



Department of
Conservation
Te Papa Atawhai



Identification and storage of cold-water coral bycatch specimens INT2015-03

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Conservation Services Programme Annual Plan 2016/17
multi-year project (INT2015-03) was consulted on in 2015/16

Identification and storage of cold-water coral bycatch specimens

Project Code: INT 2015-03

Start Date: 1 October 2016

Completion Date: 30 June 2018

Guiding Objectives: CSP Objectives B, C, & E.

CONTEXT

Identify coral bycatch that cannot be identified by Government fisheries observers to the finest taxonomic level (assign codes to coral specimens to the species level wherever possible, when this is not possible; identify specimens to genus or family level).

Overall Objective

The overall objective is to determine which protected cold-water coral species are captured in fisheries and the mode of their capture, while also building on New Zealand cold-water coral collection sample size for use in future research.

Specific Objectives

1. To determine, through examination of returned cold-water coral specimens and photos, the taxon, and where possible the provenance of cold-water corals killed in New Zealand fisheries (for returned dead specimens).
2. To collect sub-samples of all protected cold-water coral specimens for genetic analysis in future.

(Milestones 1-15)

Deliverables

The key deliverables are:

1. A written summary of results, for circulation to stakeholders, on a six monthly basis.
2. Supply of information requested by CSP within a reasonable timeframe (usually 10 working days).
3. Annual report(s) of confirmed identification, provenance and all other data collected, of all specimens examined. To the extent possible, the final report will also identify potential interactions between corals collected and fishing gear, and identify factors that may have contributed to coral mortality. Data will be reported by fishery stratum (fishing method, fishery area and where possible target species).
4. Presentation of six monthly and annual reports to the CSP Technical Working Group.
5. Provision of all data collected in electronic format, suitable for updating Ministry for Primary Industries databases and/or other relevant databases.

MPI db's = COD; trawl

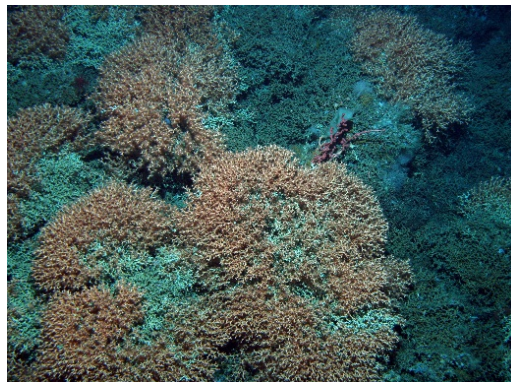
Background



The 2010 amendment of Schedule 7A of the Wildlife Act 1953 protects all hard corals, including: black corals (all species in the order Antipatharia); gorgonian corals (all species in the order Alcyonacea (previously known as Order Gorgonacea)); stony corals (all species in the order Scleractinia); and hydrocorals (all species in the family Stylasteridae).

Observers on commercial fishing vessels are not always able to identify cold-water corals at sea with high precision (especially down to the species level) with the identification of bycaught individuals often requiring identification from a coral taxonomist in the majority of cases. Identifying coral bycatch that is unable to be identified by Government fisheries observers to the finest taxonomic level provides vital baseline information that can help to better inform research and marine protection such as predictive modelling, benthic risk assessments and management of benthic marine protected species.

Investigating the interaction between commercial fishing vessels and protected cold-water corals in New Zealand waters will allow for a more comprehensive mitigation framework to be implemented in future resulting in the continued protection of protected cold-water corals in New Zealand waters.



Description of Services

Cold-water coral specimens' bycaught in commercial fishery operations are taken by government observers on commercial fishing vessels

Standard procedures:

- Observers carry out protected coral bycatch identifications at sea using classification guides – any they are unsure of, unusual, not in usual distribution range, the samples are returned for confirmed identification
- All data recorded electronically at sea & on benthic / catch forms
- After identifications are made on land, relevant databases are updated

A requirement of CSP (for other invertebrate fauna, marine mammals, this is a requirement of MPI)



Methods

Overall summary of tasks



Objective 1:

