

Krill fishing at the South Sandwich Islands (CCAMLR Subarea 48.4)

Context

A complete closure to fishing for Antarctic krill (*Euphausia superba* Dana) within the South Sandwich Islands section of the Government of South Georgia & South Sandwich Islands (SGSSI) Marine Protected Area (MPA), has been advocated by the Great British Oceans coalition in order to establish a marine reserve for krill dependent species.

Summary

This note, which has been prepared by UK scientists who represent both the UK and the GSGSSI at CCAMLR, reviews the ecological consequences of such a closure, including an evaluation of probable management scenarios and their consequences. The risks to the South Georgia & South Sandwich Islands as well as those to the wider regional Antarctic krill-dependent ecosystem are also discussed.

Scientific basis and consequences for the regional ecosystem

- No decrease in wildlife attributable to krill fishing within the SGSSI MPA has ever been recorded. Closing the SGSSI MPA to krill fishing is highly unlikely to have any net benefit in terms of increasing biodiversity.
- Krill at South Georgia and the South Sandwich Islands are not a self-sustaining population. They arrive in the flow of the Antarctic Circumpolar Current from the Antarctic Peninsula and from the Weddell Sea further south. It is therefore vital to protect and reduce the risks to the sources of these krill flows, upstream of the SGSSI MPA.
- The South Sandwich Islands are currently allocated 15% of the regional krill catch limits for the southwest Atlantic.
- This allocation is currently not fished, as the fishery prefers other areas, and the South Sandwich Islands are therefore already a *de facto* no take zone.
- A formal closure of the South Sandwich Islands will result in the catch being taken elsewhere, and most likely it will be reallocated upstream to either the Antarctic Peninsula, the South Shetland Islands or the South Orkney Islands.
- These areas are particularly vulnerable to pressure from the krill fishery, as the fishery operates at these locations during the summer. These locations support millions of krill dependent predators throughout the summer breeding season, including penguins and seals; these areas are also important for recovering populations of whales.

- Reallocating catch to these upstream areas will not only increase the environmental risk to them, but also to South Georgia and the South Sandwich Islands, which are reliant on the streams of krill flowing from the Antarctic Peninsula and the Weddell Sea.
- The remoteness of the South Sandwich Islands means that they are relatively little understood scientifically. This is a risk identified during the science development of the SGSSI MPA and during the ongoing MPA review. The MPA review forms part of the 5-year fishery science plan working towards an impact assessment of management measures in the MPA and wider region.

Policy advice and management scenarios

- The krill fishery is closed in summer during the predator breeding season throughout the entire SGSSI MPA, with additional pelagic no-take zones (year-round closures) extending 12 nm around each of the South Sandwich Islands
- Extending these existing closures to the whole of the South Sandwich Islands (Subarea 48.4) will have no net ecological benefit within the SGSSI MPA. However, the risk to the SGSSI ecosystem will be increased facilitating more krill, to be taken from areas that are upstream of the islands.
- Reallocating the catch to other areas will also allow the fishery to take increased amounts of krill at times of years when the krill ecosystem is more vulnerable.
- The UK reputation for providing precautionary, impartial scientific advice for CCAMLR could be severely damaged. The UK has been instrumental in many world-leading management initiatives within CCAMLR, exactly because the Delegation advocates using the best available science for making management and policy decisions in the natural environment.
- The UK is currently a strong voice in CCAMLR initiatives to develop MPAs in the Weddell Sea and the Antarctic Peninsula and any unilateral closure would lead to mistrust of the UK, damaging a much wider strategy.

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Krill fishing at the South Sandwich Islands – Supporting information

Background

The Antarctic krill fishery is managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). CCAMLR is an international Convention with 25 Member States, including the UK, forming the Commission. The Convention follows an ecosystem-based approach to management, and the Convention Area includes the waters within the SGSSI MPA. Management of the waters around South Georgia and the South Sandwich Islands therefore comprise management procedures set both by CCAMLR and by GSGSSI.

Krill life history

Antarctic krill (*Euphausia superba*) is a key species in the Southern Ocean ecosystem, linking primary production to abundant, charismatic, vertebrate predators such as whales and penguins in short and highly efficient food chains. Antarctic krill has a circumpolar distribution; it is a species that is believed to have a high reproductive dependence on the seasonal sea ice surrounding the Antarctic continent.

