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Antarctic krill fisheries management: "What's next?"

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Abstract

The move from Stage 1 to 2 in feedback management (FBM) for the Antarctic krill fishery is of critical importance to CCAMLR. Useful proposals at WG-EMM-16 this year highlighted strategies that could be used to do this, and ASOC encourages CCAMLR to develop a plan for discussion of these proposals and to improve the collection of data needed to implement them. In particular, the enhancement of data collection by fishing operators and from CEMP will be critical to progressing FBM. Another outstanding need is the ability to quantify krill flux, a factor that creates considerable uncertainty for management of the fishery. Finally, CCAMLR should re-examine the data sampling program for the krill observer program and make changes as necessary to improve the quality of data collected. In general, CCAMLR should give high priority to obtaining the data required for FBM and agreeing a strategy for putting FBM into practice.

1 - Feedback management - issues for consideration

Since 2010, the work on krill has focused on the development of feedback management (FBM). It has been recognized that different parts of the Convention Area may need different approaches when it comes to FBM. In the meantime, ASOC concludes that it is key to maintain subarea catch limits established in CM 51-07 to minimize the risks of localized depletion of krill in important foraging areas of land-based predators (see SC-CAMLR-XXXV/BG/17).

Several strategies for developing FBM were presented at WG-EMM this year. Those proposed strategies are focusing on how to move from Stage 1 to 2 in FBM for the krill fishery in Subareas 48.1 and 48.2. Regarding Subarea 48.1, the US presented a series of papers that summarized the ecological background for the strategy, the decision rule for adjusting local catch limits and a series of retrospective analyses showing how the approach would work. The implementation of such a strategy includes the following series of steps: defining a base catch limit for catches in four groups of SSMUs (gSSMUs), collecting data on predators and krill, delaying the start of the fishing season until this data collection effort is underway, submitting the data to the Secretariat, and increasing the frequency of catch and effort reporting by the fishery. Thereafter, the Secretariat will use the submitted data to compute appropriate catch limits and will apply the decision rule relevant to each gSSMU, providing advance notice to fishing vessels so as to adjust the catch limit in each gSSMU.

The UK presented a strategy to move from Stage 1 to 2 of FBM for Subarea 48.2. Their review of the state of ecological knowledge for that subarea suggests that the development of any new management approach based on ecological indicators is limited by the current level of relevant ecological information. Since improving the ecological knowledge base for the subarea will take time, it was concluded that a new experimental approach will need to be developed if the krill fishery in Subarea 48.2 is to expand beyond its current level. This approach would include oceanographic modeling, predator monitoring and fisheries acoustics. Lack of engagement by a sufficient number of Members, the level of effort, and the long time needed to provide appropriate management information might make this impractical. Therefore, other management approaches were proposed as alternative ways to distribute the krill fishing effort. Those options include establishing coastal buffers closed to fishing, closing areas during critical ecological time periods, and/or creating fishing limits and move-on rules. Any selected option will require evidence that it still achieves the objectives and provides an appropriate evaluation of the risks.

Climate change will play an important role in the development of FBM, especially in the Antarctic Peninsula area. Recent studies have compared the abundance estimates of larval stages of krill species in the Scotia–Weddell Confluence from the early 1980s and early 1990s to data collected in 2011 (WG-EMM-16/51). This analysis shows that larval abundance for Antarctic krill was lower in 2011 compared to the last 25 to 35 years. A considerable freshening of waters in the area over time was also discovered. Particularly in the South Shetland region, this might be caused by large freshwater inputs originating from the western shelf of the Weddell Sea.
The results of recent modeling analyses of different climate change scenarios were also presented at WG-EMM (see WG-EMM-16/53). These analyses focused on the potential future effects of changing temperature on the individual weight and population biomass of krill and the resulting estimated potential changes on predator populations using ecosystem models. Results showed that changing ocean temperatures are likely to decrease the weight of individual krill, and also decrease the krill population biomass with consequent effects on krill-dependent species. This work indicates the importance of considering long-term climate change predictions when developing strategies to manage krill fishing.

Implementing a FBM strategy will require commitment from Members to acquire, analyse and deliver data for use in the decision-making procedures. One of the important conclusions of the discussions at WG-EMM is that any strategy for 48.1 or 48.2 will require acoustic information from krill fishing vessels. Particularly important would be to obtain results from acoustic surveys and estimates of relative or absolute krill stock biomass. One option to advance this work could be the incorporation of a number of standard acoustic transects into the voyage plans of fishing vessels. Fishing-vessel derived acoustic data will therefore be critical to progress the development of FBM. In that context, it was highlighted that there was a need for SG-ASAM to provide the necessary acoustic procedures, data and information required. Therefore, the Scientific Committee needs to set the necessary priorities for SG-ASAM, including developing procedures for processing data, undertaking comparisons between different fishing vessels, and determining appropriate statistical analyses.

As ASOC stated back in 2007 (CCAMLR-XXVI/BG/25), “taking into account the level of uncertainty on the krill biology, the potential for fishery expansion, and the information needs of an ecosystem-based management regime, CCAMLR should seriously consider the possibility of using krill fishing vessels as research platforms, as part of a strategic management plan for the krill fishery”.

ASOC follows with great interest the FBM approaches being discussed and agrees on the importance of getting the fishing industry involved considering that fishing vessels could be good research platforms to collect data for the management of the fishery. Furthermore, ASOC is very interested in how the development of FBM, especially in Subarea 48.1, will be linked to the process towards developing marine protected areas (MPAs) in Domain 1. The establishment of reference areas in the context of FBM should be also considered in the plans for establishing MPAs in this domain.

