

# Report from the Expert Panel on the evaluation of the VRZs during the 2018/19 fishing season

## Executive Summary

### Background

In July 2018 ARK (the Association of Responsible Krill harvesting companies) launched a set of voluntary measures, known as ARK's Commitment, which were proposed to improve the long-term sustainability of the krill fishery. The Commitment was initiated with support from Greenpeace, WWF and The Pew Charitable Trusts as a precautionary action whilst CCAMLR developed spatial management of the krill fishery in Area 48. The Commitment, which took the form of Voluntary Restriction Zones (VRZs), was implemented for the 2018-19 fishing season. The krill fishing fleet associated with ARK agreed to avoid fishing in an area of up to 40 km from penguin colonies in Subarea 48.1 during the penguin breeding season (Figure 1).

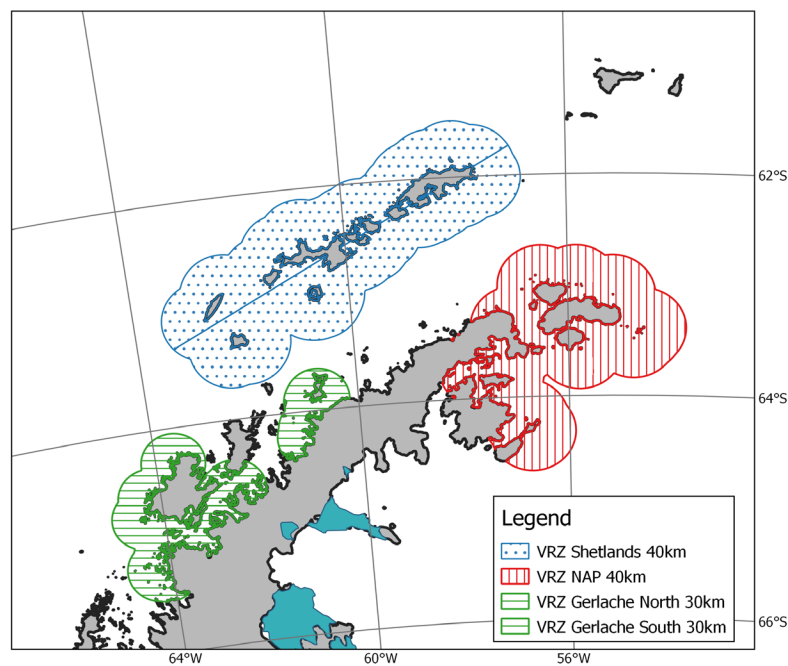


Figure 1. Map depicting the Voluntary Restricted Zones (VRZs) around the South Shetland Islands (40 km buffer zone), the northern tip of the Antarctic Peninsula (NAP, 40 km buffer zone), and northern and southern areas of the Gerlache Strait (30 km buffer zone).

ARK also emphasized its strong support for enhanced long-term ecosystem-based management of the krill fishery in Antarctica and underlined that this includes its willingness to support scientific data collection utilizing the unique competence and capacity of the fleet.

As part of ARK's Commitment, a Review Panel (RP) was established and an independent Expert Panel (EP) was tasked with annually reviewing the effect of the VRZs (see Appendix III for membership of the EP). In 2019 the EP was requested to objectively review the fleet's compliance with the VRZs during its first fishing season in operation. The objectives of the EP, as outlined in its ToR-2019, were:

1. Assess the compliance with the Voluntary Restricted Zones (VRZ) by ARK's fishing vessels, herein the possible operational challenges in complying with the VRZ as a seasonal measure and the principle of "best commercial effort" outside of the seasonal measure.
2. Provide an update on penguin population trends in the areas subject to the ARK's Commitment.
3. Review the required changes to modify the seasonal VRZs into a year-round protection measure and the size of such protection.
4. Harmonize current voluntary measures with other initiatives discussed in CCAMLR (i.e., D1MPA, FBM, CM 51-07).
5. Provide advice on complementary, operable industry measures to provide adequate ecosystem protection while waiting for equivalent CCAMLR regulations to be adopted.

As a first exercise, the EP reviewed the ToRs. While the EP agreed on the interpretation of ToRs 2-5, it identified two main issues with ToR 1. Firstly, the EP finds the term "best commercial effort" vague, subjective and difficult to consider in the evaluation. The EP recommends replacing this term with a quantitative measure or removing it from the ToR if this is not possible.

Secondly, the EP also finds the term "...possible operational challenges in complying..." vague and potentially outside the competence of the EP to assess. The EP, therefore, asks for clarification.

