includes a label with complete data. There may also be a scale present. The specimen weight may also be shown in the image.
2	Good quality. All the specimen, or part of the specimen is in focus. The lighting and background is sufficient. The image includes a label with some or complete data. May include more than one coral specimen. There may also be a scale present. The specimen weight may also be shown in the image.
3	Average quality. All the specimen, or part of the specimen is in focus. The image may include a label with some data, and a specimen weight may be shown. Insufficient lighting and background. May include more than one coral specimen.
4	Bad quality. All the specimen, or part of the specimen may be in focus, or in focus enough to be able to determine what it is. There is no label in the image. It is not photographed against a good background with a scale and good lighting, and/or photographed at an unhelpful angle. The image is of an aggregated group of corals and other specimens, so it is not clear what the subject of the image is. The image is of a non-coral.
5	Very bad quality. The specimen, or part of the specimen is out of focus and is not able to be identified to a sufficient taxonomic level as a result. There is no label in the image. It is not photographed against a good background with a scale and good lighting, and/or photographed at an unhelpful angle. The image is of an aggregated group of corals and other specimens, so it is not clear what the subject of the image is. The image is of a non-coral.

Using the ACDSee Photo Studio Professional 2020 (version 13.0) software to manage the metadata information, data for each image was either added manually into the relevant field or assigned from a drop down 'picklist'. These data were then embedded in the image file.

Finally, trip, tow and fishery data sourced from COD for each specimen by image were added to the spreadsheet. Data included position (the start and end coordinates of the tow that sampled the photographed coral), depth (minimum and maximum depths), along with the collected date, fishing method, target species, and Observer-reported Fisheries Management Area in which the coral was caught (see Figure 4-1).

3.2 Objective 2

To record all identified coral specimens and their metadata (including haplotype/genetic data) and ensure storage of the physical specimens in an appropriate taxonomic collection.

Tissue sub-samples were taken from all live-collected protected coral samples provided to NIWA by Observers. The sub-samples were stored with their corresponding NIC registration label in standard vials in 99% high grade absolute ethanol. The subsamples are currently stored in the NIC wet collection along with the parent samples.

3.3 Objective 3

To update relevant government coral identification and observer databases

Sample information of expert-identified coral specimens collected by Observers for this reporting period were extracted from Specify database *niwainvert* and provided to the COD database manager for loading and table updates. NIWA manages the COD database for FNZ and it is regularly updated

with revised identifications when corals are returned from sea (Tracey & Mills 2016). In this process the generic three-letter MPI codes initially used by Observers to record unidentified corals are updated with revised codes based on the expert identification. For example, SIA (Scleractinia) to COF (*Flabellum* spp. cup coral). Notes are also added with the expert identification and date added to COD.

A summary spreadsheet of expert identified coral specimens from images for this reporting period was collated and will be provided to the COD database manager for loading and table updates on an annual basis. For specimens from images where the generic three letter code initially used by observers to record corals is incorrect, or of higher taxonomic resolution, these codes will be updated with revised codes based on expert identifications. Notes are added to COD with the expert identification, date added to COD, the MPI image file name and NIWA image file name.

These updates made to COD allow for the potential interactions between individual coral taxa and fishing gear to be better quantified, and therefore help to identify factors that may have contributed to coral mortality.

3.4 Objective 4

> *To determine whether genetic taxonomic assessment of coral ID is an efficient means to determine or improve image-based or morphological coral ID, and to use genetic data to better understand coral bycatch.*

Following consultation with the Conservation Services Programme it was agreed that, for the 2023-2024 period of the contract effort within this objective should focus on using genomic approaches to better understand the identity, diversity and relationships of undocumented protected corals. The use of target-bait enrichment for sequencing of Ultra-Conserved Elements (UCEs; see Quattrini et al. 2017) was tested in project BCBC2020-26 for the Primnoidae (Bilewitch 2022) and those methods were applied here to a selection of octocoral specimens that were identified in that study as a tentative new family found on the Andes Seamounts (closed to bottom trawling since 2001). Although this group has not been recorded from bycatch to-date, all known records were collected at trawlable depths (612-1254m) and its distribution on the Chatham Rise outside the closed area is unknown, thus it may be susceptible to impacts from bottom-trawling and warranted further investigation as an undocumented protected coral group. Eight NIC specimens identified as belonging to the tentative new family were subsampled and sequenced using UCE target-bait enrichment (NIWA9728, 54157, 54235, 102380, 102403, 102443, 102508, 102558). An additional seven reference specimens (2x Chrysogorgiidae, 2x Keratoisididae, 3x Primnoidae) were also sequenced, which were obtained from two prior projects (BCBC2020-26: Bilewitch 2022; INT2019-05: Bilewitch & Tracey 2020). An eighth specimen (NIWA41313: cf. *Callipodium*) was extracted and included as a soft coral reference specimen, as a potential outgroup.

Additional genetic assessments conducted in Year 1 of the contract broadened the sampling scope of INT2023-05 to include additional diversity within the Paramuriceidae found outside the focal regions of that study (FMA4 and 6). Eight additional samples from the genus *Acanthogorgia* (a common component in trawl bycatch) were identified for UCE sequencing and inclusion in the analysis of INT2023-05, to broaden our understanding of cryptic and undocumented species diversity. The results of UCE sequencing for these additional specimens are detailed and discussed in the final report for INT2023-05 (Bilewitch 2024).

Approximately 10mg of tissue was removed from each ethanol-preserved specimen prior to genomic DNA (gDNA) extraction with a DNeasy Blood & Tissue kit (Qiagen Inc.). DNA extractions followed the manufacturer's recommended protocol except that incubations in proteinase K were conducted overnight and two volumes of 40µl of AE buffer were used for a final elution. The concentration of gDNA was quantified using a Quant-iT Picogreen dsDNA kit (Invitrogen Inc.) and extracts were dried prior to shipping to Daicel Arbor Biosciences (USA) for further quality control, target bait enrichment and sequencing via their myReads and myBaits-Custom service. The *octocoral-v2* bait-set (developed in Erickson et al. 2020) was used to enrich for 29 181 baits targeting 3 023 loci. Sample libraries were dual-indexed and an AVITI instrument (Element Biosciences) was used to generate 150bp paired-end sequences.

UCE sequence data was processed using the *phyluce* bioinformatic package (Faircloth 2016). Sequencing reads were cleaned and trimmed using the *illumiprocessor* module then assembled using *SPAdes* v.3.15.3 (Bankevich et al. 2012). Resulting contigs were matched to the baitset and extracted according to UCE loci. UCE-specific assemblies were concatenated and aligned using MAFFT (Katoh et al. 2013) and were trimmed using the *phyluce_align_seqcap_align* and *phyluce_align_get_gblocks_trimmed_alignments_from_untrimmed* modules in *phyluce*. Two alignments were produced: one including all UCE loci that had data from at least 75% of the 15 ingroup samples (>11) and one that had data from at least 90% (>13) of ingroup samples. Bayesian phylogenetic analysis of each alignment was performed using *ExaBayes* (Aberer et al. 2014), with $1x10^6$ generations sampled every 500 generations and 10% of samples discarded as burn-in. Alignments were partitioned according to UCE loci and the resulting output was examined for evidence of chain convergence using *Tracer* (Rambaut et al. 2018). A second analysis was conducted including Paramuriceidae reference sequences obtained from INT2023-05, with 50% (>33 samples) and 75% (>50) UCE datasets used to produce rooted Bayesian phylogenetic trees, following the same methods. This expanded analysis was used to confirm the ingroup relationships of the reference specimens *vs.* the eight specimens in question.

3.5 Objective 5

> *To update and provide input into coral-relevant resources for Fisheries Observers, including reference material and material for observer training.*

To meet this objective, resources such as the Instructions to observers when carrying out at-sea protected coral data collection (Tracey & Mills 2016), and any recommendations which have been highlighted in these reports, are regularly passed on to CSP representatives when requested to assist with Observer training.

Input into the development and improvement of Observer training resources such as revised guide material and expert review of material is ongoing.

4 Results

4.1 Objective 1: To confirm or update identifications of coral bycatch reported by Fisheries Observers to the lowest taxonomic level

4.1.1 Identification of returned protected coral specimens

During the reporting period 1 July 2022 to 30 June 2023, NIWA received and processed 11 Observer-collected protected coral samples containing 12 specimens, and 49 historical (i.e., collected prior to the current reporting year) samples (67 specimens), identified since delivery of the final annual report in the previous coral bycatch project (Mills et al. 2023b).

A summary of these 60 samples (79 specimens) identified by experts are provided in extracts from the NIWA Invertebrate Collection (NIC) Specify Database *niwainvert* (Appendix A (a–b)). Several of the historical samples are identification updates for primnoid corals provided by visiting scientist Michelle Taylor who kindly identified New Zealand specimens during a visit to examine Antarctic collections in the NIC. A number of historical samples were also registered as part of the DOC project "POP2022-04 Deep diving into decades of uncatalogued corals" (Mills et al. 2023a) and have now been identified as part of this project.

Additionally, identifications are reported for 19 research trawl-collected protected coral samples (20 specimens), collected between 1995 and 2014. These specimens were registered by the NIC team and identified by Jaret Bilewitch and Di Tracey under the POP2022-04 project and identified gratis by Michelle Taylor. Data for these samples are included in Appendix A(c).

While no formal 'analyses of accuracy' have been carried out between the Observer and NIWA expert identifications, such as those presented in Parker et al. (2009), a non-statistical summary of the accuracy of Observer ID is presented for this period and will be useful for on-going Observer training exercises. Noting that the sample sizes were very small, for the current reporting year Observers correctly identified 6 of the 11 samples, with two correctly identified to genus level (*Paragorgia* spp. - PAB, and *Flabellum* spp. - COF), two to family or family group level (stony branching corals - CBR, and bamboo corals - ISI). This indicates a 55% accuracy of Observer code use overall for the physical samples, regardless of the taxonomic level of the ID (see colour coding in Appendix A(a)).

This is slightly improved from the previous reporting year (42% accuracy of code use, see Mills et al., 2023b).

Five of the samples were incorrectly identified by Observers, however two of the identifications were within the correct coral family, but an incorrect genus assignment. One sample was correct at the phylum level but misidentified a Stylasterid hydrocoral as a branching stony coral (code CBR, should have been ERR).

Two of the samples did not have initial ID codes assigned and could not be matched in the COD database. These samples were sent in with other samples as a group and either an individual code was not assigned or the sample was not recorded on the Benthic Materials form (NIWA 147275, a specimen of *Conopora verrucosa* and NIWA 160391, a specimen of 'Anthothelidae' (now recognised as part of family Alcyoniidae)).

4.1.2 Data processing and identification of specimens from digital images

During the reporting period 1 July 2022 to 30 June 2023, NIWA received 382 digital images. All images were reviewed and processed for coral identification. A summary of the digital images processed and identified are presented in Appendix C.

Of the 382 images processed there were a total of 225 digital images taken of protected coral taxa and 157 digital images taken of non-coral or non-protected coral taxa.

In total, 2854 specimens were identified from the 382 images that were processed. A total of 2852 specimens were from within the New Zealand EEZ. The number of specimens differs from the number of images because sometimes there are multiple images of the same specimen and sometimes multiple specimens in one image. Of the 2852 specimens, 2595 were protected coral taxa, and all except one image (three specimens) were able to be georeferenced. The trip that by-caught these three specimens fished their entire trip within the New Zealand EEZ, so it has been assumed that these three specimens were also caught within the New Zealand EEZ. The remaining 259 specimens were determined to be non-protected taxa: including bryozoans, sponges, rocks, hydroids, worm tubes, echinoderms, molluscs, and rubbish (Table 4-2).

Observers provided a label showing trip and tow number information for 172 of the 382 processed images. Tow numbers for the remaining images were able to be determined to a reasonable degree of accuracy by either:

- using the image with the label as reference for subsequent images of the same specimen, or
- using COD database and the image timestamp to cross check the trip tow start and tow end date and time details already entered in COD, in the FNZ photographic logs, and on the 'Benthic Materials' form, or
- by cross checking the images with specimen records already entered in the *niwainvert* database as some specimens that had been photographed were also sent to NIWA by the Observer and they had a label indicating the tow number.

The specimen count is dominated by three separate, large catches of stony corals where individual specimens were too many to count. An estimate of 1000 individuals was recorded for two of the catches, and 300 for the third (Figure 4-1).

Figure 4-1: Two large catches of stony coral a and b: total catch in a large pile, reported as 800 kg and closeup of *Solenosmilia variabilis.* Observer ID code was CUP (Stony cup corals, Flabellidae, Fungiacyathidae (Families) and some spp. in Caryophyllidae (Family)); c and d: total catch in several fishbins, reported at 115 kg and closeup of *Desmophyllum dianthus*. Observer ID code was GDU (Bushy hard coral, *Goniocorella Dumosa*) Both catches were from South-East (Chatham Rise) (FMA4) (SOE) Fisheries Management Area.

The highest number of specimens counted from digital images of protected coral species reflects the three large catches of stony corals with the highest counts for *Solenosmilia variabilis* (n = 1098), *Desmophyllum dianthus* (n = 1013), and *Goniocorella dumosa* (n = 329). The stony cup coral *Flabellum* sp. (n = 47) had the next highest specimen count and the bubblegum coral genus *Paragorgia* followed with a specimen count of 14. Protected corals were identified from a total of 13 different families within four orders (Table 4-1). A diverse range of Antipatharia (black corals), Primnoidae (sea fans, sea whips) and Scleractinia (stony corals) were present (Table 4-1;Figure 4-2)

Table 4-1: Count of imaged, protected coral specimens identified by species following expert ID.

Phylum	Class	Order	Family	Genus	Species	Sum of Specimen count
Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	*Leiopathes*		2
			Myriopathidae	*Cupressopathes*		1
			Schizopathidae			1
				Bathypathes		3
				Dendrobathypathes		1
				Dendropathes		1
				Saropathes		1
				Telopathes	*tasmaniensis*	2
			Stylopathidae	*Tylopathes*		2
		Scleractinia				2
			Bathyporidae	*Madrepora*	*oculata*	5
			Caryophylliidae			1
				?Trochocyathus		2
				Caryophyllia		1
					profunda	10
				Desmophyllum		1
					dianthus	1012
				Goniocorella	*dumosa*	328
				Solenosmilia	*variabilis*	1098
			Dendrophylliidae	*Enallopsammia*		3

Phylum	Class	Order	Family	Genus	Species	Sum of Specimen count
			Flabellidae	*Flabellum*	*?angiostonum*	1
					knoxi	46
			Rhizangiidae	*Culicia*	*rubeola*	13
	Hydrozoa	Anthoathecata	Stylasteridae			1
				Errina	*chathamensis*	1
	Octocorallia					1
		Malacalcyonacea	Alcyoniidae	*Anthothela*		2
			Paramuriceidae			1
		Scleralcyonacea	Chrysogorgiidae	*Iridogorgia*		2
			Coralliidae	*Paragorgia*		14
			Keratoisididae			2
				Jasonisis		1
				Keratoisis		9
					?hikurangiensis	1
					?magnifica	1
			Primnoidae			1
				Callogorgia		1
				Candidella		1
				Metafannyella		12
				Primnoa	*notialis*	7
Grand Total						2595

Table 4-2: Count of imaged, non-protected coral and non-coral specimens identified by species.

