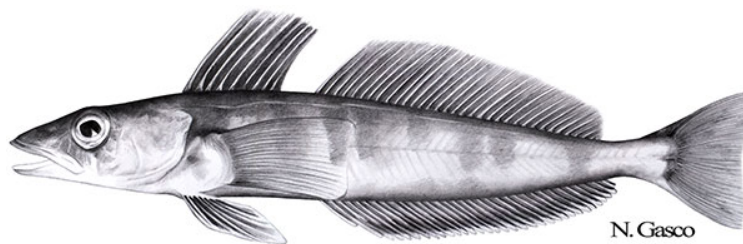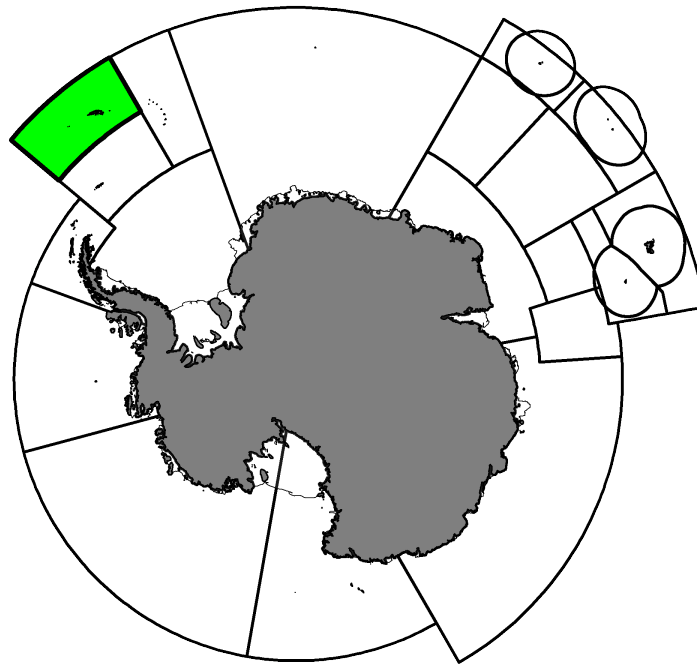# Fishery Report 2024: *Champsocephalus gunnari* in Subarea 48.3

CCAMLR Secretariat

30 April 2025

Mackerel icefish, *Champsocephalus gunnari* Lönnberg, 1905.

Map of the management areas within the CAMLR Convention Area. Subarea 48.3, 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

Fishing for *C. gunnari* began in Subarea 48.3 in the late 1970s, with large catches taken by Eastern European vessels. Catches peaked in 1983 at a reported 178,824 tonnes. Following concerns about the depletion of stocks, CCAMLR closed the fishery in the early 1990s. The fishery was reopened in 1995, but with a highly conservative catch limit, and was restricted to pelagic trawling to avoid impacts on non-target species. Conservation measures, including requirements to clean nets and ensure that they sink quickly, also reduced incidental mortality of birds. By-catch and incidental mortality is now low.

The fishing activity in Subarea 48.3 focused on an area to the northwest of the main island with vessels using pelagic trawls with a minimum mesh size of 90 mm. Although in recent years the catch limit for this fishery has been between 1,000 and 5,138 tonnes, there has been no commercial fishing since 2018, with the only catches resulting from groundfish surveys.

