INT2022-03 Identification, storage and genetics of cold-water coral bycatch specimens

Milestone 4. Six monthly progress update

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Prepared by:
Diana Macpherson, Amelia Connell, Jaret Bilewitch, Caroline R. Wood

For any information regarding this report please contact:

Diana Macpherson
Marine Biology Technician, Assistant Collection Manager
Collections Curation
+64 4 382 1628
diana.macpherson@niwa.co.nz

National Institute of Water & Atmospheric Research Ltd
Private Bag 14901
Kilbirnie
Wellington 6241

Phone +64 4 386 0300

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Cover image: At sea digital image of scleractinian coral Enallopsammia rostrata caught by bottom trawling targeting black oreo in FMA 3 (South-East Coast) [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. An understanding of deepsea coral bycatch is required to help determine how vulnerable protected corals might be to various anthropogenic impacts such as fishing, and thus help manage and conserve populations.

This project facilitates, through the examination of returned coral specimens and specimen digital images, the taxon and the provenance of corals bycaught in New Zealand fisheries. Summarised are the sample and image identifications of all observed coral bycatch that were returned during the period 1 July 2023 to 31 December 2023.

Following prioritisation discussions with CSP, genetic analysis for this year of the project will focus on characterisation of the diversity and relatedness of *Anthothela* spp.– a group of protected gorgonian octocorals encountered as fisheries bycatch. This activity will leverage off morphological examinations and taxonomic expertise provided for this group by Dr Kirrily Moore under CSP project INT2023-07.

A total of five specimen samples were collected by observers on commercial fishing vessels and returned for identification during the reporting period. A total of 415 specimens were identified from 195 digital images during the reporting period; 375 of these specimens were protected coral taxa, all images were georeferenced. Specimen and image data are presented by Fisheries Management Areas (FMA), fishing method, and targeted fishery. Highest specimen counts came from the South-East (SOE) area (FMA 4), and the South-East Coast (SEC) (FMA 3). All specimens were taken by bottom trawl, the majority of which were targeting hoki, smooth oreo, orange roughy and scampi.

1 Background

Protected cold-water deep-sea coral (referred to as coral throughout) specimens bycaught in commercial fishery operations are sampled or photographed by government observers on commercial fishing vessels. The specific objectives for this project are:

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 nine milestones scheduled for this project and here we report on the fourth, Milestone 4: Six monthly progress update with a "summary report of coral specimens, identified from samples and images, bycaught during the period 1 July 2023 - 31 December 2023".

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.

2 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).

2.1 Identification of returned protected physical coral specimens

During the reporting period 1 July 2023 to 31 December 2023, NIWA received, processed, and identified six observer-collected protected coral specimens in five sample lots. All the physical specimens returned to NIWA were collected by bottom trawl, with five specimens from fisheries targeting scampi and one specimen from a fishery targeting hoki. As part of Objective 2, sub-samples from each physical specimen are to be taken for future genetic studies (n=0). Unfortunately, none of the specimens returned during this reporting period were in a condition to allow for tissue subsamples to be taken. The scleractinian stony corals were collected already dead with no tissue remaining in the cups, and the acanthogorgid sea fan octocoral was also collected dead and denuded (i.e. no tissue or polyps were present on the colony).

The NIWA experts identifying physical specimens returned to NIWA during this reporting period were Di Tracey and Amelia Connell - Scleractinia (stony corals), Jaret Bilewitch - Octocorallia (gorgonian octocorals) and Rob Stewart - Antipatharia (black corals).

A summary of protected coral bycatch specimens collected between 1 July 2023 to 31 December 2023 and identified by experts are provided in the NIWA Invertebrate Collection (NIC) Specify Database *niwainvert* extract (Table A-1) and presented in Table 2-1 and Figure 2-1.

Table 2-1: Summary of physical protected coral species bycaught and returned during the reporting period. Count of number of specimens collected by Observers from each Fisheries Management Area (FMA) and target fishery between 1 July – 31 December 2023. Refer to Figure 2-1 for FMA location. SCI = scampi, HOK = hoki.

Order	Family	Genus	Species	FMA (target fishery)		Total no. of specimens
				SOE (SCI)	SEC (HOK)	
Malacalcyonacea	Acanthogorgiidae				1	1
Scleractinia	Caryophylliidae			3		3
Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*	2		2
Total				**5**	**1**	**6**

