



Identification of protected corals

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Reviewed and Approved for release by:



Dr Don Robertson

1. Executive Summary

This final research report presents on the requirements of Project DOC08309 INT2007/03: To identify samples of corals returned through the CSP observer programme during the 2007/08 fishing year (1 October 2007 – 30 September 2008).

Protected species need to be adequately described to ensure legal obligations of the Wildlife Act are followed. As such, samples of protected coral taxa, or of coral species that may appear to be a protected coral taxa, have been returned by observers from commercial fishing vessels as part of the Department of Conservation CSP Observer Programme requirements.

The coral by-catch samples (n=539), were sorted and identified to lower taxa (families, genera, species). Overseas experts confirmed the coral species identifications. Using common links of *trip_number* and *station_number* the Centralised Observer Database (*COD*) was updated with the correctly identified MFish species codes. NIWA Collections (NIC) database *Specify* also stores the information as coral samples are held in stewardship by NIWA for the Department of Conservation. Historical coral material that was previously received by Te Papa, were provided to NIWA and form part of the database summaries. Educational material to aid species identification has been prepared in the form of a Coral Guide (Tracey et al. 2007).

All associated event data (e.g. target species, depth), have been made available in order to help monitor and quantify protected species interactions with commercial fisheries. Fisheries that have had corals recorded as by-catch include those for deepwater and middle depths species such as orange roughy, black oreo, hoki, squid, and white warehou.

The deepsea coral samples returned by observers represent a valuable data source that can be used to elucidate the relationships between invertebrates and commercial fishing activity. The sample data will enable researchers and managers to help identify where specific coral groups and their associated fauna are at the highest risk of interactions with fishing gear.

2. Overall Objective

To identify samples of corals returned through the CSP observer programme during the 2007/08 fishing year (1 October 2007 – 30 September 2008).

2.1 Specific Objectives:

- 1) Samples of corals returned by observers to be identified to lower taxa (families, genera, species);
- 2) Update the Centralised Observer Database (*COD*) as necessary with correct species identifications;
Note: “*COD*” is a new MFish database that includes the previous database named *observer (obs)*.

- 3) Develop concise educational materials to complement *A Guide to Common Deepsea Invertebrates in New Zealand Waters* for observers on the identification of protected corals known to be caught during trawling.
- 4) A variation to project – process and identify the “historic” MFish Observer coral samples (stored at Te Papa).

2.1.1 Specific Objective 1.

The objective consists of 5 main tasks:

- providing input into MFish observer briefing process
- sorting frozen samples to putative identification level
- entering data into Excel spreadsheet
- taxonomists confirm identification
- Excel spreadsheet updated and data entered into *Specify* database

Task 1: Providing input into observer briefing process.

As part of this project, there has been no input into the coral observer briefing process since June, 2008.

Tasks 2–5: Sorting frozen samples to putative identification level, entering data into electronic spreadsheet, confirming identification, spreadsheet updates, entry into *Specify* database

Methods used follow those already established and detailed in Tracey & Consalvey (2005), and Tracey et al (2007). The coral taxa that have been returned by fisheries observers from commercial fishing voyages were thawed, sorted into main groups, identified to the lowest possible taxonomic level by Di Tracey, returned to frozen storage, the data entered onto a recording form and subsequently entered into an electronic spreadsheet. Any voucher specimens were registered and fixed, and these will be maintained in the NIWA Invertebrate Collection (NIC). Specimens are held in stewardship for the Department of Conservation.

Samples retained at NIWA have been catalogued and loaded into the NIC *Specify* database – the database that manages data for all invertebrate specimens held at NIWA.

All coral fauna excluding the black corals, were identified, to the lowest taxa possible, by Juan Sanchez (June 2008) and by Juan and other coral experts visiting NIWA in December 2008. The black coral (*Antipatharia*) samples were identified by Dennis Opresko, Oak Ridge National Laboratory, USA, (who was funded in part by this project) and Tina Molodtsova (Shirshov Institute of Oceanology). Steve Cairns (Smithsonian Institution), identified *Scleractinia* and *Stylasteridae*; Les Watling (University of Hawaii), Scott France (University of Louisiana at Lafayette), and Asako Matsumoto (University of Tokyo); identified *Octocorallia* (Gorgonian corals).