Phylum	Class	Order	Family	Genus	Species	Sum of Specimen count
Annelida	Polychaeta	Sabellida	Serpulidae			10
Arthropoda	Malacostraca	Decapoda	Axiidae	*Spongiaxius*	*novaezealandiae*	2
			Majidae			1
	Thecostraca					7
Bryozoa						26
	Gymnolaemata	Cheilostomatida	Celleporidae			2
				Celleporaria	*agglutinans*	4
	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporina*	*grandis*	1
	Stenolaemata	Cyclostomatida	Cerioporidae	*Tetrocycloecia*	*neozelanica*	6
			Horneridae	*Hornera*		1
					robusta	3
		Cyclostomatida	Cinctiporidae	*Cinctipora*	*elegans*	1
Chordata	Ascidiacea					1
	Chondrichthyes					1
Cnidaria						1
	Hexacorallia	Actinaria				5
	Hydrozoa	Leptothecata				1
			Aglaopheniidae			1
			Zygophylacidae	*Cryptolaria*		14
Echinodermata	Asteroidea	Brisingida				1
	Crinoidea	Comatulida	Phrynocrinidae	*Phrynocrinus*	*nudus*	11

Phylum	Class	Order	Family	Genus	Species	Sum of Specimen count
	Echinoidea	Camarodonta	Echinidae	*Dermechinus*	*horridus*	3
	Holothuroidea					1
Mollusca	Bivalvia	Mytilida	Mytilidae	*Idas*		1
	Gastropoda					1
		Littorinimorpha	Cassidae	*Semicassis*	*pyrum*	1
Ochrophyta	Phaeophyceae					3
Porifera						36
	Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia*		1
		Poecilosclerida	Latrunculiidae	*Latrunculia*		3
		Tetractinellida	Geodiidae	*Geodia*	*nodosa*	2
	Hexactinellida					1
		Lyssacinosida	Euplectellidae			1
			Rossellidae	*Caulophacus*		1
				Symplectella	*rowi*	1
Pumice						102
Rubbish						1
Grand Total						259

Figure 4-2: A selection of representative protected coral specimen images. a) stony cup coral *Flabellum knoxi*; b) branching stony coral *Solenosmilia variabilis*; c) bubblegum coral *Paragorgia*; d) black coral *Bathypathes*; e) sea fan *Primnoa notialis*; f) black coral *Tylopathes*; g) bamboo coral *Keratoisis*.

Similarly to the physical specimens no formal 'analyses of accuracy' have been carried out between the Observer and NIWA expert identifications, such as those presented in Parker et al. (2009), a non-statistical summary of the accuracy of Observer ID is presented for this period. Where initial observer identification codes were not provided on labels in images, the initial observer identification was taken from the benthic materials form and benthic catch form where possible. During this reporting

period Observers assigned coral identification codes for 312 images out of the 382 specimen images identified by experts. Observers correctly assigned genus or species (the lowest taxonomic level possible) codes to 72 images (23%). In addition to the correct genus/species level identifications 140 (45%) images were correct to the level of order, meaning that either a higher-level coral code was given by the Observer and the expert identified to a lower taxonomic level, or an incorrect coral code was recorded by the Observer at species/genus level but that identification was correct to the level of order. No protected coral images received were recorded with non-coral codes (e.g. black corals coded as feathery hydroids). Sixty-five images (20%) given coral codes were identified by experts as not corals.

Bryozoa continue to be mistaken for corals by observers in reporting. Figure 4-3 shows two situations where bryozoan has been reported as corals. In one case the bryozoan was reported as precious coral *Corallium* (CLL), and in the other situation the bryozoan was reported as coral rubble (CBB).

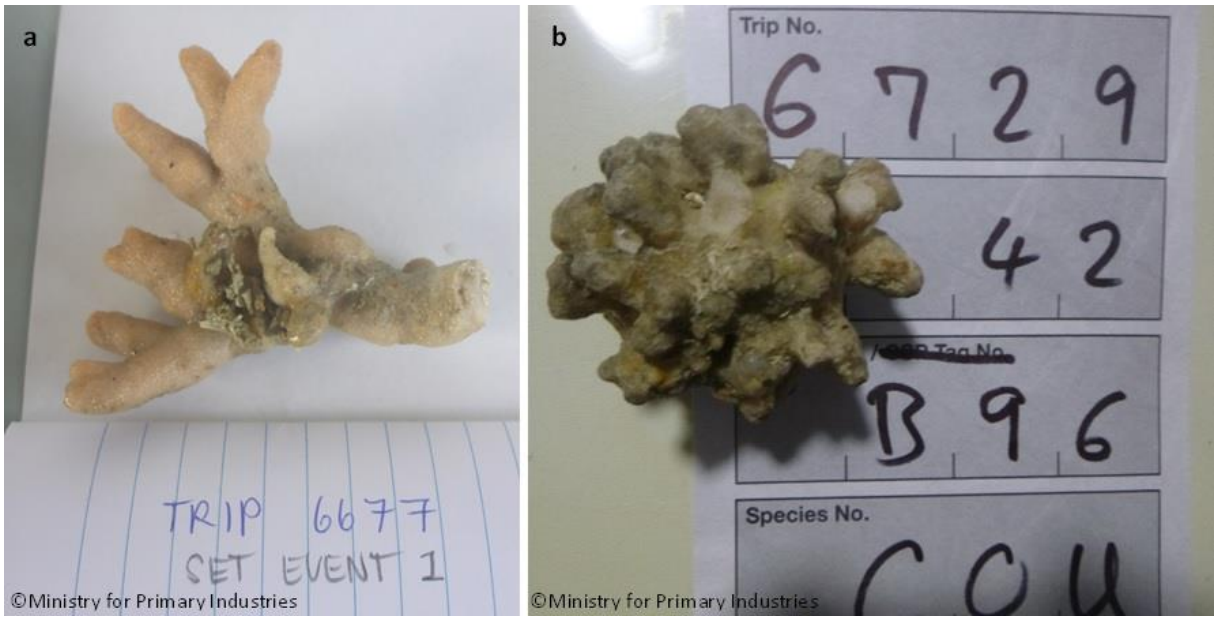

Figure 4-3: Two specimens of bryozoan recorded by Observers as corals a) was recorded as precious coral Corallium (CLL) and b) was recorded as True coral (unidentified) (COU).

4.2 Objective 2: To record all identified coral specimens and their metadata (including haplotype/genetic data) and ensure storage of the physical specimens in an appropriate taxonomic collection

All specimens are registered and stored in the NIWA Invertebrate Collection (NIC) in Wellington and all associated specimen metadata is registered in the NIC Specify database, *niwainvert*.

During this reporting period, tissue sub-samples were taken from 9 specimens from all live-caught Observer collected protected coral samples. Not all specimens returned had sufficient live tissue for subsampling. Accumulated protected coral tissue sub-samples retained for future genetic studies now number 165, and CSP funded projects using these samples for molecular studies have been carried out or are underway (e.g., see Bilewitch & Tracey 2020a, 2020b; Bilewitch 2022; plus INT2022-03– in progress).

4.3 Objective 3: To update relevant government coral identification and observer databases

4.3.1 Summary of physical specimen data loading processes into COD

The revised identifications from the *niwainvert* database were provided for uploading into COD. The COD extract summary is provided in Appendix B.

Of the 60 rows of Observer-collected physical specimen data (11 current year, 49 historical) provided for uploading into COD:

- 26 rows were able to be matched to the catch record for the specimen and were updated.
  - 14 matches were based on trip number, tow number and initial species ID,
  - 7 matches were based on trip number, tow number and MPI sample number,
  - 6 matches were made after reviewing catch data on what samples were returned and using best judgement based on the comments recorded in COD and most likely match based on the initial ID in COD.
  - Comments in COD were especially helpful when a NIWA catalogue number was noted already and when the record was an ID update (this was the case for 9 historical samples) to ensure an exact match and confirm that the new expert ID could overwrite the previous expert ID.
- 34 rows were not able to be matched to the catch record for the specimen and so had to be inserted as new catch records for the tow. Historical samples are more likely not to match and this was the case for most of the historical samples included in this year's identifications. It is noted that sample matching is improving over time and this high number reflects the recent efforts to register and identify a historical backlog of corals in the NIWA collection (see Mills et al. 2023a).

4.3.2 Data summaries and locality plots for physical sample identifications

Data summaries for the physical specimens identified from Observer collected protected coral samples in the current reporting year (1 July 2022–30 June 2023) and historical samples are provided below. These include a count by Fisheries Management Area (FMA) (Table 4-3) and a count of tows and specimens by fishing method and target fishery (Table 4-4). Also see Figure 4-4 that illustrates the geographic spread of physical sample coral by-catch in the region. Seven of the historical samples were collected in the high-seas region (ET) (Table 4-3, Figure 4-4).

Table 4-3: Summary of protected coral samples/specimens by Fisheries Management Area (FMA) or from high-seas regions (ET), for Observer collected protected coral physical samples. Collected during the current reporting year (1 July 2022-30 June 2023)

FMA	Description	Count of samples	No. of specimens
SOE	South-East (Chatham Rise) (FMA4)	6	7
SOU	Southland (FMA5)	5	5
Total	All areas	11	12

(b) Historical samples identified in this reporting period but collected prior to July 2022.

FMA	Description	Count of samples	No. of specimens
AKE	Auckland East (FMA1)	3	3
CEE	Central East (FMA2)	2	2
KER	Kermadec (FMA 10)	1	1
SEC	South-East (Coast) (FMA3)	1	1
SOE	South-East (Chatham Rise) (FMA4)	18	29
SOI	Southern Offshore Islands – Auckland & Campbell Is. (FMA 6A)	2	7
SOU	Southland (FMA5)	2	2
SUB	Subantarctic incl. Bounty Is and Pukaki Rise (FMA 6)	13	14
HOWE	Lord Howe Rise (ET)	1	1
TMAR	Tasmanian Ridge (ET)	5	6
WANB	Wanganella Bank (ET)	1	1
Total	All areas	49	67

Table 4-4: Count of tows and samples/ specimens by fishing method and target fishery for physical specimens. Samples collected in the current reporting year (1 July 2022–30 June 2023). BT = Bottom Trawl.

Target Fishery (common name)	FNZ Code	Fishing method	Count of tows	Count of samples	No. of specimens
Orange roughy	ORH	BT	1	4	4
Arrow squid	SQU	BT	2	3	4
Scampi	SCI	BT	2	2	2
Ling	LIN	BT	1	1	1
Smooth oreo	SSO	BT	1	1	1
Total			7	11	12

(b) Historical samples identified in this reporting period but collected prior to July 2022. BT = Bottom Trawl.

Target Fishery (common name)	FNZ Code	Fishing method	Count of tows	Count of samples	No. of specimens
Black oreo	BOE	BT	2	2	2
Oreos	OEO	BT	9	12	13
Orange roughy	ORH	BT	22	24	38
Scampi	SCI	BT	4	6	9
Smooth oreo	SSO	BT	4	4	4
Tarakihi	TAR	BT	1	1	1
Total			30	49	67

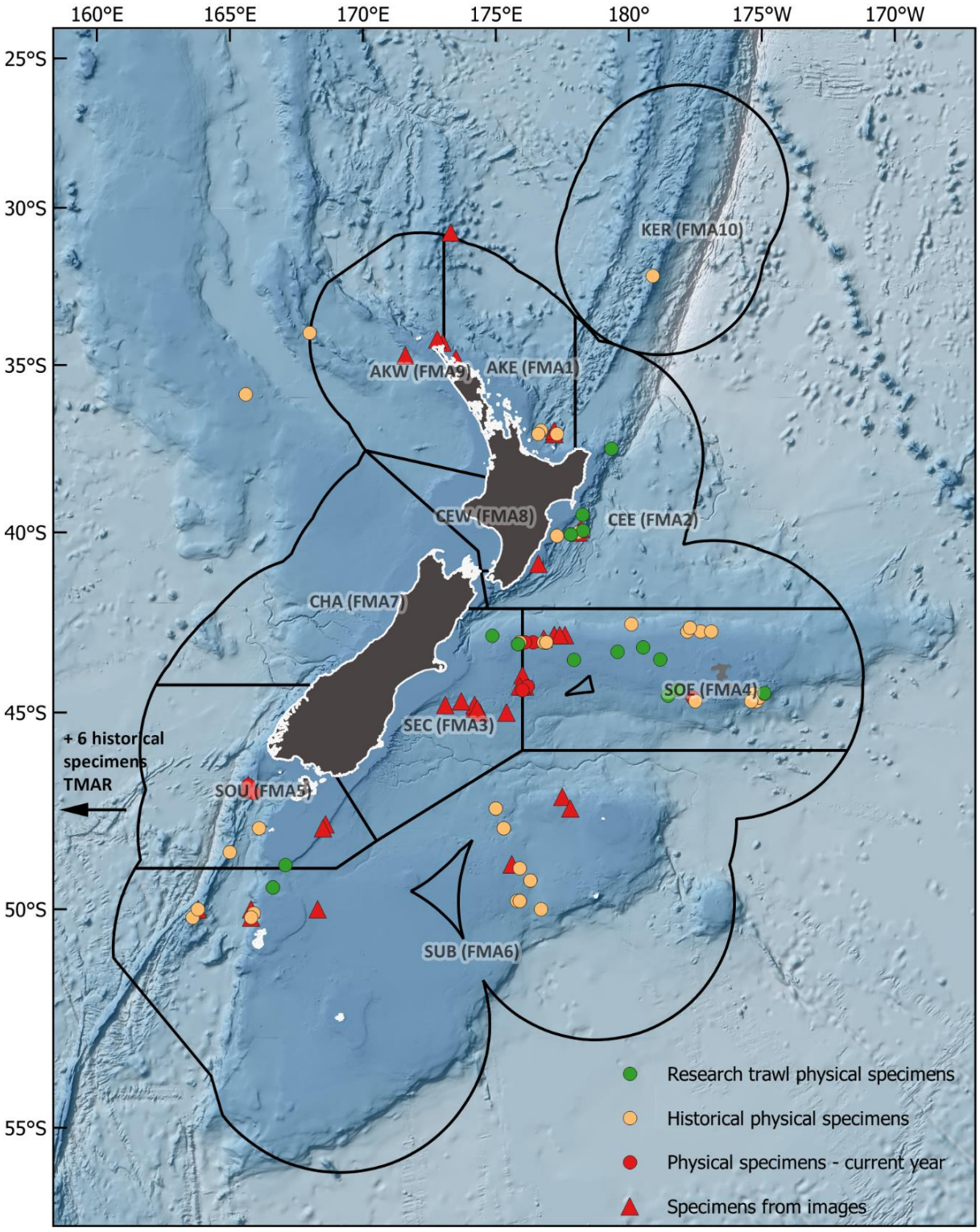

Figure 4-4: Location of identified protected coral samples. (79 physical samples, 99 specimens (19 research trawl survey samples, 11 current year observer samples, 49 historic observer samples); 312 digital image specimens) within Fisheries Management Areas (FMAs) analysed (but not all collected) within this reporting period. Physical specimens/samples (circles), and images data (triangles). Current reporting year (red symbols) is 1 July 2022–30 June 2023.