## Working mode of the EP

The EP distributed the reporting tasks among its members according to their expertise and shared the outcome via Google Docs. Underway adjustments and comments on the text were discussed three times during video conferencing where concerns, difficulties, and responsibilities were also resolved. The full document (attached) provides a record of the discussions and analyses conducted during this process. It was not possible within the time available to ensure consensus or standardized formatting throughout this long report. The EP, therefore, presents this condensed summary reflecting the key aspects of its discussion, on which consensus was reached.

## Data and Results

### Fishery and vessel track data

ARK members were requested to provide haul-by-haul data to verify vessel and catch distribution during the 2018-19 fishing season. Six out of the nine ARK vessels participating in the krill fishery submitted

haul-by-haul data. A seventh vessel submitted ARGOS track maps with the vessel's movement. The EP also reviewed the distribution of the fleet using independent maps generated using the GlobalFishingWatch.org platform.

The impact of the VRZs on the effort distribution of the ARK fleet was analyzed by comparing available catch distribution from the current fishing season with the historic (2010-2018) catch distribution from ARK vessels (~60% of the fleet).

The combined distribution of fishing data and vessel tracks shows that all nine ARK vessels remained outside the VRZs during the penguin breeding season, in accordance with ARK's Commitment. The data also shows that all ARK vessels concentrated in Subarea 48.2 during the breeding season (December 2018 -February 2019), which represents a noteworthy change from previous years. Thus, there were very low catches in Subarea 48.1 from December to March. Most of the fleet then moved to 48.1 during April.

### **Penguin population trends**

Penguin population trends for the three *Pygoscelis* species breeding adjacent to the VRZs were evaluated using data available at [www.penguinmap.com](http://www.penguinmap.com) (Humphries et al. 2017). Trends were calculated using basic linear models using nest counts on sites within the VRZs that have greater than 4 total counts available. The trends identified were therefore observed over different periods during the last few decades.

Gentoo penguin assessment is based on data from ~48% of colonies within VRZs, representing more colonies than any of the other species. Most colonies show an increasing trend.

Chinstrap penguins are abundant in Subarea 48.1 (1.6 million breeding pairs), but only a minor fraction of colonies within VRZs (~18%) have 4 or more counts and many haven't been visited since the last century. Population trends of these colonies show a mixed pattern, some decreasing and other increasing, with no clear subarea trend.

Adélie penguins are also abundant in this subarea (1.5 million breeding pairs), with the largest colonies located in the northern tip of the Antarctic Peninsula. Around 28% of colonies within VRZs have been counted  $\geq 4$  times. All these colonies show negative population trends.

A review of the distribution and size of colonies outside the VRZs indicates that there are significant colonies of Chinstrap and Adélie penguins at Elephant Island and surrounding islands (Subarea 48.1), as well as at the South Orkney Islands (Subarea 48.2), which are currently outside any VRZs.

### **Krill biomass status**

Information on krill status for Subarea 48.1 was available from CCAMLR Reports and published papers. Two key sources of information were (i) the large-scale (Subareas 48.1 to 48.4) surveys conducted in 2000 and 2019; and (ii) the AMLR acoustic grid centred on the Elephant and South Shetland Islands, conducted regularly between 1996-2011 (summer) and 2012-2015 (winter), which covers the fishing grounds in Subarea 48.1.

Results from the two krill large-scale surveys (2000 and 2019) provide similar estimates of krill biomass: ~60-63 million ton. The large-scale survey in 2019 also provided a biomass estimate for the smaller AMLR grid, ~6.8 million tonnes of krill. Long-term monitoring data (1996-2011) from the AMLR grid indicates that krill biomass fluctuates in the range of 400 thousand tons to 10 million tons. Accordingly, it seems that the current fishing season 2018/19 was in the upper range of krill biomass for this area.

## Evaluation and Advice

The complete data set from the ARK fleet was not available as requested in time for the EP to analyze. For the current year, this probably did not impact the outcome. Future failure to meet this crucial request might seriously impact the credibility of ARK's Commitment and the ability of the EP to provide the advice requested in its ToRs. The EP recommends that ARK ensures punctual data delivery for each future annual evaluation.

- 1. Assess the compliance with the Voluntary Restricted Zones (VRZ) by ARK's fishing vessels, herein the possible operational challenges in complying with the VRZ as a seasonal measure and the principle of "best commercial effort" outside of the seasonal measure.**

All vessels operated by ARK members complied with the VRZs during the 2018/19 fishing season. This was associated with a clear change in effort distribution by the ARK fleet, with all vessels operating in Subarea 48.2 during the penguin breeding season. The fleet operated outside the VRZs during the breeding season and caught less than average inside the VRZs during the non-breeding season.