There is reasonable agreement between the sorted and confirmed identifications. Easily confused species include some of the stony branching corals (e.g. *Madrepora oculata*, *Enallopsammia rostrata*, *Goniocorella dumosa* and *Solenosmilia variabilis*), black corals (*Antipatharia*) and some of the hydrocorals and gorgonian corals (e.g.

Primnoidae). The training workshops held at NIWA in December, 2008, improved our coral identification skills for these challenging groups.

NIWA has processed all CSP observer coral samples collected up to October 2008. These include the historical samples collected from Te Papa (Project variation Objective 4). The number of corals species processed for 2007/08 is 539.

36 MFish/CSP fisheries observer trips have been processed as part of the project. At times labels could not be read which makes for some inconsistencies in the data sets. Data grooming continues.

The samples were collected from 13 target fisheries: ATO Antarctic toothfish, BAR barracouta, BOE black oreo, CDL cardinalfish, HAK hake, HOK hoki, JMA Jack mackerel, LIN ling, OEO oreo, ORH orange roughy, SQU squid, SSO smooth oreo, WWA white warehou.

Due to their condition, some samples can only be identified to a higher level – order, or even phylum. The Cnidaria phylum includes Anthozoa, Hydrozoa, Scyphozoa – corals, anemones, jellyfish, and hydroids, hence all these groups have been included in the summary list. When possible, hydrocorals (stylasteridae, HDR) have been identified further to either hydrocoral (COR) or Hydroid (HDF).

Outputs of the observer collected corals can be produced from *Specify* by NIC staff with the following database headers:

Catalog number	(NIC <i>Specify</i> database Catalogue number)
Trip	
Station	
Latitude_start	
Longitude_start	
Start depth	
PhylumTaxonName	
ClassTaxonName	
SubclassTaxonName	
OrderTaxonName	
FamilyTaxonName	
GenusTaxonName	
SpeciesTaxonName	
Determination	(species name e.g. <i>Madrepora oculata</i>)
Lot number	
No of specimens	
Identified by	(e.g. Sanchez, Juan A.; Cairns, Stephen; Opresko, Dennis)
Date last modified	(e.g. 9122008 10:10:33 a.m.)
Remarks	(Opresko, Dennis Sub-sampled from oversized <i>Bathypathes B</i> (orange) from freezer for genetics; Dead or Live status)

Trip and station are the common links to *COD* (see Objective 2 below), which will enable subsequent *COD* updates to be made from this *Specify* update if a species revision occurs. No MFish species codes are entered into *Specify*.

All, or sub-samples of all specimens, are currently being retained due to their potential future research value. Where species identification of bubblegum, bamboo, and precious corals required molecular phylogenetic analyses or genetic analyses, tissue samples were removed (Juan Sanchez, Universidad de los Andes, Colombia).

Appendix 1 shows the final identification to lowest possible taxon. 562 coral records have been entered. Appendix 1 is an updated version of the previous report Appendix 1 (see Tracey, September 2008). More trips and species are listed in this *Specify* output than in the sorted sample list and in the *COD* output (see below), as:

1. Earlier observer trip samples (pre-contract) are held at NIWA and specimens were located and identified by experts in December.
2. Some black corals were accessed from Te Papa in December 2008 and we now hold voucher specimens from these corals at NIWA.
3. Some specimens have been discarded.

Note at the time of the *Specify* extract some trips were not available from *COD* as they have not been loaded.

2.1.2 Specific Objective 2. Update the Centralised Observer Database (COD) as necessary with correct species identifications

This objective was to be reported on at project completion, January 2009.

The final stage of this project was to update the “*COD*”. As well as entering the data into the NIC *Specify* database, the sorted corals data have been loaded into the Ministry of Fisheries Observer database “*COD*” (previously named *observer (obs)*, and maintained by NIWA for the Ministry of Fisheries.