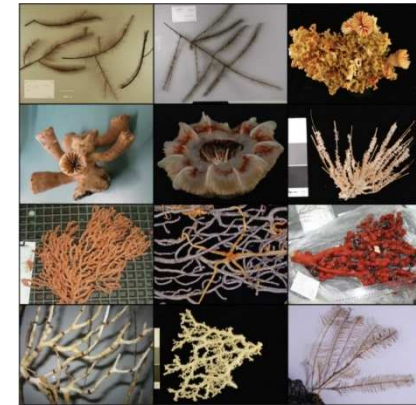
To determine, through examination of returned cold-water coral specimens and photos, the taxon, and where possible the provenance of cold-water corals killed in New Zealand fisheries (for returned dead specimens).

A similar method used to process by-catch collected by Government fisheries observers under MPI Project DAE2016-01, will be followed here (*DAE Project deferred*)

At-sea instructions to Observers

- Liaise with Observer Services Unit (MPI) to ensure at-sea instructions and relevant guides are provided to Observers on deepsea commercial vessels
- Instructions will include:
 - Follow Benthic Invertebrate Guide and Coral Guide Instructions
 - Use live status of corals information
 - Additional instructions for image collection
 - Labelling instructions stressed

If in any doubt of identification at-sea we encourage Observers to go to a higher level of identification on the benthic forms and that they retain specimens (whole or sub-samples) and take photographs for formal identification ashore by experts



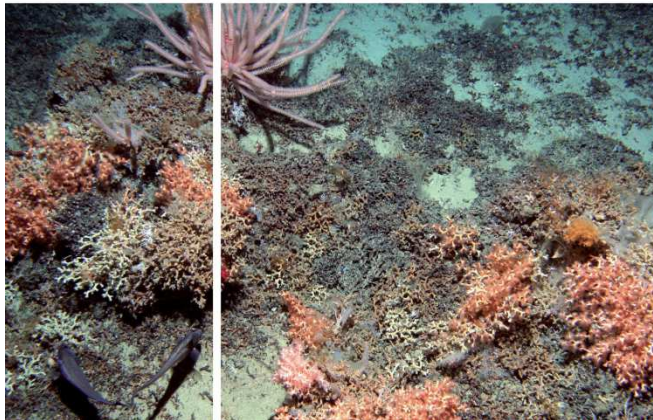



Ministry of Fisheries
Te Taiwhiri i te Moana hiri

A guide to common deepsea invertebrates in New Zealand waters

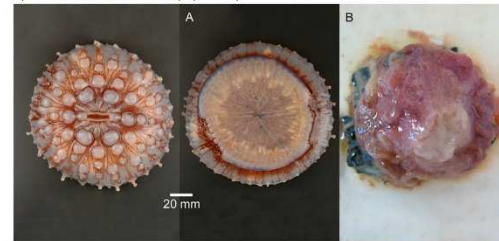
Third edition

New Zealand Aquatic Environment and Biodiversity Report No. 86
ISSN 1176-9440
2011



Phylum Cnidaria
Class Anthozoa
Order Corallimorpharia (coral-like anemones)
Family Corallimorphidae

(Coral-like anemones) (CLM)



Distinguishing features: Corallimorpharians are solitary animals morphologically intermediate between members of hexacorallian orders Actiniaria (sea anemones) and Scleractinia (stony corals). The consistency of the animal can be stiff and cartilaginous (A) or soft with copious mucus (B). The mouth is central and slit-like, tentacles are simple, and may be arrayed radially and in cycles. In members of family Corallimorphidae, each tentacle typically terminates in a bulbous sphere in which nematocysts are dense. The oral and pedal discs are circular and roughly similar in diameter; the oral disc can be flat to strongly domed; the column more or less cylindrical. There are 3 species of *Corallimorphus* in the New Zealand region, including the new species *C. niwa* (A). *C. profundus* commonly occur in the Ross Sea region and are often in poor condition when sampled by longlines. (see Figure B, pedal view of a frozen then thawed *Corallimorphus* species).

Colour: Pink, cream, yellowish, some brownish and rust red in animals that retain pigmentation.

Size: Diameter 30 to 125 mm.

Distribution: New Zealand deepsea region and Ross Sea.

