CCAMLR

COMM CIRC 12/102
SC CIRC 12/51

Tuesday, 14 August 2012

Updated notification for scientific research in the southern Ross Sea – New Zealand

TO ALL MEMBERS OF THE COMMISSION AND THE SCIENTIFIC COMMITTEE

New Zealand has submitted an updated notification for research surveys to monitor the abundance of pre-recruit Dissostichus mawsoni in the southern Ross Sea (Subarea 88.1, SSRUs J, K and L) between 2012 and 2014 (refer to COMM CIRC 11/99–SC CIRC 11/48). Details of the proposed second survey in 2012/13 are attached.

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COMMISSION POUR LA CONSERVATION DE LA FAUNE ET LA FLORE MARINES DE L'ANTARCTIQUE
КОМИССИЯ ПО СОХРАНЕНИЮ МОРСКИХ ЖИВЫХ РЕСУРСОВ АНТАРКТИКИ
COMISIÓN PARA LA CONSERVACIÓN DE LOS RECURSOS VIVOS MARINOS ANTÁRTICOS

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Attch.

NOTIFICATION FOR SCIENTIFIC RESEARCH IN 2012/13 AND 2013/14

PROPOSAL TO CONTINUE THE TIME SERIES OF CCAMLR SPONSORED RESEARCH SURVEYS TO MONITOR ABUNDANCE OF PRE-RECRUIT ANTARCT TOOTHFISH IN THE SOUTHERN ROSS SEA IN 2013

New Zealand

1. MAIN OBJECTIVE

The objective of the survey time series is to provide a time series of relative abundance indices of pre-recruit Antarctic toothfish in the Ross Sea region to:

(i) detect changes in relative abundance of recruitment over time; and
(ii) estimate variability and autocorrelation in recruitment.

The objectives of this second survey of the time series are as follows:

(i) To carry out the second of a time series of longline surveys to monitor pre-recruit (<110 cm TL) toothfish in the south of SSRUs 881.J and 881.L in the southern Ross Sea (Strata A12–C12) using standardised gear in a standardised manner
(ii) To carry out additional experimental stations in adjacent areas to identify areas of high pre-recruit abundance which could potentially be included as additional strata in future annual surveys.

At its 2010 meeting the Scientific Committee noted that the research and assessment work in Subarea 88.1 and SSRU 88.2E on the distribution, abundance and demography of Antarctic toothfish (*D. mawsoni*) had led to an estimate of the fisheries potential yield, and allowed the CCAMLR Scientific Committee to formulate and provide advice to the Commission on appropriate harvest levels and other aspects of conservation over the last eight years (SC-CAMLR-XXIX, para. 3.129). Although robust stock assessments are now available, there is still uncertainty over key aspects of Antarctic toothfish reproductive dynamics, including recruitment variability, recruitment autocorrelation, and the value of the stock recruitment relationship steepness parameter.

At its 2011 meeting, the Scientific Committee agreed that a time series of relative recruitments from a well-designed survey could be a useful input into the Ross Sea stock assessment model and endorsed a proposal to carry out this work once the fishery had closed at the end of the 2011/12 season (SC-CAMLR-XXX)**.** The first survey was successfully completed in February 2012 and the results presented to the 2012 meeting of WG-SAM (Hanchet et al. 2012a).

A proposal for the second survey in the time series was also presented to the 2012 meeting of WG-SAM (Hanchet et al. 2012b). The working group supported the proposed design of the repeat survey in 2013 (WG-SAM report 2012, paragraph 4.22). We present here the formal notification for this research survey in accordance with Conservation Measure 24-01, using the prescribed Format 2.

2. FISHERY OPERATIONS

(a) Fishing Member:

a. New Zealand

(b) Vessel details

a. Vessel name: San Aotea II
b. Vessel owner: Sanford Limited
c. Vessel type: Commercial vessel
d. Port of registration: Auckland
e. Registration number: 63631
f. Radio call sign: ZM2534
g. Overall length: 46.5 m
h. Tonnage: 1079 GRT

i. Position determination: Two independent GPS systems (Furno & JRC)
j. Fishing capacity: NA
k. Processing capacity: 20-25 tons GWT tonnes/day
l. Fish storage capacity: 565 m^3 frozen and 100 m^3 meal

(c) Target species

a. Dissostichus mawsoni

(d) Fishing gear to be used

a. Longline type: Mustad Autoline system using 11.5mm Integrated Weight (IW) longline with 15/O hooks
b. Other sampling gear: Continuous Plankton Recorder
c. Acoustic gear: Simrad ES60, 38 kHz

(e) Fishing regions

a. SSRUs 88.1J, 88.1L, 88.1K (ice permitting)
b. Latitude from ~75°S to 78°S, Longitude from ~170°E to 175°W

(f) Estimated dates of entering & leaving Convention Area

a. The vessel will conduct the research survey after it has participated in the exploratory fishery in Subarea 88.1 (i.e., it will start once the main Subarea 88.1 fishery is closed). The survey is expected to run for 2-3 weeks.
b. Therefore the vessel is expected to enter the Convention area on around 1 December and to leave on around 1 March.

