

## **5th Meeting of the Scientific Committee**

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### **SC5-DW02**

New Zealand's exploratory fishery for toothfish within the SPRFMO Area:  
update and future directions

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## Executive summary

The 2-year programme of exploratory fishing provided for by CMM 4.14 has been successfully completed and new and important biological information has been collected on toothfish. The key findings are that only Antarctic toothfish, *Dissostichus mawsoni*, were caught, that these were mostly male (~85%), and that most fish were in spawning condition or spent. Both surveys provide information on the life history of Antarctic toothfish that is consistent with the current hypothesis on Antarctic toothfish growth and movement, and have provided the first empirical scientific observations of spawning Antarctic toothfish. Information collected during these first two voyages will be shared with CCAMLR and is already being used in the current stock assessment of Antarctic toothfish in the Ross Sea region. Over the coming months, New Zealand will screen video footage and analyse all data collected in more detail than the timing of the voyages has allowed so far. In addition, to maximise the value of future data collection for both organisations' understanding of the distribution, dynamics and status of stocks of Antarctic toothfish, New Zealand will also assess the optimum quantity and nature of data required to enable the development of a spatially-explicit integrated stock assessment model of Antarctic toothfish in the region. It is anticipated that this model, targeted for completion in 2021, will include those components of the Antarctic toothfish stock residing in the SPRFMO Area as well as in the CCAMLR Area. At this stage, it is intended that a comprehensive proposal for the future of the exploratory fishery will be presented to SC-06 in 2018.

## 1. Purpose of paper

This paper provides SC-05 with an update on exploratory fishing for toothfish by the New Zealand vessel *San Aspiring* pursuant to CMM 4.14. It also briefs the Committee on future directions.

## 2. Introduction

New Zealand submitted a proposal to the SPRFMO Scientific Committee's 3<sup>rd</sup> meeting in 2015, SC-03, to carry out a 2-year exploratory research programme fishing for toothfish (Patagonian toothfish, *Dissostichus eleginoides*, and Antarctic toothfish, *Dissostichus mawsoni*) using the method of bottom longline outside New Zealand's bottom longline footprint and in excess of toothfish catch for reference years (Cryer & Fenaughty 2015 [SC-03-DW-01](#)). The proposal was for an incremental research fishing operation to conform with Article 22 of the Convention (paragraphs 16 to 18 of [CMM 2.03](#)) and SPRFMO's Bottom Fishery Impact Assessment Standard ([BFIAS](#)). The Scientific Committee assessed New Zealand's proposal and:

- **confirmed** that the proposal was acceptable under Article 22 (CMM 2.03) and the BFIAS;
- **recognised** the cautious, exploratory nature of the proposal and the scientific benefits of the proposed data collection, including the understanding of the distribution, movement and stock structure of toothfishes;
- **emphasised** the importance of implementing stringent seabird mitigation measures throughout the surveys, including integrated weighted lines, bird scaring lines when setting gear and strict offal management;
- **suggested** that, in addition to being reviewed by New Zealand's domestic working group and the SPRFMO SC, data and analyses from the surveys should be shared with CCAMLR; and
- **stressed** that its evaluation did not indicate any commitment to extending this survey beyond 2017 or to extending New Zealand's footprint if a toothfish fishery is eventually proved in this area (these decisions being for the Commission).

The SPRFMO Compliance and Technical Committee and Commission considered the proposal in 2016 and approved a 2-year exploratory fishery with a retained catch limit of 30 tonnes of *Dissostichus* spp. (both species combined) each year (see [CMM 4.14](#)).