Depth: 947 to 1773 m in New Zealand waters. Globally 30 to 4429 m.

Similar species: Could be confused with sea anemones such as *Liponema* and *Bolocera*.

References: Fautin D.G. (2011) *Corallimorphus niwa* new species (Cnidaria: Anthozoa), New Zealand members of *Corallimorphus*, and redefinition of Corallimorphidae and its members. *Zootaxa* 2775: 37–49.

Compiled by NIWA on 30/08/2011

Guides: Help improve accuracy of data
More recent Guide publications (e.g., black coral guide) are referred to in the Instructions to Observers document

Methods

Overall summary of tasks cont'd



Objective 1: Sample sorting at NIWA

- Protected corals returned by observers from commercial fishing voyages will be thawed, sorted into main groups and identified to coarse taxonomic level (generally class/order level)
- fixing & preserving samples, providing containment documenting samples (station numbering, labelling), sorting (dividing samples into major or minor taxonomic groups – ‘taxa’ – in the laboratory, covered under MPI project DAT2016-01E
- Tissue samples taken during the sorting thawing process stored in 99% high grade absolute ethanol for future molecular work
- Data entered into the web-interfaced NIWA Observer Samples Database (*OSD*), then returned to frozen storage, fixed in ethanol, or dried where appropriate
- Catalogue of all samples/specimens received in NIWA Invertebrate Collection (NIC) db *Specify*

*All protected coral specimens are held at the NIC in stewardship for
DOC*



Methods

Overall summary of tasks cont'd



Objective 1: Sample identification

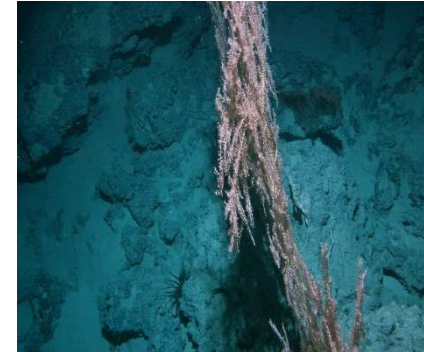
Protected coral specimens will be curated and examined at NIWA to determine their taxonomic identification.

The methods will follow NIC procedures for identifying fauna

- Accumulated protected corals stored in the NIC identified by experts as project progresses
- Emerging NIWA experts and international expert taxonomists will carry out the identifications (see next slide)
- Samples identified to the lowest feasible taxonomic level
- Updated species names (to lowest taxonomic level possible), and counts entered into *Specify* db
- No more than 200 protected coral samples identified per annum
- If time allows, the backlog will be identified – i.e., if 200 samples not returned by Observers, sample numbers will be made up from historical accumulated samples held in the NIC

- *Specify* output to COD data manager for COD field updates

2ND priority: research trawl protected coral samples identified



Methods

Overall summary of tasks cont'd



Objective 1:

Species identification and classification; visiting experts

- NIWA has established strong relationships with overseas coral taxonomists
- NIWA will take advantage of visiting taxonomists to identify material collected where local expertise does not exist

International collaborators and experts we can contact for this project are listed

Some of these experts will be funded from by the Project to visit the NIC

Taxonomic group	Expert
Stylasterid hydrocorals	Stephen Cairns (Smithsonian Institute, US); Marcelo Kitahara (Marcelo Kitahara (Universidade Federal de São Paulo, Brazil); Narissa Bax (UTas, Australia); Peter Marriott (NIWA)
Gorgonian octocorals:	
– Plexaurids	Phil Alderslade (CSIRO, Australia); Kirrily Moore (Tasmanian Museum, Australia); Sonia Rowley (University of Hawai'i at Manoa and Research Affiliate - Bishop Museum, US); Jaret Bilewicz (NZ); Sadie Mills; Kareen Schnabel (NIWA)
– Primnoids	Stephen Cairns; Kirrily Moore; Sonia Rowley; Jaret Bilewicz
– Isididae (bamboo corals)	Luisa Duenas (Universidad de los Andes, Colombia)
– Paragorgids (bubblegum)	Juan Sanchez (Universidad de los Andes, Colombia); Santiago Herrera (Lehigh University, US)
Antipatharian black corals	Dennis Opresko (Smithsonian Institute – Associate, US); Mercer Brugler (NYC College of Technology Museum, US); Rob Stewart (NIWA)
Scleractinian stony corals	Marcelo Kitahara; Stephen Cairns; Di Tracey (NIWA)