3. SURVEY DESIGN, DATA COLLECTION AND ANALYSIS

(a) Research survey design

Stratification and maps

The first survey found highest catch rates of 70–110 cm TL toothfish (defined here as pre-recruit toothfish) in the two core strata (A12 and B12) as well as in the 500–600 m depth stratum (C12) (Hanchet et al. 2012a). It is therefore proposed that the survey continue to be primarily targeted at fish of this size range in these three strata in the southern Ross Sea.

Although the optimum depth range for sampling pre-recruit toothfish has been established, there is still some uncertainty over the full extent of their distribution in the southern Ross Sea. Hanchet et al. (2012b) considered various locations for these experimental stations and concluded that the Glomar-Challenger trough was the best area for assigning them, and that they should be carried out in water deeper than 500 m.

This proposed design for the 2013 survey was endorsed by WG-SAM at its 2012 meeting (WG-SAM 2012 Report, paragraph 4.22). The five strata to be surveyed have been designated A12, B12, C12, F13 and G13 and are shown in Figure 1. Note that if the vessel is unable to carry out the experimental stations in the Glomar-Challenger Trough due to ice conditions then it will carry out these stations in the area of deep water to the north of stratum A12 instead (stratum H13). Note that the stratum boundaries used for the initial 2012 survey have been modified slightly to better align with the location of the edge of the ice sheet, the depth contours, and the SSRU management boundaries.

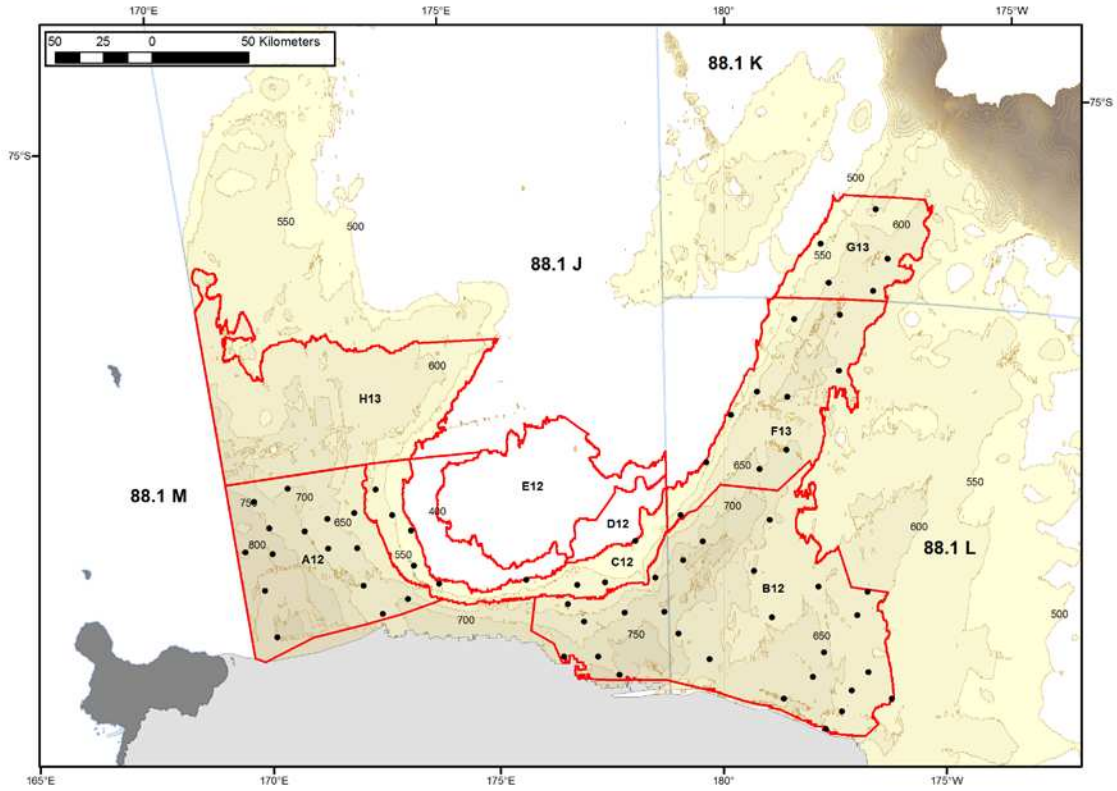

Figure 1: Location of the three core strata (A12, B12, C12) and experimental strata (F13 and G13) and associated random station positions for the 2013 pre-recruit survey. Also shown are the stratum boundaries for D12 and E12 (surveyed in 2012) and H13 (a contingency for surveying in 2013 if ice precludes sampling in F13 and G13).

