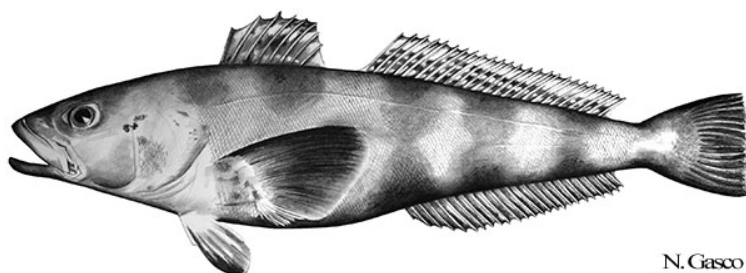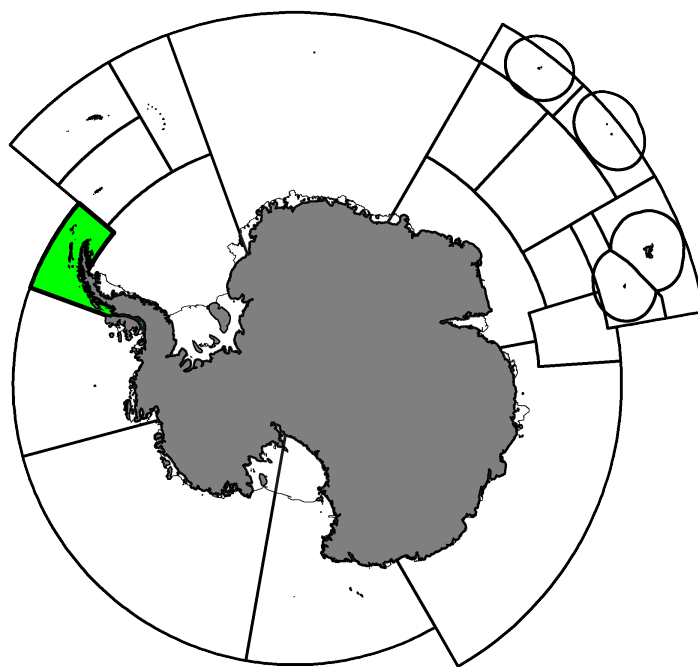# Fishery Report 2024: *Dissostichus mawsoni* in Subarea 48.1

CCAMLR Secretariat

07 April 2025

Antarctic Toothfish, *Dissostichus mawsoni* Norman, 1937.

Map of the management areas within the CAMLR Convention Area. Subarea 48.1, the region discussed in this report is shaded in green. Throughout this report, "2024" refers to the 2023/24 CCAMLR fishing season (from 1 December 2023 to 30 November 2024). Coastlines and ice shelves: UK Polar Data Centre/BAS and Natural Earth. Projection: EPSG 6932.

Contents

1. Introduction to the fishery

1.1. History

This report describes the closed longline fishery for Antarctic toothfish (*Dissostichus mawsoni*) in Subarea 48.1. This fishery began as a new fishery in 1998, conducted by Chile (Conservation Measure 134/XVI). Following a prospecting longline cruise (SC-CAMLR-XVII/BG/07 Rev. 1) with limited yield, Chile concluded that a new fishery in this area would not be feasible (SC-CAMLR-XVII, paragraph 9.3). Consequently, the Commission prohibited direct fishing (other than for scientific research purposes) for finfish in Subarea 48.1 since 7 November 1998 (CCAMLR-XVII, p. 44; Conservation Measure 72/XVII, then Conservation Measure 32-02).

From 2019 to 2021 Ukraine conducted a research survey in accordance with Conservation Measure 24-01 (SC-CAMLR-XXXVII, paragraphs 3.117-3.122; SC-CAMLR-38, paragraphs 4.24-4.28; SC-CAMLR-40, paragraph 3.97). In 2019 the survey was interrupted due to heavy sea ice conditions, and, in 2020 and 2021 the survey was interrupted because the by-catch limit on *Macrourus* spp. was reached.