Methods

Overall summary of tasks cont'd



Objective 1:

1. Database outputs

Example of Specify details to produce summary extract

Trip_code

- Station_no
- NIWA number
- OSD Number
- Observer ID label
- Initial ID
- Phylum
- Order
- Family
- Genus
- Species
- Determiner - Expert identifiers name (most recent expert ID)
- Determined date
- Weight of sample if available
- Weight of catch if available
- Count

2. Database updates – COD

Sample data loaded database 'load' table, z_invertebrate_samples.
data used to update catch records in the stage and report tables, y_benthic, and x_fishing_event_catch

- Spreadsheet of summary *db* outputs provided to CSP
- Species summary by
 - fishery stratum,
 - fishing method,
 - fishery area, and
 - target fish species



Methods

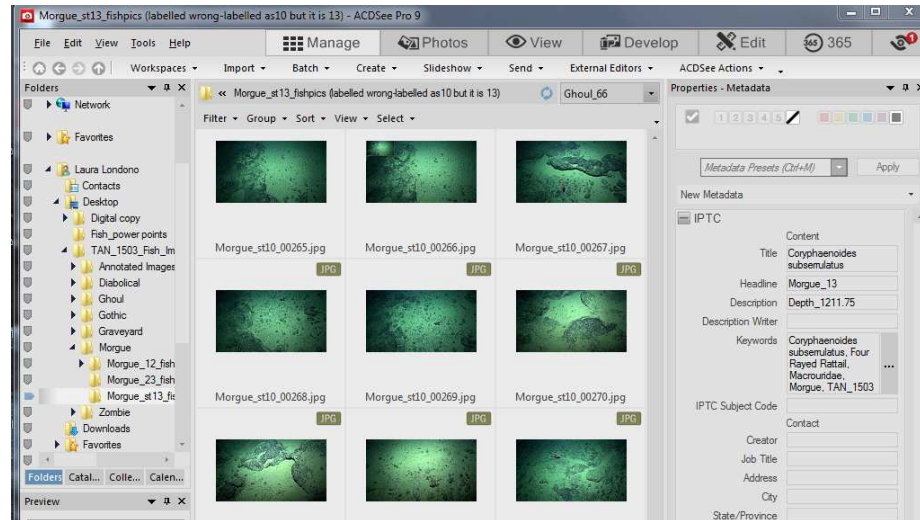
Overall summary of tasks Obj 1 cont'd



Objective 1:

Photographs - the identification and georeferenced labelling of images and the digital storage there-of

- Observer Services Unit (MPI) and CSP ensure protected coral images are provided to NIWA
- Identification of protected corals in photos made and the images georeferenced to show provenance (see next slide)
- No more than 200 specimen images will be identified per annum





Example of methods that will be followed to add metadata information – e.g., species name, position, depth, observer name), to images

1. Image
2. Drop Down Boxes To Select Information To Use For Metadata
3. Descriptive Data Output
4. Summary Output Table

The workflow involves three main steps:

1. Image: A photograph of a fish is shown in a viewer window.
2. IPTC Keywords Picker: A dialog box where available values (e.g., Lepidion microcephalus, Longnose velvet dogfish) are selected and assigned to the image.
3. Properties - Metadata: A dialog box where the selected keywords are used to populate metadata fields like Title, Headline, and Description.