1.2. Conservation Measures currently in force

The annual catch limit for this fishery (Table 1) is described in Conservation Measure 42-01.
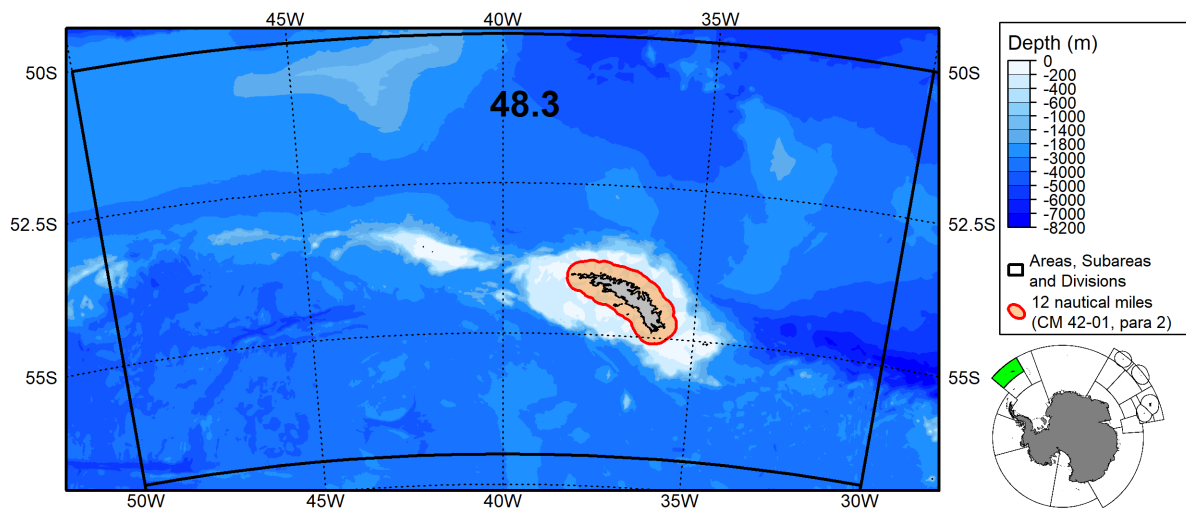
Figure 1: Location of Subarea 48.3 and of the 12 nautical miles prohibition of fishing for *Champsocephalus gunnari* from 1 March to 31 May (CM 42-01, paragraph 2). Coastlines: UK Polar Data Centre/BAS and Natural Earth. Bathymetry: GEBCO. Projection: EPSG 6932 (rotated).

1.3. Active vessels

In 2018, when fishing last occurred, 1 vessel participated in this fishery.

1.4. Timeline of spatial management

Catch limits for this fishery have been set biennially since 2012. Catch limits are based on a precautionary harvest control rule, assuming there is no recruitment in the second year of the assessment period. Annual catches, relative to the catch limit, are variable depending on the extent of participation in the fishery. They are also influenced by both interannual variation in the icefish population abundance and the availability of fish to the fishery (*i.e.*, changes in the location and depth of fish). Specific size-based move-on rules apply in

3

this fishery so that a vessel must move at least 5 nautical miles from a location where more than 10% of *C. gunnari* caught are smaller than 240 mm total length (Conservation Measure 42-01, paragraph 4). Further, fishing for *Champsocephalus gunnari* is prohibited within 12 nautical miles of the coast of the main island (Fig. 1) from 1 March to 31 May (Conservation Measure 42-01, paragraph 2).

2. Reported catch

2.1. Latest reports and limits

Reported catches of *C. gunnari* are presented in Table 1. In this fishery, since 1980, the catch of *C. gunnari* reached a maximum of 178,824 tonnes in 1983. In 2018, 1 tonne of *C. gunnari* was caught. There has been no fishing since 2018.

Table 1. Catch and effort history in tonnes for *C. gunnari* in this fishery. Source: Fine scale data. -: no fishing.

Season	Number of vessels	Catch limit (tonnes)	Catch
1980	1		8795
1981	1		27903
1982	1		54040
1983	1		178824
1984	1		35743
1985	1		628
1986	1		21008
1987	1		80586
1988	2		11473
1989	1		0
1990	1		8030
1991	1		41
1992	1		0
1993	1		0
1994	1		0
1995	1		0
1996	1		0
1997	1		0
1998	1	4520	6
1999	1	4840	265
2000	2	4036	4041
2001	5	6760	1433
2002	5	5557	2663
2003	3	2181	1972
2004	6	2887	2758
2005	7	3574	201
2006	5	2244	2177
2007	5	4337	4339
2008	5	2462	2479
2009	5	3834	1827
2010	3	1548	1
2011	2	2305	2
2012	3	3072	984
2013	3	2933	1326
2014	4	4635	33
2015	2	2695	270
2016	1	3461	2
2017	2	2074	110
2018	1	4733	1
2019	-	3269	-
2020	-	3225	-
2021	-	2132	-
2022	-	1457	-
2023	-	1708	-
2024	-	5138	-

2.2. By-catch

Catch limits for the most common by-catch species; humped rockcod (*Gobionotothen gibberifrons*), marbled rockcod (*Notothenia rossii*), grey rockcod (*Lepidonotothen squamifrons*), South Georgia icefish (*Pseudochaenichthys georgianus*) and blackfin icefish (*Chaenocephalus aceratus*) are defined in Conservation Measure 33-01 and shown for each fishing season since 2004 in Table 2. Conservation Measure 33-01 sets by-catch limits for all fisheries in Subarea 48.3; for this reason the catch limits for by-catch species can be greater than the catch limits for the targets species. By-catch is consistently low in this pelagic fishery.