1.2. Conservation Measures currently in force

Directed fishing for *Dissostichus* spp. in Subarea 48.1 is prohibited under Conservation Measure 32-02 at least until further scientific information is gathered and reviewed by the Scientific Committee and the Working Group on Fish Stock Assessment (WG-FSA).
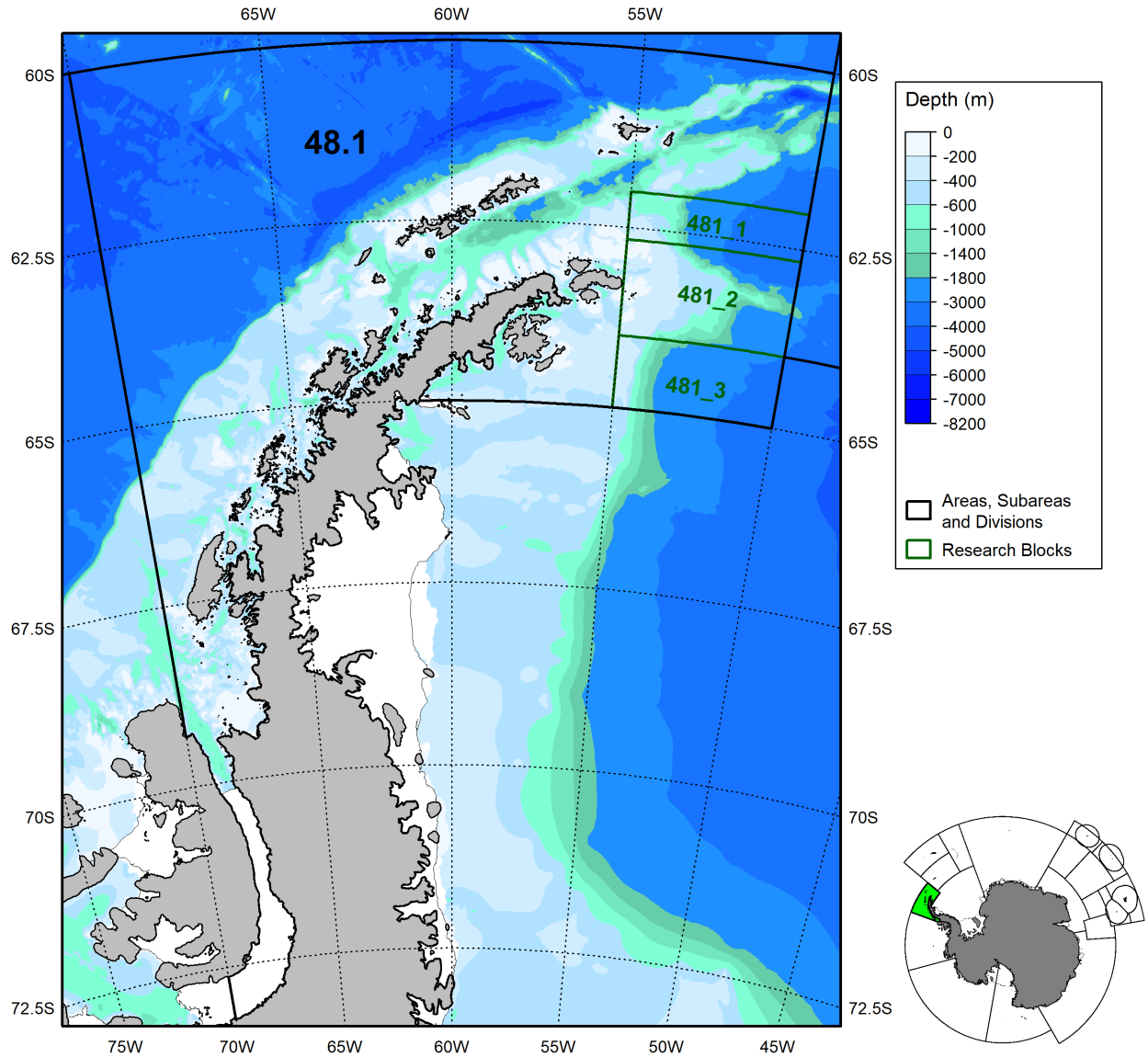
Figure 1: Location of Research Blocks in Subarea 48.1. The fishable depth range (600m-1800m) is highlighted in shades of green. Coastlines and ice shelves: UK Polar Data Centre/BAS and Natural Earth. Bathymetry: GEBCO. Projection: EPSG 6932 (rotated).

1.3. Active vessels

From 2019 to 2021, 1 Ukrainian-flagged vessel (*Calispo*) participated in this research survey. No fishing targeting *D. mawsoni* has taken place in this area since 2021.

1.4. Timeline of spatial management

In 2018, three research blocks (Fig. 1) were proposed by Ukraine in Subarea 48.1 to carry out a longline research survey (WG-FSA-18/20 Rev. 1). Noting the likely lack of accessibility in research block 481_3

due to sea ice, The Scientific Committee recommended that this research proceed in the two other research blocks (SC-CAMLR-XXXVII, paragraph 3.122; SC-CAMLR-38, paragraph 4.26).

2. Reported catch

2.1. Latest reports and limits

Reported catches of *D. mawsoni* since 2019 in Subarea 48.1 are shown in Table 1. Fishing did not take place in 2022.