4.3.3 Summary of specimen image data loading processes into COD

The revised identifications provided by coral experts will be provided for uploading into COD upon completion of this final report. Uploads of expert identifications in COD will be completed by 15 October 2024.

Updated coral identifications from this reporting period will be loaded into final fields in COD by 15 October 2024. The retroactive loading of expert identification codes from images identified for previous contracts INT201503-DOC16307 and INT201909-DOC20303 is a task that is yet to be completed. Updates were unable to be made previously because COD was unable to store image metadata and modifications to the database structure, and FNZ agreement for this to happen, were required. Database modifications have now been made and a pilot project to update and load data from the July 2021 – June 2022 reporting period was funded by FNZ (DAT201601E). These updated protected coral identifications for the July 2021-June 2022 reporting period have been loaded into COD.

4.3.4 Data summaries and locality plots for specimen image sample identifications

Data summaries for the protected coral specimens identified from images in the current reporting year (1 July 2022–30 June 2023) are provided below. These include a count by Observer Fisheries Management Areas (FMA) (Table 4-5) and a count of tows and protected coral specimens by fishing method and target fishery (Table 4-6). Also presented is a summary of the number tows with more than one different species of protected coral specimens (Table 4-7) and the number of tows that a protected coral species is caught across (Table 4-8). Also see Figure 4-4 that illustrates the geographic spread of protected coral bycatch from digital images in the region.

These data summaries only report on the number of specimens counted from digital images, and no reporting is done on unphotographed protected coral bycatch that is recorded by observers in the benthic or general catch tables.

Table 4-5: Summary of imaged, protected coral specimens by Fisheries Management Area (FMA), ranked by specimen count.

Area	Description	Total no. of specimens
SOE	South-East (Chatham Rise) (FMA4)	2491
SEC	South-East Coast (FMA3)	30
SUB	Subantarctic (FMA6)	29
SOU	Southland (FMA5)	19
AKE	Auckland East (FMA1)	8
AKW	Auckland West (FMA9)	4
CEE	Central East (FMA2)	3
SOI	Southern Offshore Islands – Auckland & Campbell Is. (FMA 6A)	3
	No FMA recorded	3
Total		2590

Table 4-6: Count of tows by fishing method and target fishery for imaged, protected coral specimens.
BT = Bottom Trawl; PRB = Precision Seafood Harvesting Bottom Trawl.

Target Fishery (common name)	FNZ code	Fishing Method	Count of Tows	Total no. of specimens	Remarks
Orange roughy	ORH	BT	28	2123	
Scampi	SCI	BT	6	338	
Squid	SQU	BT	5	63	
Smooth oreo	SSO	BT	14	54	
Black oreo	BOE	BT	2	3	
Tarakihi	TAR	PRB	2	2	
Ling	LIN	BT	2	2	
Snapper	SNA	PRB	1	1	
Barracouta	BAR	BT	1	1	
No target fishery provided			1	3	No gear type
All			**62**	**2590**	

Table 4-7: Count of tows by number of coral taxa photographed.

Number of different taxa of coral	Number of tows
1 taxon of coral was photographed	46
2 taxa of coral were photographed	12
3 taxa of coral were photographed	3
4 taxa of coral were photographed	2
Total	63

Table 4-8: Count of tows across which a coral taxon was caught.

Taxon of coral	Fisheries code	Number of tows caught in
Paragorgia spp.	PAB	13
Solenosmilia variabilis	SVA	10
Keratoisis spp.	BOO	8
Desmophyllum dianthus, Goniocorella dumosa	DDI, GDU	7
Flabellum spp.	COF	4
Primnoa spp., stony corals	PMN, SIA	3
Metafannyella spp., *Madrepora oculata,* Black corals, *Bathypathes* spp., *Caryophyllia* spp., Primnoidae, Bamboo corals, *Anthothela* spp., *Tylopathes* spp.	MEF, MOC, COB, BTP, CAY, PRI, ISI, ANB, TYL	2
Dendrobathypathes spp., True coral (unidentified), Stylasterids (hydrocorals), Stony cup corals, *Dendropathes* spp., *Jasonisis, Telopathes tasmaniensis, Leiopathes* spp., *Saropathes* spp., *Culicia rubeola, Iridogorgia* spp., *Callogorgia* spp., *Enallopsammia rostrata, Errina* spp.	DEN, COU, COR, CUP, DDP, JAS, TEO, LEI, SRO, CUR, IRI, CLG, ERO, ERR	1
Total		63

The FMAs with the highest number of photographed protected coral bycatch specimens were the SOE South-East (FMA4) and SEC South-East Coast (FMA3) regions, with SUB Subantarctic (FMA6) the next highest. Even when the three large stony coral catches were treated as single specimen catches rather than multiple specimens, the Fisheries Management Area (FMA) with the highest number of specimens photographed remains South-East (Chatham Rise) (FMA4). The highest number of photographs protected coral specimens were by bottom trawl operations targeting orange roughy, scampi, squid and smooth oreo. If the three large stony coral catches were treated as single specimen catches, then the order of target fisheries would change slightly, with scampi dropping in rank from 2nd to 4th, orange roughy target fishery remains with the highest number of photographed protected coral specimens.

4.4 Objective 4: Determine whether genetic taxonomic assessment of coral ID is an efficient means to determine or improve image-based or morphological coral ID, and to use genetic data to better understand coral bycatch

Genome-scale DNA sequencing approaches confirmed with high confidence the genetic distinctiveness of eight specimens of a tentatively undescribed family of gorgonian octocorals, indicating they were not misidentified members of morphologically similar protected octocoral families – the Chrysogorgiidae, Primnoidae, nor the Keratoisididae. UCE-enriched genomic sequencing was successful for all eight specimens of the putative new family, six of the seven reference samples from morphologically similar families, and the additional soft coral reference specimen. A single reference sample of a bamboo coral did not pass quality control assessments and was excluded from UCE sequencing. Sequencing of the remaining 15 samples produced over 1x10^{6} reads, resulting in over 1.5x10^{9} base-pairs (bp) of sequencing data after trimming and quality control (see Appendix D for details). A reference sample of the primnoid octocoral *Thouarella laxa* (NIWA42522) produced only 26 361 reads (3.0x10^{6} bp) and was excluded from further analysis. The remaining samples had an average of 7.5 million reads (SE=5.8x10^{5}) and read assembly produced an average of 34 098 contigs (SE=14 628), ranging from 4073 (NIWA131891: *Radicipes*) to 204 785 (NIWA53309: *Thouarella cf. laxa*) with a maximum contig length of 59 212 bp (NIWA131891). Matching to UCE loci resulted in an average of 1746 contigs (SE=78), with a range of 1039-2135. The average length of UCE contigs was 619bp (SE=38), with a maximum length ranging from 1243 to 29 662bp.

Concatenation and alignment of UCE loci for the 14 ingroup samples resulted in 2 538 loci with a total length of 1.1x10^{6}bp, of which 2.2x10^{5} positions showed informative variation. Restricting the alignment to loci that were sequenced for 75% or 90% of all samples resulted in alignments with 2063 and 1159 loci, which were 6.7x10^{5} and 2.8x10^{5}bp in length, respectively.

Inclusion of an additional 53 reference sequences of Paramuriceidae from INT2023-05 for outgroup analysis resulted in a UCE dataset with 2999 loci with a total length of 6.6x10^{5}bp, of which 2.7x10^{5} positions showed informative variation. Restricting the alignment to loci present in 50% or 75% of samples resulted in alignments with 2595 and 1310 loci, which were 4.9x10^{5} and 2.4x10^{4} bp in length, respectively.

Bayesian phylogenetic analysis of both the 75% and 90% datasets for the 14 ingroup specimens produced trees that were identical in topology and support values (Figure 4-5). Trees from both subsets completely resolved relationships for all identified genera among reference samples,

whereas the eight specimens of the new family were genetically indistinguishable to each other but formed a clade distinct from the reference specimens.

Outgroup analysis using 53 additional sequences of Paramuriceidae produced Bayesian phylogenetic results that confirmed the placement of NIWA41313 as an outgroup to all other taxa in Figure 4-5. Since these phylogenetic trees displayed identical relationships to that of the 14-specimen ingroup analysis (Figure 4-5), no further treatment of this dataset was undertaken and the tree results are not shown here since they will be presented in detail under INT2023-05, for analysis of the Paramuriceidae.

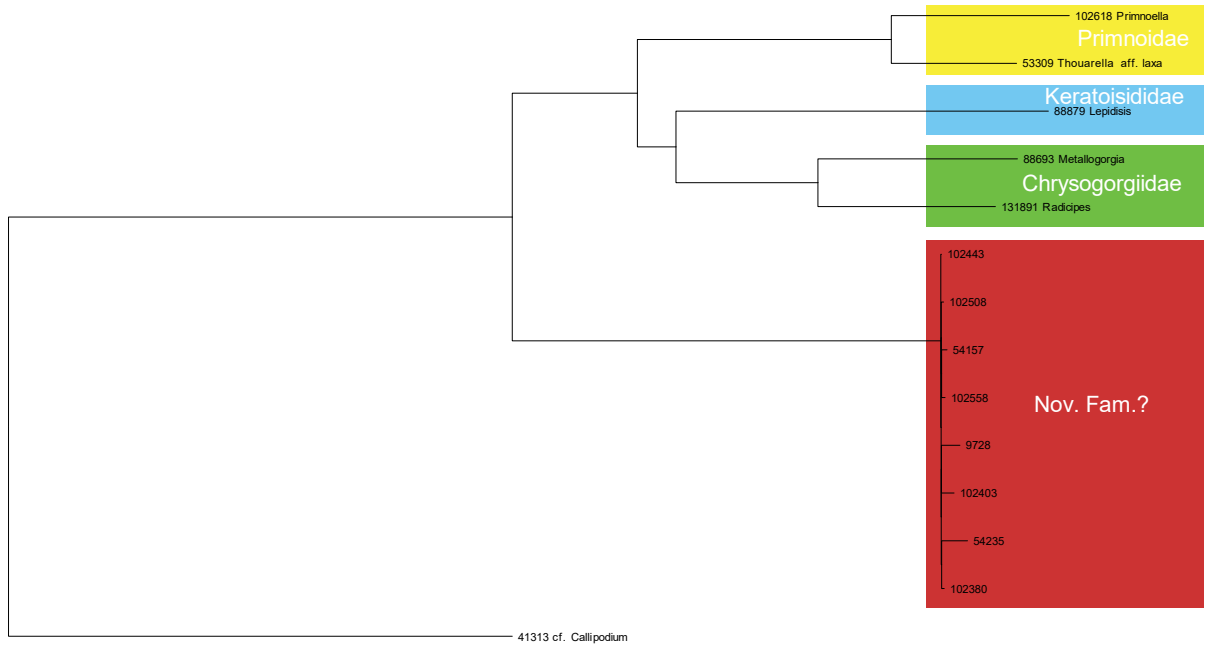

Figure 4-5: Bayesian phylogenetic analysis of relationship of unidentified gorgonian octocorals. Branch tip labels indicate NIWA NIC catalogue numbers and taxon names. Coloured boxes indicate family-level groupings with family names indicated in grey. All displayed branches had 100% posterior probability and the tree topology was identical for both 75%- and 90%-inclusion datasets.

4.5 Objective 5: Update and provide input into coral-relevant resources for Fisheries Observers, including reference material and material for observer training.

A key activity of this, and previous projects has been to assist with the development and improvement of Observer training resources such as the Coral Identification Guide (Tracey et al. 2024) (Figure 4-6) to continue to improve the accuracy of at-sea identification, and thus provide higher-quality data for downstream usage. Revisions and corrections to the guide are being collated and will be provided to CSP for inclusion in the next version.

The Ministry for Primary Industries (MPI) recently revised its Observer Training programme for new Observers. The Department of Conservation CSP and NIWA were invited to review the Benthic Materials online training module. This training module includes a large section on protected corals. Under this project, multiple corrections and suggestions for improvement were made, particularly around specimen labelling and coral identification.

As a result of the involvement in the review of the Benthic Materials online training module, MPI contracted two parallel projects (MPI24302 and MPI24304) which contributed to Observer training and improving coral identification skills through four workshops.

Two half-day workshops were held in November 2023. One workshop was for new Observers who had just completed their training, and the second workshop was for current Observers to refresh their benthic invertebrate identification skills. Both workshops spent half the time focusing on coral identification with Observers learning to handle different coral specimens, understand defining characteristics, correctly use coral and invertebrate identification guides, and to distinguish between easily confused groups.

Two full day workshops were held in April 2024 as part of the annual Observer refresher training for current Observers. Half of each of these workshops focused on coral identification.

Recommendations highlighted in previous coral bycatch project reports (Macpherson et al. 2021; Macpherson et al. 2022; Mills et al. 2023b) and the instructions to Observers (Tracey & Mills 2016; Tracey et al. 2019) were passed on to Observers during the training workshops.

Methods for Observers to use when sampling at sea, including image labelling, are always highlighted at annual CCAMLR Training sessions as well.