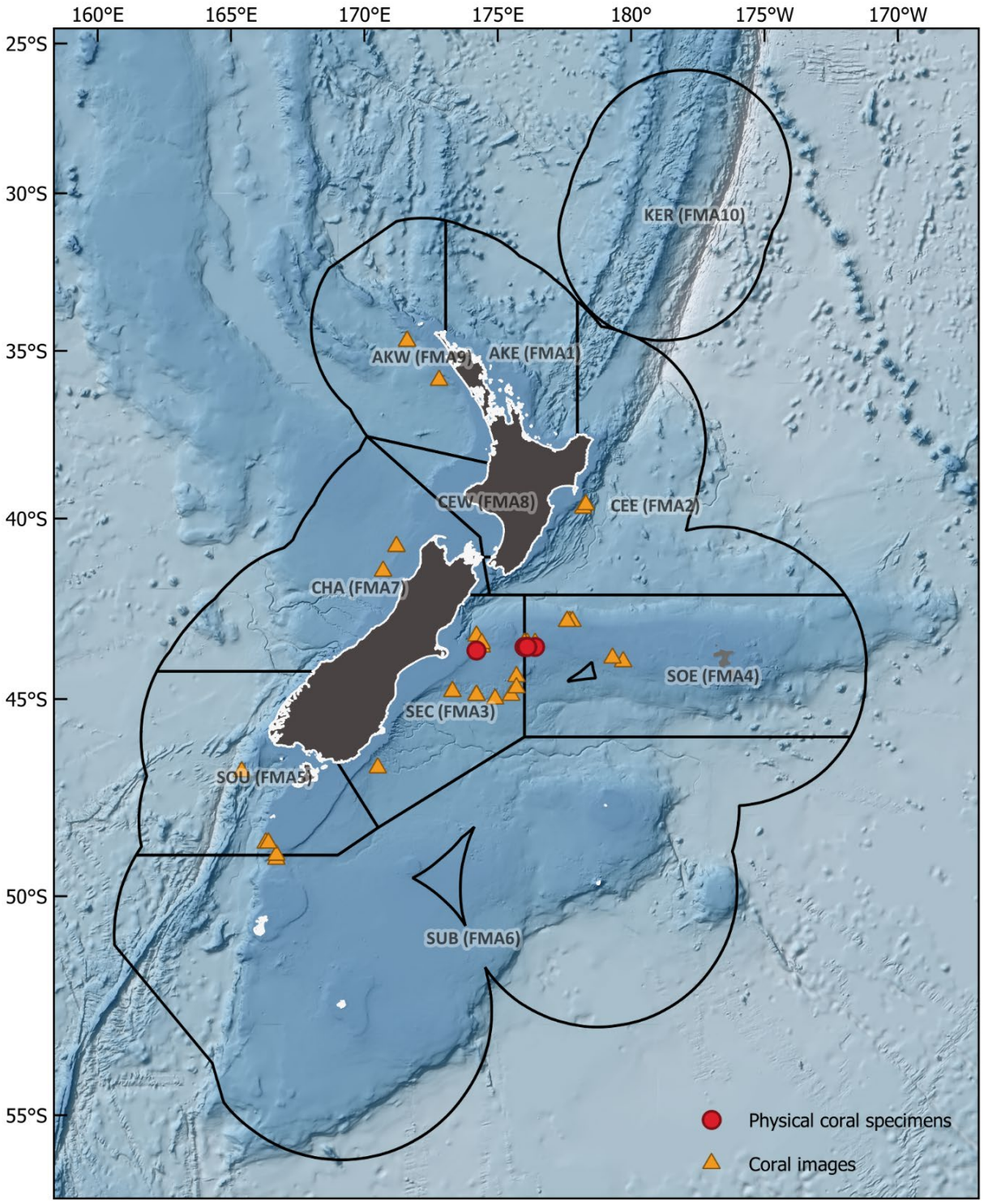

Figure 2-1: Observer collected bycatch coral. Physical specimens (red circle), and specimens from images (orange triangle), collected between 1 July – 31 December 2023.

2.2 Processing and identification of specimens from images

During the reporting period 1 July 2023 to 31 December 2023, NIWA received 195 digital images, and all of these were processed using methods outlined in Connell et al. (2024).

The NIWA experts identifying specimens from images during this reporting period were:

- Di Tracey and Amelia Connell - Scleractinia (stony corals)
- Jaret Bilewitch - Octocorallia (gorgonian octocorals)
- Diana Macpherson - Antipatharia (black corals), Hydrozoa (hydroids) and other taxa
- Peter Marriott - Stylasteridae (hydrocorals)
- Michelle Kelly - Porifera (sponges)
- Sadie Mills - Brisingida (sea stars)

In total, 415 specimens were identified, noting that at times there were multiple images of the same specimen as well as images of multiple specimens.

Of the 415 identified specimens, 375 were protected coral taxa, and 40 were other non-protected invertebrates (sponges, sea pens, brisingid sea stars, hydroids and polychaetes). All samples were able to be georeferenced and all were photographed within New Zealand's Exclusive Economic Zone (EEZ) (Figure 2-1 and Table B-1).

The highest number of photographed protected coral specimens were from the South East (Chatham Rise) region (FMA 4), and the South-East Coast (FMA 3) (Table 2-2). The target fisheries with the highest number of tows with bycatch identified as coral by observers were the bottom trawl fisheries for hoki, smooth oreo, orange roughy and scampi (Table 2-3). All photographed specimens were collected by bottom trawl.

Table 2-2: Summary of the number of expert identified coral specimens from images by Fisheries Management Area (FMA).

Area	Description	Total no. of specimens
AKW	Auckland West (FMA9)	28
CEE	Central East (FMA2)	21
CHA	Challenger (FMA7)	3
SEC	South-East Coast (FMA3)	150
SOE	South East (Chatham Rise) (FMA4)	166
SOU	Southland (FMA5)	4
SUB	Subantarctic (FMA6)	3
Total		**375**

Table 2-3: Count of tows and count of expert identified coral specimens from images by target fishery. All specimens were collected by bottom trawl fishing method.

Target fishery (common name)	FNZ code	Distinct count of tows	Total no. of specimens
Black oreo	BOE	2	2
Alfonsino & long-finned beryx	BYX	2	21
Hake	HAK	2	3
Hoki	HOK	13	141
Ling	LIN	6	6
Orange roughy	ORH	14	64
Scampi	SCI	12	60
Smooth oreo	SSO	11	78
Total		**62**	**375**

A diverse collection of protected coral specimens was identified by experts from 14 families within five orders (Table 2-4 and Figure 2-2). Stony cup coral *Flabellum knoxi* was collected the most, with 140 specimens caught in 12 distinct tows. A total of 68 specimens of stony branching coral *Solenosmilia variabilis* was caught in seven distinct tows. There were 21 specimens of bubblegum coral *Paragorgia* caught in only two tows, and 20 primnoid octocoral specimens, possibly of the genus *Fanellia* were collected in one tow.

For the non-coral specimens (n=40, also see Table 2-4), six specimens were identified by observers as a type of stony coral but were confirmed as either sponge, clumps of polychaete tube worms, or as discs from armless star from the order Brisinginda (i.e., the arms had fallen off, just leaving discs that resemble a cup coral). Three specimens were identified by observers as octocorals but are likely to be degraded hydroid colonies. The remaining 31 specimens were identified by observers as either sponge, sea pen or hydroid, and were correct.

Table 2-4: Count of tows and count of expert identified coral and non-coral specimens from images.

Phylum	Class	Order	Family	Genus	Species	Distinct count of tows	Total no. of specimens
Annelida	Polychaeta					1	2
Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	*Leiopathes*		2	2
			Schizopathidae	*Lillipathes*		1	1
				Parantipathes		3	3
		Scleractinia				1	1
			Caryophylliidae			3	12
				Caryophyllia		4	4
				Desmophyllum	*dianthus*	4	10

Phylum	Class	Order	Family	Genus	Species	Distinct count of tows	Total no. of specimens
				Goniocorella	*dumosa*	7	36
				Solenosmilia	*variabilis*	7	68
			Dendrophylliidae	*Enallopsammia*	*rostrata*	3	3
			Flabellidae	*Flabellum*	*knoxi*	12	140
			Madreporidae	*Madrepora*	*oculata*	1	10
			Stephanocyathidae	*Stephanocyathus*	*platypus*	3	7
	Hydrozoa					2	9
		Anthoathecata	Solanderiidae	*Solanderia?*		1	1
			Stylasteridae			1	1
		Leptothecata	Symplectoscyphidae	*Symplectoscyphus?*		1	1
	Hydrozoa?					1	1
	Octocorallia	Malacalcyonacea	Victorgorgiidae	*Trachythela?*		1	1
		Scleralcyonacea	Acanthogorgiidae			2	2
				Acanthogorgia		3	3
				Acanthogorgia?		1	1
			Balticinidae	*Balticina?*		1	1
			Chrysogorgiidae	*Chrysogorgia*		1	1
			Coralliidae	*Paragorgia*		2	21
			Keratoisididae			1	2
				Isidella		3	3
				Keratoisis		2	2
			Primnoidae	*Fanellia?*		1	20
				Primnoa	*notialis*	3	9
				Thouarella		8	11
				Tokoprymno		1	1
			Protoptilidae	*Distichoptilum*	*gracile*	1	1
Echinodermata	Asteroidea	Brisingida				1	2
Porifera						1	1
	Demospongiae	Tetractinellida	Geodiidae	*Geodia*	*chathamensis*	1	1
	Hexactinellida					1	20
Total						**67**	**415**

Figure 2-2: A selection of representative protected coral specimen images. a) stony branching coral *Solenosmilia variabilis*; b) golden coral *Chrysogorgia*; c) clumps of stony branching coral *Goniocorella dumosa* amongst mainly scampi on deck; d) black coral *Parantipathes*; e) primnoid sea fan *Primnoa notialis*; f) bubblegum coral *Paragorgia*; g) stony cup coral *Flabellum knoxi*; h) primnoid sea fan, possibly *Fanellia* [Observer, FNZ].

