

# CCAMLR's approach to managing the krill fishery (2022). *Euphausia superba* in Area 48

CCAMLR Secretariat

14 March 2023

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) was established by international convention in 1982 in response to increasing commercial interest in Antarctic krill resources. A summary of the history of the Antarctic krill fishery is given in the krill [fishery report](#). In Subareas 48.1, 48.2, 48.3 and 48.4, limits on krill harvesting are described in Conservation Measures [51-01](#) and [51-07](#).

In 2010, the Scientific Committee agreed that the best estimate of krill biomass from the CCAMLR-2000 Survey in Area 48 ([Trathan et al., 2001](#)) was 60.3 million tonnes. Using a krill population projection model - the Generalised Yield Model (GYM, [Constable and de la Mare, 1996](#); [Constable et. al, 2000](#)) - CCAMLR agreed to the current precautionary catch limit for krill of 5.61 million tonnes per season (1 December to 30 November of the following year) in Subareas 48.1, 48.2, 48.3 and 48.4 combined ([SC-CAMLR-XXIX](#), paragraph 3.30; Conservation Measure [51-01](#)).

Precautionary catch limits for krill were determined using a set of decision rules to determine what proportion of the stock could be fished while still achieving the objective of the [Convention](#). To do this, the population of krill was projected forward in time using the GYM to simulate the effects of different catch levels (Fig. 1). In Figure 1, the distribution in blue represents the range of potential starting points for projections. For each projection, a starting point is randomly picked from this distribution and the population is projected forward with key parameters, such as recruitment, drawn at random from plausible ranges to account for natural variability and uncertainty.

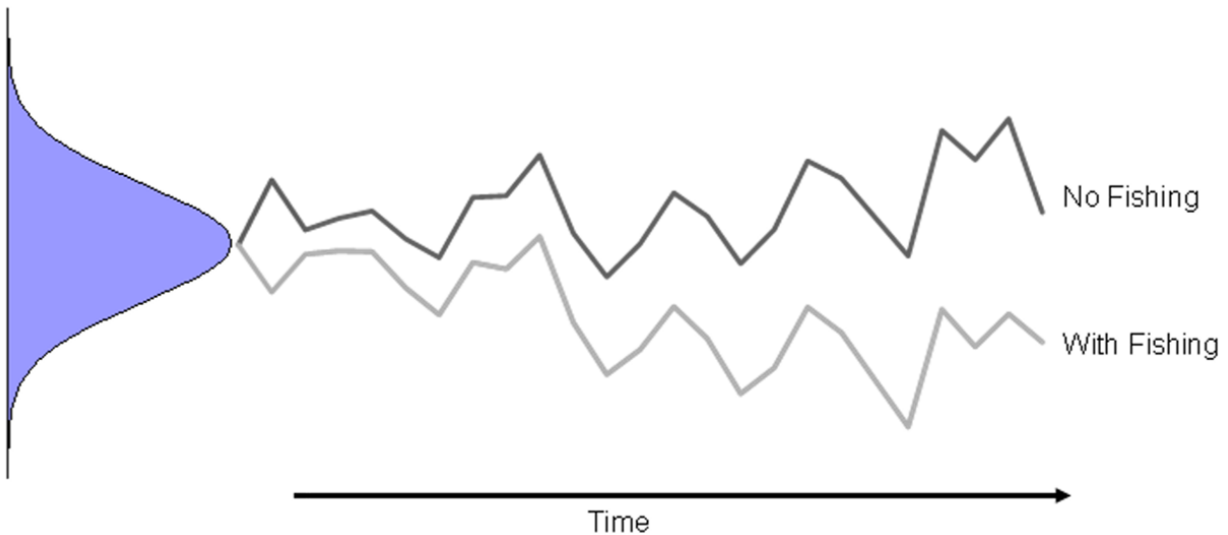


Figure 1. Schematic of krill population projections using the GYM.

The catch limit for krill is set on the basis of a sustainable yield (*gamma*) that can be taken as a constant catch. Using the GYM outputs, the following rules are applied to determine sustainable yield (Fig. 2):

1. Choose a yield, *gamma*<sub>1</sub>, so that the probability of the spawning biomass dropping below 20% of its median pre-exploitation level over a 20-year harvesting period is 10%.
2. Choose a yield, *gamma*<sub>2</sub>, so that the median escapement at the end of a 20 year period is 75% of the median pre-exploitation level.
3. Select the lower of *gamma*<sub>1</sub> and *gamma*<sub>2</sub> as sustainable yield.