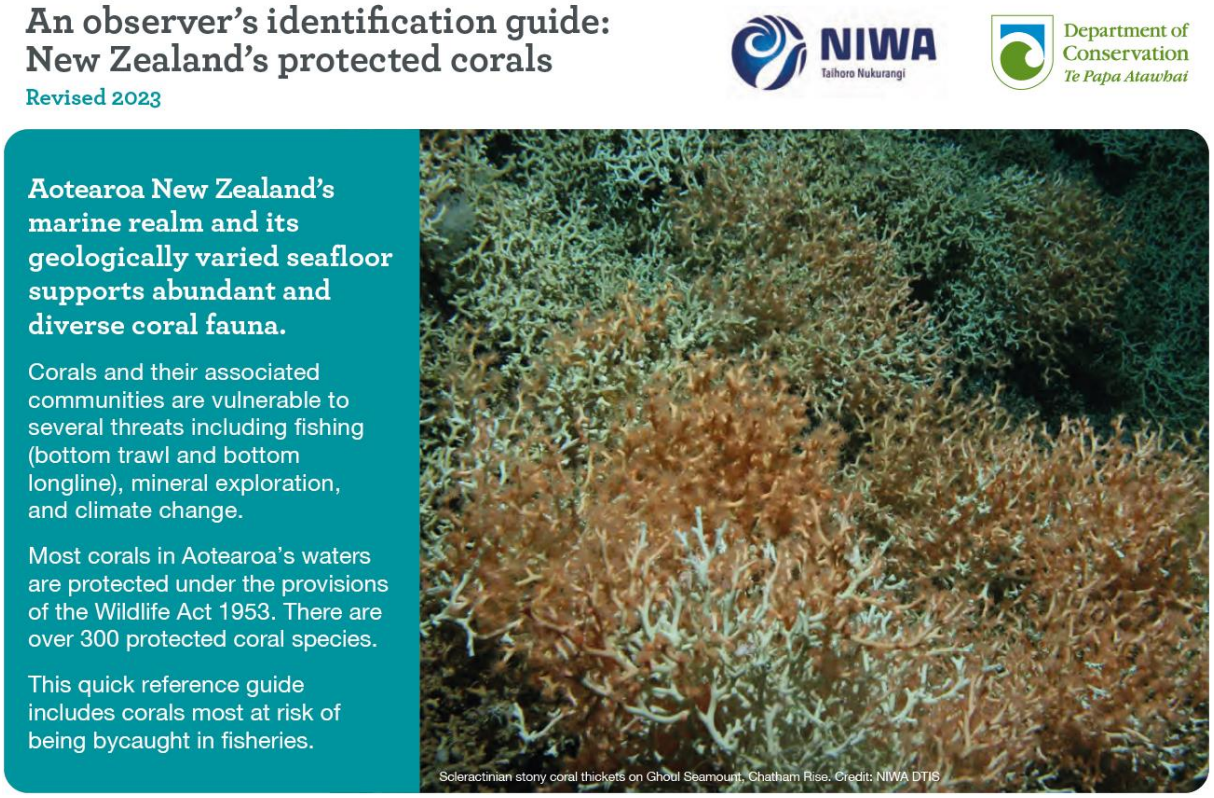

Figure 4-6: Revised DOC Coral identification guide (2023) front cover.

5 Summary and conclusions

This is the first year of a three-year project for the identification, storage and genetics of protected coral bycatch and continues the work of several multi-year time-series of fisheries bycatch projects. Not only do these accumulated coral records contribute to filling knowledge gaps around spatial

distribution of species, but they help describe the overall composition of observed bycatch, and provide an opportunity to continue to improve both predictive habitat suitability models and risk assessments, as well as expand knowledge of the region's biodiversity.

The objective for this reporting period to detail all bycaught physical samples and digital images returned by fisheries Observers was met. The process was efficient as the methods have been consistent and standardised over several years. The required database updates for physical specimens have been made. Database updates for the specimens from digital images will be completed by 15 October 2024.

Protected corals continue to be taken as bycatch within the region, primarily from bottom trawl fishing methods. The identified samples were photographed and or collected opportunistically from commercial fishing activity when either Observers were uncertain of their identification of the coral specimen, the specimen was caught outside the expected depth range or distribution, or when the specimen was considered rare or unusual. A few Observers have provided their email address on specimen labels seeking direct feedback from experts on the identification of specimens (which has been given). This highlights an encouraging interest in improving their identification skills.

These samples are highly valuable and continue to augment datasets used to highlight interactions between fishing and protected corals, for example in the modelling of species distributions and community classifications. Recognising the importance of these data for enhancing basic understanding of coral distribution and given recent elucidation of unexplored cryptic diversity in some coral groups, Observers are always encouraged to return a specimen or sub-sample of the specimen, whenever they are able to, regardless of how confident they are in their identification. Overall, the accuracy of the Observer identification is good and for some groups can be carried out to family and sometimes genus or species level. While the sample sizes used in the general accuracy summaries are small, it is nevertheless clear certain taxa continue to be confused.

A total of 99 physical specimens (including research trawl and observer collected), and 2595 specimens from digital images were identified or verified to the lowest taxon level possible by experts. All except one of the processed images were able to be georeferenced. There were 238 digital images taken of protected coral taxa and 144 digital images taken of non-coral or non-protected coral taxa.

Similar to previous projects, the number of Observer specimens photographed was high for this reporting period, however physical samples returned for identification from within the EEZ were low (11 physical samples containing 12 actual specimens) for this period compared with previous periods.

As observed previously in BCBC2020-26 (Bilewitch 2022) and INT2019-05 (Bilewitch & Tracey 2020a), molecular systematics is an effective tool for the objective identification of specimens belonging to known (described) coral taxa. However, genetic approaches are also capable of the discrimination and delineation of cryptic and undescribed taxa, such as the eight specimens of a putative new family analysed here. UCE phylogenomic analysis using a comprehensive suite of independent genetic characters has indicated that these specimens are definitively *not* members of the three protected octocoral families with which they share morphological similarities (particularly the Primnoidae: Bilewitch 2022). The phylogenetic results and observed genetic distances indicate that these specimens are a closely related family – likely members of the 'S2' clade identified by McFadden et al. (2022). In addition to the Chrysogorgiidae, Primnoidae and Keratoisididae, clade S2 contains the Mopseidae, Pleurogorgiidae and the Ifalukellidae. The relationships of the latter three families to

these eight unknown specimens have not been examined, although an affinity to the Mopseidae is unlikely since it consists of delicate bamboo corals which are highly dissimilar to the specimens under study, nor do the eight specimens show an affinity to the Pleurogorgiidae. Prior to decisions as to whether they constitute taxonomic description as a new family, the eight specimens sequenced here require more detailed morphological analysis including comparisons to the Ifalukellidae, with which they share some superficial similarities. The NIC contains four specimens of ifalukellids for potential comparison – all of which were collected from the Coral Sea to the west of New Caledonia. Thus, the eight specimens either represent an undescribed family of protected octocorals, or a new record of a described family previously not recorded from the New Zealand EEZ: the Ifalukellidae.

6 Recommendations

Octocoral taxonomy has recently been revised by McFadden et al. (2022). This taxonomic revision has implications for the three letter MPI "species" codes, particularly those that are more generic and refer to multiple families or orders of coral. One major change that resulted from this paper is the synonymy of Order Alcyonacea into Octocorallia. Families that were within Alcyonacea are now spread between two new Orders, Malacalcyonacea and Scleralcyonacea.

Due to the taxonomic hierarchy changes (McFadden et al. 2022) it is recommended that a review of existing three letter MPI coral codes is undertaken to ensure the meanings and scientific names for higher level codes are correct. For example, the scientific name for code ISI is still listed as Isididae (according to MARLIN (https://marlin.niwa.co.nz/species_codes/ Apr 2024) but in the notes it has been amended to: *Over-arching code to use to describe coral with bamboo-like skeleton (includes Families Keratoisididae and Mopseidae)*. These notes align with the recent revisions, but the scientific name is incorrect. Isididae now sits within Order Malacalcyonacea whereas the bamboo coral families Keratoisididae and Mopseidae are now both within Order Scleralcyonacea. There are currently no species of the genera encompassed within family Isididae known from the New Zealand region.

Another recommendation includes the creation of a new three letter code for the coral family Paramuriceidae. Most of the genera formerly within family Plexauridae (PLE) have been moved to family Paramuriceidae. The only genus in the New Zealand region in family Plexauridae is *Swiftia*.

For some returned physical specimens and images, the processing and identification ashore and database updates are made difficult if labelling protocols and photography instructions are not followed. While we appreciate the workload that is placed on Observers at sea, we provide the following recommendations regarding their at-sea data collection methods.

Digital Images need to be taken with a label that includes trip and tow data as a minimum, and preferably also includes the 3-letter species code used. For physical coral specimens or sub-samples of coral specimens the labels need to include trip and tow data, the MPI number, and a species code. This information helps experts verify the identification. Over time, standardised easy-to-use pre-printed labels for Observers to include in photographs should improve this process and hence the accuracy of accompanying metadata. Examples of different labelling methods used by Observers are shown by Macpherson et al. (2021). We note the standardised use of pre-printed labels and photocards has recently progressed within FNZ (see section 2.1, Figures 1 and 2 of Schnabel et al. 2021).

7 Acknowledgements

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Appendix A Summary output from NIWA Invertebrate Collection (NIC) Specify Database *niwainvert*.

This publicly accessible website can be used to search the initial and expert ID species codes: https://marlin.niwa.co.nz/species_codes/ and FMA codes: https://marlin.niwa.co.nz/area_codes/.

(a) Revised identifications of 12 bycatch specimens (in 11 sample lots) returned by observers between 1 July 2022 to 30 June 2023. Green highlighted cells indicate the level of matching where three-letter identification codes were correctly used, yellow highlighted cells indicate the level at which the identification is valid where incorrect identification codes were used.

NIWA Cat Num	TRIP	Tow	OSD Num	MPI Sample Num	Initial ID Code	Expert ID code	Class	Order	Family	Full Taxon	Count	Date	Latitude1	Longitude1	Depth 1	Depth 2
147271	6687	16	6266		COB	TEO	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes tasmaniensis*	1	Oct-22	-47.1	165.9	988	1071
147272	6687	16	6267		COB	TEO	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes tasmaniensis*	1	Oct-22	-47.1	165.9	988	1071
160395	6774	1	6387		CBR	SVA	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia variabilis*	1	Apr-23	-43.1	176.4	393	389
160371	6761	53	6355		COF	COF	Hexacorallia	Scleractinia	Flabellidae	*Flabellum knoxi*	2	Feb-23	-44.3	176.2	156	
147275	6687	16	6270			COO	Hydrozoa	Anthoathecata	Stylasteridae	*Conopora verrucosa*	1	Oct-22	-47.1	165.9	988	1071
160373	6761	53	6357		CBR	ERR	Hydrozoa	Anthoathecata	Stylasteridae	*Errina chathamensis*	1	Feb-23	-44.3	176.2	156	
160391	6774	10	6381			AND	Octocorallia	Malacalcyonacea	Alcyoniidae	Anthothelidae	1	Apr-23	-43.1	176.1	399	405
147273	6687	54	6268		PAB	PAB	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*	1	Oct-22	-44.6	-177.6	960	1034
147266	6679	33	6252		BOO	JAS	Octocorallia	Scleralcyonacea	Keratoisididae	*Jasonisis*	1	Oct-22	-46.9	165.7	466	476
147274	6687	16	6269		ISI	BOO	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*	1	Oct-22	-47.1	165.9	988	1071
160378	6761	62	6362		THO	MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella chathamensis*	1	Mar-23	-44.4	176.0	177	

(b) Revised identifications of 49 historical bycatch samples (67 specimens) returned by observers, identified between 24 March 2023 to 12 March 2024.

NIWA Cat num.	TRIP	tow	OSD num.	MPI Sample No.	Initial ID Code	Expert ID code	Class	Order	Family	Taxon name	Count	Date	Latitude1	Longitude1	Depth 1	Depth 2
60378	2595	53				LEI	Hexacorallia	Antipatharia	Leiopathidae	*Leiopathes acanthophora*	8	Mar-08	-44.7	-175.2	730	1126
47913	2714	123		76		LSE	Hexacorallia	Antipatharia	Leiopathidae	*Leiopathes secunda*	1	Nov-08	-44.5	-175.3	661	873
66327	2699	132	870			COB	Hexacorallia	Antipatharia	Schizopathidae	Schizopathidae	1	Oct-08	-42.7	-177.7	1129	996
112053	1024	39				TYL	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*	1	Aug-97	-37.0	176.7	976	
47030	1054	25				DDI	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	2	Nov-97	-43.1	176.9	368	351
47036	1153	70				DDI	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	2	Sep-98	-47.2	148.7	950	
47049	1171	57				DDI	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	1	Dec-98	-50.2	163.6	1006	
88010	1711	13				DDI	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	1	Oct-02	-34.0	168.0	840	1079
103595	1054	6				DDI	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	3	Nov-97	-43.1	176.8	358	
103597	1153	107		21		DDI	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	6	Sep-98	-50.1	165.9	990	
104683	1152	1				DDI	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	1	Sep-98	-47.1	148.7	1046	
88283	1054	25				GDU	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella dumosa*	1	Nov-97	-43.1	176.9	368	351
89157	1282	24				GDU	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella dumosa*	1	Nov-99	-40.1	177.3	420	
60383	2595	55		12		SVA	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia variabilis*	1	Mar-08	-44.6	-175.1	983	1361
89117	1137	10				SVA	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia variabilis*	1	Aug-98	-47.5	148.8	912	
88406	1124	65				ERO	Hexacorallia	Scleractinia	Dendrophylliidae	*Enallopsammia rostrata*	1	Aug-98	-37.1	177.3	614	648
47785	2699	17				ANB	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*	1	Oct-08	-44.5	-174.9	1008	1087
65586	2832	75	787			ANB	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*	1	May-09	-47.5	175.0	1061	1123
11317	1137	6				ANB	Octocorallia	Malacalcyonacea	Alcyoniidae	cf. *Anthothela*	1	Aug-98	-47.5	148.9	1024	
42492	2653	111		158		ICI	Octocorallia	Malacalcyonacea	Melithaeidae	*Iciligorgia*	1	Jul-08	-49.8	175.8	1041	1084

NIWA Cat num.	TRIP	tow	OSD num.	MPI Sample No.	Initial ID Code	Expert ID code	Class	Order	Family	Taxon name	Count	Date	Latitude1	Longitude1	Depth 1	Depth 2
42513	2614	39		26		ICI	Octocorallia	Malacalcyonacea	Melithaeidae	*Iciligorgia*	1	Apr-08	-49.8	175.9	870	1005
47778	2614	39				ICI	Octocorallia	Malacalcyonacea	Melithaeidae	*Iciligorgia*	2	Apr-08	-49.8	175.9	870	1005
65539	2832	75		786		ICI	Octocorallia	Malacalcyonacea	Melithaeidae	*Iciligorgia*	1	May-09	-47.5	175.0	1061	1123
11130	1172	53				PRI	Octocorallia	Scleralcyonacea	Primnoidae	*Callozostron acanthodes*	1	Dec-98	-40.0	178.1	862	
112283	1099	15				CTP	Octocorallia	Scleralcyonacea	Primnoidae	*Calyptrophora* cf. *cucullata*	1	Sep-98	-32.2	-179.1	122	307
131940	5844	32	4810		COB	CTP	Octocorallia	Scleralcyonacea	Primnoidae	*Calyptrophora inornata*	1	Dec-19	-42.7	-177.7	1156	1165
42605	2571	122		27		DSY	Octocorallia	Scleralcyonacea	Primnoidae	*Dasystenella acanthina*	1	Mar-08	-50.0	176.7	839	912
42625	2468	102				DSY	Octocorallia	Scleralcyonacea	Primnoidae	*Dasystenella austasensis*	1	Aug-07	-49.0	175.9	910	1092
44619	2520	38		2		MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*	1	Nov-07	-44.7	-177.5	1209	1040
47734	1707	75				MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*	1	Oct-02	-43.1	175.9	400	400
66292	2862	113	805			MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*	1	Jun-09	-42.8	-177.3	965	1018
9731	1124	60				MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella moseleyi*	1	Aug-98	-37.1	176.6	970	
66281	2894	93		39		MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella moseleyi*	1	Jul-09	-35.9	165.6	766	1025
47926	2699	17		6		NAR	Octocorallia	Scleralcyonacea	Primnoidae	*Narella hypsocalyx*	1	Oct-08	-44.5	-174.9	1008	1087
9754	1153	11		6		PLD	Octocorallia	Scleralcyonacea	Primnoidae	*Parastenella spinosa*	1	Sep-98	-47.7	147.4	954	
42557	2626	184		3		PLL	Octocorallia	Scleralcyonacea	Primnoidae	*Plumarella*	1	Jun-08	-42.6	-179.9	1049	1203
172847	2324	21				THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella andeep*	1	Nov-06	-49.3	176.3	1192	1300
9617	1171	38				THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella brevispinosa*	1	Nov-98	-48.6	165.0	1061	
9761	1292	5				THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella brevispinosa*	1	Nov-99	-50.2	165.8	1090	1172
42609	2614	215		219		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella brevispinosa*	1	May-08	-48.0	175.3	1050	1120