The South Georgia and the South Sandwich Islands are at the northern limit of the krill distribution. Krill at South Georgia and the South Sandwich Islands do not form a self-sustaining population. Rather, the biomass of krill at South Georgia and the South Sandwich Islands is entirely dependent on advection of krill produced in the seas adjacent to the Antarctic Peninsula and the Weddell Sea.

Current catch limit and its allocation

CCAMLR has agreed that until robust assessment and management procedures are available, an interim annual catch limit for the southwest Atlantic will be set at 620,000 tonnes. The interim catch limit is known within CCAMLR as the 'trigger' level.

The trigger level is spatially subdivided across four CCAMLR management regions, established in 2009 and based on advice from the CCAMLR Scientific Committee. A total of 25% of the total krill catch can be taken around the Antarctic Peninsula (CCAMLR Subarea 48.1), 45% around the South Orkneys (CCAMLR Subarea 48.2), 45% around South Georgia (CCAMLR Subarea 48.3) and 15% around the South Sandwich Islands (CCAMLR Subarea 48.4). The regional proportions of the trigger level allocation sum to more than 100%, to allow flexibility for the fishery, but the overall catch is still capped at 620,000 tonnes; around 1% of the estimated regional biomass.

Under GSGSSI legislation, the krill fishery can only operate within the SGSSI MPA during winter. At the South Sandwich Islands the quota is currently not fished, as the fishery prefers South Georgia. The islands are therefore already a *de facto* no take zone.

If the UK notified CCAMLR that the South Sandwich Islands was formally a closed area, but also argued that the spatial allocation of the interim catch limit be maintained at 15%, this would probably be perceived by other CCAMLR Members as the UK allocating 15% of the krill catch to itself. As CCAMLR does not use catch allocations to Members, this would be viewed as operating against the spirit of the CAMLR Convention.

During the 2016 discussions concerning the spatial allocation of catches, several fishing nations argued that the proportional catch allocated to the South Sandwich Islands should be reallocated to the Antarctic Peninsula. No scientific basis for the reallocation was provided by the fishing nations, the rationale they presented was purely economic. The motives for this proposal are probably because some fishing nations wished to increase the catch allocation for the Antarctic Peninsula, as it has been fully taken in recent years (Figure 3). The CAMLR Commission eventually agreed to maintain the status quo and not to reallocate the catch allocation from the South Sandwich Islands; noting that any expansion of the total catch or changes to the regional allocation of the krill fishery should not happen unless advice from the CCAMLR Scientific Committee indicates that it will continue to be sustainable. This discussion illustrates the fact that any reallocation (either through national GSGSSI legislation, or through CCAMLR) must be on the basis of robust scientific evidence, to do otherwise will be extremely difficult to justify in CCAMLR.

The krill fishery

Fishing for krill follows a seasonal pattern over the course of the CCAMLR fishing season (December – November). The fishery usually begins during the Austral summer in December at the Antarctic Peninsula, progresses to the South Orkneys in the period April to July, usually as a result of Autumn seasonal sea ice formation. Subsequently, as the seasonal sea ice expands during late Autumn, the fishery moves from the South Orkneys to South Georgia where it operates as a winter fishery. In recent years, the local allocation of catch at the Peninsula has been reached in May and the fishery has moved early to the South Orkneys. Only the Peninsula region, Subarea 48.1, has been closed in recent years due to the catch limit being reached.

Within the SGSSI MPA, krill fishing has occurred predominantly at South Georgia, though historically a very small amount of harvesting also occurred at the South Sandwich Islands (Figure 1).

Changing seasonal ecological interactions within the krill fishery

The krill fishery has a differing spatial overlap with krill predators at different times of year. When the fishery operates at the Peninsula it occurs during the breeding season of penguins and seals. This is a particularly important period as penguins and seals are constrained to feed close to their colonies, so that they can return to land to provision their offspring. As the fishery moves to the South Orkneys, the temporal overlap with these same predators is mostly during moult and juvenile dispersion. The winter fishery at South Georgia and, potentially, at the South Sandwich Islands, occurs when the predators are widely dispersed across the wider Scotia Sea region; however, less is known about the spatial distribution of predators at this time of year, and it remains an active topic of research. Krill fishing during the summer predator breeding season is generally considered to be of higher risk. This was part of the scientific advice presented to GSGSSI during planning for the SGSSI MPA in 2012 and 2013. Now, as part of the SGSSI MPA, krill harvesting is restricted to the winter months preventing conflict with predators during their summer breeding seasons.

