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# Stakeholder perspectives on ecosystem-based management of the Antarctic krill fishery



Rachel D. Cavanagh<sup>\*,1</sup>, Simeon L. Hill<sup>1</sup>, Cheryl A. Knowland, Susie M. Grant

British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET, United Kingdom

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## ABSTRACT

Information about stakeholder aspirations is a fundamental requirement for ecosystem-based management, but the detail is often elusive, and debates may focus on simplistic opposing positions. This is exemplified by the Antarctic krill fishery, which, despite a current operational catch limit equivalent to just 1% of the estimated biomass and actual annual catches much lower than this, is the subject of a high-profile debate framed around ambiguous concepts such as sustainability. Q methodology was applied to explore the detailed views of representatives of three stakeholder sectors (the fishing industry, conservation-focused non-governmental organisations (NGOs), and scientists from seven countries involved in research on the krill-based ecosystem). The analysis distinguished two clear groupings, one of which included the views of all NGO participants while the other included the views of fishing industry participants and a subset of the scientists. Key differences between the groups included the priority given to different management measures, and to continued commercial fishing. However, the results also revealed considerable overlap between viewpoints. Both groups prioritised the maintenance of ecosystem health and recognised the importance of defining management objectives. Also, neither group prioritised a decrease in catch limits. This suggests that most participants in the study agree that management should improve but do not perceive a major problem in the ecosystem's ability to support current catch levels. Cooperation to identify shared management objectives based on stakeholder aspirations for the ecosystem might enhance progress, whereas polarised discussions about preferred management measures or ambiguous concepts are likely to impede progress.

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## 1. Introduction

Ecosystem-based management (EBM) is an integrated approach that aims to manage natural resources and biodiversity by maintaining ecosystem processes, functions and services [1,2]. Despite widespread support for this approach and progress in some areas, full implementation of EBM for marine systems has yet to be achieved [3]. In attempting to balance the aspirations that different stakeholders (defined here as individuals and groups with an interest in the management of a resource [4]) have for ecosystems, the approach requires the engagement of diverse interest groups to determine what they desire from the ecosystem and the ecosystem states likely to provide this [5–7]. Yet bringing together this range of frequently conflicting viewpoints often introduces tension which may impede the development of EBM [8–10]. Dialogue amongst diverse stakeholders should be encouraged

and there are cases where friction has helped to catalyse new research and improve understanding that has successfully guided management [11]. However debates can become reduced to discussions framed around ambiguous or poorly-defined concepts such as sustainability and overfishing [12,13]. Such debates, when characterised by simplistic opposing positions, provide little detail about stakeholder aspirations.

The fishery for Antarctic krill (*Euphausia superba*) in the Scotia Sea and Antarctic Peninsula region (Fig. 1) illustrates this problem. Ninety per cent of the total krill catch in the Southern Ocean has been taken from this region, and since 1997 it has been the only area in which harvesting has occurred [14]. For brevity this fishery's target species is hereafter referred to as krill and its location as the Scotia Sea. Krill are a major food source for many fish, birds and mammals in the Scotia Sea and have been harvested by a commercial fishery since the 1970s. In the 2013/14 season twelve vessels from five nations took part in the fishery and caught approximately 312,000 t of krill, the highest reported catch since 1991 [15].

The fishery is managed by the Commission for the Conservation of Antarctic Living Resources (CCAMLR), an intergovernmental

\* Corresponding author.

E-mail address: [rcav@bas.ac.uk](mailto:rcav@bas.ac.uk) (R.D. Cavanagh).

<sup>1</sup> Joint first authors.

