Agreement on the Conservation of Albatrosses and Petrels

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Update For Net Monitoring Cable Mitigation Measures on Continuous Trawl Vessels: Results From F/V Saga Sea (2024 – 2026)

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SUMMARY

The degree of diversity between trawlers means that mitigation measures developed may not be appropriate for all vessel types. This paper updates information on the measures developed for krill vessels operating in the Southern Ocean, using continuous trawling, which would allow them to use a net monitoring cable (NMC). This has been previously described to ACAP in SBWG12 Doc 16. The krill fishery in Antarctica is managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), who are responsible for the sustainable management of Antarctic Marine Ecosystems. This paper looks at updating a previous submission in 2024, which reviewed the impacts on seabirds of the reintroduction on the NMC.

The NMC provides a continuous power supply, reducing the number of hauls and the time the net is on the surface, which is considered a high-risk period for birds. Continuous trawl vessels, wishing to use cables, were permitted a derogation from the CM provided they carried out a series of trials of different mitigation measures to assess any impact the reintroduction of cables may have on bird populations.

This report presents an update to previous findings shared during SBWG12, but focusses on the additional observations from the stern trawler Saga Sea during the 2024 to 2026 seasons (Trial 6 under CCAMLR) as requested by CCAMLR (WG-FSA-IMAF-2024, Annex 7, Para 5.52) and evaluating refinements to mitigation devices specific to stern trawlers and further modifications to the cable ‘sock’ device. The use of NMCs on side trawlers has since

been approved by CCAMLR, information in this document will primarily be related to stern trawler mitigation but will refer to previous trials.[1]

RECOMMENDATIONS

We recommend that SBWG:

1. Recognise that current ACAP Best Practice Advice for trawl fisheries may not be feasible for continuous trawlers, and metrics such as trawl speed, number and type of nets, and general gear configuration should be taken into account.
2. Recognise that the use of a 'sock' provides the most effective mitigation measure to deter birds from cables in stern continuous trawlers.
3. Note the results of additional trials conducted during the CCAMLR 2024/2025 fishing season, which evaluate the mitigation measures designed to reduce seabird interactions with net monitoring cables on continuous trawl vessels targeting Antarctic krill (*Euphausia superba*).
4. Considers that the risk to ACAP species from the use of NMCs within CCAMLR Area 48 be considered low, but should this be extended to other areas be re-assessed.

Actualización de las medidas de mitigación de cables de seguimiento de las redes en embarcaciones de arrastre continuo. Resultados de la embarcación pesquera Saga Sea (2024 – 2026)

RESUMEN

El grado de diversidad entre los arrastreros implica que las medidas de mitigación elaboradas pueden no ser apropiadas para todos los tipos de embarcaciones. Este documento actualiza la información sobre las medidas desarrolladas para las embarcaciones que capturan kril en el océano Austral utilizando la pesca de arrastre continuo, lo que les permitiría a estas embarcaciones utilizar un cable de seguimiento de las redes. Esto ya se ha descrito previamente al ACAP en el documento SBWG12 Doc 16. La pesquería de kril en la Antártida está gestionada por la Comisión para la Conservación de los Recursos Vivos Marinos Antárticos (CCRVMA), responsable de la ordenación sostenible de los ecosistemas marinos antárticos. Este documento analiza la actualización de un informe anterior presentado en 2024, que revisaba los impactos de la reintroducción del cable de seguimiento de las redes en las aves marinas.

El cable de seguimiento de las redes proporciona un suministro eléctrico continuo, lo que reduce el número de virados y el tiempo que la red permanece en la superficie, período que

se considera de alto riesgo para las aves. Se ha hecho una excepción a la medida de conservación para las embarcaciones de arrastre continuo que deseen utilizar cables siempre y cuando hayan realizado una serie de pruebas de diferentes medidas de mitigación para evaluar cualquier impacto potencial de la reintroducción de cables en las poblaciones de aves.
Este informe presenta una actualización de los hallazgos previos compartidos durante la GdTCS12, pero se centra en las observaciones adicionales del arrastrero de popa Saga Sea durante las temporadas de 2024 a 2026 (Ensayo 6 en el marco de la CCRVMA), según lo solicitado por la CCRVMA (WG-FSA-IMAF-2024, Anexo 7, Párrafo 5.52) y en la evaluación de mejoras en los dispositivos de mitigación específicos para arrastreros de popa y modificaciones adicionales al dispositivo de "calcetín" de cable. El uso de cables de seguimiento de las redes en arrastreros laterales ha sido aprobado por la CCRVMA; la información de este documento se referirá principalmente a la mitigación en arrastreros de popa, pero también hará referencia a ensayos anteriores.