Table 1. Catch (tonnes) and effort history for *Dissostichus mawsoni* in this research fishery. Source: Fine scale data and past estimates for IUU catch (-: no fishing, or no IUU estimate available).

Season	Number of vessels	Catch limit (tonnes)	Catch	Estimated IUU catch (tonnes)
2019	1	40	9	-
2020	1	43	15	-
2021	1	43	14	-
2022	-		-	-
2023	-		-	-
2024	-		-	-

The latest catches of *D. mawsoni* by research block are indicated in Table 2.

Table 2: Catch and catch limits by Research Block in 2021 for *Dissostichus mawsoni* in Subarea 48.1. Source: Fine scale data.

Research Block	Catch limit	Catch (% of catch limit)
481_2	43	14 (32.6%)

2.2. By-catch

Catch limits for by-catch species groups (*Macrourus* spp., skates and rays, and other species) are defined in Conservation Measure 33-03 and shown at the Subarea scale for each fishing season in Table 3.

If the by-catch of any one species is equal to, or greater than, 1 tonne in any one haul or set, then the fishing vessel must move at least 5 nautical miles away for a period of at least five days (Conservation Measure 33-03).

Skates thought to have a high probability of survival are released at the surface in accordance with Conservation Measure 33-03.

The by-catch in Subarea 48.1 consists predominantly of *Macrourus* spp (Table 3). In 2020 and 2021 the survey was concluded prior to reaching the catch limit allocated to *D. mawsoni* due to the by-catch of *Macrourus* spp.

Table 3. Reported catch and catch limits for by-catch species (*Macrourus* spp., skates and rays, and others) in this research fishery (see CM 33-03 for details). -: no fishing. Source: fine-scale data.

Season	*Macrourus* spp.		Skates and rays			Other catch	
	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Number Released	Catch Limit (tonnes)	Reported Catch (tonnes)
2019	6	3	2	<1	11	6	<1
2020	7	7	2	<1	3	7	<1
2021	7	7	2	<1	6	7	<1
2022		-		-	-		-
2023		-		-	-		-
2024		-		-	-		-

2.3. Vulnerable marine ecosystems (VMEs)

All Members are required to submit, within their general new (Conservation Measure 21-01) and exploratory (Conservation Measure 21-02) fisheries notifications requirements, information on the known and anticipated impacts of their gear on vulnerable marine ecosystems (VMEs), including benthic communities and benthos such as seamounts, hydrothermal vents and cold-water corals. For research fisheries notified under Conservation Measure 24-01, exemptions from specific Conservation Measures can be made, as recorded each year under Conservation Measure 24-05. All of the VMEs in CCAMLR's VME Registry are currently afforded protection through specific area closures.

In 2019, Ukraine indicated that CCAMLR standard methods for the identification of VMEs will be applied on board during the survey (WG-SAM-2019/28).

There are currently 34 VMEs and 3 VME Risk Areas designated in Subarea 48.1.

2.4. Incidental mortality of seabirds and marine mammals

The requirements of Conservation Measure 25-02, including the 'Minimisation of the incidental mortality of seabirds in the course of longline fishing or longline fishing research in the Convention Area' apply to this fishery.

The risk level for birds in Subarea 48.1 is category 4 (average to high) (SC-CAMLR-XXX, Annex 8, paragraph 8.1).

There have been no observed seabird mortality reported by vessels in Subarea 48.1 in this research survey.

There have been no observed mammal mortality reported by vessels in Subarea 48.1 in this research survey.

3. Illegal, Unreported and Unregulated (IUU) fishing

IUU fishing activity has not been reported in Subarea 48.1.

4. Data collection

4.1. Data collection requirements

The collection of biological data as part of the CCAMLR Scheme of International Scientific Observation (SISO) includes representative samples of length, weight, sex and maturity stage, as well as collection of otoliths for age determination of the target and most frequently taken by-catch species.

4.2. Summary of available data

Both the vessel's crew and observers collect fishing effort, catch, and by-catch information.

Following Conservation Measure 22-07, vessels participating in this fishery must report the occurrence of VME indicator organisms on hauled lines. To do so, the vessel's crew observe lines in segments (1000-hook sections or 1200m sections, whichever is the shorter) and report the number of VME indicator units (either one litre of those VME indicator organisms that can be placed in a 10-litre container, or one kilogram of those VME indicator organisms that do not fit into a 10-litre container). Depending on the number of VME indicator units landed, vessels must immediately report and potentially cease fishing in the area (termed a Risk Area) until further review of the data is completed (see Conservation Measure 22-07). Based on the portion of the line monitored, observers further identify VME indicator organisms to the lowest taxonomic level possible.