The Ministry of Fishery’s Research Data Management (RDM) contracted Data Manager (NIWA) was provided with the coral spreadsheet data to enable *COD* to be updated as required under this and the MFish DAT200601E Project.

The data including species codes, weights, and sample numbers were entered into tables in *COD* (539 records) All data were entered using the common link of *trip_number* and *station_number*. Any updates from the expert taxonomist’s identifications provided in December 2008 can be made subsequent to loading but some specific codes are not yet available, e.g. the black corals and several other species.

Data were extracted by linking ‘catch effort’ (CE) and ‘green weight’ (catch weight) records from observer data to ‘ID’ records.

Linking using the ‘*fishing_event_key*’ only will link each species in each data set to each other, and so we have also linked where the ‘*obs species*’ = ‘*sort_id*’, as this will provide the closest identification (*sort_id*) to the recorded *obs green weight* (these two fields should be the same). In addition we have inserted records where there was not a direct link on the species codes (for example trip 1823 station 63, observers recorded COU, JFI and the spreadsheet listed 3 corals - BOO CGR SVA). There are also trips without CE data (Antarctic toothfish (ATO) trips).

All associated event data returned by observers (e.g. target species, gear type) are now included along with the coral data in a spreadsheet summary from *COD* (Appendix 2).

The compiled data are provided in order to help monitor and quantify protected species interactions with the various commercial fisheries.

Ministry of Fisheries Research Data Management Group (Kim George and Craig Loveridge), have informed us that the Government Observers are now using the 'Observer Benthic Materials Form', and as such they do not enter the same invertebrate 'materials' data into the green weight section of the catch forms, for the same catch.

The *COD* extract excel spreadsheet (Appendix 2), are the updates where coral samples were recorded on catch forms and the subsequent sorted and confirmed identifications of corals returned for identification by:

trip_number
station_number
target_species
start_bottom_depth
end_bottom_depth
event_start_date
trunc_start_latitude
trunc_start_longitude
trunc_end_latitude
trunc_end_longitude
sample_no
label_id (MFish code; often not provided)
sort_id (by NIWA experts)
expert_id (overseas expert's species identification - groundtruthing)
final_id
scientific_name
common_name
est_weight (estimated weight in kg)
status (specimen 'live or dead' status)
species
sci_name
comm_name
greenweight (from catch)

From the MFish species codes links are made to Species Master to obtain the species, scientific, and common names.

At this stage NIWA are awaiting a formal contract with the Research Data Management Group to load the Observer Benthic Materials Forms to *COD*. This means there is currently a problem linking the identified data, if they are only recorded on Benthic Materials Forms and not in 'catch'. As such there are missing data points in Appendix 2.

In *COD* 36 trips have been updated from 13 target fisheries for this project. A total of 47.5 t of Cnidaria (corals, anemones, jellyfish, and hydroids) has been recorded from these trips. However in *COD* the overall total weight of Cnidaria recorded is over 670 t (1052 records).

The extract shows that we have also sorted coral samples from CCAMLR surveys. These have been processed as the samples had no clear identifier that they came from the Ross Sea region. We recommend that the bag has "Antarctic Waters" or "Ross

Sea” written on the outside or that funding be sought to process these samples simultaneously.

2.1.3 Specific Objective 3.

The “Coral Identification Guide” has been published (Tracey et. al.2008). Some updates are required and visiting coral experts who read over the guide in December 2008 have suggested some additions / changes.

Tracey & Mackay (2008) presented on the Coral Guide at the Deepsea Coal Symposium. The Guide has been highly praised by the Observers and by the scientific community both in New Zealand and overseas and we again thank DoC for the funding to produce this useful resource that complements the Invertebrate Guide.

2.1.4 Specific Objective 4

A variation to project - based on additional funding was to process and identify the “historic” MFish Observer coral samples (stored at Te Papa).

In addition to the observer coral samples processed since October 2007, corals and other invertebrates as well as fish samples stored at Te Papa in the last few years, have now also been processed at NIWA. The corals from Te Papa were processed with additional funding provided by DoC and the other invertebrates were processed under MFish funding. These are also recorded in Appendix 1.