Sample size required

Hanchet et al. (2011a, b) used historical catch data to determine the number of longline sets required for each of the survey strata to achieve a target c.v. of 10%. Given that a c.v. of 9% was achieved with the 2012 survey design, a similar sample size has been adopted for the 2013 survey in the A12, B12 and C12 strata (Table 1). It is proposed that an additional 10 experimental sets are made in stratum F13 and an additional 5 experimental sets in stratum G13, making 65 sets in all, which is the same number of sets that was proposed in 2012.

Table 1: Stratum details, planned number of stations, median (and interquartile range) of catch rates (kg / 1000 hooks) of all fish in strata A12–C12 from the 2012 survey. [1] Catch rates in strata F13, G13, and H13 are only approximate. Nominal catch based on 4600 hooks per set and CPUE.

				CPUE kg/1000 hooks		Nominal catch (t)	
Stratum name	Area (km^2)	Depth range (m)	Number of sets	Median	25–75% range	Based on median	Based on 25–75%
A12	6 632	600–800	15	149	90–192	11	6–13
B12	13 921	600–800	26	113	81–142	14	10–17
C12	3 061	500–600	9	192	153–237	8	6–10
F13[1]	5 657	500–800	10	100	50–150	5	2–7
G13[1]	2 970	500–800	5	100	50–150	2	1–3
H13	8401	500–600	15	100	50–150	7	3–10
Total			65			39	26–50

Vessel and fishing gear standardisation

To develop a time series of relative abundance indices it is critical that the fishing gear and other aspects of the survey are standardised between years.

The New Zealand flagged longline vessel FV *San Aotea II* will again be used for the survey. The standard fishing gear used by New Zealand autoliners as described by Fenaughty (2008) will be used for the research. Integrated weighted line (IWL) will be used for all lines — this has ca. 50 g of lead weight per metre of backbone. The hooks and snoods will be spaced at 1.4 m intervals and connected to rotors and swivels that are permanently attached to the backbone (see Fenaughty 2008, Figure 1). The snoods will be 300–400 mm long. The hooks used will be standardised to 15 /O EZ-Baiter hooks. These hooks have been proven capable of catching toothfish of the target length when fish are available (Hanchet et al. 2012a). Hooks will be baited with squid bait using an automatic baiting machine. The % baited hooks averaged 91% (range 78–95%) during the 2012 survey, and this will be closely monitored during the 2013 survey to ensure standardisation within and between surveys.

All aspects of the survey design will be identical to that used for the 2012 survey. Following Hanchet et al. (2011) start points for the sets were randomly generated using the NIWA random station programme, with a minimum separation of 12 km between sets. The sets will ideally be made along the depth contour but weather and/or ice conditions may mean this is not possible. The order of priority for the survey will be A12, B12, C12, F13, and G13. There will be a target soak time of 18 hours with a range of ± 6 hours subject to environmental conditions (ice, weather etc.,) and operational requirements. All sets will comprise 4600 hooks per set. With an average soak time of 18 hours and lines comprising 4600 hooks it is anticipated that six lines will be set in the random locations over each 36-hour period. The survey is estimated to take about 16 days fishing time.

Tagging

Fish will be tagged at a rate of at least five fish per tonne caught following Hanchet et al. (2012a). Based on a mean fish weight of about 11 kg in these strata, this will equate to tagging and releasing every ~18th fish. Whilst making every effort to achieve a high tagging overlap statistic, the sampling of the targeted size range (<110 cm) for otoliths will take priority.

(b) Data collection

It is proposed to measure, weigh and determine sex of all toothfish per set and collect up to 20 otoliths per set. Although the otoliths will be randomly sampled across the full size range of fish caught, a minimum of 10 pairs of otoliths (five males and five females) from each 1 cm length class between 50 and 110 cm will be collected. This alone will require biological sampling of at least 600 fish from the survey area.

Samples of toothfish gonads from a range of fish lengths will be collected for histological analyses. Samples of muscle tissue for toothfish and other key prey species including Channichthyiids and Nototheniids will be collected for stable isotope studies. The stomach contents from up to 200 toothfish and 50 of every other key fish species will be retained (focusing on those fish sampled for trophic studies to allow for cross-comparison).

