# Status of stocks in the CCAMLR Convention Area in 2024

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## The Convention

The Convention on the Conservation of Antarctic Marine Living Resources (the Convention) is an international agreement established to conserve Antarctic marine living resources and is an integral part of the Antarctic Treaty System.

Large-scale fishing for finfish began in the Southern Ocean in the late 1960s, targeting species such as mackerel icefish (*Champsocephalus gunnari*), marbled rockcod (*Notothenia rossii*) and Patagonian rockcod (*Patagonotothen guntheri*). By the late 1970s, some species had been overfished in some areas and their fisheries have been closed since the late 1980s (Kock, 2000). A list of exploited species including stocks that were either exploited historically or for which no fishing has ever been permitted are listed in Tables 1 and 2.

Krill fishing started in the mid-1970s, and by 1980 more than 400 000 tonnes were caught annually. Krill is a keystone species in the Antarctic ecosystem with seabirds, seals and whales relying on it as prey. In 1978, concern over increased fishing and its effect on the wider ecosystem led the Antarctic Treaty Consultative Parties to convene a conference on the conservation of Antarctic marine living resources. The conference agreed to the Convention on the Conservation of Antarctic Marine Living Resources, which came into force on 7 April 1982.

The objective of the Convention, set out in Article II, is the conservation of Antarctic marine living resources, where the term 'conservation' includes rational use. Article II (3) sets out the principles of conservation to achieve the objective of the Convention as:

- (a) prevention of decrease in the size of any harvested population to levels below those which ensure its stable recruitment. For this purpose its size should not be allowed to fall below a level close to that which ensures the greatest net annual increment;
- (b) maintenance of the ecological relationships between harvested, dependent and related populations of Antarctic marine living resources and the restoration of depleted populations to the levels defined in sub-paragraph (a) above; and
- (c) prevention of changes or minimisation of the risk of changes in the marine ecosystem which are not potentially reversible over two or three decades, taking into account the state of available knowledge of the direct and indirect impact of harvesting, the effect of the introduction of alien species, the effects of associated activities on the marine ecosystem and of the effects of environmental changes, with the aim of making possible the sustained conservation of Antarctic marine living resources.

The Convention applies to all marine living resources that occur south of the Antarctic Convergence, except for the management or harvesting of whales and seals. Whaling and sealing – which do not take place in the Convention Area – are recognised by CCAMLR to be the responsibility of the International Convention for the Regulation of Whaling, and the Convention for the Conservation of Antarctic Seals respectively. Nevertheless, the role of these

species in the ecosystem is considered by CCAMLR when making its management decisions. CCAMLR has adopted a comprehensive set of measures to support the conservation of Antarctic marine living resources, a large part of which is the management of fisheries in the Convention Area.

The area covered by the Convention (the Convention Area) extends to all marine waters south of the Antarctic Convergence (Article I). At the Convergence, there is an abrupt increase in sea water temperature from south to north which creates an ecological boundary. Because the Convergence is an oceanographic boundary and does not follow a straight-line path, the Convention Area is defined in Article I (4) to follow a set of defined longitude and latitude points that approximate the position of the Convergence.

CCAMLR has divided the Convention Area into a set of defined sub-areas and divisions, each with specific management requirements. Some are closed to certain types of fishing activity. Some are open to fishing but are subject to the requirements of conservation measures. As set out in Article II, CCAMLR follows an ecosystem-based and precautionary approach to management.

## Management approach

CCAMLR determines catch limits and other measures necessary to manage fisheries through analysis of extensive data, including data collected by independent scientific observers (mandatory on all vessels), and catch and effort data provided by all vessels. Scientific surveys and research provide independent estimates of stock abundance and recruitment patterns. There are large-scale acoustic surveys of krill populations, a long-term tagging program implemented by fishing vessels that generates estimates of stock sizes for toothfish, and trawl surveys to determine size of icefish and some toothfish stocks.

CCAMLR's Scientific Committee develops advice on management measures for each fishery by estimating precautionary catch limits and developing other elements necessary to apply an ecosystem approach. These include measures to reduce by-catch of fish such as grenadiers and skates, to minimise the incidental mortality of seabirds and marine mammals and to consider benthic impacts of bottom fishing gear. CCAMLR requires haul by haul catch and effort data and implementation of an extensive mark-recapture program, assisted by at least one scientific observer on each toothfish vessel.