The vessel's crew report total catch of non-VME by-catch (mostly fishes) by coarse taxonomic groups given the taxonomic expertise required to discriminate similar species. Observers collect biological information on toothfish and by-catch specimens at a finer taxonomic resolution, as well as data on individual specimens such as size and maturity.

Summaries of data reported to CCAMLR for the past five years are given in Tables 4 and 5.

Table 4. Summary of VME indicator taxa by-catch, by-catch of other species and biological data reported by vessels crew and observers in each of the last five seasons. By-catch records correspond to the number of observations of total weight and count of individuals for each taxon identified. Observers may take further biological measurements on toothfish and by-catch taxa. Taxonomic identification may occur at different levels. -: no fishing.

Data source	Data class	Variable	2020	2021	2022	2023	2024
Vessel crew	VME	line segments	72	120	-	-	-
		VME indicator units > 5 and < 10	0	0	-	-	-
		VME indicator units > 10	0	3	-	-	-
	by-catch	taxa identified	9	10	-	-	-
		records	48	76	-	-	-
Observer	VME	line segments	72	120	-	-	-
		taxa identified	6	6	-	-	-
		weight or volume measurements	0	2	-	-	-
	toothfish	specimens examined	554	607	-	-	-
		length measurements	554	607	-	-	-
		weight measurements	554	607	-	-	-
		sex identifications	554	607	-	-	-
		maturity stage identifications	554	607	-	-	-
		gonad weight measurements	554	607	-	-	-
		otolith samples	340	473	-	-	-
	by-catch	specimens examined	736	1548	-	-	-
		taxa identified	12	10	-	-	-
		length measurements	711	1468	-	-	-
		weight measurements**	736	1548	-	-	-
		standard length measurements*	0	0	-	-	-
		wingspan measurements*	0	0	-	-	-
		pelvic length measurements*	0	0	-	-	-
		snout to anus measurements*	418	880	-	-	-
		sex identifications**	711	1469	-	-	-
		maturity stage identifications**	711	1446	-	-	-
		gonad weight measurements**	0	13	-	-	-
		otolith samples**	160	300	-	-	-

*: Species-dependent records
**: Voluntary records

Table 5. Summary of biological data for predominant by-catch groups reported by observers (from random subsets of lines) in each of the last five seasons. Taxonomic identification may occur at different levels. -: no fishing.

By-catch group	Variable	2020	2021	2022	2023	2024
Macrourus spp.	specimens examined	426	880	-	-	-
	taxa identified	2	2	-	-	-
	length measurements	426	880	-	-	-
	weight measurements**	426	880	-	-	-
	snout to anus measurements*	418	880	-	-	-
	sex identifications**	426	880	-	-	-
	maturity stage identifications**	426	880	-	-	-
	gonad weight measurements**	0	12	-	-	-
	otolith samples**	160	300	-	-	-
Other fish	specimens examined	285	589	-	-	-
	taxa identified	8	6	-	-	-
	length measurements	285	588	-	-	-
	weight measurements**	285	589	-	-	-
	standard length measurements*	0	0	-	-	-
	sex identifications**	285	589	-	-	-
	maturity stage identifications**	285	566	-	-	-
	gonad weight measurements**	0	1	-	-	-
	otolith samples**	0	0	-	-	-