NIWA Cat num.	TRIP	tow	OSD num.	MPI Sample No.	Initial ID Code	Expert ID code	Class	Order	Family	Taxon name	Count	Date	Latitude1	Longitude1	Depth 1	Depth 2
42620	2571	146		35		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella brevispinosa*	1	Mar-08	-50.0	163.8	890	1027
42624	2614	122		124		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella* cf. *andeep*	1	Apr-08	-48.0	175.3	1025	1114
162876	1171	12				THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella* cf. *variabilis*	1	Nov-98	-48.0	166.1	935	
44623	2520	101		10		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella hilgendorfi*	1	Nov-07	-42.8	-177.8	932	
42522	2699	132		46		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella laxa*?	2	Oct-08	-42.7	-177.7	1129	996
9740	1603	28				THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella moseleyi*	1	Feb-02	-42.8	-176.9	734	
9684	1054	25				THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella variabilis*	1	Nov-97	-43.1	176.9	368	351
67807	2324	21				TOK	Octocorallia	Scleralcyonacea	Primnoidae	*Tokoprymno* cf. *maia*	1	Nov-06	-49.3	176.3	1192	1300
66285	2955	26	256			TOK	Octocorallia	Scleralcyonacea	Primnoidae	*Tokoprymno maia*	1	Oct-09	-44.7	-175.4	1085	1276

(c) Revised identifications of physical specimens collected by NIWA staff on fisheries research trawl surveys from 1995–2014 and identified by experts since the last reporting period.

NIWA Cat Num.	Voyage	Tow	Initial ID Code	Expert ID code	Class	Order	Family	Full Taxon	Total Lot Weight (g)	Count	Date	Latitude1	Longitude1	Depth 1	Depth 2
171422	KAH1009	87	DDI	DDI	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	200	1	09/10/2010	-43.15	175.84	450	443
171419	KAH1009	87	GDU	GDU	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella dumosa*	200	1	09/10/2010	-43.15	175.84	450	443
9638	TAN9812	84		DSY	Octocorallia	Scleralcyonacea	Primnoidae	*Dasystenella austasensis*		1	25/10/1998	-44.55	-178.52	1045	
9745	TAN9812	25		DSY	Octocorallia	Scleralcyonacea	Primnoidae	*Dasystenella austasensis*		1	07/10/1998	-44.39	-178.16	805	
15499	TAN9506	83		PRI	Octocorallia	Scleralcyonacea	Primnoidae	*Faxiella* n. sp. A		1	19/05/1995	-37.54	179.35	943	1145
76763	TAN1003	53		PRI	Octocorallia	Scleralcyonacea	Primnoidae	*Faxiella* n. sp. A		1	24/03/2010	-39.49	178.26	752	
76764	TAN1003	25		PRI	Octocorallia	Scleralcyonacea	Primnoidae	*Faxiella* n. sp. A		1	22/03/2010	-40.06	177.82	1141	
45314	TAN0801	21	THO	MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*		1	31/12/2007	-43.24	-179.46	508	515
25491	TAN0501	58		MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*		1	06/01/2005	-43.57	-178.82	447	442
27624	TAN0701	14		MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*		2	31/12/2006	-43.36	179.58	409	423
27606	TAN0701	9		MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*		1	30/12/2006	-43.58	177.94	355	359
91997	TAN1401	106		MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*	100	1	21/01/2014	-42.92	174.87	744	
76765	TAN1003	25		MEF	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella moseleyi*		1	22/03/2010	-40.06	177.82	1141	
172846	TAN0911	61		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella* n. sp.		1	12/12/2009	-49.47	166.62	537	531
34997	TAN0709	116	THO	THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella variabilis*		1	22/07/2007	-44.48	-174.90	1199	1201
61614	TAN0911	61		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella variabilis*		1	12/12/2009	-49.47	166.62	537	531
61611	TAN0911	66		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella variabilis*		1	13/12/2009	-48.92	167.09	359	344
76757	TAN1003	65		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella variabilis*		1	26/03/2010	-39.95	178.28	1285	
172835	TAN1003	25		THO	Octocorallia	Scleralcyonacea	Primnoidae	*Thouarella variabilis*		1	22/03/2010	-40.06	177.82	1141	

Appendix B Summary of physical specimen data loaded into COD.

Summary of data loaded into COD including historical and current year samples returned by observers between 1 July 2022 to 30 June 2023. This publicly accessible website can be used to search target species and expert species codes: https://marlin.niwa.co.nz/species_codes/ and FMA codes: https://marlin.niwa.co.nz/area_codes/. The fishing method codes are as follows: BT = Bottom Trawl.

niwa_cat_number	trip_number	station_number	target_species	gear_code	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	end_seabed_depth	initial_species	expert_species	class_name	order_name	family_name	taxon	sample_count
160391	6774	10	SCI	BT	Apr-23	SOE	-43.1	176	401	407		AND	Anthozoa	Alcyonacea	Anthothelidae	Anthothelidae	1
147266	6679	33	LIN	BT	Oct-22	SOU	-46.9	165.7	470	480	BOO	JAS	Anthozoa	Alcyonacea	Keratoisididae	*Jasonisis*	1
147274	6687	16	ORH	BT	Oct-22	SOU	-47	165.8	988	1071	ISI	BOO	Anthozoa	Alcyonacea	Keratoisididae	*Keratoisis*	1
147273	6687	54	SSO	BT	Oct-22	SOE	-44.6	182.4	981	1034	PAB	PAB	Anthozoa	Alcyonacea	Paragorgiidae	*Paragorgia*	1
160378	6761	62	SQU	BT	Mar-23	SOE	-44.3	176	177		THO	MEF	Anthozoa	Alcyonacea	Primnoidae	*Metafannyella chathamensis*	1
60378	2595	53	ORH	BT	Mar-08	SOE	-44.6	184.8	1113	1239		LEI	Anthozoa	Antipatharia	Leiopathidae	*Leiopathes acanthophora*	8
47913	2714	123	ORH	BT	Nov-08	SOE	-44.5	184.6	912	868		LSE	Anthozoa	Antipatharia	Leiopathidae	*Leiopathes secunda*	1
66327	2699	132	ORH	BT	Oct-08	SOE	-42.7	182.3		983		COB	Anthozoa	Antipatharia	Schizopathidae	Schizopathidae	1
147272	6687	16	ORH	BT	Oct-22	SOU	-47	165.8	988	1071	COB	TEO	Anthozoa	Antipatharia	Schizopathidae	*Telopathes tasmaniensis*	1
147271	6687	16	ORH	BT	Oct-22	SOU	-47	165.8	988	1071	COB	TEO	Anthozoa	Antipatharia	Schizopathidae	*Telopathes tasmaniensis*	1
112053	1024	39	ORH	BT	Jul-97	AKE	-37	177.3	915	977		TYL	Anthozoa	Antipatharia	Stylopathidae	*Tylopathes*	1
47785	2699	17	ORH	BT	Oct-08	SOE	-44.4	185.1	1125	1276		ANB	Anthozoa	Malacalcyonacea	Alcyoniidae	*Anthothela*	1
65586	2832	75	OEO	BT	May-09	SUB	-47.4	175	1158	1194		ANB	Anthozoa	Malacalcyonacea	Alcyoniidae	*Anthothela*	1
11317	1137	6	ORH	BT	Aug-98	TMAR	-47.4	148.9	1024	1095		ANB	Anthozoa	Malacalcyonacea	Alcyoniidae	cf. *Anthothela*	1

niwa_cat_number	trip_number	station_number	target_species	gear_code	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	end_seabed_depth	initial_species	expert_species	class_name	order_name	family_name	taxon	sample_count
42513	2614	39	OEO	BT	Apr-08	SUB	-49.8	175.8		1112		ICI	Anthozoa	Malacalcyonacea	Melithaeidae	*Iciligorgia*	1
47778	2614	39	OEO	BT	Apr-08	SUB	-49.8	175.8		1112		ICI	Anthozoa	Malacalcyonacea	Melithaeidae	*Iciligorgia*	2
42492	2653	111	BOE	BT	Jul-08	SUB	-49.8	175.8	1103	1090		ICI	Anthozoa	Malacalcyonacea	Melithaeidae	*Iciligorgia*	1
65539	2832	75	OEO	BT	May-09	SUB	-47.4	175	1158	1194		ICI	Anthozoa	Malacalcyonacea	Melithaeidae	*Iciligorgia*	1
103595	1054	6	SCI	BT	Nov-97	SOE	-43	176.8	358	336		DDI	Anthozoa	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	3
47030	1054	25	SCI	BT	Nov-97	SOE	-43	176.9	368	351		DDI	Anthozoa	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	2
104683	1152	1	ORH	BT	Sep-98	TMAR	-47.1	148.7	1046	1077		DDI	Anthozoa	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	1
47036	1153	70	ORH	BT	Sep-98	TMAR	-47.1	148.7	950	1048		DDI	Anthozoa	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	2
103597	1153	107	ORH	BT	Sep-98	SOI	-50	165.9	990	1226		DDI	Anthozoa	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	6
47049	1171	57	OEO	BT	Dec-98	SUB	-50.2	163.6	1002	1223		DDI	Anthozoa	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	1
88010	1711	13	ORH	BT	Oct-02	WANB	-33.9	167.9	840	1079		DDI	Anthozoa	Scleractinia	Caryophylliidae	*Desmophyllum dianthus*	1
88283	1054	25	SCI	BT	Nov-97	SOE	-43	176.9	368	351		GDU	Anthozoa	Scleractinia	Caryophylliidae	*Goniocorella dumosa*	1
89157	1282	24	SCI	BT	Nov-99	CEE	-40	177.3	420	420		GDU	Anthozoa	Scleractinia	Caryophylliidae	*Goniocorella dumosa*	1
89117	1137	10	OEO	BT	Aug-98	TMAR	-47.4	148.7	912	948		SVA	Anthozoa	Scleractinia	Caryophylliidae	*Solenosmilia variabilis*	1
60383	2595	55	ORH	BT	Mar-08	SOE	-44.6	184.8	1470	1361		SVA	Anthozoa	Scleractinia	Caryophylliidae	*Solenosmilia variabilis*	1
160395	6774	1	SCI	BT	Apr-23	SOE	-43	176.4	395	394	CBR	SVA	Anthozoa	Scleractinia	Caryophylliidae	*Solenosmilia variabilis*	1
88406	1124	65	ORH	BT	Aug-98	AKE	-37.1	177.2	614	648		ERO	Anthozoa	Scleractinia	Dendrophylliidae	*Enallopsammia rostrata*	1
160371	6761	53	SQU	BT	Feb-23	SOE	-44.3	176.1	156		COF	COF	Anthozoa	Scleractinia	Flabellidae	*Flabellum knoxi*	2
11130	1172	53	ORH	BT	Dec-98	CEE	-40	178.1	862	1446		PRI	Anthozoa	Scleralcyonacea	Primnoidae	*Callozostron acanthodes*	1

niwa_cat_number	trip_number	station_number	target_species	gear_code	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	end_seabed_depth	initial_species	expert_species	class_name	order_name	family_name	taxon	sample_count
112283	1099	15	TAR	BT	Apr-98	KER	-32.1	180.9	122	307		CTP	Anthozoa	Scleralcyonacea	Primnoidae	*Calyptrophora* cf. *cucullata*	1
131940	5844	32	ORH	BT	Dec-19	SOE	-42.7	182.2	1156	1165	COB	CTP	Anthozoa	Scleralcyonacea	Primnoidae	*Calyptrophora inornata*	1
42605	2571	122	SSO	BT	Mar-08	SUB	-49.9	176.6	1315	1434		DSY	Anthozoa	Scleralcyonacea	Primnoidae	*Dasystenella acanthina*	1
42625	2468	102	SSO	BT	Aug-07	SUB	-49	175.9	1215	1240		DSY	Anthozoa	Scleralcyonacea	Primnoidae	*Dasystenella austasensis*	1
47734	1707	75	SCI	BT	Oct-02	SEC	-43.1	175.9	400	400		MEF	Anthozoa	Scleralcyonacea	Primnoidae	*Metafannyella*	1
44619	2520	38	SSO	BT	Nov-07	SOE	-44.6	182.5	1209	1040		MEF	Anthozoa	Scleralcyonacea	Primnoidae	*Metafannyella*	1
66292	2862	113	ORH	BT	Jun-09	SOE	-42.7	182.7	1020	1046		MEF	Anthozoa	Scleralcyonacea	Primnoidae	*Metafannyella*	1
9731	1124	60	ORH	BT	Aug-98	AKE	-37.1	176.6	920	846		MEF	Anthozoa	Scleralcyonacea	Primnoidae	*Metafannyella moseleyi*	1
66281	2894	93	ORH	BT	Jul-09	HOWE	-35.9	165.5	1106	1088		MEF	Anthozoa	Scleralcyonacea	Primnoidae	*Metafannyella moseleyi*	1
47926	2699	17	ORH	BT	Oct-08	SOE	-44.4	185.1	1125	1276		NAR	Anthozoa	Scleralcyonacea	Primnoidae	*Narella hypsocalyx*	1
9754	1153	11	ORH	BT	Sep-98	TMAR	-47.6	147.4	954	956		PLD	Anthozoa	Scleralcyonacea	Primnoidae	*Parastenella spinosa*	1
42557	2626	184	ORH	BT	Jun-08	SOE	-42.6	180.1	1418	1411		PLL	Anthozoa	Scleralcyonacea	Primnoidae	*Plumarella*	1
172847	2324	21	OEO	BT	Nov-06	SUB	-49.2	176.3	1192	1300		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella andeep*	1
9617	1171	38	OEO	BT	Nov-98	SOU	-48.5	164.9	1061	1248		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella brevispinosa*	1
9761	1292	5	SSO	BT	Nov-99	SOI	-50.1	165.8	1090	1172		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella brevispinosa*	1
42620	2571	146	BOE	BT	Mar-08	SUB	-49.9	163.8	1043	888		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella brevispinosa*	1
42609	2614	215	OEO	BT	May-08	SUB	-47.9	175.3		1175		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella brevispinosa*	1
42624	2614	122	OEO	BT	Apr-08	SUB	-47.9	175.3				THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella* cf. *andeep*	1
162876	1171	12	OEO	BT	Nov-98	SOU	-48	166.1	935	1043		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella* cf. *variabilis*	1

niwa_cat_number	trip_number	station_number	target_species	gear_code	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	end_seabed_depth	initial_species	expert_species	class_name	order_name	family_name	taxon	sample_count
44623	2520	101	ORH	BT	Nov-07	SOE	-42.7	182.1	1058	1217		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella hilgendorfi*	1
42522	2699	132	ORH	BT	Oct-08	SOE	-42.7	182.3		983		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella laxa*?	2
9740	1603	28	ORH	BT	Feb-02	SOE	-42.8	183.1	734	938		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella moseleyi*	1
9684	1054	25	SCI	BT	Nov-97	SOE	-43	176.9	368	351		THO	Anthozoa	Scleralcyonacea	Primnoidae	*Thouarella variabilis*	1
67807	2324	21	OEO	BT	Nov-06	SUB	-49.2	176.3	1192	1300		TOK	Anthozoa	Scleralcyonacea	Primnoidae	*Tokoprymno cf. maia*	1
66285	2955	26	ORH	BT	Oct-09	SOE	-44.6	184.6		1220		TOK	Anthozoa	Scleralcyonacea	Primnoidae	*Tokoprymno maia*	1
147275	6687	16	ORH	BT	Oct-22	SOU	-47	165.8	988	1071		COO	Hydrozoa	Anthoathecata	Stylasteridae	*Conopora verrucosa*	1
160373	6761	53	SQU	BT	Feb-23	SOE	-44.3	176.1	156		CBR	ERR	Hydrozoa	Anthoathecata	Stylasteridae	*Errina chathamensis*	1

Appendix C Summary of digital images processed and identified.