Provisions for protection within the SGSSI MPA

The MPA, introduced in 2012, has a set of overarching objectives for the whole protected area, as well as specific objectives and conservation targets in relation to protecting specific species or ecosystem processes. The SGSSI MPA management identified the dependence of land-based predators on krill flow from the Antarctic Peninsula as a risk, and acknowledged the effect a closure of the South Sandwich Islands to the krill fishery would have on krill and predator populations around the Antarctic Peninsula. Within the MPA therefore, GSGSSI introduced specific measures aimed to reduce risks from fishing pressure, as well as to protect land-based predators during their most constrained and vulnerable period of breeding. Specifically, for the protection of land-based krill predators and to reduce the risk of land-based predators interacting with the fishery, the MPA provides the following:

- The krill fishery is closed in summer during their breeding season throughout the SGSSI MPA
- Penguin colonies at the South Sandwich Islands are protected by pelagic no-take zones of 12 nm around each island during (summer and) winter
- Land-based predators at South Georgia are also protected by pelagic no-take zones of 12nm during (summer and) winter.

These spatial and temporal measures protect krill-eating land-based predators, including some of their important foraging areas within the SGSSI MPA, without increasing pressure on the krill-dependent ecosystem upstream at the Antarctic Peninsula or South Orkney Islands.

Closing of the South Sandwich Island krill fishery

As CCAMLR does not use catch allocations to Members, a scenario whereby the catch allocation remains at the South Sandwich Islands would be viewed as the UK setting out its own quota and going against the spirit of the CCAMLR Convention, consequently that option is not considered further in this note.

Two other plausible scenarios are considered, whereby the interim catch allocated to the South Sandwich Islands, either:

- 1) remains available to CCAMLR Members, within Subarea 48.4, but outside of the SGSSI MPA; or,
- 2) is reallocated across other CCAMLR Subareas - the Antarctic Peninsula, the South Orkneys or South Georgia.

Scenario 1: The catch remains available to CCAMLR Members, within Subarea 48.4, but outside of the SGSSI MPA

Scenario 1 would retain the catch allocation within Subarea 48.4, but would restrict fishing to outside of the SGSSI MPA. Figure 2 shows results from the last large scale survey for krill which was undertaken in 2000. The figure shows the distribution of krill biomass across the Scotia Sea. The results show that where information is available there are only low densities of krill, within Subarea 48.4 and outside of the UK EEZ. In general, the

fishery operates elsewhere over the continental shelf, or at the shelf edge. In subarea 48.4, there are no major continental shelves, so the fishery cannot find predictable krill fishing locations.

In order to present a scientific argument that fishing in Subarea 48.4 outside the SGSSI MPA is feasible, the UK would need to provide evidence that there were sufficient krill outside of its waters for a fishery to occur. If this was not possible, the UK may be perceived to be setting up artificial barriers to fishing.

Scenario 2:

The catch is reallocated across other CCAMLR Subareas - the Antarctic Peninsula, the South Orkneys or South Georgia

Scenario 2 would redistribute the catch allocation across other CCAMLR Subareas. CCAMLR Members are highly likely to argue that the catch allocation for the South Sandwich Islands should be allocated to Subareas 48.1 (Antarctic Peninsula) and/or Subarea 48.2 (South Orkney Islands), particularly as the interim catch limit for Subarea 48.1 has been reached every year in recent years.

This scenario would probably result in additional krill catch being taken upstream of the South Sandwich Islands during the summer (Figure 2), consequently increasing the risk to the whole Antarctic krill based ecosystem. Not only would the fishery increase the risk to the Peninsula and South Orkney regions but it would catch the krill destined to reach the South Sandwich Islands before they reach the islands. This therefore nullifies the perceived benefit of a closure at the South Sandwich Islands.

To date, the approach adopted by CCAMLR, as advocated by the UK, has been to spread catches in space and time, in order to avoid conflicts with natural krill eating predators; the closure of the South Sandwich Islands would have exactly the reverse effect.

Conclusion

The South Georgia and South Sandwich Islands krill are not a unit stock, but originate from the Weddell Sea and the Antarctic Peninsula.