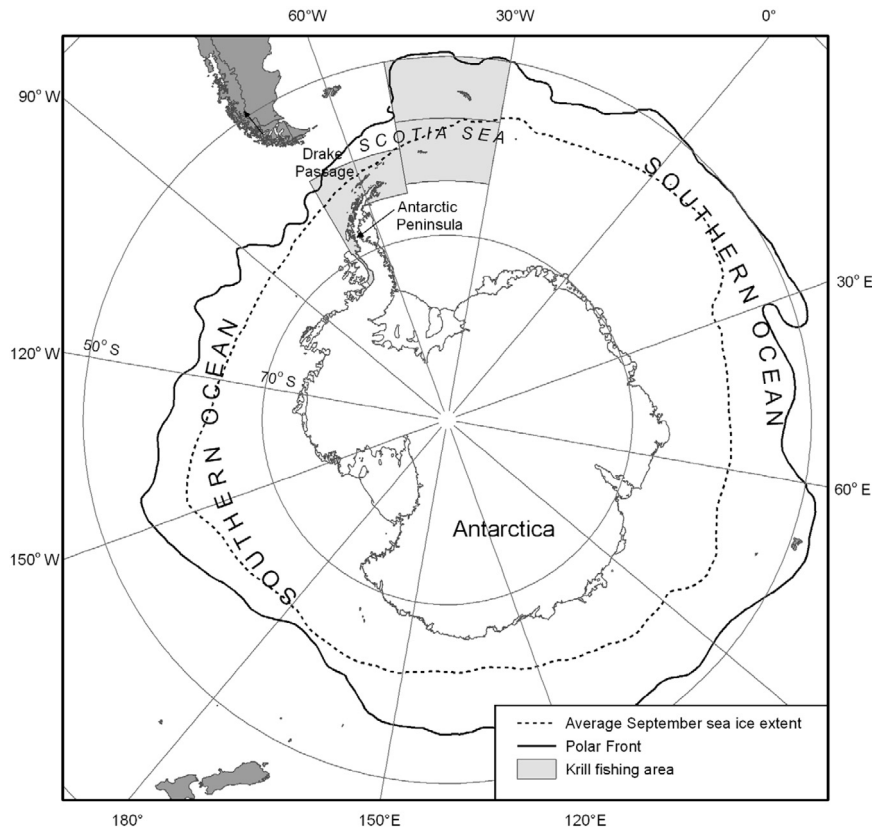


Fig. 1. The Southern Ocean showing the krill fishing area in the Scotia Sea and Antarctic Peninsula region. The Polar Front is the ecological boundary of the Southern Ocean.

organisation established in 1982 in response to concern about the impacts of increased krill fishing on the ecosystem [16]. CCAMLR follows “principles of conservation” which map on to those of EBM, allowing “rational use” while aiming to maintain ecosystem productivity, health and resilience [17,18]. Various authors have described CCAMLR as a pioneer of the ecosystem approach to fisheries management [e.g. 16,19], a term whose definition overlaps with that of EBM [20]. Despite progress in many areas, CCAMLR has not yet defined operational objectives for managing the ecosystem impact of the krill fishery and currently uses interim management measures [19,21,22]. These include a low operational catch limit or “trigger level” for krill. The nominal catch limit for the whole of the Scotia Sea is 5.6 million tonnes but the fishery currently cannot exceed the trigger level of 620,000 t which is equivalent to just 1% of the estimated biomass [23]. CCAMLR has also implemented measures intended to reduce competition between the fishery and krill predators including the subdivision of the catch limit across four large subareas, and the establishment of a Marine Protected Area (MPA) on the South Orkney shelf [24,25]. The Scientific Committee which advises CCAMLR is continuing to develop management methods for the fishery, including a “feedback management approach” (FBM) which “will use decision rules to adjust selected activities (distribution and level of krill catch and/or research) in response to the state of monitored indicators” [26]. Although this has not been further defined in practical terms, the ambition to develop FBM is effectively an ambition to further develop EBM.

The Southern Ocean does not border any permanently inhabited landmasses and its ecosystem services therefore have few local beneficiaries; however services such as climate regulation and nutrient cycling are globally important, and its iconic wildlife has a significant public profile [18]. Stakeholders in the krill fishery include direct beneficiaries such as the fishing industry’s

employees, suppliers and customers, as well as the beneficiaries of other ecosystem services that could be impacted by the fishery [18]. National governments represent the interests of stakeholders through their membership of CCAMLR; members currently include 24 States and the European Union, all of whom must agree to decisions by consensus. Stakeholders may also engage with CCAMLR through special interest groups who are observers to its meetings (but do not participate in decision-making), including the Association of Responsible Krill harvesting companies (ARK), and the Antarctic and Southern Ocean Coalition (ASOC) which represents over 30 conservation-focused non-governmental organisations (NGOs).

CCAMLR’s management of the krill fishery follows the principles of EBM, and the CCAMLR process allows stakeholders to present their opinions. Nonetheless representations of the krill fishery in both the popular media and academic literature imply considerable controversy. One point of view suggests that the fishery is well managed e.g. accreditation from two certification bodies; [27,28] and that CCAMLR is an effective Regional Fishery Body [29,30]. The opposing point of view suggests that management is not sufficiently precautionary [31], and that catches are not sustainable [32] or constitute overfishing [33]. Thus the debate appears to be polarised over whether or not management is effective, but it lacks clarity about the meaning of central phrases such as “sustainable” or the specifics of what stakeholders want to achieve [23].

Improved understanding about the aspirations of those who benefit from the Southern Ocean and might be affected by management decisions would be valuable for the further development of krill fishery management. The analysis presented here begins the work of exploring stakeholder aspirations for a fished Southern Ocean ecosystem more than three decades after CCAMLR’s original Members agreed their principles of conservation.

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