3 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.

The specimen identifications reported in section 2.1 of this report have been updated in the NIC database *niwainvert* and specimens are stored as appropriate in the NIC wet and dry collections.

4 Objective 3

To update relevant government coral identification and observer databases.

Expert identifications of both physical specimens and imaged corals from this reporting period will be uploaded into the Centralised Observer Database (COD) and reported on for Milestone 5 in the draft final report.

For the last reporting period (1 July 2022–30 June 2023), physical specimen expert ID updates were completed in April 2024 and a written summary provided in Connell et al. (2024). Work to upload the expert identifications for the specimens from images for the last reporting period was completed in October 2024, and a summary of this work is provided below.

Of the 316 image data rows provided for uploading into COD, 315 could be matched via a variety of categories, i.e. the images were matched to various fields in COD (e.g. NIWA catalog number, or initial observer ID):

- 104 benthic rows in COD were updated with expert ID (271 image data rows).
- 16 benthic rows were inserted with expert ID as new catch records for the tow (44 image data rows). These were mostly a "split image" (i.e. where more than one taxon is showing in the same image), but some were because a match could not be made to an existing benthic record (n=12 images).
- The one remaining image data row could not be matched to an existing record and was not updated. It is a non-coral which relates to a physical specimen that has not been identified by an expert yet.

In total, 120 benthic rows were updated - 119 in the benthic table and one in the general catch table.

5 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.

After consultation with CSP, genomic characterisation of the protected octocoral group *Anthothela* was identified as a priority for the current year. *Anthothela* is a common component of bottom trawl catch and there are 39 available specimens housed in the NIC: 12 bycaught during commercial fishing operations, four bycaught during fisheries research trawls conducted by NIWA for the Ministry of Primary Industries (MPI) and 27 from other NIWA research voyages. Only one species of *Anthothela* has been identified in New Zealand (*A. vickersi*) and the two available specimens of the closely related genus *Lateothela* have no species-level identification. Genomic characterisation will thus be used to:

- Determine if cryptic undescribed species are present among the available specimens
- Assess population variation and genetic relatedness of the localities from which the available specimens were collected, as a preliminary assessment of hotspots and population connectivity
- Determine the proportion of total species- and population-level diversity represented within bycatch samples, to continue previous efforts to document impacts of commercial fishing on protected octocoral diversity through CSP (INT2019-05, BCBC2020-26, INT2023-05)

All available NIC specimens of *Anthothela* (n=39) and *Lateothela* (n=2) will be sampled for DNA extraction and up to 30 of those producing sufficient genomic DNA quality and quantity will be selected for genome skimming – a genomic sequencing approach that simultaneously generates UCE data and mitochondrial DNA barcodes. The resulting dataset will follow the methods of Quattrini et al. (2024) and will be used to analyse intraspecific variation and test for cryptic species.

6 Objective 5

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

Updates have been made to the document "Instructions to observers when carrying out at-sea protected coral data collection" (Macpherson et al., 2024), to reflect NIWA staff changes and the revised Coral Identification Guide (Tracey et al., 2023). A copy has been provided to CSP for approval and is also included in Appendix C. Once approved it can be forwarded to the Observer Services Unit of the FNZ Observer Programme for dissemination to the Observers.

7 Recommendations

Octocoral taxonomy has recently been revised by McFadden et al. (2022) (a summary is provided in Connell et al. 2024), and further revisions have been completed since. Most of the genera formerly within family Plexauridae (PLE) have been moved to family Paramuriceidae, which has now been replaced with Acanthogorgiidae (ACD). There remains only one genus in family Plexauridae that occurs in Aotearoa which is *Swiftia* (SWI). Family Acanthogorgiidae now includes nearly all Paramuriceidae genera, including commonly bycaught genus *Acanthogorgia* (ACC), along with others such as *Muriceides* (MRI), *Bebryce*, *Villogorgia* (VIL) and *Paramuricea* (PRG).

As already mentioned in Connell et al. (2024), 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. 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.

8 Acknowledgements

Our thanks to the FNZ observers for their on-going efforts at sea and to the various coral experts who provided identifications for this reporting period. These include Di Tracey, Rob Stewart, Peter Marriott, Michelle Kelly and Jaret Bilewitch (all NIWA). We acknowledge Dean Stotter and Jeff Forman for processing the Observer samples and the NIWA Invertebrate Collection team for providing curatorial support for the specimens. Our thanks to the NIWA Fisheries Data Services for COD data extracts and data uploading. Thanks to reviewer Sadie Mills for her comments on this report. Finally, we thank the CSP team particularly Hollie McGovern and Erin Hewetson for providing coral images, and Marine Senior Science Advisor, Lyndsey Holland. This work was funded by DOC Project INT2022-03.

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Appendix A Summary output from NIWA Invertebrate Collection (NIC) Specify Database *niwainvert* updated with revised expert identifications of six bycatch specimens (in five sample lots) collected by observers between 1 July 2023 to 31 December 2023.

This publicly accessible website can be used to search the target species, initial observer 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: BT = Bottom Trawl. OSD = Observer samples database used in NIWA to record all incoming observer collected samples (including fish, invertebrates, seabirds and mammals).

Table A-1: Summary output from NIWA Invertebrate Collection (NIC) Specify Database niwainvert. Updates with revised expert identifications of six bycatch specimens (in five sample lots) collected by observers between 1 July 2023 to 31 December 2023.

NIWA Cat. Num.	TRIP	Tow	OSD Num.	Initial ID Code	Phylum	Class	Order	Family	Genus	Species	Expert ID code	Date	Latitude1	Longitude1	Depth 1	FMA	Gear code	Target species	Count
171377	6895	7	6565	GOC	Cnidaria	Octocorallia	Malacalcyonacea	Acanthogorgiidae			ACD	06/10/2023	-43.725	174.21	489	SEC	BT	HOK	1
163468	6896	5	6458	GDU	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*	GDU	07/10/2023	-43.57	176.0417	350	SOE	BT	SCI	1
163469	6896	6	6459	DDI	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae			CUP	08/10/2023	-43.5833	176.4267	395	SOE	BT	SCI	2
163471	6896	14	6461	GDU	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	*Goniocorella*	*dumosa*	GDU	13/10/2023	-43.575	176.0533	360	SOE	BT	SCI	1
163472	6896	20	6462	DDI	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae			CUP	19/10/2023	-43.59	176.1417	360	SOE	BT	SCI	1

Appendix B Summary of digital images processed and identified for the reporting period 1 July 2023 to 31 December 2023

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: BT = Bottom Trawl.

Table B-1: Spreadsheet summary of digital images processed and identified for the reporting period 1 July to 31 December 2023.