This publicly accessible website can be used to search the target species, initial and expert ID species codes: https://marlin.niwa.co.nz/species_codes/ and FMA codes: https://marlin.niwa.co.nz/area_codes/. The fishing method codes are as follows: BLL = Bottom LongLine; SN = Set Net; BT = Bottom Trawl (single); MW = Midwater Trawl (single); PRB = Precision Seafood Harvesting Bottom Trawl (also referred to as MHS = Modular Harvest System).

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID Code	Expert ID Code
6632	1	BT	SQU	Jul-22	SOU	-47.9	168.6	232	Cnidaria	Hexacorallia	Scleractinia	Rhizangiidae	*Culicia*	*rubeola*		13	SIA	CUR
6641	28	BT	BOE	Aug-22	SEC	-44.9	174.2	1020	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		1	COU	GDU
6641	28	BT	BOE	Aug-22	SEC	-44.9	174.2	1020	Cnidaria	Octocorallia	Malacalcyonacea	Isididae				1	ERR	ISI
6641	28	BT	BOE	Aug-22	SEC	-44.9	174.2	1020	Cnidaria	Octocorallia	Malacalcyonacea	Isididae				0	ERR	ISI
6641	52	BT	SSO	Aug-22	SUB	-47.2	177.5	1068	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	COU	PAB
6641	52	BT	SSO	Aug-22	SUB	-47.2	177.5	1068	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	COU	PAB
6647	11	PRB	TAR	Aug-22	AKW	-34.3	173	173	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Callogorgia*			1	GOC	CLG
6647	11	PRB	TAR	Aug-22	AKW	-34.3	173	173	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Callogorgia*			0	GOC	CLG
6647	11	PRB	TAR	Aug-22	AKW	-34.3	173	173	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Callogorgia*			0	GOC	CLG
6647	11	PRB	TAR	Aug-22	AKW	-34.3	173	173	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Callogorgia*			0	GOC	CLG
6647	17	PRB	TAR	Aug-22	AKW	-34.2	172.8	113	Cnidaria	Hexacorallia	Antipatharia	Myriopathidae	*Cupressopathes*			1	DEN	COB
6647	17	PRB	TAR	Aug-22	AKW	-34.2	172.8	113	Cnidaria	Hexacorallia	Antipatharia	Myriopathidae	*Cupressopathes*			0	DEN	COB
6647	20	PRB	SNA	Aug-22	AKE	-34.8	173.5	72	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Saropathes*			1	DEN	SRO
6647	20	PRB	SNA	Aug-22	AKE	-34.8	173.5	72	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Saropathes*			0	DEN	SRO
6647	20	PRB	SNA	Aug-22	AKE	-34.8	173.5	72	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Saropathes*			0	DEN	SRO
6647	20	PRB	SNA	Aug-22	AKE	-34.8	173.5	72	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Saropathes*			0	DEN	SRO
6647	20	PRB	SNA	Aug-22	AKE	-34.8	173.5	72	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Saropathes*			0	DEN	SRO
6675	107	BT	SSO	Oct-22	SOI	-50	165.8	998	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			1	LLE	BOO
6675	107	BT	SSO	Oct-22	SOI	-50	165.8	998	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			0	LLE	BOO

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID Code	Expert ID Code
6675	107	BT	SSO	Oct-22	SOI	-50	165.8	998	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		1	SIA	SVA
6675	142	BT	SSO	Nov-22	SUB	-47.5	177.8	869	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6675	142	BT	SSO	Nov-22	SUB	-47.5	177.8	869	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6675	142	BT	SSO	Nov-22	SUB	-47.5	177.8	869	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6677	1	SN	SPO	Sep-22	SEC	-45.6	171.1	125	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporina*	*grandis*		1	CLL	CEG
6677	1	SN	SPO	Sep-22	SEC	-45.6	171.1	125	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporina*	*grandis*		0	CLL	CEG
6677	1	SN	SPO	Sep-22	SEC	-45.6	171.1	125	Bryozoa	Stenolaemata	Cyclostomatida	Cinctiporidae	*Cinctipora*	*elegans*		1	PRI	CEL
6679	33	BT	LIN	Oct-22	SOU	-46.9	165.7	470	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Jasonisis*		147266	1	BOO	JAS
6679	33	BT	LIN	Oct-22	SOU	-46.9	165.7	470	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Jasonisis*		147266	0	BOO	JAS
6679	33	BT	LIN	Oct-22	SOU	-46.9	165.7	470	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Jasonisis*		147266	0	BOO	JAS
6679	33	BT	LIN	Oct-22	SOU	-46.9	165.7	470	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Jasonisis*		147266	0	BOO	JAS
6679	33	BT	LIN	Oct-22	SOU	-46.9	165.7	470	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Jasonisis*		147266	0	BOO	JAS
6679	33	BT	LIN	Oct-22	SOU	-46.9	165.7	470	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Jasonisis*		147266	0	BOO	JAS
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes*	*tasmaniensis*	147271	1	BTP	TEO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes*	*tasmaniensis*	147272	1	BTP	TEO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes*	*tasmaniensis*	147271	0	BTP	TEO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes*	*tasmaniensis*	147272	0	BTP	TEO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes*	*tasmaniensis*	147271	0	BTP	TEO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes*	*tasmaniensis*	147272	0	BTP	TEO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes*	*tasmaniensis*	147271	0	BTP	TEO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Telopathes*	*tasmaniensis*	147272	0	BTP	TEO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*		174274	1	ISI	BOO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*		174274	0	ISI	BOO
6687	16	BT	ORH	Oct-22	SOU	-47	165.8	988	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*		174274	0	ISI	BOO

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID Code	Expert ID Code
6687	28	BT	ORH	Oct-22	SOU	-47	165.8	923	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*	*?magnifica*		1	ISI	BOO
6687	28	BT	ORH	Oct-22	SOU	-47	165.8	923	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*	*?magnifica*		0	ISI	BOO
6687	28	BT	ORH	Oct-22	SOU	-47	165.8	923	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*	*?magnifica*		0	ISI	BOO
6687	54	BT	SSO	Oct-22	SOE	-44.6	182.4	981	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6687	54	BT	SSO	Oct-22	SOE	-44.6	182.4	981	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6687	54	BT	SSO	Oct-22	SOE	-44.6	182.4	981	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6687	54	BT	SSO	Oct-22	SOE	-44.6	182.4	981	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6687	54	BT	SSO	Oct-22	SOE	-44.6	182.4	981	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6687	54	BT	SSO	Oct-22	SOE	-44.6	182.4	981	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6687	54	BT	SSO	Oct-22	SOE	-44.6	182.4	981	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6688	2	BT	ORH	Oct-22	AKW	-34.7	171.6	973	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Dendrobathypathes*			1	LEI	DEN
6688	2	BT	ORH	Oct-22	AKW	-34.7	171.6	973	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			1	LLE	BOO
6688	48	BT	ORH	Oct-22	CEE	-40	178.1	813	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Dendropathes*			1	TPT	DDP
6689	5	BT	TRE	Nov-22	AKW	-35.7	173.4	61	Porifera							1	ONG	ONG
6697	50	BT	SCI	Nov-22	SOE	-42.9	177.6	360	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		1	DDI	DDI
6697	50	BT	SCI	Nov-22	SOE	-42.9	177.6	360	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	DDI	DDI
6697	67	BT	SCI	Nov-22	SOE	-42.9	177.2	346	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		1	DDI	DDI
6697	67	BT	SCI	Nov-22	SOE	-42.9	177.2	346	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	DDI	DDI
6698	12	BT	SCI	Oct-22	SOE	-43	176.8	384	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		1	DDI	DDI
6698	12	BT	SCI	Oct-22	SOE	-43	176.8	384	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	DDI	DDI
6699	20	BT	SCI	Nov-22	CEE	-40.9	176.6	371	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		1	SIA	DDI
6699	20	BT	SCI	Nov-22	CEE	-40.9	176.6	371	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	SIA	DDI
6699	20	BT	SCI	Nov-22	CEE	-40.9	176.6	371	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	SIA	DDI
6706	3	BT	SSO	Nov-22	SEC	-44.8	173.1	1065	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*	*?hikurangiensis*		1	COU	BOO

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID Code	Expert ID Code
6706	3	BT	SSO	Nov-22	SEC	-44.8	173.1	1065	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*	*?hikurangiensis*		0	COU	BOO
6706	18	BT	SSO	Nov-22	SEC	-44.9	174.2	943	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	COU	PAB
6706	18	BT	SSO	Nov-22	SEC	-44.9	174.2	943	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	COU	PAB
6706	20	BT	SSO	Nov-22	SEC	-45	174.4	1014	Cnidaria							1	COU	
6706	20	BT	SSO	Nov-22	SEC	-45	174.4	1014	Cnidaria							0	COU	
6706	59	BT	SSO	Nov-22	SOE	-44.5	182.1	992	Cnidaria	Hexacorallia	Scleractinia					1	COU	SIA
6706	59	BT	SSO	Nov-22	SOE	-44.5	182.1	992	Cnidaria	Hexacorallia	Scleractinia					0	COU	SIA
6706	75	BT	ORH	Nov-22	SOE	-44.5	185.2	1318	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			1	BOO	BOO
6706	75	BT	ORH	Nov-22	SOE	-44.5	185.2	1318	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		1	UNX	PMN
6706	75	BT	ORH	Nov-22	SOE	-44.5	185.2	1318	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		0	UNX	PMN
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		1	COU	SVA
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	COU	SVA
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	COU	SVA
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		1000	CUP	DDI
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	CUP	DDI
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	CUP	DDI
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	CUP	DDI
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	CUP	DDI
6706	79	BT	ORH	Nov-22	SOE	-44.5	185.1	1284	Cnidaria	Hexacorallia	Scleractinia					0	CUP	SIA
6706	94	BT	ORH	Nov-22	SOE	-44.2	185.3	1248	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		1		SVA
6706	130	BT	SSO	Dec-22	SOE	-44.5	180.7	1015	Cnidaria	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*			1	COU	ANB
6706	130	BT	SSO	Dec-22	SOE	-44.5	180.7	1015	Cnidaria	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*			0	COU	ANB
6706	130	BT	SSO	Dec-22	SOE	-44.5	180.7	1015	Cnidaria	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*			0	COU	ANB
6706	130	BT	SSO	Dec-22	SOE	-44.5	180.7	1015	Cnidaria	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*			0	COU	ANB

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6706	130	BT	SSO	Dec-22	SOE	-44.5	180.7	1015	Cnidaria	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*			0	COU	ANB
6706	130	BT	SSO	Dec-22	SOE	-44.5	180.7	1015	Cnidaria	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*			0	COU	ANB
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Octocorallia	Malacalcyonacea	Alcyoniidae	*Anthothela*			1	CBB	ANB
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Arthropoda	Thecostraca						7	CBB	BRN
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Arthropoda	Thecostraca						0	CBB	BRN
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		5	CBB	PMN
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		0	CBB	PMN
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		0	CBB	PMN
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		0	CBB	PMN
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		0	CBB	PMN
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		0	CBB	PMN
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Hexacorallia	Scleractinia					1	CBB	SIA
6706	135	BT	SSO	Dec-22	SEC	-45	175.4	1101	Cnidaria	Hexacorallia	Scleractinia					0	CBB	SIA
6707	18	BLL	BNS	Nov-22	ET	-30.8	173.3	666	Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	*Leiopathes*			1	GOC	LEI
6707	18	BLL	BNS	Nov-22	ET	-30.8	173.3	666	Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	*Leiopathes*			0	GOC	LEI
6707	18	BLL	BNS	Nov-22	ET	-30.8	173.3	666	Cnidaria	Octocorallia	Malacalcyonacea	Paramuriceidae				1	GOC	PLE
6715	7	BT	SSO	Nov-22	SEC	-44.8	174.2	892	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	*Enallopsammia*			3	CBR	ERO
6715	7	BT	SSO	Nov-22	SEC	-44.8	174.2	892	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	*Enallopsammia*			0	CBR	ERO
6715	32	BT	ORH	Nov-22	SOE	-42.7	182.4	1209	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		2	GDU	GDU
6715	32	BT	ORH	Nov-22	SOE	-42.7	182.4	1209	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		0	GDU	GDU
6715	32	BT	ORH	Nov-22	SOE	-42.7	182.4	1209	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		3	GDU	SVA
6715	32	BT	ORH	Nov-22	SOE	-42.7	182.4	1209	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	GDU	SVA
6715	35	BT	ORH	Nov-22	SOE	-42.8	183	752	Cnidaria	Octocorallia						1	CBR	COU
6715	35	BT	ORH	Nov-22	SOE	-42.8	183	752	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae				1	GOC	PRI