MFish covered the cost of updating the historic data in *COD* (under DAT200601E Project). DoC covers *COD* updates for the current project. The data from the historical samples are included in Appendices 1 and 2.

At some stage the *COD* may be updated with the information from the samples already processed by Te Papa or by Dr W. Blom, Marine Department, Auckland War Memorial Museum. DoC has requested that a list be provided by Te Papa of the processed and identified samples. These already identified historical invertebrate material, specifically voucher specimens, that have been received by Te Papa over the last few years and subsequently identified would require confirmed identification by an experienced taxonomist, would, for completeness, need to be assigned appropriate Ministry of Fisheries species codes, and the data entered into the *COD*. These tasks require additional funding.

We noted above that some black corals were accessed from Te Papa in December 2008 and we now hold voucher specimens from these corals at NIWA and the information is stored on *Specify*.

3. General comments:

- The Observer Benthic Materials Forms need to be loaded into *COD*.
- New MFish codes need to be allocated to corals species, and families.
- Some outstanding invertebrate material lists held by Te Papa need to be entered into *COD* and *Specify* if vouchers are obtained by NIC.
- Some updates would benefit the Coral ID Guide.
- The coral collection programme and accurate identification data can be used to assess the incidental catch of corals (Rowe and Tracey 2008), to contribute to producing protected or proposed to be protected species distribution plots (Rowden et al. 2008), for systematics and species identification (Sánchez et al. 2008), and to elucidate the relationships between invertebrates and commercial fishing activity (see Appendix 3, Tracey et al. 2008).

4. Acknowledgements

Thanks to the Government Observers who have collected the coral samples for this project. Special thanks to NIWA staff particularly Dean Stotter for his input into the sample sorting, along with Mark Fenwick. Thanks to Brian Sanders for updating the Centralised Observer Database (COD) and for carrying out data extracts, and to Karen Schnabel and Sadie Mills (NIC) for ensuring data were entered into *Specify* and for data extracts. We are most grateful to taxonomists Juan Sanchez (Universidad de los Andes, Colombia) and Dennis Opresko (Oak Ridge National Laboratory, USA, (visits partly funded by DOC project) as well as visiting taxonomists to NIC who were able to contribute to the identifications of the observer collected Cnidaria: Tina Molodtsova (Shirshov Institute of Oceanology). Steve Cairns (Smithsonian Institution); Les Watling (University of Hawaii), Scott France (University of Louisiana at Lafayette), Asako Matsumoto (University of Tokyo); Daphne Fautin (University of Kansas); Frederic Sinniger (University of the Ryukyus1 Senbaru, Okinawa). I wish to acknowledge Erika Macaky for her help in producing the Coral Identification Guide and Don Robertson Chief Scientist, Biodiversity and Biosecurity, and Project Manager, for his thorough and helpful review of this document. Finally thanks to Johanna Pierre and Stephanie Rowe (DoC), for awarding NIWA this project and to Stephanie for her on-going support interest in coral by-catch in the New Zealand fisheries.

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6. **Appendices** (available on request from the Marine Conservation Services Manager, DOC)

Appendix 1: Specify export January 2009 spreadsheet.

This Appendix provides a summary of Cnidaria (Anthozoa, Hydrozoa, Scyphozoa – corals, anemones, jellyfish, and hydroids), by-catch processed to date by NIWA as part of the DOC08309 Project. Samples include the historical samples collected from Te Papa. Species have been confirmed by expert taxonomists as recently as December, 2008. Some samples can only be identified to a higher level – order, phylum. No species codes are entered into the Specify database.

Appendix 2: COD extract January 2009 spreadsheet

This Appendix provides a summary of Cnidaria (Anthozoa, Hydrozoa, Scyphozoa – corals, anemones, jellyfish, and hydroids), by-catch processed to date by NIWA as part of the DOC08309 Project. Samples include the historical samples collected from Te Papa. Species have been confirmed by expert taxonomists. Some samples can only be identified to a higher level – order, phylum.

Appendix 3:

New Zealand's protected corals: what do we know? Poster