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6842	8	BT	HOK	1/07/2023	SEC	-43.6	174.4	547	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		0	COF	COF
6842	8	BT	HOK	1/07/2023	SEC	-43.6	174.4	547	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		8	COF	COF
6842	57	BT	LIN	1/08/2023	CHA	-41.5	170.7	384	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae				1	GOC	ACD
6854	23	BT	LIN	30/07/2023	CHA	-40.8	171.2	373	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia			1	COU	ACC
6854	25	BT	LIN	31/07/2023	CHA	-40.8	171.2	358	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia			1	COU	ACC
6862	12	BT	ORH	8/08/2023	AKW	-34.7	171.6	916	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		10	CBR	SVA
6862	12	BT	ORH	8/08/2023	AKW	-34.7	171.6	916	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		10	CBR	SVA
6862	12	BT	ORH	8/08/2023	AKW	-34.7	171.6	916	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		1	CBR	SVA
6862	12	BT	ORH	8/08/2023	AKW	-34.7	171.6	916	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	Enallopsammia	rostrata		1	SIA	ERO
6862	12	BT	ORH	8/08/2023	AKW	-34.7	171.6	916	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	Enallopsammia	rostrata		0	SIA	ERO
6862	12	BT	ORH	8/08/2023	AKW	-34.7	171.6	916	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	Enallopsammia	rostrata		0	SIA	ERO
6862	17	BT	ORH	9/08/2023	AKW	-34.7	171.6	973	Cnidaria	Octocorallia	Scleralcyonacea	Chrysogorgiidae	Chrysogorgia			1	CHR	CHR
6862	17	BT	ORH	9/08/2023	AKW	-34.7	171.6	973	Cnidaria	Octocorallia	Scleralcyonacea	Chrysogorgiidae	Chrysogorgia			0	CHR	CHR
6862	17	BT	ORH	9/08/2023	AKW	-34.7	171.6	973	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			1	LLE	ISP
6862	17	BT	ORH	9/08/2023	AKW	-34.7	171.6	973	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			0	LLE	ISP
6862	17	BT	ORH	9/08/2023	AKW	-34.7	171.6	973	Porifera	Hexactinellida						20	ONG	GLS
6862	25	BT	ORH	11/08/2023	AKW	-35.9	172.8	890	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae				2	LLE	ISI
6862	25	BT	ORH	11/08/2023	AKW	-35.9	172.8	890	Cnidaria	Hexacorallia	Scleractinia	Stephanocyathidae	Stephanocyathus	platypus		2	CUP	STP
6881	28	BT	HOK	16/09/2023	SEC	-44.4	175.7	685	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		1	CBR	SVA

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6881	35	BT	HOK	18/09/2023	SEC	-43.5	174.2	519	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		1	SIA	COF
6884	14	BT	LIN	23/09/2023	SOU	-48.7	166.4	505	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			1	THO	THO
6884	14	BT	LIN	23/09/2023	SOU	-48.7	166.4	505	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6884	14	BT	LIN	23/09/2023	SOU	-48.7	166.4	505	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6884	14	BT	LIN	23/09/2023	SOU	-48.7	166.4	505	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6884	14	BT	LIN	23/09/2023	SOU	-48.7	166.4	505	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6884	14	BT	LIN	23/09/2023	SOU	-48.7	166.4	505	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6884	24	BT	LIN	28/09/2023	SOU	-48.7	166.4	500	Cnidaria	Hydrozoa	Leptothecata	Symplectoscyphidae	Symplectoscyphus?			1	HDF	HDF
6896	5	BT	SCI	7/10/2023	SOE	-43.5	176	350	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa	163468	1	GDU	GDU
6896	6	BT	SCI	8/10/2023	SOE	-43.5	176.4	395	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae			163469	5	DDI	SIA
6896	6	BT	SCI	8/10/2023	SOE	-43.5	176.4	395	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae			163469	0	DDI	SIA
6896	14	BT	SCI	13/10/2023	SOE	-43.5	176	360	Porifera	Demospongiae	Tetractinellida	Geodiidae	Geodia	chathamensis	163470	1	CBR	DSO
6896	14	BT	SCI	13/10/2023	SOE	-43.5	176	360	Porifera	Demospongiae	Tetractinellida	Geodiidae	Geodia	chathamensis	163470	0	CBR	DSO
6896	14	BT	SCI	13/10/2023	SOE	-43.5	176	360	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa	163471	2	GDU	GDU
6896	14	BT	SCI	13/10/2023	SOE	-43.5	176	360	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa	163471	0	GDU	GDU
6896	14	BT	SCI	13/10/2023	SOE	-43.5	176	360	Porifera	Demospongiae	Tetractinellida	Geodiidae	Geodia	chathamensis	163470	0	CBR	DSO
6896	16	BT	SCI	16/10/2023	SOE	-43.5	176.1	360	Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	Leiopathes			1	COB	LEI
6896	16	BT	SCI	16/10/2023	SOE	-43.5	176.1	360	Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	Leiopathes			0	COB	LEI
6896	20	BT	SCI	19/10/2023	SOE	-43.5	176.1	360	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae			163472	6	DDI	SIA
6896	20	BT	SCI	19/10/2023	SOE	-43.5	176.1	360	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae			163472	0	DDI	SIA
6896	24	BT	SCI	23/10/2023	SOE	-43.5	176	360	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Desmophyllum	dianthus		6	DDI	DDI
6896	24	BT	SCI	23/10/2023	SOE	-43.5	176	360	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Desmophyllum	dianthus		0	DDI	DDI
6906	5	BT	SCI	21/11/2023	SOE	-42.9	177.6	325	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa		1	SIA	GDU
6906	6	BT	SCI	22/11/2023	SOE	-42.9	177.7	320	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Caryophyllia			1	SIA	CAY
6906	6	BT	SCI	22/11/2023	SOE	-42.9	177.7	320	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa		1	SIA	GDU

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6906	7	BT	SCI	22/11/2023	SOE	-42.9	177.6	325	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae				1	SIA	SIA
6906	11	BT	SCI	24/11/2023	SOE	-42.9	177.8	320	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa		5	SIA	GDU
6906	11	BT	SCI	24/11/2023	SOE	-42.9	177.8	320	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			3	THO	THO
6906	11	BT	SCI	24/11/2023	SOE	-42.9	177.8	320	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa		0	SIA	GDU
6906	11	BT	SCI	24/11/2023	SOE	-42.9	177.8	320	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6906	11	BT	SCI	24/11/2023	SOE	-42.9	177.8	320	Annelida	Polychaeta						2	SIA	POL
6906	14	BT	SCI	25/11/2023	SOE	-42.9	177.5	320	Porifera							1	SIA	ONG
6906	17	BT	SCI	26/11/2023	SOE	-42.9	176.8	404	Cnidaria	Hydrozoa	Anthoathecata	Solanderiidae	Solanderia?			1	MIN	HDF
6906	40	BT	SCI	12/12/2023	SOE	-42.9	177.6	320	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Caryophyllia			1	SIA	CAY
6906	40	BT	SCI	12/12/2023	SOE	-42.9	177.6	320	Cnidaria	Hydrozoa						1	MIN	HDF
6906	67	BT	SCI	22/12/2023	SOE	-42.9	177.6	325	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Desmophyllum	dianthus		2		DDI
6906	67	BT	SCI	22/12/2023	SOE	-42.9	177.6	325	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa		20	SIA	GDU
6906	67	BT	SCI	22/12/2023	SOE	-42.9	177.6	325	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa		3	SIA	GDU
6906	67	BT	SCI	22/12/2023	SOE	-42.9	177.6	325	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			1	THO	THO
6918	4	BT	BOE	19/11/2023	SEC	-46.8	170.5	988	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	Enallopsammia	rostrata		1	SIA	ERO
6918	4	BT	BOE	19/11/2023	SEC	-46.8	170.5	988	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	Enallopsammia	rostrata		0	SIA	ERO
6918	4	BT	BOE	19/11/2023	SEC	-46.8	170.5	988	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	Enallopsammia	rostrata		0	SIA	ERO
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			1	GOC	ACC
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			0	GOC	ACC
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			0	GOC	ACC
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			0	GOC	ACC
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			0	GOC	ACC
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			0	GOC	ACC
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			0	GOC	ACC
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			0	GOC	ACC