In practical terms, "best commercial effort" means that vessels, after the breeding season, will fish outside the VRZs when it is economically feasible (equally good as inside). This is one potential explanation of why non-breeding season catches in the VRZs in 2018/2019 were lower than average.

- 2. Provide an update on penguin population trends in the areas subject to the ARK's Commitment**

The three main penguin species breeding in the region present contrasting population trends: Gentoo penguins mainly had increasing trends, Adélie penguins mainly had decreasing trends and Chinstrap penguins lacked any consistent trend. However, for all three species, count data is scarce and in many cases is out-dated, which prevents an evaluation of status and trends for the areas of interest.

In order to make a quantitative assessment of fishing impacts on penguins, the EP notes the need to design and implement a long-term monitoring program that can update population status at regular intervals.

The EP recommends that ARK contributes to penguin monitoring programs in accordance with ongoing CCAMLR activities and requests.

### **3. Update on krill population status**

Krill biomass distribution has a direct effect on the performance of penguins, and other predators, including the fishing fleet. The EP underlines the need for regular surveys of krill distribution and abundance at various spatial scales.

Large-scale surveys in 2000 and 2019 provide similar biomass estimates for Subareas 48.1 to 48.4. Nonetheless, the EP notes that smaller-scale surveys generally show high levels of intra- and inter-annual variability in krill biomass. The EP also highlights the likely negative future impact of climate change on krill populations and recommends strengthening the monitoring of krill stocks.

The EP recognizes the competence and capacity of the ARK fleet to conduct acoustic surveys (SC-CAMLR-38/06) and recommends the continuation of the ongoing survey programs.

The EP recommends that ARK, together with the scientific community, develops and implements a program of regular acoustic surveys on local scales to enable estimation of biomass and exploitation rates at multiple scales (SC-CAMLR-38/03), including in fishing hotspots (i.e. locations which account for a significant fraction of the subarea krill catch).

### **4. Review the required changes to modify the seasonal VRZs into a year-round protection measure and the size of such protection**

The EP agreed that it is not possible to evaluate the VRZ regime from the experience of less than one year. Nevertheless, there are some general issues and questions that were raised during the discussion reflecting uncertainty about the reasoning behind the implementation of the VRZs. The EP draws the attention of the RP to the possibility that the VRZs might have impacts other than those intended, especially if established on a year-round basis. The EP is aware of concerns that measures such as the VRZs may cause a concentration of effort in preferred fishing areas that remain open to fishing. Since the establishment of the VRZs, new scientific research has hypothesized potential negative impacts of fishing on the ecosystem and its various components: (i) on land-based predators during winter, (ii) on recovering stocks of baleen whales, (iii) on certain life stages of krill (gravid females, recruits).

The EP stresses that potential side effects of fishing effort displacement caused by the implementation of VRZs need further attention and actions. However, the EP notes that the concept of fishing effort concentration is not well defined in quantitative terms. An agreed indicator of fishing effort concentration (potentially based on local harvest rates, i.e. catch/biomass at an appropriate spatial scale) would help in the evaluation of the VRZs and, more generally, in the development of CCAMLR's management approach for the krill fishery.

Accordingly, the EP identified and recommended additional requirements for the operation of the VRZs, including (i) monitoring of penguin colonies, (ii) analysis of the potential impacts from fishing effort concentration/high local harvest rate effects, (iii) understanding the environmental conditions in fishing hotspots.

In conclusion, no evidence in support of year-round VRZs has been presented and current information suggests that there is a risk that year-round VRZs could counteract the objectives of the measure. The EP

recommends postponing the introduction of year-round VRZs until further knowledge is gathered about the impacts of local harvest rate and the effects of concentrated fishing effort.

The EP questioned the logic behind the exclusion of the Elephant Island region from the VRZs and requests clarification for this design. However, the EP notes that the revised D1MPA<sup>1</sup> proposal (CCAMLR-38/25) does not include a General Protection Zone (GPZ) in this region. The EP is not aware of the rationale behind this change in the D1MPA proposal and recommends dialogue between ARK and the proponents of the D1MPA to improve harmonization and clarification of the rationale.

The EP supports the principle of using VRZs as a framework for data collection and identifies two related issues, both of which require coordination with the wider scientific community. The first is to support the comparison of ecosystem status in areas open to fishing with that in areas closed to fishing, using an “experimental framework”. The second is to engage in data collection that supports the development of spatially and temporally explicit protection of predator populations.

#### **5. Harmonize current Voluntary Measures with other initiatives discussed in CCAMLR**

The EP notes that CCAMLR is currently developing several initiatives for improving the management of the krill fishery and protection of the wider ecosystem. These include feedback management, risk assessment, the combined management strategy proposed by EMM-19 (SC-CAMLR-38/03), and a network of MPAs.