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6715	55	BT	ORH	Dec-22	SOE	-44.2	185.4	1120	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		1000	GDU	SVA
6715	55	BT	ORH	Dec-22	SOE	-44.2	185.4	1120	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	GDU	SVA
6715	55	BT	ORH	Dec-22	SOE	-44.2	185.4	1120	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	GDU	SVA
6715	113	BT	SSO	Dec-22	SEC	-44.9	174.3	992	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		3	DDI	DDI
6715	113	BT	SSO	Dec-22	SEC	-44.9	174.3	992	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		0	DDI	DDI
6715	113	BT	SSO	Dec-22	SEC	-44.9	174.3	992	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			3	ISI	BOO
6715	113	BT	SSO	Dec-22	SEC	-44.9	174.3	992	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			0	ISI	BOO
6715	113	BT	SSO	Dec-22	SEC	-44.9	174.3	992	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6715	113	BT	SSO	Dec-22	SEC	-44.9	174.3	992	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6715	113	BT	SSO	Dec-22	SEC	-44.9	174.3	992	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6715	124	BT	SSO	Dec-22	SEC	-44.7	173.7	960	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		2	GDU	GDU
6724	35	BT	ORH	Dec-22	SOE	-42.6	182.9	1375	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			1	COU	TYL
6724	35	BT	ORH	Dec-22	SOE	-42.6	182.9	1375	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			0	COU	TYL
6724	35	BT	ORH	Dec-22	SOE	-42.6	182.9	1375	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			0	COU	TYL
6724	35	BT	ORH	Dec-22	SOE	-42.6	182.9	1375	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			0	COU	TYL
6724	35	BT	ORH	Dec-22	SOE	-42.6	182.9	1375	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			0	COU	TYL
6724	35	BT	ORH	Dec-22	SOE	-42.6	182.9	1375	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			0	COU	TYL
6724	35	BT	ORH	Dec-22	SOE	-42.6	182.9	1375	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			0	COU	TYL
6724	36	BT	ORH	Dec-22	SOE	-42.6	182.7	1417	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB

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6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	37	BT	ORH	Dec-22	SOE	-42.6	182.9	1450	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	38	BT	ORH	Dec-22	SOE	-42.6	182.6	1350	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6724	38	BT	ORH	Dec-22	SOE	-42.6	182.6	1350	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	39	BT	ORH	Dec-22	SOE	-42.6	183.1	1311	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			0	LLE	BOO
6724	39	BT	ORH	Dec-22	SOE	-42.6	183.1	1311	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			0	LLE	BOO
6724	39	BT	ORH	Dec-22	SOE	-42.6	183.1	1311	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			2	LLE	BOO
6724	39	BT	ORH	Dec-22	SOE	-42.6	183.1	1311	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			0	LLE	BOO
6724	39	BT	ORH	Dec-22	SOE	-42.6	183.1	1311	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			0	LLE	BOO
6724	39	BT	ORH	Dec-22	SOE	-42.6	183.1	1311	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	*Keratoisis*			0	LLE	BOO
6724	39	BT	ORH	Dec-22	SOE	-42.6	183.1	1311	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6724	39	BT	ORH	Dec-22	SOE	-42.6	183.1	1311	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6724	60	BT	ORH	Jan-23	SOE	-42.6	182.6	1404	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6724	60	BT	ORH	Jan-23	SOE	-42.6	182.6	1404	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	60	BT	ORH	Jan-23	SOE	-42.6	182.6	1404	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	60	BT	ORH	Jan-23	SOE	-42.6	182.6	1404	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	60	BT	ORH	Jan-23	SOE	-42.6	182.6	1404	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	60	BT	ORH	Jan-23	SOE	-42.6	182.6	1404	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6724	63	BT	ORH	Jan-23	SOE	-42.6	183	1299	Ochrophyta	Phaeophyceae						3	SEO	SEO
6724	63	BT	ORH	Jan-23	SOE	-42.6	183	1299	Ochrophyta	Phaeophyceae						0	SEO	SEO

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6724	63	BT	ORH	Jan-23	SOE	-42.6	183	1299	Ochrophyta	Phaeophyceae						0	SEO	SEO
6724	63	BT	ORH	Jan-23	SOE	-42.6	183	1299	Ochrophyta	Phaeophyceae						0	SEO	SEO
6724	63	BT	ORH	Jan-23	SOE	-42.6	183	1299	Ochrophyta	Phaeophyceae						0	SEO	SEO
6724	71	BT	ORH	Jan-23	SOE	-42.6	180.4	1175	Porifera	Hexactinellida	Lyssacinosida	Euplectellidae				1	ONG	GLS
6724	71	BT	ORH	Jan-23	SOE	-42.6	180.4	1175	Porifera	Hexactinellida	Lyssacinosida	Euplectellidae				0	ONG	GLS
6724	71	BT	ORH	Jan-23	SOE	-42.6	180.4	1175	Echinodermata	Asteroidea	Brisingida					1		BRG
6724	71	BT	ORH	Jan-23	SOE	-42.6	180.4	1175	Echinodermata	Asteroidea	Brisingida					0		BRG
6727	23	BT	LIN	Dec-22	SUB	-50	168.3	580	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*?angiostonum*		1	COF	COF
6727	23	BT	LIN	Dec-22	SUB	-50	168.3	580	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*?angiostonum*		0	COF	COF
6727	24	BT	LIN	Jan-23	SUB	-49.9	168.2	594	Pumice							100	ROK	ROK
6727	46	BT	SQU	Jan-23	SOU	-48	168.5	142	Bryozoa	Stenolaemata	Cyclostomatida	Cerioporidae	*Tetrocycloecia*	*neozelanica*		3	SIA	TNE
6729	28	BT	SWA	Jan-23	SOU	-48	168.5	143	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae			160331	2	COU	COZ
6729	28	BT	SWA	Jan-23	SOU	-48	168.5	143	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae			160331	0	COU	COZ
6729	31	BT	SWA	Jan-23	SUB	-49.7	168	610	Cnidaria	Hexacorallia	Actinaria				160334	2	COU	ANT
6729	31	BT	SWA	Jan-23	SUB	-49.7	168	610	Porifera	Demospongiae	Tetractinellida	Geodiidae	*Geodia*	*nodosa*	160327	1	COU	ONG
6729	31	BT	SWA	Jan-23	SUB	-49.7	168	610	Porifera	Demospongiae	Tetractinellida	Geodiidae	*Geodia*	*nodosa*	160332	1	COU	ONG
6729	41	BT	WAR	Jan-23	SOU	-48	168.5	141	Chordata	Chondrichthyes						1	EGC	EGC
6729	41	BT	WAR	Jan-23	SOU	-48	168.5	141	Porifera	Demospongiae	Poecilosclerida	Latrunculiidae	*Latrunculia*		160330	3	ONG	LAA
6729	41	BT	WAR	Jan-23	SOU	-48	168.5	141	Porifera	Demospongiae	Haplosclerida	Callyspongiidae	*Callyspongia*		160326	1	ONG	ONG
6729	41	BT	WAR	Jan-23	SOU	-48	168.5	141	Pumice							2	ONG	ROK
6729	42	BT	SWA	Jan-23	SOU	-47.8	168.7	274	Bryozoa	Stenolaemata	Cyclostomatida	Cerioporidae	*Tetrocycloecia*	*neozelanica*	160325	1	COU	TNE
6729	46	BT		Jan-23	SUB	-50.1	168.2	578	Mollusca	Bivalvia	Mytilida	Mytilidae	*Idas*		160323	1	COU	MUS
6729	47	BT	LIN	Jan-23	SUB	-49.8	168.1	606	Cnidaria	Hexacorallia	Actinaria				160333	2	ACS	ANT
6729	47	BT	LIN	Jan-23	SUB	-49.8	168.1	606	Echinodermata	Echinoidea	Camarodonta	Echinidae	*Dermechinus*	*horridus*	160322	3	DHO	DHO

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6729	60	BT		Jan-23	SOU	-48.8	167	186	Bryozoa						160342	2	UNE	COZ
6729	60	BT		Jan-23	SOU	-48.8	167	186	Bryozoa						160342	0	UNE	COZ
6729	61	BT	SWA	Jan-23	SOU	-48.8	167.1	211	Chordata	Ascidiacea					160329	1	UNF	ASC
6729	70	BT	SQU	Jan-23	SOI	-50.9	166.6	167	Bryozoa						160335	1	UNF	COZ
6729	70	BT	SQU	Jan-23	SOI	-50.9	166.6	167	Bryozoa						160335	0	UNF	COZ
6733	5	MW	BAR	Dec-22	SEC	-44.5	172.7	161	Cnidaria	Hydrozoa	Leptothecata	Zygophylacidae	*Cryptolaria*			1		CRT
6733	28	MW	BAR	Dec-22	SOU	-48.6	166.4	171	Cnidaria	Hydrozoa	Leptothecata	Zygophylacidae	*Cryptolaria*		160337	1	DEN	CRT
6733	28	MW	BAR	Dec-22	SOU	-48.6	166.4	171	Bryozoa						160338	1	LSE	COZ
6736									Cnidaria	Hexacorallia	Scleractinia	Bathyporidae	*Madrepora*	*oculata*		3		MOC
6736	14	BT	SSO	Jan-23	SUB	-50	163.8	911	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		1	COU	GDU
6736	14	BT	SSO	Jan-23	SUB	-50	163.8	911	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		15	COU	GDU
6736	14	BT	SSO	Jan-23	SUB	-50	163.8	911	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		1	COU	SVA
6736	14	BT	SSO	Jan-23	SUB	-50	163.8	911	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		1	COU	SVA
6736	14	BT	SSO	Jan-23	SUB	-50	163.8	911	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		7	COU	SVA
6736	30	BT	SSO	Jan-23	SOI	-50.2	165.8	860	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Primnoa*	*notialis*		1	CLL	PMN
6744									Rubbish							1		RUB
6744	49	MW	SQU	Feb-23	SOU	-47.6	167	152	Bryozoa						160339	0	CBB	COZ
6759	23	SN	ELE	Apr-23	SEC	-45.8	170.8	93	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		1	CBB	CAG
6759	23	SN	ELE	Apr-23	SEC	-45.8	170.8	93	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		0	CBB	CAG
6759	23	SN	ELE	Apr-23	SEC	-45.8	170.8	93	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		0	CBB	CAG
6759	67	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							1	CBB	COZ
6759	67	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							0	CBB	COZ
6759	67	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							1	CBB	COZ
6759	67	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							0	CBB	COZ

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6759	67	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							4	CBB	COZ
6759	67	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							0	CBB	COZ
6759	67	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							0	CBB	COZ
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		1	CBB	CAG
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		0	CBB	CAG
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		1	CBB	CAG
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		0	CBB	CAG
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							1	CBB	COZ
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							1	CBB	COZ
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							0	CBB	COZ
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa	Stenolaemata	Cyclostomatida	Horneridae	*Hornera*	*robusta*		1	CBB	COZ
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa	Stenolaemata	Cyclostomatida	Horneridae	*Hornera*	*robusta*		1	CBB	COZ
6759	70	SN	ELE	Apr-23	SEC	-45.8	170.9	95	Bryozoa							0	CBB	COZ
6759	74	SN	ELE	Apr-23	SEC	-45.6	170.7	31	Porifera							1	ONG	ONG
6759	74	SN	ELE	Apr-23	SEC	-45.6	170.7	31	Porifera							0	ONG	ONG
6759	88	SN	ELE	May-23	SEC	-45.8	170.9	91	Bryozoa							10	CBB	COZ
6759	88	SN	ELE	May-23	SEC	-45.8	170.9	91	Bryozoa							0	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		1	CBB	CAG
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		0	CBB	CAG
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		0	CBB	CAG
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Gymnolaemata	Cheilostomatida	Celleporidae	*Celleporaria*	*agglutinans*		0	CBB	CAG
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa							1	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa							0	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa							0	CBB	COZ

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6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Stenolaemata	Cyclostomatida	Horneridae	*Hornera*	*robusta*		1	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Stenolaemata	Cyclostomatida	Horneridae	*Hornera*	*robusta*		0	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Stenolaemata	Cyclostomatida	Horneridae	*Hornera*	*robusta*		0	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa							1	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa							0	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa							1	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa							0	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Stenolaemata	Cyclostomatida	Horneridae	*Hornera*			1	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Stenolaemata	Cyclostomatida	Horneridae	*Hornera*			0	CBB	COZ
6759	98	SN	ELE	May-23	SEC	-45.8	170.8	88	Bryozoa	Stenolaemata	Cyclostomatida	Horneridae	*Hornera*			0	CBB	COZ
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Cnidaria	Hydrozoa	Anthoathecata	Stylasteridae				1	COU	COR
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Cnidaria	Hydrozoa	Anthoathecata	Stylasteridae				0	COU	COR
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							4	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							1	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							0	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							0	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							5	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							1	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							0	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							1	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							4	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							1	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							0	ONG	ONG
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Porifera							0	ONG	ONG

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID	Expert ID Code
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Mollusca	Gastropoda						1	UNF	GAS
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Mollusca	Gastropoda						0	UNF	GAS
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Mollusca	Gastropoda	Littorinimorpha	Cassidae	*Semicassis*	*pyrum*		1	UNF	SPY
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Mollusca	Gastropoda	Littorinimorpha	Cassidae	*Semicassis*	*pyrum*		0	UNF	SPY
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Bryozoa	Stenolaemata	Cyclostomatida	Cerioporidae	*Tetrocycloecia*	*neozelanica*		1	UNF	TNE
6761	9	BT	BAR	Feb-23	SOU	-48	168.5	141	Bryozoa	Stenolaemata	Cyclostomatida	Cerioporidae	*Tetrocycloecia*	*neozelanica*		0	UNF	TNE
6761	19	MW	BAR	Feb-23	SEC	-46	170.8	118	Cnidaria	Hydrozoa	Leptothecata	Zygophylacidae	*Cryptolaria*			10	DEN	CRT
6761	19	MW	BAR	Feb-23	SEC	-46	170.8	118	Cnidaria	Hydrozoa	Leptothecata	Zygophylacidae	*Cryptolaria*			0	DEN	CRT
6761	19	MW	BAR	Feb-23	SEC	-46	170.8	118	Cnidaria	Hydrozoa	Leptothecata	Zygophylacidae	*Cryptolaria*			1	DEN	CRT
6761	19	MW	BAR	Feb-23	SEC	-46	170.8	118	Cnidaria	Hydrozoa	Leptothecata	Zygophylacidae	*Cryptolaria*			1	DEN	CRT
6761	50	BT	SQU	Feb-23	SOE	-44.2	176.1	140	Porifera	Hexactinellida	Lyssacinosida	Rossellidae	*Symplectella*	*rowi*	160376	1	CIC	SYR
6761	50	BT	SQU	Feb-23	SOE	-44.2	176.1	140	Porifera	Hexactinellida	Lyssacinosida	Rossellidae	*Symplectella*	*rowi*	160376	0	CIC	SYR
6761	53	BT	SQU	Feb-23	SOE	-44.3	176.1	156	Cnidaria	Hydrozoa	Anthoathecata	Stylasteridae	*Errina*	*chathamensis*	160373	1	CBR	ERR
6761	53	BT	SQU	Feb-23	SOE	-44.3	176.1	156	Cnidaria	Hydrozoa	Anthoathecata	Stylasteridae	*Errina*	*chathamensis*	160373	0	CBR	ERR
6761	53	BT	SQU	Feb-23	SOE	-44.3	176.1	156	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*knoxi*		1	COF	COF
6761	53	BT	SQU	Feb-23	SOE	-44.3	176.1	156	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*knoxi*		0	COF	COF
6761	53	BT	SQU	Feb-23	SOE	-44.3	176.1	156	Cnidaria	Hexacorallia	Actinaria				160370	1	UNX	ANT
6761	53	BT	SQU	Feb-23	SOE	-44.3	176.1	156	Cnidaria	Hexacorallia	Actinaria				160370	0	UNX	ANT
6761	53	BT	SQU	Feb-23	SOE	-44.3	176.1	156	Cnidaria	Hexacorallia	Actinaria				160370	0	UNX	ANT
6761	58	BT	SQU	Feb-23	SOE	-44.1	176.1	138	Arthropoda	Malacostraca	Decapoda	Majidae			160380	1	UNF	CRB
6761	58	BT	SQU	Feb-23	SOE	-44.1	176.1	138	Arthropoda	Malacostraca	Decapoda	Axiidae	*Spongiaxius*	*novaezealandiae*	160372	2	UNI	
6761	58	BT	SQU	Feb-23	SOE	-44.1	176.1	138	Arthropoda	Malacostraca	Decapoda	Axiidae	*Spongiaxius*	*novaezealandiae*	160372	0	UNI	
6761	62	BT	SQU	Mar-23	SOE	-44.3	176	177	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*knoxi*		2	COF	COF
6761	62	BT	SQU	Mar-23	SOE	-44.3	176	177	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*knoxi*		0	COF	COF