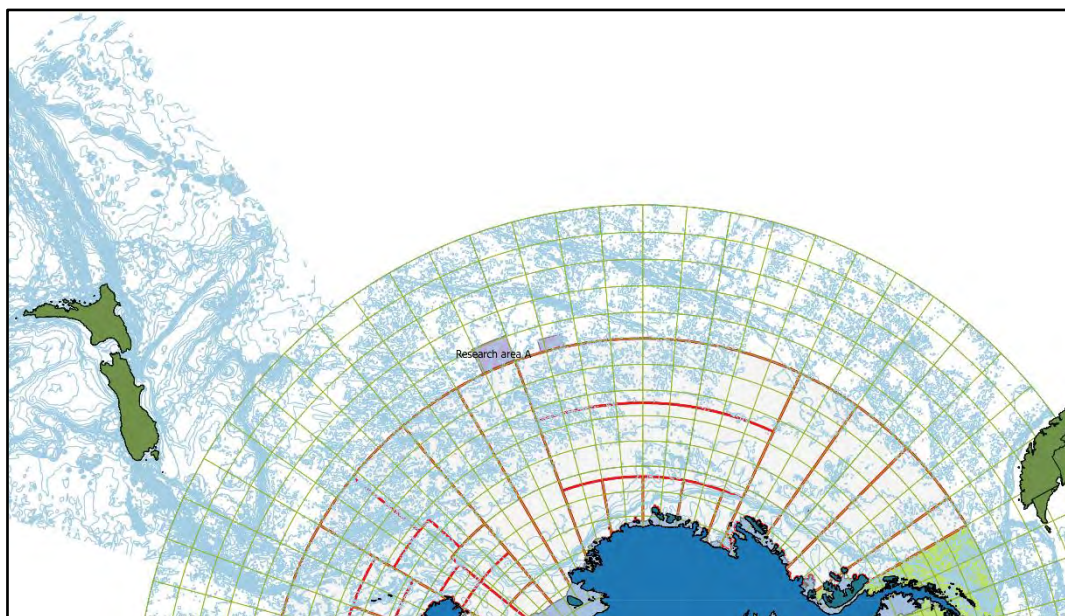
Preparatory and design work continued through late 2015 and 2016 and the first exploratory fishing, enabled through conditioning of Sanford Limited's High Seas Fishing Permit, was conducted by the New Zealand demersal longline vessel *San Aspiring* between 2 and 9 August 2016. Preliminary results from the first survey were presented to SC-04 (Cryer & Fenaughty 2016 [SC-04-DW-02](#)) and some additional information is presented here.

### 3. Objectives and scope of the exploratory fishing

The fishing, data collection, and tagging conducted during the first trip were structured to address the following key objectives of the exploratory fishing programme:

- To map the bathymetry of the fishable area within the two zones identified in CMM 4.14;
- To characterise the local toothfish populations, including life-cycle information;
- To document the relative abundance of Patagonian and Antarctic toothfish;
- To understand the stock structure and movement patterns of toothfish in the SPRFMO area and between SPRFMO, CCAMLR and other management areas;
- To tag toothfish for stock linkage studies, and, potentially, for biomass estimation; and
- To collect information on the distribution, relative abundance, and life history of bycatch species, including seabirds, marine mammals, reptiles, and other species of concern as appropriate.

CMM 4.14 provides for a 2-year exploratory fishery within defined research blocks (Figure 1) and constrained to a maximum catch of 30 tonnes of *Dissostichus* (both species combined) each year. The fishing gear to be used for this work was standardised and very similar fishing gear to existing research surveys carried out within the adjacent CCAMLR Convention Area. Full details are available in the revised proposal available in paper [SC-03-DW-01](#). As specified, a New Zealand observer was carried throughout both trips and was assisted by a science liaison officer experienced in similar survey fishing within the adjacent CCAMLR Area and by the crew. A video camera over the hauling position was used to record the hauling of all lines.



**Figure 1: General location of the exploratory research fishing blocks.**

## 4. Data collection

Because this was a researched-focused exploratory fishing exercise, substantially more information was collected by the observer and the on-board Sanford Ltd science liaison officer than would occur in a typical fishing trip:

- All fish caught were identified to species level, to the extent possible, and unidentified specimens were retained for expert identification;
- Toothfish were tagged at a rate of three fish per greenweight tonne;
- All captured toothfish were carefully observed for the presence of tags;
- Samples of toothfish (of whatever species) were taken from each line and measured for total length, weight, sex, gonad size and stage, and stomachs were examined for diet studies with standardised qualitative measurements taken;
- To the extent possible, 5 pairs of otoliths were taken for each 5 cm length class of toothfish between 100 and 150 cm for each sex;
- All Macrourids, up to a maximum of 10 per set, were identified and sampled for length, weight, sex, and gonad weight (for each species).
- Catches (kg) of VME indicator taxa were recorded using the standard CCAMLR method for demersal longline (this is compatible with SPRFMO data standards);
- Observations of seabirds, marine mammals, reptiles and other species of concern around the vessel were made.