The questions for CCAMLR are:

- How can CCAMLR engage the fishing industry so that fishing vessels get involved in the collection of krill acoustic data?
- Are there any plausible incentives that CCAMLR can provide that would encourage the broad participation of fishing vessels?
- What could be an effective process to design a protocol to organize the collection and analysis of data in a collaborative way so as to optimize time and resources of fishing operators?
- What are the next steps that CCAMLR will agree this year to advance the development of FBM? Is there a need for a focused intersessional workshop to discuss current proposals?
- How is CCAMLR envisioning linking the development of FBM with the process to establish MPAs, especially in Domain 1?

2 - CEMP and CEMP Data - Reference areas

In its current configuration, the CCAMLR Ecosystem Monitoring Program (CEMP) does not allow CCAMLR to distinguish the impacts of fishing from those associated with environmental factors, including climate change. There is a clear need to organize monitoring to detect defined spatial and temporal effects in areas used by predators and where fishing occurs. Advancing any of the strategies proposed for FBM would require enhancing CEMP, including integrating monitoring data from foraging areas used by predators in summer and winter.
It is important to understand how the spatial scale of data collected at individual CEMP sites reflects changes in the marine ecosystem. This is a fundamental element in developing FBM for the krill fishery. With this in mind, the CCAMLR Secretariat recently conducted an analysis of the correlations between "combined standardized indices" (CSI) of summer CEMP parameters and the patterns of inter-annual variability of different sites in Subarea 48.1. This analysis showed a general positive concordance in the results of CEMP data between sites in the same subarea in response to changes in the ecosystem. Nevertheless, the concordant responses of CEMP sites located in the Bransfield Strait differ from the response from sites located in Cape Shirreff. The explanation for this is that Cape Shirreff is associated with a different foraging environment since it is connected to the Drake Passage. This shows that it would be important to consider the site-specific foraging behavior of indicator species, especially when determining priorities for the location of new CEMP sites in this region. FBM would be strengthened by selecting reference areas that would facilitate the identification of major drivers of variation in monitoring data. The temporal concordance of CSIs of CEMP data across Area 48 could be a good basis for the identification of reference monitoring areas.

The questions for CCAMLR are:

- Is CCAMLR pursuing a clear process to enhance CEMP?
- Is there a need for a focused workshop to discuss how to improve CEMP in light of the presented FBM proposals for Subarea 48.1 and 48.2?
- What are the proposed next steps to identify the location of new CEMP sites and reference areas that are needed to advance FBM?

3 - Krill flux and its role in krill availability

Uncertainties in krill flux have been always one of the big challenges in the management of the krill fishery. Krill can move actively and swim at rates that are equivalent to the speed of water currents, allowing them to travel small distances. Thus, krill flux could play a significant role in determining krill availability to predators in areas that are impacted by fishing operations.

Krill flux is a very important variable when developing FBM for the krill fishery in Area 48. In the context of allocating krill catch limits at different levels (i.e. subarea, SSMUs, etc), it would be key to study krill flux at different spatial–temporal scales in those areas where the fishery operates. This becomes even more important where concentrated fishing occurs. As recommended by WG-EMM this year, the Scientific Committee needs to consider how to progress the development of methods to quantify flux, and to better understand the role of both behavior of krill and oceanographic processes that can aggregate krill and transport krill to downstream areas.

The questions for CCAMLR are:

- What is the concrete action that CCAMLR will take this year in order to develop the methods to quantify flux?
- Will CCAMLR propose to organize a focused workshop with the involvement of experts from WG-EMM, SG-ASAM and oceanographers to advance this issue?

4- Observer coverage

There are many uncertainties related to the krill biology and therefore, collection of systematic biological samples of krill is needed to allow CCAMLR to manage the krill fishery based on solid scientific evidence. Although scientific observation data is not currently used to set catch limits, it is used for other fishery management matters. Despite the general agreement that 100% coverage is scientifically desirable, the krill fishery still remains the only fishery within the Convention Area that does not require that level of scientific observer coverage.
One important issue is the need to improve the quality of data collected by observers. It was noted at WG-EMM-16 that the quality of observer data with regard to finfish larvae is not equivalent between vessels. Consequently, it was suggested that it was more important to increase the quality of observer data than the quantity of coverage. It was also concluded that the main focus should be the sampling design and not so much the sample sizes. Thus, it was suggested that sampling could be organized so as to include different locations, times and sample sizes to make the most of the data to be collected. Furthermore, Member commitment to the effective collection of data through observers is critical for the implementation of FBM. Also, the qualifications and expertise of observers to collect krill data (especially in the case of national observers) needs to be taken into account in the design of FBM strategies.

The questions for CCAMLR are:

- How will CCAMLR assess whether the current sampling design is appropriate for the questions that need to be answered?
- What are the next steps that CCAMLR proposes to revise/evaluate the sampling design?
- Is CCAMLR planning to establish a focused working group to further discuss these important observer coverage matters?

5-Summary of recommendations

ASOC strongly recommends that:

- CCAMLR prioritize the move to Stage 2 of FBM, and fully discuss the proposals that have been presented for doing so at WG-EMM-16. Additionally, CCAMLR should develop plans for obtaining acoustic data from fishing operators, as well as linking the process to ongoing MPA proposal development for the Antarctic Peninsula.
- CCAMLR should develop a strategy for enhancing CEMP to contribute to the development of FBM.
- CCAMLR should determine methods to better quantify krill flux.
- CCAMLR should assess the sampling design used in the current observer program and revise as needed to improve data quality.

These steps will improve CCAMLR’s ability to set appropriate management measures for the krill fishery.

References