Specific by-catch related move-on rules (whereby a vessel must move at least 5 nautical miles from a location where significant amounts of by-catch were hauled) are detailed in Conservation Measure 42-01, paragraph 6.

Table 2. Reported catch and catch limits for by-catch species (*Gobionotothen gibberifrons*, *Notothenia rossii*, *Lepidonotothen squamifrons*, *Pseudochaenichthys georgianus* and *Chaenocephalus aceratus*) in the fishery for *Champsocephalus gunnari* in Subarea 48.3 (see CM 33-01 for details). Source: fine-scale data. -: no fishing.

Season	*Gobionotothen gibberifrons*		*Notothenia rossii*		*Lepidonotothen squamifrons*		*Pseudochaenichthys georgianus*		*Chaenocephalus aceratus*	
	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)	Catch Limit (tonnes)	Reported Catch (tonnes)
2004	1470	0	300	0	300	0	300	2	2200	<1
2005	1470	<1	300	<1	300	<1	300	25	2200	1
2006	1470	0	300	1	300	0	300	6	2200	<1
2007	1470	<1	300	0	300	0	300	<1	2200	0
2008	1470	<1	300	<1	300	0	300	<1	2200	<1
2009	1470	<1	300	<1	300	0	300	<1	2200	<1
2010	1470	<1	300	<1	300	0	300	<1	2200	0
2011	1470	0	300	0	300	0	300	<1	2200	0
2012	1470	<1	300	<1	300	24	300	<1	2200	<1
2013	1470	<1	300	<1	300	<1	300	<1	2200	<1
2014	1470	<1	300	<1	300	0	300	2	2200	1
2015	1470	<1	300	<1	300	0	300	<1	2200	<1
2016	1470	0	300	0	300	0	300	0	2200	0
2017	1470	<1	300	<1	300	0	300	<1	2200	<1
2018	1470	0	300	0	300	0	300	<1	2200	0
2019	1470	-	300	-	300	-	300	-	2200	-
2020	1470	-	300	-	300	-	300	-	2200	-
2021	1470	-	300	-	300	-	300	-	2200	-
2022	1470	-	300	-	300	-	300	-	2200	-
2023	1470	-	300	-	300	-	300	-	2200	-
2024	1470	-	300	-	300	-	300	-	2200	-

2.3. Incidental mortality of seabirds and marine mammals

A summary of seabird mortality in this fishery in recent years is presented in Table 3. The three most common species injured or killed in this fishery were white-chinned petrel (*Procellaria aequinoctialis*), grey-headed albatross (*Thalassarche chrysostoma*) and black-browed albatross (*Thalassarche melanophris*).

The level of risk of incidental mortality of birds in Subarea 48.3 remains at category 5 (high) (SC-CAMLR-XXX, Annex 8, paragraph 8.1).

Conservation Measure 25-03 applies to this fishery. It sets out technical measures to minimise bird by-catch and relates to: net monitoring cables, vessel lighting, discarding of offal, net cleaning, net sinking (nets are most likely to trap birds when they are on the surface of the water) and streamer lines (bird scarers).

Conservation Measure 42-01 has a further mitigation measure whereby, should any vessel catch a total of 20 birds, it shall cease fishing and shall be excluded from further participation in the fishery in that year.

Table 3. Number of reported birds caught (killed or with injuries likely to substantially reduce long-term survival) in this fishery in each fishing season.

Season	*Procellaria aequinoctialis*	*Thalassarche chrysostoma*	*Thalassarche melanophris*	Other
2001	6	1	10	
2003	14		3	
2004	34	1	6	
2005	1		6	1
2006	18	1	18	2
2007	3	1		
2008	3			2
2009	3	2	4	2
2010	1			1
2013	1			
2017	3			

There were no observations of mammal mortalities reported by vessels in this fishery.