## 5. Fishing results

Fishing was conducted in August of 2016 and 2017. In 2016, seven sets of integrated weight line were made in depths between 1000 and 2300 m. A total of 35 994 hooks were set, of which 30 424 were recovered; two broken lines led to the loss of 5 570 hooks on unrecoverable sections of longline.

The total retained catch of toothfish in 2016 was 28 961 kg (1070 fish). All toothfish caught were *Dissostichus mawsoni* (Antarctic toothfish) and 85% were males. The main bycatch was of rattails, *Macrourus* spp., but amounted to only 155 kg, ~0.5% of the total catch. Even smaller amounts of the morid cod *Antimora* (32.2 kg) and moray cod (*Muraenolepis*, < 1 kg) were taken. A total of 104 toothfish were tagged using standard CCAMLR tags, largely in proportion to the catch. This compares with the minimum expectation of 87 toothfish tagged (three for each of 29 tonnes). Full biological records were made for 98 toothfish and 57 rattails of three species (noting one specimen is still to be identified and may be of a fourth species). Many of the toothfish gonads were found to be late-stage or spent. The total amount of VME indicator material recovered from the seven sets in 2016 was 3.34 kg, equivalent to 0.48 kg per set or 0.11 kg per 1000 hooks recovered.

At the time of writing, fishing had not started on the second exploratory trip so no data were available. An update and description of fishing results from 2017 should be available in time for SC-05's meeting.

Video was recorded over the hauling station during both trips. The footage from the first trip has been archived and will be screened once the footage from the second trip is received. This will complement information from the on-board observer.

## 6. Future directions

The 2-year programme of exploratory fishing provided for by CMM 4.14 has been successfully completed and new and important biological information has been collected on toothfish. The key findings are that only Antarctic toothfish, *Dissostichus mawsoni*, were caught, that these were mostly male (~85% on the first trip), and that most fish were in spawning condition or spent. This exploratory fishing programme has been designed to be directly comparable with other work carried out within the adjacent CCAMLR areas. In particular, this study extends and enhances the information coming from the midwinter survey carried out by the New Zealand vessel *Janas*. Both surveys provide information on the life history of Antarctic toothfish that is consistent with the hypothesis on Antarctic toothfish growth and movement (Hanchet et al 2008), and have provided the first empirical scientific observations of spawning Antarctic toothfish.

Data and information collected during these first two voyages will be shared with CCAMLR and is already being used in the current stock assessment of Antarctic toothfish in the Ross Sea region. Over the coming months, New Zealand will screen video footage and analyse all data collected in more detail than the timing of the voyages has allowed so far. In addition, to maximise the value of future data collection for both organisations' understanding of the distribution, dynamics and status of stocks of Antarctic toothfish, New Zealand will also assess the optimum quantity and nature of data required to enable the development of a spatially-explicit integrated stock assessment model of Antarctic toothfish in the region. It is anticipated that this model, targeted for completion in 2021, will include those components of the Antarctic toothfish stock residing in the SPRFMO Area as well as in the CCAMLR Area. At this stage, it is intended that a comprehensive proposal for the future of the exploratory fishery will be presented to SC-06 in 2018.

## 7. Recommendations

It is recommended that the SPRFMO Scientific Committee:

- **notes** the New Zealand demersal longliner *San Aspiring* has completed the 2-year exploratory fishing programme approved under [CMM 4.14](#);
- **notes** that substantial bathymetric, operational, and biological information was collected;
- **notes** that the retained catch each year was under the 30 tonne annual limit;
- **notes** the tag and release of Antarctic toothfish (*Dissostichus mawsoni*) at a rate three fish tagged per tonne caught, the data from which have been shared with CCAMLR;
- **notes** New Zealand's intention to develop an integrated exploratory fishery programme to maximize the benefits of data collection for both CCAMLR and SPRFMO.

## 8. Acknowledgments

Thanks are due to the crew of the *San Aspiring* and to the MPI observers for collection of data, and to members of MPI's South Pacific Working Group for useful comments on early drafts.

## 9. References

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