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6918	25	BT	SSO	25/11/2023	SOE	-44.5	182.1	988	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia?			0	GOC	ACC
6918	42	BT	ORH	28/11/2023	SOE	-43.1	186		Cnidaria	Hexacorallia	Scleractinia	Stephanocyathidae	Stephanocyathus	platypus		0	STP	STP
6918	42	BT	ORH	28/11/2023	SOE	-43.1	186		Cnidaria	Hexacorallia	Scleractinia	Stephanocyathidae	Stephanocyathus	platypus		0	STP	STP
6918	42	BT	ORH	28/11/2023	SOE	-43.1	186		Cnidaria	Hexacorallia	Scleractinia	Stephanocyathidae	Stephanocyathus	platypus		0	STP	STP
6918	42	BT	ORH	28/11/2023	SOE	-43.1	186		Cnidaria	Hexacorallia	Scleractinia	Stephanocyathidae	Stephanocyathus	platypus		3	STP	STP
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	GDU	SVA
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		1	GDU	SVA
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	GDU	SVA
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	GDU	SVA
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	GDU	SVA
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	GDU	SVA
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	GDU	SVA
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	GDU	SVA
6918	54	BT	ORH	30/11/2023	SOE	-44.6	184.8	1394	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	GDU	SVA
6918	65	BT	BOE	2/12/2023	SOE	-44.4	181.3		Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		1	SIA	SVA
6918	65	BT	BOE	2/12/2023	SOE	-44.4	181.3		Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	SIA	SVA
6918	65	BT	BOE	2/12/2023	SOE	-44.4	181.3		Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	SIA	SVA
6918	65	BT	BOE	2/12/2023	SOE	-44.4	181.3		Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	SIA	SVA
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			1	ISI	ISP
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			0	ISI	ISP
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			0	ISI	ISP
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			0	ISI	ISP
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			0	ISI	ISP
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			0	ISI	ISP
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Hexacorallia	Scleractinia	Stephanocyathidae	Stephanocyathus	platypus		2	SIA	STP

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Hexacorallia	Scleractinia	Stephanocyathidae	Stephanocyathus	platypus		0	SIA	STP
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Balticinidae	Balticina?			1	PTU	PTU
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Balticinidae	Balticina?			0	PTU	PTU
6918	71	BT	ORH	4/12/2023	SOE	-42.7	180.4		Cnidaria	Octocorallia	Scleralcyonacea	Balticinidae	Balticina?			0	PTU	PTU
6918	72	BT	ORH	4/12/2023	SOE	-42.6	180.8		Cnidaria	Hydrozoa?						1	GOC	HDF
6918	72	BT	ORH	4/12/2023	SOE	-42.6	180.8		Cnidaria	Hydrozoa?						0	GOC	HDF
6918	72	BT	ORH	4/12/2023	SOE	-42.6	180.8		Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			1	ISI	ISP
6918	72	BT	ORH	4/12/2023	SOE	-42.6	180.8		Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Isidella			0	ISI	ISP
6918	73	BT	ORH	4/12/2023	SOE	-42.7	182.2	1201	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Parantipathes			1	COB	PTP
6918	73	BT	ORH	4/12/2023	SOE	-42.7	182.2	1201	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Parantipathes			0	COB	PTP
6918	73	BT	ORH	4/12/2023	SOE	-42.7	182.2	1201	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Parantipathes			0	COB	PTP
6918	78	BT	ORH	5/12/2023	SOE	-42.8	183.1	848	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Goniocorella	dumosa		3	SIA	GDU
6918	97	BT	ORH	8/12/2023	SOE	-44.6	184.8		Cnidaria	Hexacorallia	Scleractinia					1	SIA	SIA
6918	97	BT	ORH	8/12/2023	SOE	-44.6	184.8		Cnidaria	Hexacorallia	Scleractinia					0	SIA	SIA
6918	97	BT	ORH	8/12/2023	SOE	-44.6	184.8		Cnidaria	Hexacorallia	Scleractinia					0	SIA	SIA
6918	97	BT	ORH	8/12/2023	SOE	-44.6	184.8		Cnidaria	Hexacorallia	Scleractinia					0	SIA	SIA
6918	97	BT	ORH	8/12/2023	SOE	-44.6	184.8		Cnidaria	Hexacorallia	Scleractinia					0	SIA	SIA
6918	101	BT	SSO	9/12/2023	SOE	-44.6	182.4		Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			1	PRI	THO
6918	101	BT	SSO	9/12/2023	SOE	-44.6	182.4		Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	PRI	THO
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		5	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Malacalcyonacea	Victorgorgiidae	Trachythela?	(or else Alcyoniidae: Lateothela)		1	COU	VIC
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Malacalcyonacea	Victorgorgiidae	Trachythela?	(or else Alcyoniidae: Lateothela)		0	COU	VIC
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Malacalcyonacea	Victorgorgiidae	Trachythela?	(or else Alcyoniidae: Lateothela)		0	COU	VIC
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Malacalcyonacea	Victorgorgiidae	Trachythela?	(or else Alcyoniidae: Lateothela)		0	COU	VIC
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Malacalcyonacea	Victorgorgiidae	Trachythela?	(or else Alcyoniidae: Lateothela)		0	COU	VIC
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	111	BT	SSO	11/12/2023	SEC	-44.9	175.5	1135	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	133	BT	SSO	15/12/2023	SEC	-44.9	174.2	993	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		1	SIA	SVA
6918	133	BT	SSO	15/12/2023	SEC	-44.9	174.2	993	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Caryophyllia			1	SIA	CAY
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		2	PRI	PMN
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PRI	PMN
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PRI	PMN
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PRI	PMN
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PRI	PMN
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PRI	PMN
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PRI	PMN