RECOMENDACIONES

Se recomienda al GdTCS realizar las siguientes acciones:

1. Reconocer que las actuales recomendaciones de mejores prácticas del ACAP para las pesquerías de arrastre pueden no ser viables para los arrastreros continuos y que deben tenerse en cuenta parámetros como la velocidad de arrastre, el número y el tipo de redes y la configuración general de los artes de pesca.
2. Reconocer que el uso de una malla protectora o "calcetín" proporciona la medida de mitigación más eficaz para disuadir a las aves de atacar los cables de los arrastreros continuos de popa.
3. Tomar nota de los resultados de ensayos adicionales realizados durante la temporada de pesca 2024/2025 de la CCRVMA, que evalúan las medidas de mitigación diseñadas para reducir las interacciones de los cables de seguimiento de las redes con las aves marinas en embarcaciones de arrastre continuo que capturan kril antártico (*Euphausia superba*).
4. Tomar nota de que el riesgo para las especies del ACAP derivado del uso de cables de seguimiento de las redes dentro del Área 48 de la CCRVMA se considera bajo, pero debe reevaluarse si esto se extiende a otras áreas.

Mise à jour des mesures d'atténuation relatives aux câbles de contrôle du filet (NMC) sur les chalutiers à chalutage continu : Résultats du F/V Saga Sea (2024–2026)

RÉSUMÉ

Le degré de diversité entre les chalutiers signifie que les mesures d'atténuation développées peuvent ne pas être adaptées à tous les types de navires. Cet article met à jour les

informations sur les mesures développées pour les navires de pêche au krill opérant dans l'océan Austral et pratiquant le chalutage continu, ce qui leur permettrait d'utiliser un câble de contrôle du filet (NMC, Net Monitoring Cable). Ces éléments ont été précédemment décrits à l'ACAP dans le document SBWG12 Doc 16. La pêcherie de krill en Antarctique est gérée par la Commission pour la conservation de la faune et de la flore marines de l'Antarctique (CCAMLR), qui est responsable de la gestion durable des écosystèmes marins antarctiques. Cet article met à jour une soumission précédente de 2024, qui examinait les impacts sur les oiseaux marins de la réintroduction du NMC.

Le NMC fournit une alimentation électrique continue, réduisant le nombre de traits et le temps pendant lequel le filet reste en surface, ce qui est considéré comme une période à haut risque pour les oiseaux. Les chalutiers à chalutage continu souhaitant utiliser des câbles ont obtenu une dérogation à la mesure de conservation (CM), à condition de réaliser une série d'essais de différentes mesures d'atténuation afin d'évaluer les impacts potentiels de la réintroduction des câbles sur les populations d'oiseaux.

Ce rapport présente une mise à jour des résultats précédemment communiqués lors du SBWG12, mais se concentre sur des observations supplémentaires issues du chalutier arrière Saga Sea au cours des saisons 2024 à 2026 (essai 6 sous l'égide de la CCAMLR), comme demandé par la CCAMLR (WG-FSA-IMAF-2024, annexe 7, par. 5.52), et évalue les améliorations apportées aux dispositifs d'atténuation spécifiques aux chalutiers arrière ainsi que les modifications supplémentaires du dispositif de « chaussette » (sock) de câble. L'utilisation de NMC sur les chalutiers latéraux a depuis été approuvée par la CCAMLR ; les informations présentées dans ce document concernent principalement l'atténuation pour les chalutiers arrière, tout en faisant référence aux essais précédents.

RECOMMANDATIONS

Nous recommandons que le SBWG :

1. Reconnaisse que les conseils actuels de l'ACAP en matière de bonnes pratiques pour la pêche au chalut peuvent ne pas être applicables aux chalutiers à chalutage continu et que des facteurs tels que la vitesse du chalut, le nombre et le type de filets ainsi que la configuration générale des engins doivent être pris en compte.
2. Reconnaisse que l'utilisation d'une « chaussette » constitue la mesure d'atténuation la plus efficace pour éloigner les oiseaux des câbles sur les chalutiers arrière à chalutage continu.
3. Prenne note des résultats des essais supplémentaires réalisés pendant la saison de pêche CCAMLR 2024/2025, qui évaluent les mesures d'atténuation conçues pour réduire les interactions entre les oiseaux de mer et les câbles de contrôle du filet (NMC) sur les navires à chalutage continu ciblant le krill antarctique (*Euphausia superba*).
4. Considère que le risque pour les espèces de l'ACAP lié à l'utilisation des NMC dans la zone 48 de la CCAMLR est faible, mais que ce risque devrait être réévalué en cas d'extension à d'autres zones.