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID Code	Expert ID Code
6761	62	BT	SQU	Mar-23	SOE	-44.3	176	177	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*knoxi*		36	COF	COF
6761	62	BT	SQU	Mar-23	SOE	-44.3	176	177	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*			1	THO	MEF
6761	62	BT	SQU	Mar-23	SOE	-44.3	176	177	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*			0	THO	MEF
6761	62	BT	SQU	Mar-23	SOE	-44.3	176	177	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*			0	THO	MEF
6761	62	BT	SQU	Mar-23	SOE	-44.3	176	177	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*			0	THO	MEF
6761	80	BT	SQU	Mar-23	SEC	-44.2	175.8	141	Cnidaria	Hydrozoa	Leptothecata	Aglaopheniidae			160377	1	HDF	HDF
6761	80	BT	SQU	Mar-23	SEC	-44.2	175.8	141	Cnidaria	Hydrozoa	Leptothecata	Aglaopheniidae			160377	0	HDF	HDF
6761	80	BT	SQU	Mar-23	SEC	-44.2	175.8	141	Cnidaria	Hydrozoa	Leptothecata	Aglaopheniidae			160377	0	HDF	HDF
6761	80	BT	SQU	Mar-23	SEC	-44.2	175.8	141	Cnidaria	Hydrozoa	Leptothecata	Aglaopheniidae			160377	0	HDF	HDF
6761	80	BT	SQU	Mar-23	SEC	-44.2	175.8	141	Cnidaria	Hydrozoa	Leptothecata	Aglaopheniidae			160377	0	HDF	HDF
6761	84	BT	SQU	Mar-23	SEC	-44.2	175.8	156	Bryozoa							1	COU	COZ
6761	84	BT	SQU	Mar-23	SEC	-44.2	175.8	156	Bryozoa	Stenolaemata	Cyclostomatida	Cerioporidae	*Tetrocycloecia*	*neozelanica*		1	COU	TNE
6761	85	BT	SQU	Mar-23	SOE	-44	176	139	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*?Trochocyathus*			2	DDI	CUP
6761	85	BT	SQU	Mar-23	SOE	-44	176	139	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*?Trochocyathus*			0	DDI	CUP
6761	85	BT	SQU	Mar-23	SOE	-44	176	139	Cnidaria	Hydrozoa	Leptothecata					1	HDF	HDF
6761	85	BT	SQU	Mar-23	SOE	-44	176	139	Cnidaria	Hydrozoa	Leptothecata					0	HDF	HDF
6768									Annelida	Polychaeta	Sabellida	Serpulidae				9		SZS
6768	22	BT	SQU	Feb-23	SOE	-44.1	176	155	Annelida	Polychaeta	Sabellida	Serpulidae				1	CBD	SZS
6768	22	BT	SQU	Feb-23	SOE	-44.1	176	155	Annelida	Polychaeta	Sabellida	Serpulidae				0	CBD	SZS
6771	18	BT	SQU	Mar-23	SEC	-44.3	175.9	200	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*knoxi*		7	COF	COF
6771	18	BT	SQU	Mar-23	SEC	-44.3	175.9	200	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*knoxi*		0	COF	COF
6771	18	BT	SQU	Mar-23	SEC	-44.3	175.9	200	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	*Flabellum*	*knoxi*		0	COF	COF
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Porifera							12	ANZ	ONG
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Porifera							0	ANZ	ONG

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID Code	Expert ID Code
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Porifera							0	ANZ	ONG
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Caryophyllia*			1	DDI	CAY
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Caryophyllia*			0	DDI	CAY
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		2	DDI	DDI
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae				1	GDU	GDU
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		1	GDU	GDU
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		1	GDU	GDU
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		2	GDU	GDU
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		300	GDU	GDU
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*			1	SIA	DDI
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Desmophyllum*	*dianthus*		3	SIA	DDI
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		1	SIA	GDU
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Porifera							1	SIA	ONG
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Porifera							0	SIA	ONG
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Porifera							0	SIA	ONG
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*			1	THO	MEF
6774	13	BT	SCI	Apr-23	SOE	-42.9	177.2	309	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Metafannyella*			10	THO	MEF
6774	15	BT	SCI	Apr-23	SOE	-42.9	177.4	350	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Caryophyllia*	*profunda*		10	DDI	CAY
6774	15	BT	SCI	Apr-23	SOE	-42.9	177.4	350	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Caryophyllia*	*profunda*		0	DDI	CAY
6774	15	BT	SCI	Apr-23	SOE	-42.9	177.4	350	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Caryophyllia*	*profunda*		0	DDI	CAY
6774	15	BT	SCI	Apr-23	SOE	-42.9	177.4	350	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Caryophyllia*	*profunda*		0	DDI	CAY
6774	15	BT	SCI	Apr-23	SOE	-42.9	177.4	350	Echinodermata	Holothuroidea						1	HTH	HTH
6774	15	BT	SCI	Apr-23	SOE	-42.9	177.4	350	Echinodermata	Holothuroidea						0	HTH	HTH
6802	37	BT	TAR	Jun-23	AKW	-34.9	172.4	192	Porifera							1	APU	ONG

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID Code	Expert ID Code
6802	37	BT	TAR	Jun-23	AKW	-34.9	172.4	192	Porifera							1	COU	ONG
6802	38	BT	SNA	Jun-23	AKW	-34.6	172.5	78	Porifera							1	ONG	ONG
6802	38	BT	SNA	Jun-23	AKW	-34.6	172.5	78	Porifera							1	ONG	ONG
6807	79	BT	BOE	May-23	SUB	-48.9	175.6	942	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6807	104	BT	SSO	Jun-23	SUB	-47.5	177.8	1000	Echinodermata	Crinoidea	Comatulida	Phrynocrinidae	*Phrynocrinus*	*nudus*		3	PTU	CRN
6807	104	BT	SSO	Jun-23	SUB	-47.5	177.8	1000	Echinodermata	Crinoidea	Comatulida	Phrynocrinidae	*Phrynocrinus*	*nudus*		8	PTU	CRN
6824	1	BT	ORH	Jun-23	AKE	-37.1	177.2	717	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Bathypathes*			1	COB	BTP
6824	1	BT	ORH	Jun-23	AKE	-37.1	177.2	717	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Bathypathes*			1	COB	BTP
6824	4	BT	ORH	Jun-23	AKE	-37.1	177.2	730	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Candidella*			1	GOC	PRI
6824	4	BT	ORH	Jun-23	AKE	-37.1	177.2	730	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	*Candidella*			0	GOC	PRI
6824	21	BT	ORH	Jun-23	AKE	-37	177.2	735	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae				1	BOO	ISI
6824	21	BT	ORH	Jun-23	AKE	-37	177.2	735	Cnidaria	Octocorallia	Scleralcyonacea	Chrysogorgiidae	*Iridogorgia*			2	CHR	IRI
6824	21	BT	ORH	Jun-23	AKE	-37	177.2	735	Cnidaria	Octocorallia	Scleralcyonacea	Chrysogorgiidae	*Iridogorgia*			0	CHR	IRI
6824	21	BT	ORH	Jun-23	AKE	-37	177.2	735	Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	*Leiopathes*			1	COB	LEI
6824	21	BT	ORH	Jun-23	AKE	-37	177.2	735	Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	*Leiopathes*			0	COB	LEI
6824	21	BT	ORH	Jun-23	AKE	-37	177.2	735	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			1	COB	TYL
6824	21	BT	ORH	Jun-23	AKE	-37	177.2	735	Cnidaria	Hexacorallia	Antipatharia	Stylopathidae	*Tylopathes*			0	COB	TYL
6824	21	BT	ORH	Jun-23	AKE	-37	177.2	735	Porifera	Hexactinellida						1	GLS	GLS
6824	45	BT	ORH	Jun-23	CEE	-39.9	178.2	720	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		1	SIA	SVA
6824	45	BT	ORH	Jun-23	CEE	-39.9	178.2	720	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	SIA	SVA
6828	9	BT	ORH	Jun-23	SOE	-42.6	182.6	1395	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6828	9	BT	ORH	Jun-23	SOE	-42.6	182.6	1395	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6828	10	BT	ORH	Jun-23	SOE	-42.6	182.8	1444	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			1	PAB	PAB
6828	10	BT	ORH	Jun-23	SOE	-42.6	182.8	1444	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB

Trip number	Station number	Fishing method	Target species	Event start date	Start obs FMA	Start latitude	Start longitude	Start seabed depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat. No.	Specimen count	Initial OBS ID Code	Expert ID Code
6828	10	BT	ORH	Jun-23	SOE	-42.6	182.8	1444	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6828	10	BT	ORH	Jun-23	SOE	-42.6	182.8	1444	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6828	10	BT	ORH	Jun-23	SOE	-42.6	182.8	1444	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	*Paragorgia*			0	PAB	PAB
6828	12	BT	ORH	Jun-23	SOE	-42.8	182.7	910	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Bathypathes*			1	BTP	BTP
6828	12	BT	ORH	Jun-23	SOE	-42.8	182.7	910	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Bathypathes*			0	BTP	BTP
6828	12	BT	ORH	Jun-23	SOE	-42.8	182.7	910	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	*Bathypathes*			0	BTP	BTP
6828	15	BT	ORH	Jun-23	SOE	-42.6	182.9	1290	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae				1	BTP	COB
6828	15	BT	ORH	Jun-23	SOE	-42.6	182.9	1290	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		1		GDU
6828	15	BT	ORH	Jun-23	SOE	-42.6	182.9	1290	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		0		GDU
6828	15	BT	ORH	Jun-23	SOE	-42.6	182.9	1290	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		0		GDU
6828	24	BT	ORH	Jun-23	SOE	-42.7	182.2	955	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		1	GDU	GDU
6828	24	BT	ORH	Jun-23	SOE	-42.7	182.2	955	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		0	GDU	GDU
6828	24	BT	ORH	Jun-23	SOE	-42.7	182.2	955	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		0	GDU	GDU
6828	24	BT	ORH	Jun-23	SOE	-42.7	182.2	955	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		0	GDU	GDU
6828	24	BT	ORH	Jun-23	SOE	-42.7	182.2	955	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*		0	GDU	GDU
6828	31	BT	ORH	Jun-23	SOE	-42.8	182.7	920	Cnidaria	Hexacorallia	Scleractinia	Bathyporidae	*Madrepora*	*oculata*		2	SIA	MOC
6828	31	BT	ORH	Jun-23	SOE	-42.8	182.7	920	Cnidaria	Hexacorallia	Scleractinia	Bathyporidae	*Madrepora*	*oculata*		0	SIA	MOC
6828	53	BT	ORH	Jun-23	SOE	-42.7	182.7	914	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		1	SIA	SVA
6828	53	BT	ORH	Jun-23	SOE	-42.7	182.7	914	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	SIA	SVA
6828	55	BT	ORH	Jun-23	SOE	-42.7	182.7	930	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		80	SIA	SVA
6828	55	BT	ORH	Jun-23	SOE	-42.7	182.7	930	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	SIA	SVA
6828	55	BT	ORH	Jun-23	SOE	-42.7	182.7	930	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	SIA	SVA
6828	55	BT	ORH	Jun-23	SOE	-42.7	182.7	930	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Solenosmilia*	*variabilis*		0	SIA	SVA

Appendix D Summary statistics for UCE sequencing of octocoral specimens.

Summary of DNA sequencing and sequence processing for each included octocoral specimen (Sample ID). 'Raw' = read counts and total sequence data following sequencing and initial quality control; 'Assembled' = contig counts and sequence lengths following assembly; 'UCE-matched' = contig counts and sequence lengths following matching of contigs to UCE target baits. Sample 42522 was excluded from UCE matching and further analysis due to low initial read counts resulting in few assembled contigs.

	Raw		Assembled					UCE-matched				
Sample ID	# Reads	Total bp	# Contigs	Total bp	Mean bp	Max bp	# Contigs >1kb	# Contigs	Total bp	Mean bp	Max bp	# Contigs >1kb
102380_Nov_Fam	8653312	1195434148	38337	6170932	161	6480	249	1950	1188043	609	2822	49
102403_Nov_Fam	7054913	951549620	46106	6110618	133	6045	258	1719	1064445	619	2534	77
102443_Nov_Fam	3469723	516681733	8817	3218846	365	8558	808	1881	1662462	884	2108	601
102508_Nov_Fam	8606989	1204861212	20785	5434468	261	18719	555	1984	1463964	738	5054	186
102558_Nov_Fam	8655664	1212571036	19324	4477997	232	8501	309	1926	1270997	660	3768	87
54157_Nov_Fam	8629118	1182837403	35381	6079908	172	18719	296	1974	1186399	601	4545	52
54235_Nov_Fam	8644146	1176841314	11029	3139879	285	9967	220	1386	760435	549	3258	54
9728_Nov_Fam	8665785	1156005346	26726	5296314	198	5469	331	1545	885279	573	3205	48
102618_Primnoella	5782353	860210272	15766	4296153	272	4125	686	1962	1643133	837	2224	458
131891_Radicipes	2092670	294702001	4073	5433095	1334	59212	557	1039	349324	336	29662	2
41313_Callipodium	8679182	1233854024	6116	2835000	464	5136	281	1533	1082048	706	2573	87
42522_T_laxa	26361	3023460	75	16795	224	822	0	-	-	-	-	-
53309_T_aff_laxa	8623809	1183627782	204785	20407123	100	11998	20	1691	801347	474	1243	2
88693_Metallogorgia	8624653	1196771322	31488	5210965	165	4139	164	1718	888998	517	2704	27
88879_Lepidisis	8648967	1232561026	12876	3286154	255	19284	170	2135	1200438	562	2560	57