*: Species-dependent records
**: Voluntary records

The counts of by-catch taxa reported above (Table 5) correspond to specimens that have been individually sampled by observers. These are a subset of all the specimens counted by observers and are generally identified at a more precise taxonomic level. The figures below (Figs. 2 and 3) display the distribution of the most frequently examined by-catch taxa in time and space. It is important to note that observers sample a random subset of lines and do not individually examine all taxa; as such these figures are more representative of the distribution of biological observations than the catch of these taxa or their spatial distribution. At a coarse taxonomic level, the total catch of by-catch species groups is provided in section 2.2 above.
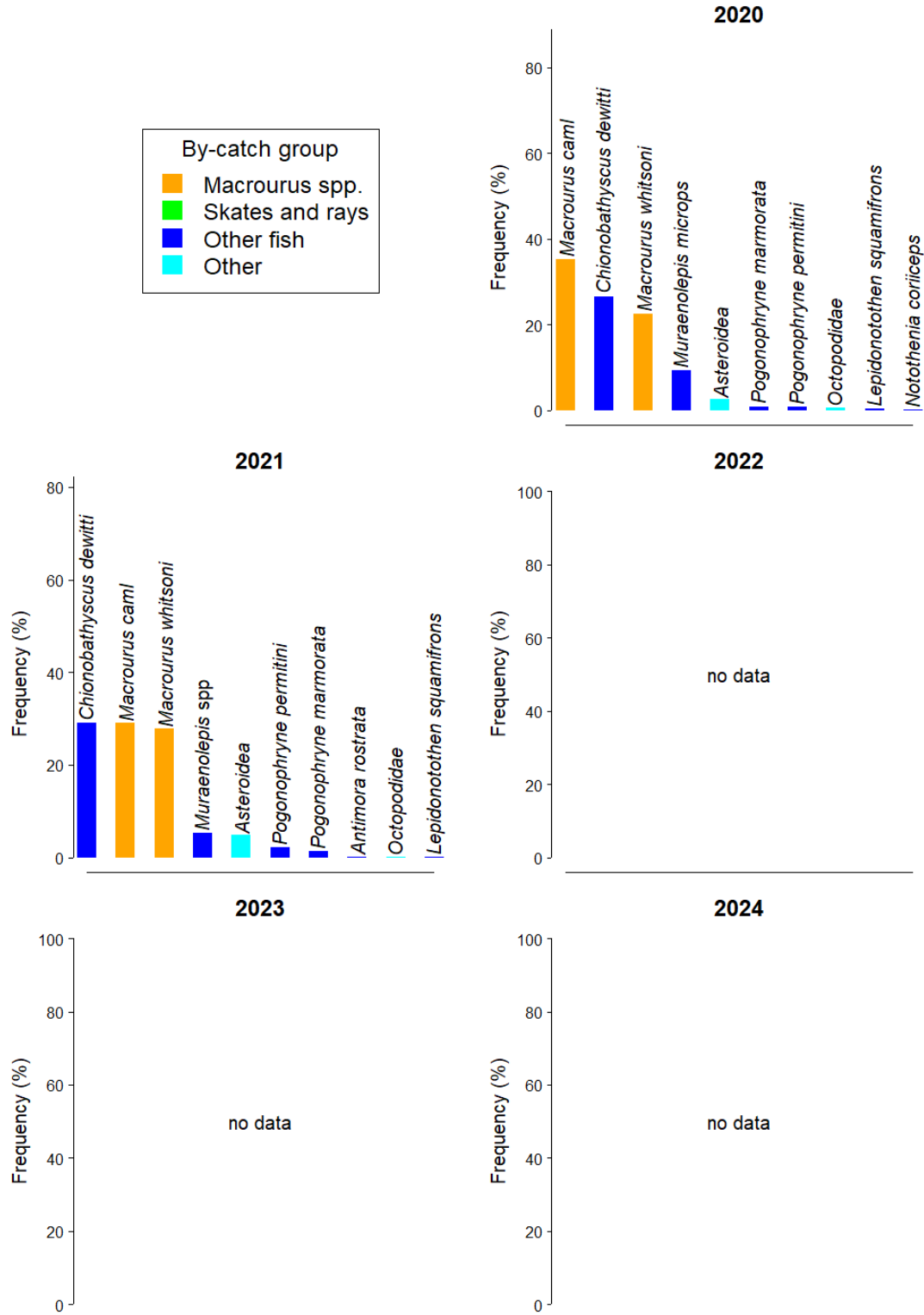
Figure 2. Relative frequencies of the most commonly examined by-catch taxa in each of the last five seasons, from the observer data (unweighted raw counts of individually examined specimens). Taxonomic identification may occur at different levels.
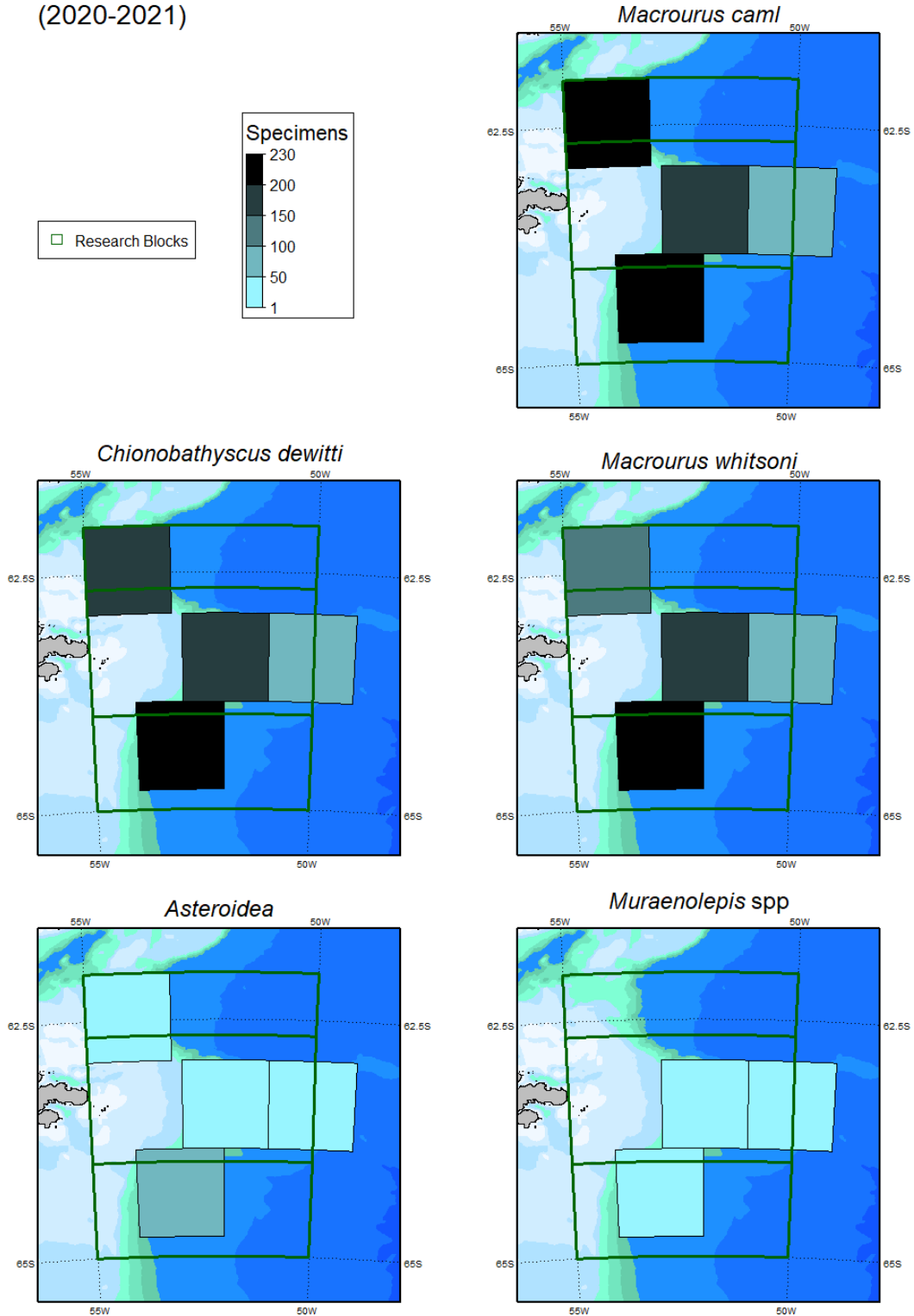
Figure 3. Spatial distribution of the most commonly examined by-catch taxa across the last five seasons, from the observer data (unweighted raw counts of individually examined specimens in each cell). The data were aggregated using equal area (100 km x 100 km) cells. Taxonomic identification may occur at different levels. Refer to Figure 1 for more details on the boundaries shown. Coastlines and ice shelves: UK Polar Data Centre/BAS and Natural Earth. Bathymetry: GEBCO. Projection: EPSG 6932 (rotated).