1. INTRODUCTION

As highlighted in the most recent ACAP advice for pelagic and demersal trawlers (ACAP, 2023), the incidental mortality of seabirds continues to be a global concern, with many birds still being killed or injured following collisions (strikes) with warp cables or net monitoring cables (NMCs)[2] , as well as becoming entangled in the nets themselves. Current ACAP advice to reduce cable strikes includes reducing the general attractiveness of seabirds to vessels by managing offal and discards correctly and keeping birds away from the cables using bird-scaring lines and snatch blocks (to reduce the aerial extent of the cables). While these will be appropriate in the majority of conventional trawl fisheries, technological advances have led to greater diversity in fishing gear configurations and operating methods that ACAP may need to consider when providing advice. This Working Document focuses on the krill trawl fishery operating in the Southern Ocean and presents an update on the development and testing of mitigation measures to reduce interactions between seabirds and net-monitoring cables. The fishery is managed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), an organisation responsible for the sustainable management of Antarctic ecosystems, which includes reducing the impact of fishing on bird and mammal populations.

As such, CCAMLR adopted Conservation Measure (CM) 25-03 in 1991 to prohibit the use of net-monitoring cables in the Convention Area from the 1994/1995 season onward. This CM was introduced following concerns about seabird mortalities resulting from collisions with net-monitoring cables, such as those of the New Zealand white-capped albatross in the Soviet squid fishery (SC-CAMLR-X/BG/4, 1991) and fisheries operating around the Kerguelen Islands (SC-CAMLR-X/BG/14, 1991).

Whilst the use of mitigation measures, such as streamer lines, was originally suggested, a number of trawl fisheries within the Convention Area were expanding, notably the myctophid fishery near the highest density of nesting albatrosses. Instead, net monitor cables were phased out and replaced by acoustic, cableless, net sounders (SC-CAMLR-X, Para 8.37).

Since 2006, Norwegian vessels have utilised continuous trawling systems to harvest krill. Krill enters the net and then passes through the codend into a hose leading directly to the vessel's holds, meaning nets do not need to be hauled to retrieve the catch.

2. CONTINUOUS TRAWL FISHERIES

Current methods used by continuously trawl vessels differ in several ways from conventional trawlers, for which the prohibition of net-monitoring cables was originally intended. These differences potentially reduce the potential for seabird interactions with the gear and include:

a. a shorter length of cable exposed to the air (reduced aerial extent: ~ 10+m (continuous) against ~100+m (conventional)). The cable is located in parallel and close to the warp). Previous studies have shown that minimizing this distance has proved successful in reducing warp strikes by seabirds (Melvin et al., 2010) and this has been incorporated into best practice advice in ACAP's Summary advice (ACAP 2014) for reducing impact of trawl gear on seabirds.
b. fewer sets and hauls are needed. This reduces the time the nets spend on the surface which are considered high-risk events for seabirds.
c. lower towing speeds. The mouth of each trawl is held open by a steel beam, in contrast to conventional trawls that use trawl doors (otter boards). This enables lower towing speeds;1.5 – 2 knots compared to 3-4 knots with conventional krill trawls and ~ 5 knots for

[2] NMC is defined by ACAP as a Netsonde Monitoring Cable - ACAP (2023) 'The netsonde monitor cable connects the echo-sounder or net-sounder on the headline of the trawl net to the vessel'.

vessels targeting pelagic fish. This reduced towing speed makes it easier for birds to avoid the gear.

d. the monitoring cable being attached in parallel and close to the warp meaning it should no longer be considered a 'third wire'; and,
e. the vessels do not discharge offal (this is prohibited by CCAMLR, south of 60 degrees), but do discharge 'stick water[3]', a product of processing carried out on board which is not attractive to birds.

The use of net-monitoring cables in trawl fisheries enables a more effective method of monitoring fishing gear than battery-operated systems, which are limited by their battery life.