In accordance with the ecosystem and precautionary approach embedded in Article II, CCAMLR has developed harvest strategies and decision rules which have stock status targets that are higher than if they were based on single species management objectives. Therefore, the status of CCAMLR stocks evaluated in relation to CCAMLR decision rules do not translate easily to FAO classification categories which utilise a single-species target of maximum sustainable yield. However, CCAMLR stock status and harvest strategies can be expressed in relation to FAO classification criteria and reference points to generate an FAO classification, allowing them to be compared with other fisheries globally.

CCAMLR currently manages fisheries on Antarctic krill (*Euphausia superba*), mackerel icefish (*Champsocephalus gunnari*) and two species of toothfish (*Dissostichus eleginoides* and *D*.

*mawsoni*). Biological stock definitions are not yet fully developed for several CCAMLR fisheries, but all current fisheries are managed as individual stocks. 'Current' fisheries are defined as fisheries which have had harvest (including any research harvest), or a biomass assessment within the past five years.

CCAMLR's decision rules reflect all three aspects of Article II (3) to determine a catch limit. The decision rules project the stock into the future with a timeline chosen to reflect the life history of the species, and are used to determine a catch limit that minimises the probability of recruitment impairment and results in a target stock status set in accordance with an ecosystem approach (Constable et al., 2000). For krill and toothfish there is a requirement that the probability of spawning stock biomass (SSB) dropping below SSB<sub>20</sub>% within the projection period must be less than 10% over the chosen projection periods of 20 and 35 years, respectively. The target reference points for CCAMLR stocks are SSB<sub>75</sub>% for krill and SSB<sub>50</sub>% for toothfish (SSB<sub>60</sub>% for toothfish in Division 58.5.1). For icefish, decision rules were developed using short-term assessments to estimate catches over the next two fishing seasons that would result in SSB<sub>75</sub>%.

For CCAMLR fisheries of krill and toothfish, measures for unfished and current biomass typically refer to  $SSB_0$  and  $SSB_{curr}$ , and it is this metric that is used to classify current stock status for CCAMLR fisheries into an FAO status. Further details on the status of each toothfish fishery are available in the CCAMLR fishery reports (<a href="https://fisheryreports.ccamlr.org">https://fisheryreports.ccamlr.org</a>).

#### **Toothfish stocks**

Six toothfish stocks have had integrated stock assessments conducted using CASAL or Casal2 (Bull et al., 2012; Casal2 Development Team 2024) and classify as FAO Tier 1 stocks (D. mawsoni in Subarea 88.1 and SSRUs 882AB, and D. eleginoides in Subareas 48.3, 48.4, 58.6, and Divisions 58.5.1 and 58.5.2). The current stock statuses for five of these stocks using the defined FAO criterion of  $SSB_{curr}/SSB_{\theta}$  metric range from 37.9% to 65.2%. The stock status of D. eleginoides in Subarea 48.3 was last agreed in 2019 at 50%  $SSB_{\theta}$  (SC-CAMLR-38 paragraph 3.71 and Table 1). These stocks therefore classify using FAO categories as maximally sustainably fished (1 stock) or underfished (5 stocks) (Table 1). Note these status evaluations derive from 'characteristic metric 2: spawning potential' of the FAO criteria (FAO 2011). The quality of the assessments also meets the FAO criterion for low uncertainty.

Other CCAMLR toothfish stocks classify as FAO Tier 2 (*D. mawsoni* in Subareas 48.4, 48.6, 88.2, 88.3 and Division 58.4 (See fisheryreports.ccamlr.org), and *D. eleginoides* in Subarea 58.7 (DFFE, 2023)). Note these status evaluations derive from 'characteristic metric 3: catch trend' of the FAO criteria (FAO 2011). The target metric for managing data-limited fisheries uses a proportion (gamma) of vulnerable biomass, set at 4% of the current estimate of vulnerable biomass of toothfish in a defined area using five-year trends in either CPUE or vulnerable biomass as determined through a mark-recapture program. The 4% value was derived from an evaluation concluding that a 4% harvest rate of a depleted toothfish stock would not influence the time needed for rebuilding to the target status (*i.e.*, stock size would increase at a rate indistinguishable from a non-harvested stock).