FishAssociation_RAWspreadsheet.xlsx - Excel

Formula bar: =VLOOKUP(H321,E:\[FOP_posi_Rawdata.xlsx]Morgue13!\$F\$2:\$W\$3863,18,FALSE)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Event	Voyage	Segment	Transect	Station no	% of fish observation (f	Decimal time	Fixed time	depth	Observation Longitude	Observation latitude	Reference #	2nd viewing	Common name ID	Latin ID	Family	
1	Tan_1503	Morgue	W	13	###	###	0.0	901.44	###	###	###		Video start	Video		
2	Tan_1503	Morgue	W	13	###	###	0.0	900.14	###	###	1		Banded rattail	Coelorinchus fasciatus	Macrouridae	
3	Tan_1503	Morgue	W	13	###	###	0.0	900.65	###	###	2		Cardinal	Epigonus spp.	Epigonidae	
4	Tan_1503	Morgue	W	13	###	###	0.0	902.3	###	###	3		Cardinal	Epigonus spp.	Epigonidae	
5	Tan_1503	Morgue	W	13	###	###	0.0	901	###	###	4, 5		n/a	n/a	n/a	shark - image poc
6	Tan_1503	Morgue	W	13	###	###	0.0	903.75	###	###	6		Smooth oreo	Pseudocyttus maculatus	Oreosomatidae	
7	Tan_1503	Morgue	W	13	###	###	0.0	903.75	###	###	7		Cardinal	Epigonus spp.	Epigonidae	
8	Tan_1503	Morgue	W	13	###	###	0.0	905.58	###	###	8		n/a	n/a	Moridae	Image too dark/f
9	Tan_1503	Morgue	W	13	###	###	0.0	905.58	###	###	9		Nezumia namatahi	Nezumia namatahi	Macrouridae	
10	Tan_1503	Morgue	W	13	###	###	0.0	909.9	###	###	10		Smooth oreo	Pseudocyttus maculatus	Oreosomatidae	
11	Tan_1503	Morgue	W	13	###	###	0.0	910.04	###	###	11, 12		Smooth oreo	Pseudocyttus maculatus	Oreosomatidae	
12	Tan_1503	Morgue	W	13	###	###	0.0	913.02	###	###	13		Unknown rattail 10	n/a	Macrouridae	
13	Tan_1503	Morgue	W	13	###	###	0.0	913.82	###	###	14		Orange roughy	Hoplostethus atlanticus	Trachichthyidae	
14	Tan_1503	Morgue	W	13	###	###	0.0	921.46	###	###	15		Smooth oreo	Pseudocyttus maculatus	Oreosomatidae	
15	Tan_1503	Morgue	W	13	###	###	0.0	921.46	###	###	16		n/a	n/a	Macrouridae	Image too dark - r
16	Tan_1503	Morgue	W	13	###	###	0.0	921.46	###	###	17		2 banded rattail	Coelorinchus matamua	Macrouridae	Image too dark
17	Tan_1503	Morgue	W	13	###	###	0.0	926.49	###	###	18		Unknown rattail 2	n/a	Macrouridae	image too dark
18	Tan_1503	Morgue	W	13	###	###	0.0	926.93	###	###	19		Unknown rattail 10	n/a	Macrouridae	
19	Tan_1503	Morgue	W	13	###	###	0.0	926.93	###	###	20		n/a	n/a	Moridae	fish hidden
20	Tan_1503	Morgue	W	13	###	###	0.0	935.15	###	###	21		n/a	n/a	n/a	Dogfish- image to
21	Tan_1503	Morgue	W	13	###	###	0.0	935.15	###	###	21		n/a	n/a	n/a	Dogfish- image to
22	Tan_1503	Morgue	W	13	###	###	0.0	939.39	###	###	22		Cardinal	Epigonus spp.	Epigonidae	
23	Tan_1503	Morgue	W	13	###	###	0.0	940.68	###	###	23		Cardinal	Epigonus spp.	Epigonidae	
24	Tan_1503	Morgue	W	13	###	###	0.0	940.67	###	###	23		Orange roughy	Hoplostethus atlanticus	Trachichthyidae	

Methods



Objective 2: To collect sub-samples of all protected cold-water coral specimens for genetic analysis in future

Objective 2:

Tissue samples will be taken from all protected coral samples and stored in standard vials in 99% high grade absolute ethanol with a unique label

Method including fixation requirements discussed with geneticists Peter Ritchie and Lyndsey Holland (VUW)

NIC Manager will also be available to ensure the correct procedures are followed for genetic tissue sampling as this work is carried out routinely in the NIC

Genetic identification from more detailed analysis using, for example, next-generation sequencing, would be carried out at a later date and will depending on what species tissue samples have accumulated



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