(c) Method for data analysis

The data will be analysed in a similar way to a trawl survey except that the “area swept” (or attraction distance) will be assumed constant between sets. The entire catch will be weighed from each set. Mean catch rates from strata A12–C12 will be calculated and used to estimate

the relative abundance (and c.v.) of toothfish in the survey area. Catch rates will also be analysed for the other strata to determine potential additional strata for sampling in future surveys.

Sex specific age-length keys will be developed for the combined strata A12–C12. At least 500 otoliths will be read in accordance with the protocols developed by Horn (2002) and Sutton & Horn (2010). The age-length key will then be applied to the scaled length frequency distributions, which will then be used to produce proportion-at-age distributions for the survey area using the NIWA catch-at-age software (Bull & Dunn 2002). This software also produces c.v.s for numbers of fish at each age that incorporate the variance from both the length-frequency data and the age-length key using a bootstrapping procedure.

(d) How and when will the data meet the objectives of the research

It is anticipated that it will take 3–5 years before sufficient data are available to reliably estimate variability and autocorrelation in recruitment. It is likely to take at least 5 years before we can be confident that the survey can be used to detect changes in relative abundance of recruitment over time.

4. PROPOSED CATCH LIMITS

(a) Proposed catch limits and justification

At its 2011 meeting the Scientific Committee recommended that a research catch of 80 t, which would nominally cover the first two surveys, be set aside from the 2011–12 catch limit on the shelf to allow the pre-recruit survey to be conducted immediately following the closure of the fishery in Subarea 88.1 (SC-CAMLR-XXX, paras 3.174–3.175). It further noted that the survey should be restricted to 65 sets and that gear standardisation was a critical factor in the implementation of the survey which was easiest to achieve by using the same vessel between years. The Commission endorsed this advice and encouraged the Scientific Committee to consider the requirements for extending the pre-recruit survey beyond 2012/13 to achieve greater benefit from this research (CCAMLR-XXX, paras 11.14–15).

The total catch from 59 sets in the 2012 pre-recruit survey was 30.9 t (Hanchet et al. 2012a). It is anticipated that the catch from 65 sets during the 2013 survey will be less than 50 t (Table 1). Therefore, there should be sufficient catch remaining from the original allocation of 80 t to allow the 2013 survey to take place under the existing provisions.

We suggest that a rolling catch allocation of 80 t spread across every two years would alleviate the problem of catch allocation. Thus, under this scenario, a catch of 30.9 t would be set aside from the 2013 shelf catch limit for the 2013 survey. A rolling catch allocation would facilitate the continuation of the annual survey time series and guard against the possibility of one or two high catches from stopping the survey before it was complete.

(b) Evaluation of the proposed catch on stock status

The catch for the proposed research survey has already been accounted for in the stock assessment model and is therefore consistent with Article II of the Convention.

(c) Details of dependent and related species

The research survey is being conducted in the same area as the shelf fishery. There is therefore no additional effect on dependent and related species.

5. RESEARCH CAPABILITY

(a) Name(s) and address of the chief scientist(s) responsible for planning and coordinating the research

Dr Ben Sharp
New Zealand Ministry of Fisheries
105 The Terrace
Wellington, New Zealand

And

Dr Stuart Hanchet
NIWA, PO Box 893
Nelson, New Zealand

(b) Number of scientists and crew

Five scientific staff including (two scientists, in addition to one CCAMLR observer, one NZ observer, and one Industry scientist) and 22 crew.

(c) Is there opportunity for inviting scientists from other Members?

Yes – there is an opportunity for one international scientist (i.e., part of the 5 scientific staff above)

(d) Commitment to fulfil obligations of proposed Research Plan

The first survey was successfully completed during the 2012-13 season, and the vessel and research providers have undertaken to complete the proposed research during the 2012-13 and 2013-14 fishing years.

To ensure that the survey is scientifically robust it is planned to have a strong and experienced science team on board. Experienced New Zealand and international (CCAMLR) scientific observers will be on board. It is planned to have two scientists (one New Zealand and one international) on board the ship during the survey to direct the research. As in the 2012 survey, Antarctica New Zealand will provide logistical support to transfer the two scientists from New Zealand to Scott Base and from there out to the vessel at the end of the fishing season. In the unlikely event that ice conditions, logistical complications, or unforeseen events make it impossible to transfer the scientists to the vessel, the New Zealand observer, together with the fishing industry scientist (David Bilton), will assume responsibility for the successful execution of the survey.

6. REPORTING FOR EVALUATION AND REVIEW CAPABILITY

Because the research is multi-annual, a report summarising the preliminary results of the survey and a proposal for the following year's survey will be submitted to WG-SAM 2013. The final research report, including results of ageing, will be provided to WG-FSA in October 2013.

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