In addition to a conservative harvest rate, fishing is only allowed in a small proportion of each data-limited stock's geographic range and the precautionary catch limit updated annually. Therefore, FAO stock status is typically classified as underfished (Table 1). Several stocks with these characteristics are not fished currently (last fished more than 5 years ago) and therefore classified as unknown, however, when fishing last occurred their FAO status was underfished (*i.e.*, biomass estimates were above target thresholds), with the exception of Division 58.4.4. The level of uncertainty for currently fished data-limited stocks of toothfish is considered to be medium.

In relation to the *D. eleginoides* stock in Division 58.4.4, this fishery was closed in 2002 based on concern of low stock levels due to high IUU fishing in the area. However, no evidence of IUU fishing has been reported since 2010 and the limited research fishing conducted was managed based on a precautionary harvest rate applied to the biomass in the fished area at the time, with the last year of research fishing in 2019. Although there is no evidence of IUU fishing, and results from a draft integrated stock assessment were presented in 2021, stock status is currently classified as unknown with a high level of uncertainty.

#### **Icefish stocks**

There are two fisheries for mackerel icefish (*Champsocephalus gunnari*), one in Division 58.5.2, and one in Subarea 48.3.

For each icefish stock, survey data and stock assessments are updated annually (Division 58.5.2) or biennially (Subarea 48.3). Catch limits are set based on the harvest rate that when applied to the one-sided lower 95% confidence bound of the current biomass estimate for the following two years would result in 75% of the vulnerable biomass remaining (Fisheryreports.CCAMLR.org). FAO stock status for each icefish stock is classified as underfished with a low level of uncertainty.

## Krill stocks

Antarctic krill (*Euphausia superba*) is distributed throughout the Convention Area and is a highly abundant key ecosystem species. Acoustic survey data on krill biomass have been updated periodically, most recently in 2019 by a large-scale multi-national survey (Krafft et al., 2021), and from 2012 to 2024 by annually or multi-year mesoscale surveys covering areas where the fishery operated in Subareas 48.1 (SC-CAMLR-43/BG/14), 48.2 (Skaret et al., 2023; WG-EMM-2024/05) and 48.3 (WG-EMM-2024/06). Acoustic surveys were conducted in Division 58.4.1 in 2019 (Abe et al., 2023) and in 58.4.2 in 2020 (Cox et al., 2022) for the East Antarctic region.

The target reference point for krill is *SSB*<sub>75%</sub>, which takes account of the key role of krill within the Antarctic ecosystem. Application of the decision rules in the South Atlantic region, where survey biomass is about 60 million tonnes, implies a precautionary catch limit of 5.61 million tonnes per fishing season in Subareas 48.1, 48.2, 48.3 and 48.4 combined, which is less than 10% of stock size (Zhao et al., 2024). However, to take account of local ecosystem requirements the catch limit applied in Subareas 48.1 to 48.4 is constrained to 620,000 t until there is an

agreed mechanism to distribute catches spatially and seasonally such that localised impacts on dependent predators are avoided or minimised (Conservation Measure 51-01). The krill fishery in Area 48 is therefore classified as underfished. However, additional measures are under consideration to avoid ecosystem impacts that may result from localised depletion of krill.

The krill fishery was active in Area 58 until 1995, with some minor catches between 2017 and 2019. Revised biomass estimates were provided in 2023 based on recent surveys, but the catch limits have not been updated. The FAO stock status is classified as underfished. The levels of uncertainty for krill in Area 48 and 58 are evaluated as low based on the extensive information available from multiple surveys and modelling approaches.

## **Summary**

For FAO stock status reporting, there are 37 stocks of the four currently targeted species. Fifteen of these are currently harvested and their status classified relative to FAO stock status (Table 1). Of the 15, 12 were classified as underfished and 3 as maximally sustainably fished. Further details on the status of each fishery are available in the CCAMLR fishery reports (<a href="https://fisheryreports.CCAMLR.org">https://fisheryreports.CCAMLR.org</a>). There are an additional 41 stocks of species for which fishing occurred prior to the implementation of the CCAMLR Convention or prior to the development of the current management procedures and are currently not targeted (Table 2). No FAO stock status is provided for these stocks.