The actual catch limit is the level of yield selected in step 3 multiplied by the estimate of biomass from surveys of that stock.

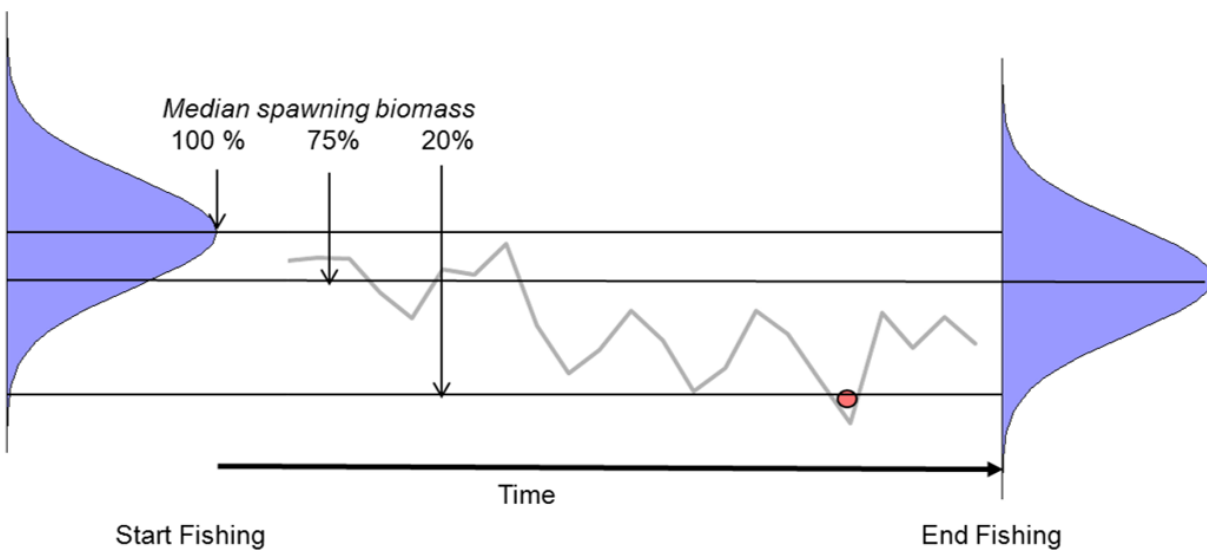


Figure 2. Schematic of krill population projections showing the decision rules.

In setting a 5.61 million tonne catch limit over such a large area, CCAMLR recognised that the fishery had the potential to be spatially restricted and had the potential for localised, potentially negative, ecosystem impacts. In recognition of this risk, CCAMLR introduced a trigger level of 620,000 tonnes above which the fishery cannot proceed until there is an agreed mechanism to distribute catches such that localised impacts are avoided. The trigger level was selected as it represented the combined maximum historic catches reported from each Subarea. The trigger level was subdivided such that no more than 25% (155,000 t.) can be taken from Subarea 48.1, no more than 45% (279,000 t.) can be taken from Subarea 48.2 and Subarea 48.3 and no more than 15% (93,000 t.) from Subarea 48.4 (Conservation Measure 51-07; Fig. 3). These percentages deliberately sum to more than 100% to provide flexibility to the fishery while achieving the objective of distributing fishing effort.