3. CCAMLR TRIALS

Following a proposal put forward to CCAMLR in in 2016 (WG-FSA-16/38), vessels using the continuous fishing method were permitted a derogation allowing them to use NMCs provided they followed a specified trial (SC-CAMLR-38/18, 2019). This was designed to monitor the effectiveness of the mitigation measures put in place, Electronic Monitoring (EM) was also installed to enhance and increase coverage. Initial trials were conducted on three vessels: two side trawlers, Antarctic Sea and Antarctic Endurance and one stern trawler, Saga Sea. Following the 2024 meeting, CCAMLR granted Antarctic Sea and Antarctic Endurance a derogation from the trials as the measures in place for the side trawlers were considered sufficient to minimise any impacts on seabirds.

4. MITIGATION DEVICES DEPLOYED BY SAGA SEA

The Saga Sea, registered in Norway, is a mid-water continuous trawl vessel that deploys its fishing gear from the stern. It is 84 meters in length with a Gross Tonnage (GT) of 4,915 and a beam of 16.5 meters. It normally trawls using two nets but can switch down to one if, for example, maintenance is required. The mouth of each net is 20 x 20 meters, and they each have a total length of 164 meters[4]. Figure 1 shows how the twin trawls are set up at the stern of the vessel, along with the positioning of the NMC and streamer lines.

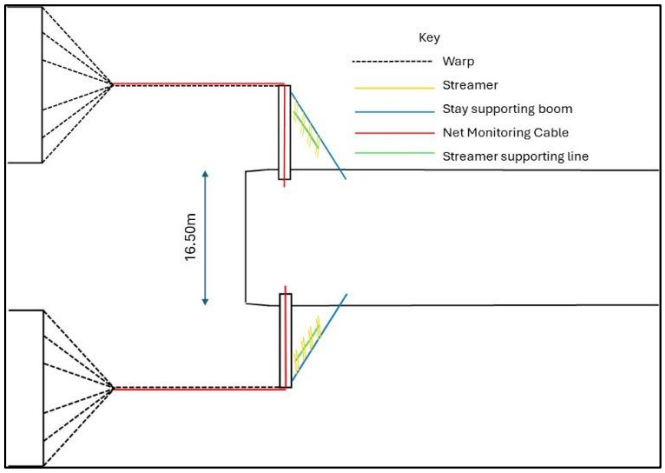


Figure 1 Schematic showing the stern of the Saga Sea with the twin trawl set up.

[3] 'Stick water' is defined by CCAMLR as '…a liquid discharge produced as a by-product of processing of krill and fish. As stick water does not contain a source of food for birds, it is not considered as offal.' (Conservation Measure 25-03).

[4] For full description see: https://www.ccamlr.org/en/node/126361#quicktabs-vessel_tabs=2

From the start of this trial period (Trial 6) on 16/03/2024, the mitigation measures used have undergone several iterations. Initially, the primary device consisted of bird bafflers, composed of six paired yellow lengths of hose connected by lines half and three-quarters of the way down to prevent entanglement. The hoses were weighted at the bottom with metal chains to keep them taut Figure 2.