Currently, there is no krill fishing at the South Sandwich Islands. If it were to occur under the GSGSSI management and monitoring regulations, the fishery would:

- 1) be subject to higher quality monitoring and regulation than occurs within CCAMLR,
- 2) would be restricted to winter when the impact on and risk to predators is at its lowest.

Forcing the fishery outside of the SGSSI MPA, such that catches are taken upstream of the islands would:

- 1) increase the catch in areas that are the source of krill that would otherwise eventually arrive at South Georgia and the South Sandwich Islands,
- 2) increase the catch in the summer breeding season thereby increasing the risk to the wider Antarctic krill based ecosystem.

Within the SGSSI MPA, the reallocation of catches would increase the risk to the ecosystems at South Georgia, the South Sandwich Islands, not reduce it.

Increasing the ecological risks across the whole of the Antarctic krill dependent ecosystem, would be almost impossible to defend at CCAMLR. The UK reputation for impartial, unbiased and independent science would be damaged at a critical time when major decisions on management of the Scotia Sea ecosystem are required, particularly the design and agreement of MPAs near the Antarctic Peninsula and the Weddell Sea.

Closing the South Sandwich Islands would have major unintended consequences, it would be seen as creating a paper park, and it would potentially have negative impacts on the Antarctic ecosystem. Closing the South Sandwich Islands would not represent UK science at its best.

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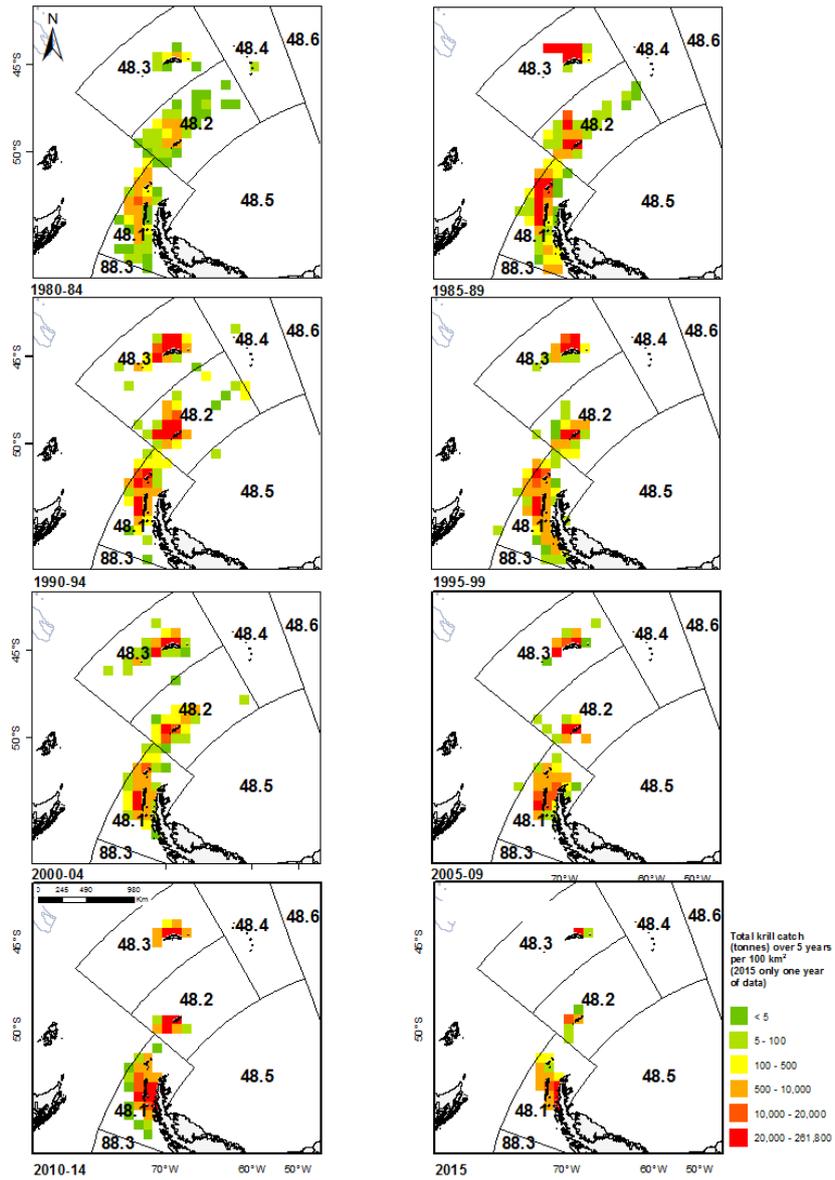


Figure 1 Total krill catch (tonnes) summed for consecutive 5 year intervals (final box shows 3 year sums) for the period 1980 to 2015. Catch data are C1 catch and effort reporting data. Final panel shows 2015 data only.