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# **Tables and Figures**

Table 1: Status of commercial fisheries in the Convention Area as of 1 October 2024. Current research fisheries and fisheries that operated before the CAMLR Convention entered into force are not included. 'Near target' indicates stocks with biomasses (CCAMLR Assessment Categories 1 and 2) or harvest rates (CCAMLR Assessment Category 3) currently or projected to be within ±5% of established CCAMLR targets. 'Above target' and 'below target' indicate stocks with biomasses or harvest rates outside of this range. Target biomasses are 50% (60% in Division 58.5.1) of unfished spawning biomass for *Dissostichus* spp. and 75% of unfished biomass for *Euphausia superba* and *Champsocephalus gunnari*. Category 1 assessments are integrated stock assessments (*Dissostichus* spp.) or 2-yr projections based on the results of recent trawl surveys (*C. gunnari*). Category 2 assessments (*E. superba*) are 20-yr projections based on the results of hydroacoustic surveys conducted > 5 years in the past. Category 3 assessments (*Dissostichus* spp.) are trend analyses of catch per unit effort or mark-recapture estimates of vulnerable biomass, with target harvest rates of 4% for toothfish in Category 3. FAO status determined on the basis of indicated FAO metric as of 1 October 2024 from FAO (2011). Blank indicates no information available.

Species	CCAMLR Subarea or Division	Last calendar year of reported catch	CCAMLR assessment category	CCAMLR status as of 1 October 2024	FAO tier and (metric category)	FAO status classification
Euphausia superba	48.1 to 48.4	2024	24	Above target	1 (3)	Underfished
	48.5	1991		Not assessed	(-)	
	48.6	1993		Not assessed		
	58.4.1	2017	24	Above target	1 (3)	Underfished
	58.4.2	2019	24	Above target	1 (3)	Underfished
	58.4.3	1979		Not assessed		
	58.4.4	1979		Not assessed		
	88.1	1990		Not assessed		
	88.2	1980		Not assessed		
	88.3	1991		Not assessed		
Champsocephalus gunnari	48.2	1990		Commercial fishing prohibited		
Sumari	48.3	2018	1	Above target	1 (2)	Underfished
	58.5.1	2017	1	Not assessed	1 (2)	Chachionea
	58.5.2	2024	1	Near target	1 (2)	Underfished
Dissostichus	48.1	Never		Commercial	1 (2)	Chachishea
eleginoides	10.1	commercially fished		fishing prohibited		
	48.2	Never commercially fished		Commercial fishing prohibited		
	48.31	2024	1	Near target	1 (2)	Underfished
	48.4	2024	1	Above target	1 (2)	Underfished
- - - -	58.4.3a outside areas of national	2018		Closed fishery with catch limit of zero tonnes		
	jurisdiction	• • • •				
	58.4.3b	2009		Not assessed		
	58.4.4a	2000		Not assessed		
	58.4.4b	2020		Not assessed	1 (2)	** 1 2 4 4
	58.5.1 <sup>2</sup>	2024	1	Near target	1 (2)	Underfished
	58.5.2 within areas of national jurisdiction	2024	1	Below target	1 (2)	Maximally Sustainably Fished

	58.5.2 outside areas of national jurisdiction	Never commercially fished		Commercial fishing prohibited		
	58.6 <sup>2</sup>	2024	1	Above target	1(2)	Underfished
	58.7 <sup>2</sup>	2024		Not assessed		
Dissostichus mawsoni	48.1	Never commercially fished		Commercial fishing prohibited		
	48.2	Never commercially fished		Commercial fishing prohibited		
	48.4	2024	3	Near target	2 (3)	Underfished
	48.5	Never commercially fished		Commercial fishing prohibited		
	48.6	2024	3	Near target	2 (3)	Maximally Sustainably Fished
	58.4.1	2018		Commercial fishing prohibited		
	58.4.2	2024	3	Near target	2(3)	Underfished
	58.4.3b outside areas of national jurisdiction	2010		Closed fishery with catch limit of zero tonnes		
	88.1 and 88.2AB	2024	1	Above target	1 (2)	Underfished
	88.2C-G and H	2024	3	Near target	2 (3)	Maximally Sustainably Fished
	88.33	Never commercially fished		Commercial fishing prohibited		

Catch and effort data from fishing for *Dissostichus eleginoides* in Subarea 48.3 for 2022, 2023 and 2024 were received by the Secretariat. Said fishing was carried out in the absence of a CCAMLR Conservation Measure for 48.3, since CM 41-02 was not readopted for the 2021/22, 2022/23 and 2023/24 fishing seasons.