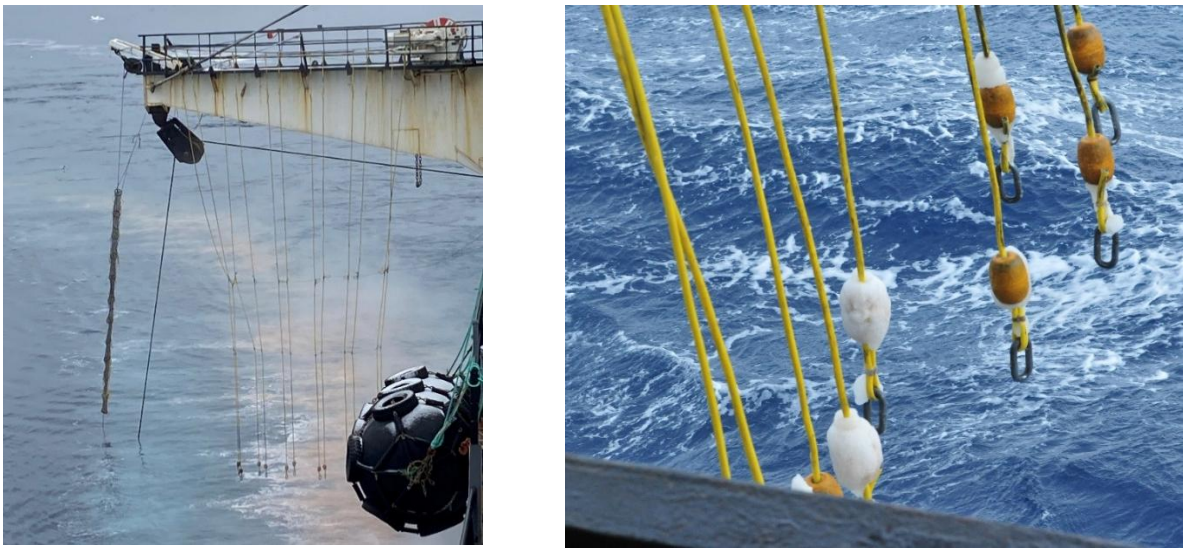


Figure 2 Bird bafflers as used on the Saga Sea A) full view and B) close-up of the ends, with ice development.

Netting was placed around the cable to both increase visibility and reduce the effects of any impact (Figure 3Figure 3 'The sock' showing a schematic and a close-up of the end during deployment.

. This has been termed ‘the sock’ but is similar in design to the ‘road cone’ previously described by ACAP (ACAP 2014).

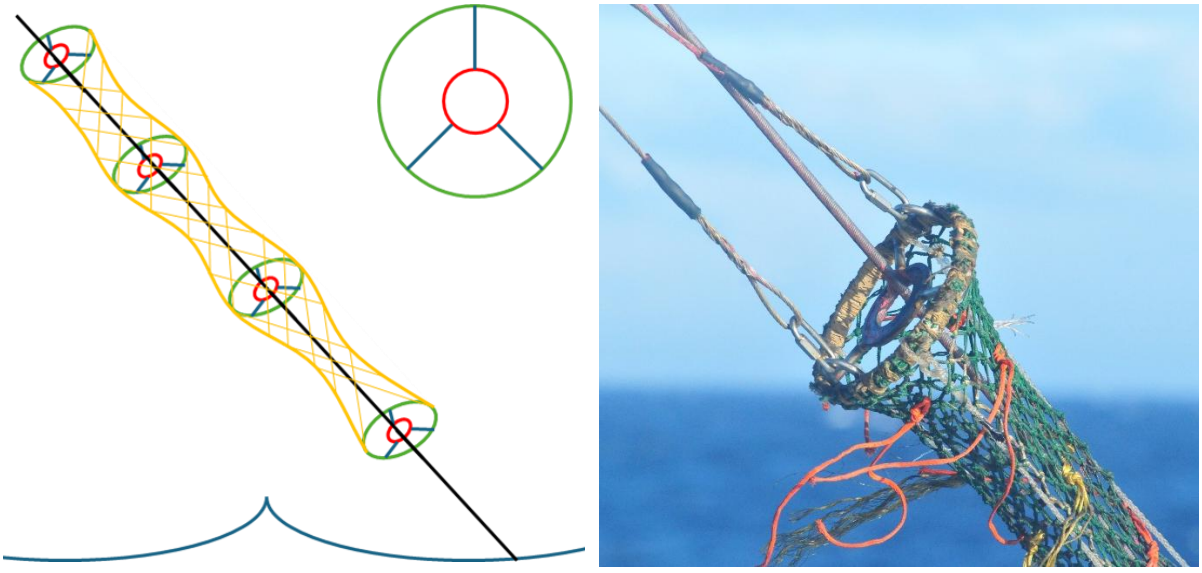


Figure 3 'The sock' showing a schematic and a close-up of the end during deployment.

It consisted of a series of steel rings covered in netting to form a tube. The tube could be lowered or raised between one and three meters above the sea level, depending on conditions, and was further modified to include a series of small streamers to increase the deterrent effect and increase visibility to seabirds (Figure 3Figure 3. This was previously reported to SBWG (SBWG12 Doc 6).