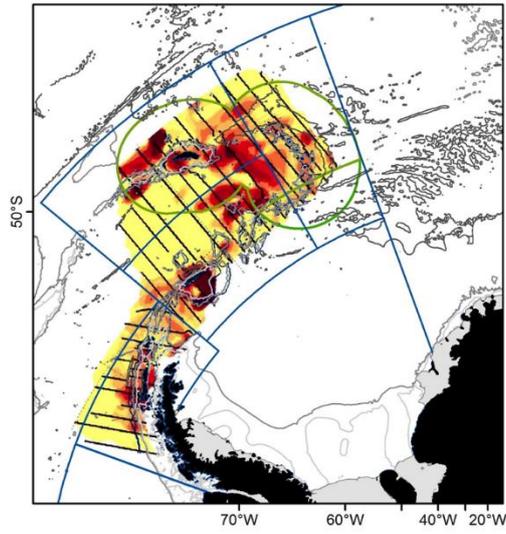


Figure 2 The CCAMLR 2000 synoptic survey krill density distributions (taken from Hewitt et al 2004) with the current MPA protections and CCAMLR management areas plotted.

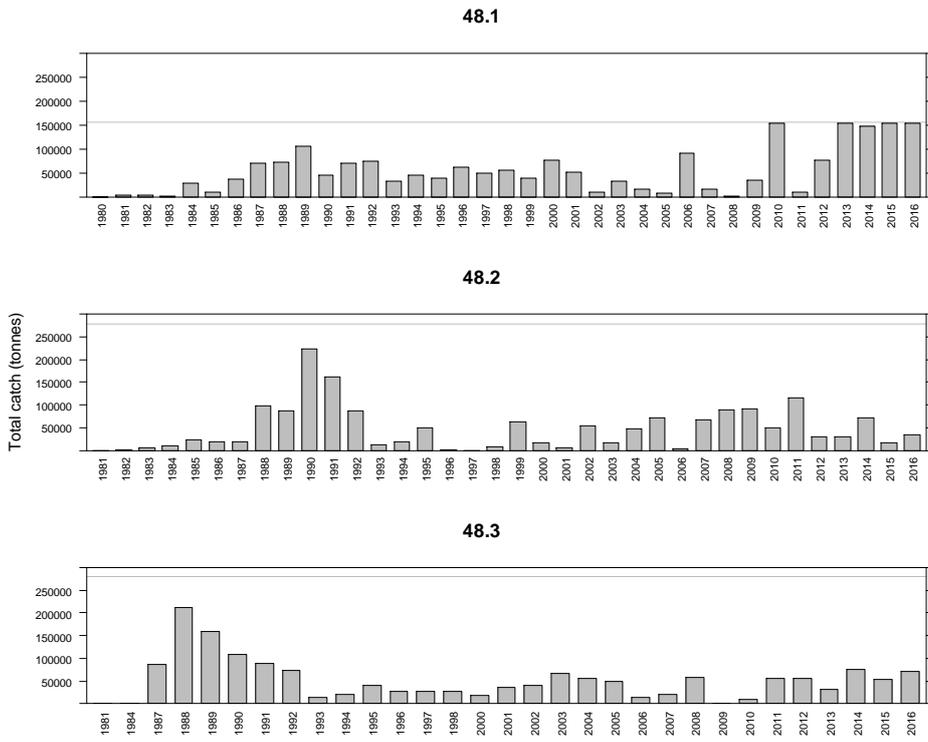


Figure 3 Total krill catch (tonnes) in Subareas 48.1, 48.2, 48.3 for the period 1980 to 2015. Horizontal grey line shows the catch limit for each Subarea. Source: CCAMLR data. Fishing in 48.4 has been negligible since the 1990's