3. Illegal, Unreported and Unregulated (IUU) fishing

There has been no evidence of illegal, unreported and unregulated IUU fishing activity in this fishery.

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.

4.2. Summary of available data

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

The vessel's crew report total catch of by-catch by coarse taxonomic groups given the taxonomic expertise required to discriminate similar species. Observers collect biological information on icefish 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 by-catch 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 icefish and by-catch taxa. Taxonomic identification may occur at different levels. -: no fishing.

Data source	Data class	Variable	2020	2021	2022	2023	2024
Last data in 2018							

Table 5. Summary of biological data for predominant by-catch groups reported by observers (from random subsets of trawls) in each of the last five seasons. Taxonomic identification may occur at different levels.

By-catch group	Variable	2020	2021	2022	2023	2024
Last data in 2017						

4.3. Length frequency distributions

Recent length frequency distributions of the catches of *C. gunnari* across the entire subarea are shown in Figure 2. 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, the number of vessels in the fishery and the spatial and temporal distributions of fishing.
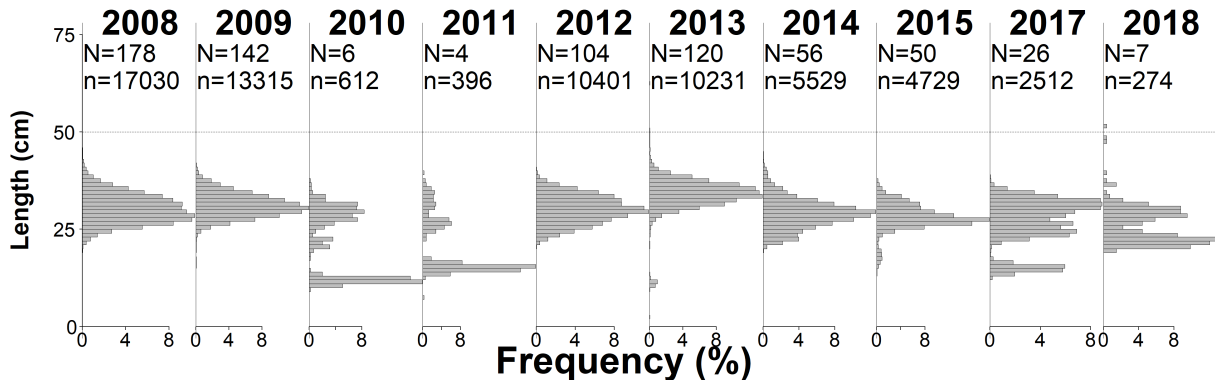

Figure 2. Annual length frequency distributions of *Champsocephalus gunnari* caught in Subarea 48.3. The number of hauls from which fish were measured (N) and the number of fish measured (n) in each year are indicated. Note: length frequency distributions are only shown where more than 150 fish were measured in a given season/area.

9

5. Research

5.1. Status of the science

Champsocephalus gunnari play an important role in the ecosystem as predators of krill (*Euphausia superba*), other euphausiids and the hyperiid amphipod (*Themisto gaudichaudii*; Main *et al.*, 2009) and as prey species of fur seals and gentoo penguins. *Champsocephalus gunnari* may also be consumed by juvenile toothfish in years of high *C. gunnari* abundance (Collins *et al.*, 2007).

Estimates of *C. gunnari* standing stock have been shown to vary in relation to krill abundance (Everson *et al.*, 1999), and in years of poor krill availability, *C. gunnari* condition is poorer and larger quantities are likely to be consumed by both fur seals and gentoo penguins, which are normally krill-dependent predators.

Preliminary analysis of long-term data series from UK trawl surveys (since 1986) indicates that abundance of previously overexploited fish (*C. gunnari* and *N. rossi*) may now be slowly increasing (WG-FSA-17/44; Hollyman *et al.*, 2021). Time-series analysis of length-frequency data of *C. gunnari* from five Argentine surveys between 1993 and 2013 also indicates a steady increase in densities of adult fish (WG-FSA-13/65).

The UK undertook a groundfish survey of CCAMLR Subarea 48.3 on the *FV Sil* between the 27th January and 5th February 2019 (WG-FSA-2019/20). A total of 73 random and representative hauls were completed covering depths of between 108 and 352 m. Overall biomass of *Chamsocephalus gunnari* was calculated at 50,897 tonnes with a lower 1-sided 95% interval estimate of 30,288 tonnes. This was lower than in 2017, but comparable with the long term average. The highest catches were on the moraine banks of the two northern strata and at the western end of Management Area 483B, with one high catch recorded in the South West stratum.