The EP recommends that ARK communicates with the proponents of the related CCAMLR management initiatives and shares its current experience, planning regular interactions, and offering support over the coming years.

The EP recommends that ARK works proactively with scientists engaged in the CCAMLR process to make the best use of its capacity and competence to collect scientific information in support of the development and harmonization of current CCAMLR management initiatives.

#### **6. Provide advice on complementary, operable industry measures to provide adequate ecosystem protection while waiting for equivalent CCAMLR regulations to be adopted**

The implementation of the VRZs cannot be assessed without monitoring key indicators of the status of krill, penguins and other predators, and how they change over time.

In this context, the EP recommends that ARK develops its voluntary measures to include acquisition of data to support the design of spatial management measures under CCAMLR. To advance this process, the EP recommends that ARK:

- discusses with stakeholders the development of an experimental framework as recommended under Section 4 to disentangle fishing impacts on predators from impacts resulting from climate change.

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<sup>1</sup> D1MPA – Domain 1 Marine Protected Area. The Domain 1 covers the Western Antarctic Peninsula, the South Shetland, Elephant and South Orkney Islands.

- interacts with CCAMLR scientists to enhance CCAMLR's sampling scheme in time and space as an approach to assess local harvest rates, krill flux and other data required to support the development of spatial management measures.

## References







Humphries, G.R.W., Naveen, R., Schwaller, M., Che-Castaldo, C., McDowall, P., Schrimpf, M. and H.J. Lynch. 2017. Mapping application for penguin populations and projected dynamics (MAPPPD): data and tools for dynamic management and decision support. *Polar Record*, 53(2): 160-166.

CCAMLR-38/25. 2019. Revised proposal for a conservation measure establishing a Marine Protected Area in Domain 1 (Western Antarctic Peninsula and South Scotia Arc).

SC-CAMLR-38/03. 2019. Report of the Working Group on Ecosystem Monitoring and Management (Concarneau, France, 24 June to 5 July 2019).

SC-CAMLR-38/06. 2019. Report of the Meeting of the Subgroup on Acoustic Survey and Analysis Methods (Bergen, Norway, 26 to 30 August 2019).

## APPENDIX. Affiliation of the members of the Expert Panel 2019

MEMBER	AFFILIATIONS & POSITIONS (last 5 years)
<p>Olav Rune Godø</p> 	<ul style="list-style-type: none"> <li>● Advisor Norwegian Research Centre 2018-</li> <li>● Scientific Advisor Aker Biomarine 2018-</li> <li>● SC-CCAMLR Representative for Norway 2012-2017</li> <li>● Senior Scientist Institute of Marine Research, Bergen, Norway – 2017</li> </ul>
<p>Simeon Hill</p> 	<ul style="list-style-type: none"> <li>● British Antarctic Survey</li> </ul>
<p>Taro Ichii</p> 	<ul style="list-style-type: none"> <li>● Senior Researcher of National Research Institute of Far Seas Fisheries(NRIFSF), Japan (2018-2019)</li> <li>● Director Oceanic Resources Division of NRIFSF (2015-2017)</li> <li>● SC-CAMLR Representative for Japan (2014-2019).</li> </ul>
<p>Grant Humphries</p> 	<ul style="list-style-type: none"> <li>● Director, Black Bawks Data Science (2017 - 2019)</li> <li>● Post-doctoral fellow, Stony Brook University (2015 -2017)</li> <li>● Post-doctoral fellow, UC Davis (2014 - 2015)</li> <li>● Post-doctoral researcher, Farallon Institute (2014 - 2015)</li> <li>● SC-CCAMLR / CCAMLR advisor to Oceanites (2016 - 2019)</li> </ul>
<p>Rodolfo Werner</p> 	<ul style="list-style-type: none"> <li>● Senior Advisor of The Pew Charitable Trusts and Antarctic and Southern Ocean Coalition (2003 - 2019)</li> <li>● SC-CCAMLR Representative for ASOC (2003 - 2019)</li> <li>● Science Advisor of Antarctic Wildlife Research Fund (AWR) (2015 -2019)</li> </ul>
<p>Javier A. Arata</p> 	<ul style="list-style-type: none"> <li>● Executive Officer of ARK (2018-2019)</li> <li>● General Manager of CRC IDEAL (Research Center on Dynamics of High Latitude Marine Ecosystems) from University Austral of Chile (2016-2018).</li> <li>● Science Advisor for the Chilean Institute for Antarctic Research, INACH (2014-2015).</li> <li>● SC-CAMLR Representative for Chile (2009-2015).</li> </ul>