4.3. Length frequency distributions

The length frequency distributions of the catches of *D. mawsoni* for 2019-2021 across the entire Subarea and in each Research Block are presented in Figure 4. These length frequency distributions are unweighted; they have not been adjusted for factors such as the size of the catches from which they were collected. The interannual variability exhibited in the figure may reflect changes in the fished population but is also likely to reflect changes in the gear used, and the spatial and temporal distributions of fishing.

The majority of *D. mawsoni* caught in the Subarea 48.1 fishery ranged from 50 to 175 cm in total length (Fig. 4).
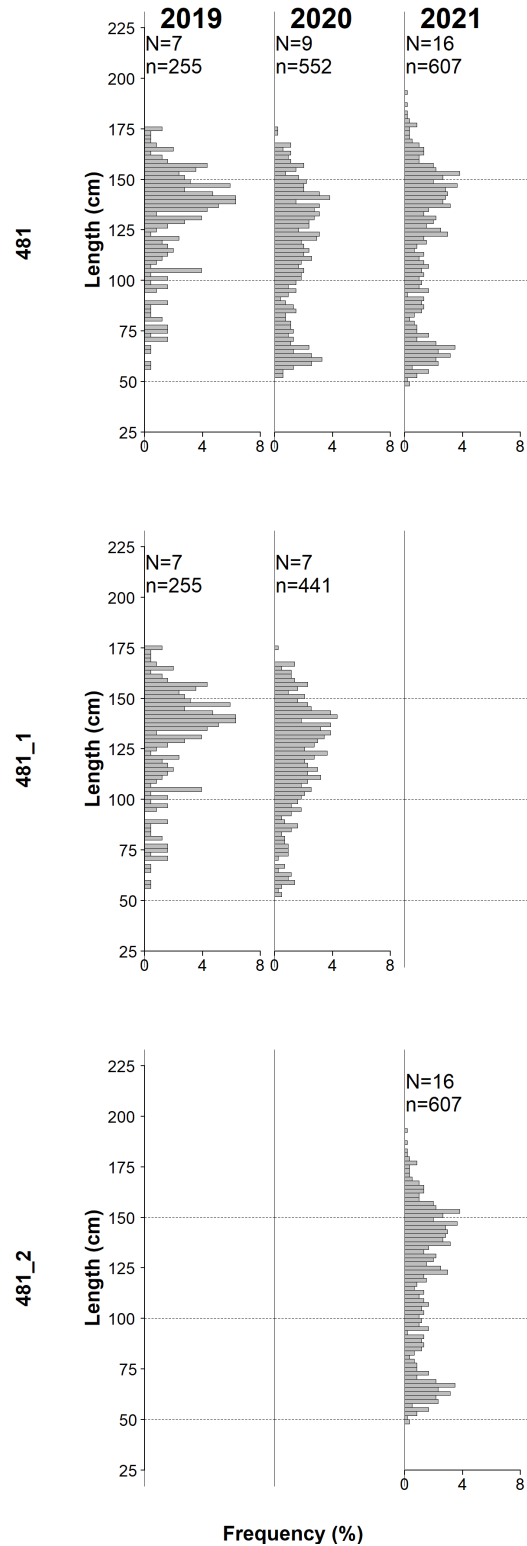
Figure 4. Annual length frequency distributions of *Dissostichus mawsoni* caught in Subarea 48.1 (top panel) and in each Research Block (lower panels). The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are indicated. Note: length frequency distributions are only shown where more than 150 fish were measured in a given season/area.

4.4. Tagging

Since 2012, vessels have been required to tag and release *Dissostichus* spp. at a rate of 5 fish per tonne of total catch (Table 6). The tag-overlap statistic estimates the similarity between the size distributions of the fish that are tagged and those that are caught by a vessel. Each vessel catching more than 10 tonnes of each species of *Dissostichus* is required to achieve a minimum tag-overlap statistic of 60% (Conservation Measure 41-01 Annex C).

Table 6. Annual tagging rate (number of fish tagged per tonne of total catch), reported by vessels operating in this fishery. The tag-overlap statistics (CM 41-01) for *D. mawsoni* and *D. eleginoides* respectively are provided in brackets (NC: Tag-overlap statistic is Not Calculated for less than 30 fish tagged; -: no fish were tagged).

Flag State	Vessel name	Fishing Season		
		2019	2020	2021
Ukraine	Calipso	4.4 (63.1,-)	5.3 (78.7,NC)	5.1 (67.9,-)

To date in this area, 192 *D. mawsoni* have been tagged and released (1 has been recaptured; Table 7).

Table 7. Number of *D. mawsoni* tagged in recent fishing Seasons. The number of fish recaptured by each vessel in each Season is provided in brackets.

Flag State	Vessel name	Fishing Season		
		2019	2020	2021
Ukraine	Calipso	39 (0)	79 (1)	74 (0)

5. Research

5.1. Status of the science

Catch limits for CCAMLR's fisheries for *D. mawsoni* and *D. eleginoides* for the 'assessed' fisheries in Subareas 48.3, 88.1 and 88.2 and Division 58.5.2 are set using fully integrated stock assessments; more basic approaches are used for the 'data-limited' fisheries (in Subarea 48.6 and in Area 58 outside the exclusive economic zones (EEZs)). The management of data-limited fisheries has been a major focus of attention in CCAMLR in recent years after the acknowledgement that commercial fishing and routine observer data collection had resulted in too few data to develop a full assessment of the targeted stocks in these areas. CCAMLR has developed a framework for designing and undertaking research fishing designed to lead to an assessment of these toothfish stocks in the short to medium term, established under the provisions of Conservation Measure 41-01. This research planning framework has three phases: a prospecting phase, a biomass estimation phase and an assessment development phase, with a set of decisions and reviews for the progression between stages.

In order to obtain the data necessary for a stock assessment, catch limits for research fishing by commercial vessels are set at a level intended to provide sufficient information (including sufficient recaptures of tagged fish) to achieve a stock assessment within a time period of 3 to 5 years. These catch limits are also set so that they provide reasonable certainty that exploitation rates at the scale of the stock or research unit will not negatively impact the stock. Appropriate exploitation rates are based on estimates from areas with assessed fisheries and are not more than 3-4% of the estimated stock size.