<sup>&</sup>lt;sup>2</sup> This stock is managed by national authorities.

<sup>&</sup>lt;sup>3</sup> Annual research fishing occurs, with catches reported through 2024.

<sup>4</sup> CCAMLR assessment categories for krill will be refined in the next 12 months by the Working Groups of the Scientific Committee.

Table 2: Status of stocks in the Convention Area for species that were not commercially harvested as of 1 October 2024. Research fisheries are not included.

Species or Family	CCAMLR Subarea or Division	Last year of reported catch	CCAMLR assessment category	CCAMLR status	FAO status
Lithodidae	48.2	2010		Not assessed	
	48.3	2010		Not assessed	
Martialia hyadesi	48.3	2001		Not assessed	
Macrouridae	58.4.3a	2004		Not assessed	
	58.4.3b	2004		Not assessed	
Channichthyidae	48.3	1986		Not assessed	
Chaenocephalus	48.1	Never		Commercial fishing prohibited	
aceratus		commercially			
	40.2	fished			
	48.2	Never		Commercial fishing prohibited	
		commercially fished			
	48.3	Never		Commercial fishing prohibited	
		commercially			
Chaenodraco	58.4.2	fished 2004		Not assessed	
wilsoni					
Pseudochaenichthys	48.1	Never		Commercial fishing prohibited	
georgianus		commercially			
	49.2	fished		C '161' 13' 1	
	48.2	Never commercially		Commercial fishing prohibited	
		fished			
	48.3	Never		Commercial fishing prohibited	
	40.5	commercially		Commercial fishing promoted	
		fished			
Nototheniidae	48.3	1980		Not assessed	
	58.4.4	1979		Not assessed	
	58.5	1978		Not assessed	
	58.6	1983		Not assessed	
Lepidonotothen kempi	58.4.2	2004		Not assessed	
Trematomus eulepidotus	58.4.2	2004		Not assessed	
Pleuragramma antarcticum	58.4.2	2004		Not assessed	
Gobionotothen	48.1	Never		Commercial fishing prohibited	
gibberifrons		commercially			
		fished			
	48.2	1988		Commercial fishing prohibited	
	48.3	Never		Commercial fishing prohibited	
		commercially fished			
Lepidonotothen	48.1	Never		Commercial fishing prohibited	
squamifrons		commercially			
	40.0	fished		~	
	48.2	Never		Commercial fishing prohibited	
		commercially fished			
	48.3	Never		Commercial fishing prohibited	
		commercially			
		fished			

	58.4.4a	Never	Commercial fishing prohibited
	except for	commercially	
	waters	fished	
	adjacent to		
	the Prince		
	Edward		
	Islands		
	58.4.4b	Never	Commercial fishing prohibited
		commercially	
		fished	
Notothenia rossii	48.1	Never	Commercial fishing prohibited
		commercially	
		fished	
	48.2	Never	Commercial fishing prohibited
		commercially	
		fished	
	48.3	1985	Commercial fishing prohibited
Patagonotothen	48.1	Never	Commercial fishing prohibited
guntheri		commercially	
		fished	
	48.2	Never	Commercial fishing prohibited
		commercially	
		fished	
	48.3	1988	Commercial fishing prohibited
Myctophidae	88.3	1988	Not assessed
Electrona carlsbergi	48.1	Never	Commercial fishing prohibited
o .		commercially	
		fished	
	48.2	Never	Commercial fishing prohibited
		commercially	
		fished	
	48.3	1991	Commercial fishing prohibited
Sharks	all	Never	Commercial fishing prohibited
		commercially	
		fished	
All other finfishes	48.1	Never	Commercial fishing prohibited
		commercially	
		fished	
	48.2	Never	Commercial fishing prohibited
		commercially	
		fished	