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PRI	PMN
6918	146	BT	SSO	17/12/2023	SEC	-45	174.9	1108	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PRI	PMN
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Caryophyllia			1	SIA	CAY
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Dendrophylliidae	Enallopsammia	rostrata		1	SIA	ERO
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		3	SIA	SVA
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Caryophyllia			0	SIA	CAY
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Caryophyllia			0	SIA	CAY
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		0	SIA	SVA
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Desmophyllum	dianthus		1	SIA	DDI
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Desmophyllum	dianthus		0	SIA	DDI
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			1	THO	THO
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6918	153	BT	SSO	18/12/2023	SEC	-44.9	174.2	969	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		20	SIA	SVA
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	Paragorgia			0	PAB	PAB
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	Paragorgia			0	PAB	PAB
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		0	PMN	PMN
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	Paragorgia			20	PAB	PAB
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	Paragorgia			0	PAB	PAB
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Hydrozoa						0	HDF	HDF
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Hydrozoa						0	HDF	HDF
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Primnoa	notialis		2	PMN	PMN
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Desmophyllum	dianthus		1	SIA	DDI
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Hexacorallia	Scleractinia	Madreporidae	Madrepora	oculata		10	SIA	MOC
6918	162	BT	SSO	19/12/2023	SEC	-44.7	175.7	1069	Cnidaria	Hydrozoa						8	HDF	HDF

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6918	171	BT	ORH	22/12/2023	SOE	-42.7	179.6	1176	Cnidaria	Octocorallia	Scleralcyonacea	Protoptilidae	Distichoptilum	gracile		1	DGR	DGR
6918	180	BT	ORH	24/12/2023	SOE	-42.6	180.9		Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Parantipathes			1	COB	PTP
6918	180	BT	ORH	24/12/2023	SOE	-42.6	180.9		Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Parantipathes			0	COB	PTP
6918	190	BT	ORH	27/12/2023	SOE	-43.8	185.7		Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			1	THO	THO
6918	190	BT	ORH	27/12/2023	SOE	-43.8	185.7		Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	THO	THO
6918	199	BT	ORH	28/12/2023	SOE	-44.6	184.8		Cnidaria	Hexacorallia	Scleractinia	Caryophylliidae	Solenosmilia	variabilis		20	SIA	SVA
6923	9	BT	LIN	27/11/2023	SOU	-48.7	166.3	630	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae				0	GOC	ACD
6923	9	BT	LIN	27/11/2023	SOU	-48.7	166.3	630	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae				1	GOC	ACD
6923	15	BT	HAK	30/11/2023	SUB	-49.1	166.7	625	Cnidaria	Octocorallia	Scleralcyonacea	Acanthogorgiidae	Acanthogorgia			1	PLE	ACC
6923	25	BT	HAK	5/12/2023	SUB	-49	166.7	470	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			0	COB	THO
6923	25	BT	HAK	5/12/2023	SUB	-49	166.7	470	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			2	COB	THO
6923	26	BT	LIN	6/12/2023	SOU	-48.7	166.4	545	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Thouarella			1	COB	THO
6925	6	BT	SSO	14/12/2023	SEC	-44.8	173.3	1016	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Keratoisis			1	ISI	BOO
6925	10	BT	SSO	16/12/2023	SEC	-44.9	174.2	988	Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	Leiopathes			1	LEI	LEI
6925	10	BT	SSO	16/12/2023	SEC	-44.9	174.2	988	Cnidaria	Hexacorallia	Antipatharia	Leiopathidae	Leiopathes			0	LEI	LEI
6925	10	BT	SSO	16/12/2023	SEC	-44.9	174.2	988	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	Paragorgia			0	PAB	PAB
6925	10	BT	SSO	16/12/2023	SEC	-44.9	174.2	988	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	Paragorgia			1	PAB	PAB
6925	10	BT	SSO	16/12/2023	SEC	-44.9	174.2	988	Cnidaria	Octocorallia	Scleralcyonacea	Coralliidae	Paragorgia			0	PAB	PAB
6925	10	BT	SSO	16/12/2023	SEC	-44.9	174.2	988	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Tokoprymno			1	THO	TOK
6925	10	BT	SSO	16/12/2023	SEC	-44.9	174.2	988	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Tokoprymno			0	THO	TOK
6925	10	BT	SSO	16/12/2023	SEC	-44.9	174.2	988	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Tokoprymno			0	THO	TOK
6925	15	BT	SSO	17/12/2023	SEC	-44.8	173.1	1004	Echinodermata	Asteroidea	Brisingida					2	STP	BRG
6925	16	BT	SSO	17/12/2023	SEC	-44.8	173.3	1016	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Keratoisis			1	ISI	BOO
6925	16	BT	SSO	17/12/2023	SEC	-44.8	173.3	1016	Cnidaria	Octocorallia	Scleralcyonacea	Keratoisididae	Keratoisis			0	ISI	BOO
6925	34	BT	ORH	24/12/2023	SOU	-46.9	165.4	952	Cnidaria	Hydrozoa	Anthoathecata	Stylasteridae	Conopora	verrucosa		1	CRE	COO

Trip	Tow	gear_code	target_species	event_start_date	start_obs_fma	trunc_start_latitude	trunc_start_longitude	start_seabed_depth	Phylum	Class	Order	Family	Genus	Species	NIWA Cat No	Specimen count	Initial OBS ID	Expert ID
6925	34	BT	ORH	24/12/2023	SOU	-46.9	165.4	952	Cnidaria	Hydrozoa	Anthoathecata	Stylasteridae	Conopora	verrucosa		0	CRE	COO
6925	34	BT	ORH	24/12/2023	SOU	-46.9	165.4	952	Cnidaria	Hydrozoa	Anthoathecata	Stylasteridae	Conopora	verrucosa		0	CRE	COO
6925	57	BT	SSO	31/12/2023	SOE	-44.6	182.4	1080	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Parantipathes			1	GOC	PTP
6925	57	BT	SSO	31/12/2023	SOE	-44.6	182.4	1080	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Parantipathes			0	GOC	PTP
6925	57	BT	SSO	31/12/2023	SOE	-44.6	182.4	1080	Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Parantipathes			0	GOC	PTP
6926	49	BT	HOK	15/12/2023	SEC	-43.3	174.2	574	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		9	COF	COF
6926	54	BT	HOK	17/12/2023	SEC	-43.5	174.4	544	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		55	COF	COF
6926	81	BT	HOK	23/12/2023	SOE	-44.1	180.3	509	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		1	COF	COF
6926	82	BT	HOK	23/12/2023	SOE	-44.2	181	532	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		3	COF	COF
6926	85	BT	HOK	24/12/2023	SOE	-44.2	182	574	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		5	COF	COF
6926	89	BT	HOK	24/12/2023	SOE	-44.3	182.7	558	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		25	COF	COF
6926	91	BT	HOK	25/12/2023	SOE	-44.3	182	618	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		3	COF	COF
6926	97	BT	HOK	26/12/2023	SOE	-44.2	180.7	540	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		2	COF	COF
6926	99	BT	HOK	26/12/2023	SOE	-44	179.7	502	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		18	COF	COF
6926	100	BT	HOK	27/12/2023	SOE	-43.9	179.3	554	Cnidaria	Hexacorallia	Scleractinia	Flabellidae	Flabellum	knoxi		10	COF	COF
6937	6	BT	BYX	10/12/2023	CEE	-39.7	178.2	410	Cnidaria	Octocorallia	Scleralcyonacea	Primnoidae	Fanellia?			20	GOC	PRI
6937	12	BT	BYX	12/12/2023	CEE	-39.6	178.3		Cnidaria	Hexacorallia	Antipatharia	Schizopathidae	Lillipathes			1	COB	LIL

Appendix C Instructions to observers when carrying out at-sea protected coral data collection.