The outcomes of this research survey were presented in WG-SAM-2019/33, WG-SAM-2021/17 and WG-FSA-2021/44, including valuable information on pelagic and benthic ecosystems and underwater footage.

In 2019, WG-FSA-2019/38 presented results of oceanographic research conducted by Ukraine in this area and Subareas 48.2, 88.1 and 88.2.

In 2021, WG-FSA-2021/01 presented results of underwater video observation of benthic fauna including fish, squid and Antarctic krill.

In 2022, WG-FSA-2022/32 presented results of an age determination study focused on Antarctic and Patagonian toothfish and two species of grenadiers. Also, a study led by Chilean scientists and in collaboration with Ukrainian scientists (WG-FSA-2022/18), presented results on an analysis of *D. mawsoni* trophodynamics including prey composition and fatty acids profile.

5.2. Research plans

5.2.1. Background

Due to a lack of suitable data, robust stock assessment models able to yield advice on catch limits in accordance with CCAMLR decision rules have not yet been developed for a toothfish fishery in Subarea 48.1.

A proposal for this research survey was first presented in WG-SAM-18/11 by Ukraine. Subsequently, following advice from the Scientific Committee and its working groups, the proposal was improved over the years and its updated objectives and results were presented in WG-FSA-2021/44. The Scientific Committee noted (SC-CAMLR-XXXVII, paragraph 3.119) that this initiative could provide important information that would assist in testing population hypotheses developed during the Workshop for the Development of a *D. mawsoni* Population Hypothesis for Area 48 (WS-DmPH-18).

5.2.2. Objectives

Objective 1: To determine the distribution and abundance of *Dissostichus* spp. in this part of the subarea 48.1.

Objective 2: To obtain a better understanding of the stock structure of toothfish in the north-western part of the Weddell Sea and adjacent waters.

Objective 3: To collect data on the spatial and depth distributions of the by-catch species to inform the by-catch mitigation measures, and, improve the understanding of the by-catch distribution and trophic relationships and ecosystem function.

Objective 4: To trial monitoring of the hauling process and process of release of tagged fish using video cameras.

5.3. Advice by the Scientific Committee

Research plans for research survey for subarea 48.1 were adopted by the Scientific Committee in 2019 (SC-CAMLR-XXXVII, paragraphs 3.117-3.122). Then in 2020 and 2021 research survey continued (SC-CAMLR-38, paragraphs 4.24-4.28; and SC-CAMLR-40, paragraph 3.97).

6. Stock status

6.1. Summary of current status

As a data-limited fishery, this fishery does not yet have such estimates.

6.2. Assessment method

Stock biomass and catch limits in data-limited fisheries are estimated using the trend analysis. This research survey was conducted as effort-limited and catch limits were set by the Scientific Committee and its working groups.

6.3. Year of last assessment, year of next assessment

The most recent evaluation was in 2021.

7. Climate Change and environmental variability

In 2022, the Commission recognised that climate change is already having effects in the Convention Area (CCAMLR-41, paragraph 6.3) and agreed that it needed to act urgently to prepare for, and adapt to, the effects of climate change on the marine ecosystems within the Convention Area (CCAMLR-41, paragraph 6.5). The Commission noted (CCAMLR-41, paragraph 6.4) that the Scientific Committee had incorporated climate change into its advice (SC-CAMLR-41, paragraph 7.8) and through discussions at the SC-Symposium (SC-CAMLR-41, Annex 11) had also added climate change to the work plans and terms of reference of its Working Groups (SC-CAMLR-41, paragraph 7.14). The Commission adopted (CCAMLR-41, paragraph 6.28) Resolution 36/41.

In 2023, the Scientific Committee held a workshop on Climate Change (WS-CC-2023) which made recommendations regarding monitoring and management actions CCAMLR could progress to document and track the effects of climate change in the Convention Area. The recommendations were incorporated into the workplan of the Scientific Committee. Further, the Scientific Committee recommended that summaries of evidence for changes in stock assessment parameters or processes that could be due to the effects of environmental variability or climate change be developed for all fisheries (SC-CAMLR-42, paragraph 2.149).

In 2024, Members developed such summaries, in the form of tables, for fisheries in Subarea 48.3, Divisions 58.5.1 and 58.5.2 and in the Ross Sea region.

Additional Resources

- Fishery Summary: pdf, html

- Species Description: pdf, html

- Trend Analysis: pdf, html

- Fisheries Documents Browser