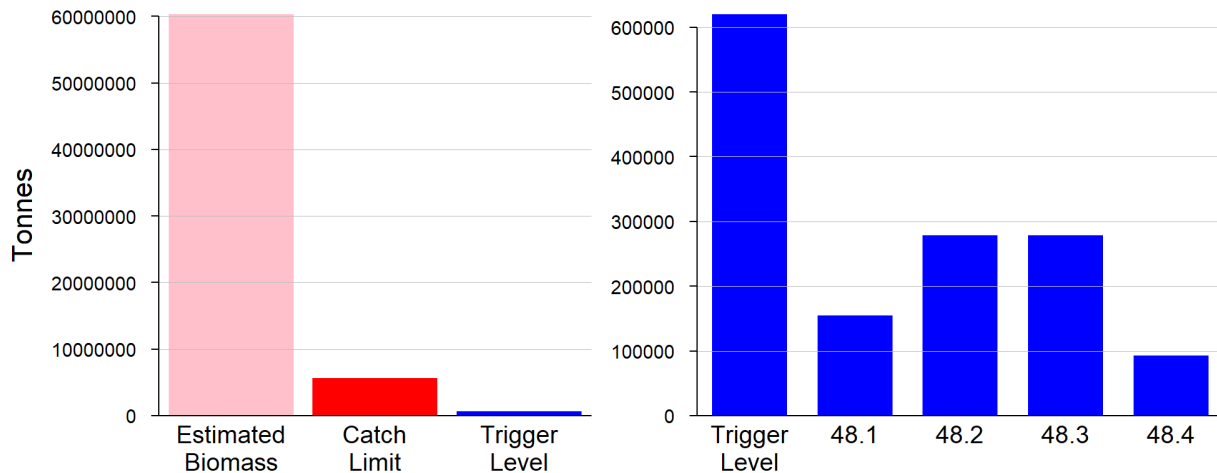


Figure 3. Estimated biomass, catch limit and trigger level in Area 48, and trigger levels in Subareas 48.1-48.4.

The current trigger level is not linked to the assessment of krill biomass; in 2010, although the precautionary catch limit was amended, the trigger level was not changed at that time. Additionally, in discussions related to the use of the GYM, the Working Group on Ecosystem Monitoring and Management (WG-EMM) considered the application of the decision rules used by CCAMLR to determine the precautionary catch limit for krill and noted that for stocks such as krill that experience high interannual variability in abundance, the probability with which the biomass may fall below 20% of the initial biomass may be greater than 0.1 even in the absence of fishing (SC-CAMLR-XXIX, Annex 6, paragraph 2.78). Given the potential impact of climate change on recruitment variability, the Working Group agreed that both the recruitment variability and the specification of the current decision rule relating to the maintenance of stable recruitment should be further investigated.

## Recent developments

In recent years, international collaborations have focused on revising the krill management approach. The approach will include three components (SC-CAMLR-40, Annex 8 Fig. 1):

- Update of acoustic-derived biomass estimates (*e.g.*, Krafft *et. al*, 2021),
- Update of the GYM (now recoded in R, in the [Grym](#) package),
- Development of a risk assessment framework to distribute catch limits spatially (*e.g.*, [WG-FSA-2021/16](#)).

The revision of the krill management approach will involve efforts from all Working Groups of the Scientific Committee, which has developed an ambitious list of tasks (SC-CAMLR-40, paragraph 3.24).

In 2021, Conservation Measure 51-07 as agreed by CCAMLR-XXXV (paragraph 5.19) expired. In 2021 (CCAMLR-40, paragraph 6.12) and 2022 (CCAMLR-41, paragraph 4.21) the Commission agreed to 1-year extensions to enable further progress on the revision of the krill fishery management approach.

In 2022, the Scientific Committee considered:

- Candidate management units (SC-CAMLR-41, Fig. 1),
- Biomass estimates for each management unit (SC-CAMLR-41, paragraphs 3.16-3.25; Tab. 3),
- An updated value of *gamma* (0.0338) for Subarea 48.1 (SC-CAMLR-41, paragraphs 3.30-3.34),

- The application of the spatial overlap analysis to determine precautionary catch limits ([SC-CAMLR-41](#), paragraph 3.35-3.39) in each management unit, in winter and summer ([SC-CAMLR-41](#), Tab. 2),
- The implementation of revised catch limits in Subarea 48.1 ([SC-CAMLR-41](#), paragraphs 3.43-3.66).

The Scientific Committee was unable to reach consensus as to whether the newly derived catch limits and spatial and temporal allocation of krill catch should be implemented in the 2023 season with commensurate changes to Conservation Measures [51-01](#) and [51-07](#) ([SC-CAMLR-41](#), paragraphs 3.67-3.69).

## **Additional Resources**

- Fishery Summary: [pdf](#), [html](#)
- Fishery Report: [pdf](#), [html](#)
- Species Description: [pdf](#), [html](#)
- [Fisheries Documents Browser](#)