Prepared by Diana Macpherson, Sadie Mills, Amelia Connell (NIWA)
January 2025

Background

These Instructions supplement the Conservation Services Programme (CSP), Department of Conservation (DOC) INT2022-03 "Identification, storage and genetics of cold-water coral bycatch specimens" project, for which NIWA is contracted.

Many protected coral species occur as bycatch in commercial fisheries around New Zealand. An understanding of deepsea coral bycatch is required to help determine how vulnerable protected corals might be to various anthropogenic impacts such as fishing, and thus help manage and conserve populations. DOC CSP recognise that Observers on commercial fishing vessels are not always able to identify this bycatch at sea with high precision (especially to species level), with the identification of species often requiring confirmation on shore by a coral taxonomist.

This project facilitates, through the examination of returned coral specimens and specimen digital images, the taxon and the provenance of corals bycaught in New Zealand fisheries.

It is a legal requirement for fishers to report protected coral bycatch. Under the New Zealand Wildlife Act (1953) protected corals are protected whether they are dead or alive.

The instructions below are similar to the **INSTRUCTIONS FOR OBSERVERS AT-SEA INVERTEBRATE COLLECTION 2022,** as part of MPI's "Taxonomic identification of benthic invertebrate samples" project for the collection of non-coral invertebrates at-sea (also included in appendix 2 in Schnabel et al. (2024)). These instructions complement the Coral Identification Guide (Tracey et al. 2023), which should be used in conjunction with the most recent MPI Fisheries Observer Manual and Observer Briefing Notes, where reporting instructions are included. See the references list for links to additional identification resources.

We thank all Observers for following these instructions

Use the revised Coral Identification Guide (Tracey et al. 2023) to identify coral bycatch to species, genus, or family level using the correct 3-letter code. If you are <u>not</u> confident that you can identify to species, genus, or family level, then we encourage the use of the higher taxonomic level codes. Use this code on photograph and specimen labels, and in your reporting.

Sort – record – label – photograph – subsample

Sub-sampling corals

- For expert ID and research back on land, take a small clipping (5-10 cm) of each type of coral. Try to ensure it has tissue (not just skeleton).
- If multiple individuals of the same species occur in the same fishing event, it isn't necessary to sample all of them (but DO record their total weight AND sample weights and count individuals if applicable).
- Retain whole large, rare or intact colonies at your discretion and with permission of the crew.
- Coral rubble and dead coral rubble (code CBB, code CBD if dead) sub-samples should also be retained to confirm identification. Please see the Live Coral Status recording instructions at the end of this document. It is preferable to use a taxon code for identifying coral rubble rather than CBB or CBD.
- Populate the specimen label with all details and ensure the label details match your reporting. This allows us to accurately update the relevant databases. Follow the MPI Fisheries Observer Manual instructions for reporting.
- The label should be filled out in pencil (2B preferred) to include:

MPI Observers	AREA:
TRIP:	Tow/Set:
Observer Benthic Materials Form MPI sample ID: **B**	(write in pencil) MPI Species Code:
Comments:	
(NIWA use only) NIWA ID:	
OSD:	Specify:

- When a sub-sample is collected, please write 'sub-sample' on the label and on the Benthic Materials Form in the comments section
- Place the sample or the sub-sample in a plastic bag with a waterproof label facing outwards.
- Freeze immediately.
- If the coral is fragile, freeze it in a ziplock bag with enough seawater to cover it, or inside any small rigid container you have available (a box or recycled plastic container).

Instructions for observers

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Sub-sampling corals

1. For expert ID and research back on land, take a small clipping (5-10 cm) of each type of coral. Try to ensure it has tissue (not just skeleton).
2. If multiple individuals of the same species occur in the same fishing event, it isn't necessary to sample all of them (but DO record their total weight AND sample weights and count individuals if applicable).
3. Retain whole large, rare or intact colonies at your discretion and with permission of the crew.
4. Dead coral and coral rubble sub-samples can also be retained to confirm identification.
5. Place the sample or the sub-sample in a plastic bag with a waterproof label facing outwards, **filled out in pencil** (2B preferred) to include:

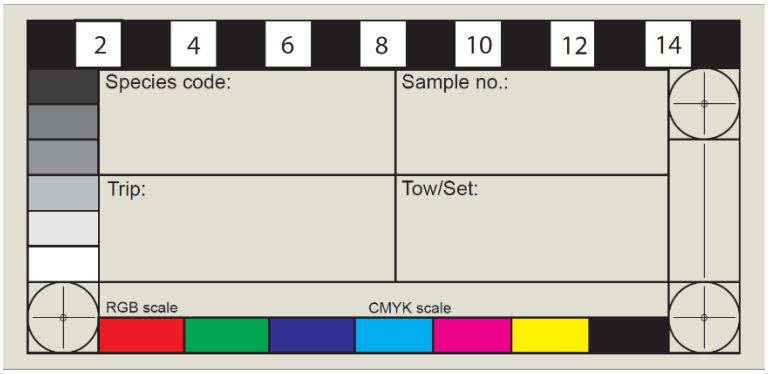
Observer: *(your name)*	**AREA:** (e.g., stat area, FMA)
TRIP:	**Tow/Set:**
Observer Benthic Materials Form: **FNZ Sample ID:**	**FNZ Species Code:** *(the lowest taxonomic level you are confident with - using this guide)*
COMMENTS: ***(****useful context, including if this is a subsample / whole specimen, and estimated* ***total*** *weight)*	

6. Freeze immediately. If delicate place in a bag of sea-water and freeze.

Page 33 of the Coral Identification Guide (Tracey et al. 2023)

Photographing

- Photographs should be taken of all coral bycatch.
- Separate the groups/species as well as possible and take photos of one species at a time, i.e., avoid grouping many different species together within the same image as it becomes difficult to process the image later.
- **Ensure the specimen label (as shown above) and/or the photo card (below) is filled in and showing in the photo**. You MUST include at least trip number, tow/set number, and the 3 letter species code, and sample number, so that the specimen and photo can be matched later.



- Take one image of the whole specimen, and if possible, capture a close-up image of a part of the specimen to provide more detail.

- If it's a particularly large coral, take several photos to show the whole colony and another of the label.
- Capture the image in good light and using a plain grey background if possible. Ensure the specimen is in focus and a size scale is included in the image.
- Please follow the Instructions in the MPI Observer Manual for taking digital images. Record all images in the photo log.

Examples of good specimen images. The images are of an entire specimen with a scale and a MPI specimen label or photo card with all required information filled in and showing within the frame. The specimen is in focus and the lighting is adequate.