The UK undertook a groundfish survey of CCAMLR Subarea 48.3 on the *FV Robin M Lee* from 7th to 17th May 2021 (WG-FSA-2021/12). Seventy-seven random trawls were completed covering depths of 105 to 354 m. The biomass of mackerel icefish, *Chamsocephalus gunnari*, was estimated at 18,013 tonnes with a lower 1-sided 95% interval estimate of 10,627 tonnes. This was one of the lowest biomass estimates in the survey series. The highest catches were in the SW area, with low catches in the NW area, which are the main commercial fishing grounds and usually have the largest survey catches.

In 2023, both the UK and Argentina conducted groundfish surveys in Subarea 48.3.

In WG-FSA-2023/44 and WG-FSA-2023/46, Argentina presented results from a survey conducted on the *BIPO Víctor Angelescu* between 27 February and 3 April. The papers covered a range of research undertaken in the survey, including oceanography, acoustic and zooplankton sampling, biogeochemistry, and fish sampling. WG-FSA-2023/61 presented analyses of reproductive potential of three icefish species (*C. gunnari*, *Pseudochaenichthys georgianus*, *Chaenocephalus aceratus*) and *Notothenia rossii* sampled during the survey, with results that were generally consistent with those of a previous Argentinian survey in this Subarea undertaken in 2013 (WG-FSA-13/59).

In WG-FSA-2023/45 Rev. 1, the UK presented results for a survey conducted on the *FV Robin M Lee* between the 1st and 10th of February 2023. Overall biomass of mackerel icefish, *Chamsocephalus gunnari*, was estimated at 61,567 tonnes with a lower 1-sided 95% confidence interval estimate of 38,231 tonnes. This estimate is the highest biomass estimate since 2017 and the highest lower 1-sided 95% confidence interval since 2013.

WG-FSA noted that the length compositions of icefish measured in these two surveys in 2023 were consistent (WG-FSA-2023, paragraph 4.75).

5.2. Advice by the Scientific Committee

The limits on the fishery for *C. gunnari* in Subarea 48.3 for the forthcoming season are defined in Conservation Measure 42-01.

6. Stock status

6.1. Summary of current status

A stratified bootstrap of the UK 2023 demersal fish survey icefish catch density and catch rate data indicate a precautionary biomass estimate of 75,170 tonnes (lower one sided 5th percentile: 47,395 tonnes) within Subarea 48.3 (see Stock Assessment Report). Projections for the 2024 and 2025 seasons applying the CCAMLR Decision Rule led to a recommendation from Working Group FSA to the Scientific Committee that the catch limit for *C. gunnari* in Subarea 48.3 should be set at 5,138 tonnes for 2024 and 3,579 tonnes for 2025.

6.2. Assessment method

The use of a length-based model to set catch limits for *C. gunnari* in Subarea 48.3 was endorsed at the 2010 meeting of the Working Group on Fish Stock Assessment (WG-FSA-10) (SC-CAMLR-XXIX, Annex 8, paragraph 5.164). The assessment used survey data on length densities and biomass density without the need to identify age-specific cohorts. Methods of aggregating the length distributions from multiple hauls using a mean of positive values (as previous assessments in this subarea), or a sum (equivalent to a mean of all values) were considered by WG-FSA-17 (WG-FSA-17/51). It was agreed that the assessment should change to using the sum, which reduces the likelihood of over-representing young fish in the population length distribution when small fish are clustered in particular survey strata.

The CCAMLR harvest control rule, using a length-based approach, has been demonstrated to provide robust precautionary estimates of catch limits and exploitation rates for *C. gunnari* in Subarea 48.3 (WG-SAM-13/31 Rev. 1).

6.3. Year of last assessment, year of next assessment

Assessments are reviewed biennially, the last assessment was in 2023.

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 (toothfish), Divisions 58.5.1 and 58.5.2 and in the Ross Sea region.

Additional Resources

- Fishery Summary: pdf, html

- Species Description: pdf, html

- Stock Assessment Report: pdf

- Fisheries Documents Browser