Instructions for observers

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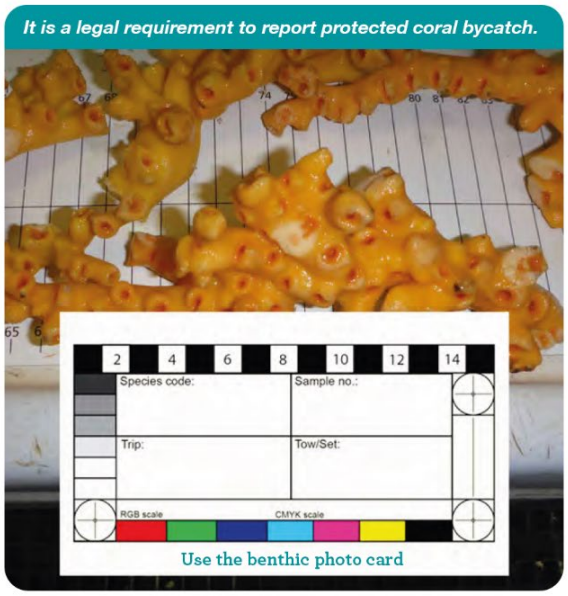
Sort - record - label - photograph - subsample

Use this guide to identify as best you can all coral bycatch per event to species, genus, or family level, and include the correct code on photograph and specimen labels, and in your reporting. This guide should be used in conjunction with the most recent MPI Fisheries Observer Manual and Observer Briefing Notes, where reporting instructions are included.



Photographing

Make sure to include a legible photo label in each image with trip and station number.

1. Photographs should be taken of all coral bycatch.
2. Separate the corals into groups /species, and photograph each type.
3. Make sure to include the benthic photo label (opposite) and make sure it is legible. You MUST include at least trip number, tow/set number, and the 3 letter species code, and sample number, so that the specimen and photo can be matched later.
4. Take one image of the whole specimen, and capture close-ups of part of the specimen to provide more detail.
5. If it's a particularly large coral, take several photos to show the whole colony and zoom into the label.
6. Capture things in good light, use a plain grey background if possible and ensure a size scale is included. Check images are in focus.
7. Record all images in the photo log.

Use the benthic photo card

1. Write down the information required **MUST include tow and trip number**.
2. Put this card next to the specimen.
3. Take photos with both the specimen and this card in the same frame.

Page 32 of the Coral Identification Guide (Tracey et al. 2023).

Freighting samples

Please follow the Transport Instructions in the MPI Fisheries Observer Manual, and send by frozen freight to:

NIWA, 301 Evans Bay Parade,
Hataitai, Wellington 6021
Attn: Jeff Forman

perishable goods - please put into a freezer on delivery

- Please check the MPI Fisheries Observer Manual, or during your trip pre-briefing, for instructions regarding specific project requests for samples by DOC or MPI. In some projects, the destination of samples may be different from the address given above.
- CONSIGNMENT NOTE: Please write TRIP No. and Vessel No. on the consignment note and if time allows a brief description of what is in the shipment helps.
- SACK, BOX, BAG: Please write on the outside of the sample bag / sack / box to be freighted frozen to NIWA, the TRIP No. and if possible, the Consignment note No. This helps NIWA keep track of samples.
- It is also helpful to place one of the spare copies of the Observer Specimen and Sample Log sheet (in a sealed plastic bag), inside the sack/ box/ bag with the samples.
- If the shipment is not able to be sent by frozen freight, then please mark the package with "**perishable goods - please put into a freezer on delivery**".

LIVE STATUS OF CORALS:

Report prepared by: Di Tracey with input from Sadie Mills, Diana Macpherson, and Rob Stewart (all NIWA).
For: Data Management team (MPI): Job number: CD10266
20 October 2015.

Live status of corals:

Current options to record life status on the MPI Benthic Materials Form are:
1 = Appeared Alive
2 = Non - biological or Dead (showing no signs of life)
4 = Decomposing
5 = Unknown (e.g., not recovered).

Additional descriptive text for 'Live status of corals' in italics, provided as requested to supplement the options on the MPI Benthic Form.

1 = Appeared Alive

*Appearance of colour on the skeleton / parts of the skeleton including pink, red, purple, yellow, grey, white, brown. Fleshy material often visible inside the cups although the soft fleshy tentacles retract into the small polyp (cup) on the branching form and live material can be hard to discern (**stony corals*** – branching and cup forms);*

*Polyps and live tissue visible on branchlets / branches. Polyp colours include red, orange, white, brown, brown-grey, yellow. Branch metallic, shiny, lustrous black (**black corals**).*

*Polyps and live tissue visible on branchlets / branches / trunk. Colours vary and includes red, orange, yellow, purple, brown polyps as well as some branches for some genera (**gorgonian corals**).*

*Fleshy and large single polyp coloured red, cream, orange. Tube form joined by runners, fleshy and coloured red, white, yellow (**soft corals**).*

*Fleshy stalk and polyp leaves. Polyps at the top or along the side of the animal visible. Colour red, cream, brown, orange, grey (**sea pens**).*

*Colony colour strong throughout the skeleton for pink, red forms. Colour even and white all over for other genera. All have the pore-like apertures visible (**hydrocorals**). The feathery non calcified forms (**hydroids**) brown, grey. Alive if you could see the polyps or even the tentacles of the polyps – but this is only easily carried out on larger specimens).*

2 = Non - biological or Dead (showing no signs of life)

*No colour on the skeleton, appear white and bleached, grey, or black (ferrous oxide coating occurs in some NZ regions). No flesh visible, crumbling and brittle (**stony corals**).*

*No polyps visible on any part of branches / trunk. Branch lacks lustre, can be brittle (**black corals**).*

*No live polyps or tissue visible on branchlets / branches / trunk. Colour washed out, white and brittle (**gorgonian corals**).*

*Animal remains fleshy but decomposing and faded colour (**soft corals**).*

*Fleshy but washed-out colour, naked brittle stalk, decomposing (**sea pens**).*

*Brown, grey in colour, no pore-like apertures visible, (**hydrocorals**). Hydroid form would be brittle and hard if dead with no tissue, naked with no hydranths/polyps).*

4 = Decomposing
Most likely a state only for the soft corals and some sea pens – smell a key here and the animal would be crumbling / disintegrating. Not often seen in this state.

5 = Unknown (e.g., not recovered).
NA

***3-D matrix forming stony branching corals:**
Coral reef comprises live coral growing on the top of the recently dead, and long dead stony branching coral 3-D matrix. The coral grows to form colonies and then a reef structure. The healthy growing portion of the colony, often measuring several metres in diameter, need substrate such as the matrix structure, to grow. There is often debate about the 'live status' of the stony coral reef. Where does the live coral end and the 'building blocks' matrix of the reef begin.

Trawling can impact the coral reef matrix and it becomes broken and scattered. Often this occurs when the live abundant colonies often seen on the top of seamounts or on rocky out-crops are impacted and the coral becomes dispersed. This impacted coral often builds up at the base of the seamount, in clumps behind boulders along the seamount flank, or on the slope. The once intact reef turns into coral rubble. Trawling can return all parts of the reef – in this instance, one would record 'live' coral on the form if live material is present, 'dead' if the coral is clearly all rubble.