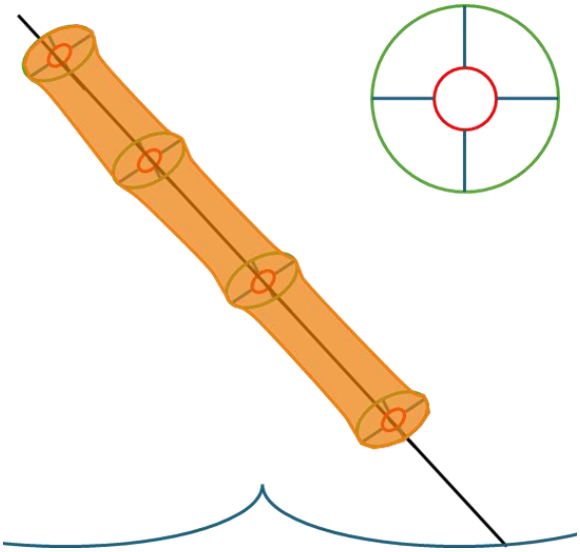
There were problems identified with it, mainly related to the steel rings that formed the frame wearing against the NMC, causing it to break and require replacing. Other recommended practices, such as the use of a snatch block were as, similar to the side trawlers the cables for the nets do not actually pass over the stern of the vessel and therefore cannot be attached to any block to draw it down.

From the start of 01/12/2024, a different design of sock was deployed, this one replacing the previous tubing with a wider, more opaque orange tube. The tube was simply a modified ventilation duct, made from a durable plastic and concertinaed to allow for easier deployment and recovery. Initial tests showed that it was too light and over time it would twist and retract up the cable. To counter this, weights were added in an additional to a guiding rope which prevented the device from twisting and kept the bottom of it near to the surface of the water. One if the issues with the original sock was that it would ice up in certain conditions when it come into contact with the surface, no such issues have been found with the updated version.

A)

B)

C)



D)

E)

F)

Figure 4 Sock deployed from 01/12/2024 onwards, A) ventilation duct used, B) attachment to the NMC, C) schematic D) close up of sock deployed E) sock without weights and D) weights attached.

5. RESULTS

Strike rates and species.

Over the period of Trial 6 (March 2024 to January 2026), a total of 97 strikes were observed against either the net monitoring cable (89), the warp cable (6), or the mitigation device (2). A breakdown of the figures is shown in Table 1. The majority of these, 65, were classed as 'aerial', where the bird contacts the cable and hits the water; 30 were classed as light strikes where the bird continued its flight, with the remaining 2 occurring when the cable struck the birds while they were on the water. No mortalities were observed, with all birds seen to recover, either flying or swimming away.

Table 1 Observed strikes between March 2024 and January 2026

Type of strike	NMC	Warp Cable	Mitigation	Total
Light	28	1	1	30
Aerial	60	4	1	65
Water	0	1	0	1
Sinker	1	0	0	1
Total	89	6	2	97

Table 2 gives a breakdown of the interactions by species, most of them, 83%, were made up of what Edwards et al. (2023) classified as 'small petrels', which were also observed to be the most numerous around the vessel. All of the birds that made contact with the NMC are classified as 'Least Concern' by IUCN, none are ACAP species.

Table 2 Species observed striking the cables.

Species	Number
Cape petrel (*Daption capense*)	78
Southern fulmar (*Fulmarus glacialoides*)	17
Snow petrel (*Pagodroma nivea*)	1
Antarctic petrel (*Thalassoica antarctica*)	1

The strike rates over the two seasons, using BPUE (birds killed per trawling hour), as defined by Phillips et al. (2024) are shown in Table 3. This assumes that every contact is a morality, which is a worst case scenario considering nearly a third of the strikes against the NMC were classified as 'Light' but has been used in this case for comparison purposes.

Table 3 Effort and estimated strike rate (BPUE) on Saga Sea before and after the new mitigation was installed.

23/03/2024 - 01/12/2024			01/12/2024 – 16/01/2024		
Hours fished	**Hours observed**	**BPUE**	**Hours fished**	**Hours observed**	**BPUE**
2787	161	0.149	5108	426	0.171

The BPUE is calculated based on the number of raised strikes (based on the observation effort) and while the BPUE did appear to increase slightly after the sock was modified it was not significant and covered a larger period and area.

It is less than the BPUEs calculated for previous trials in previous years (Table 4) and comparable with those calculated from other fisheries, for example the Argentine hake fleet (0.133) and the Patagonian squid (0.17) calculated in Phiilips et al., although these are calculated using only observed mortalities rather than all strikes.

Table 4 Comparison of BPUEs from previous NMC trials.

Trial	Hours fished	Hours observed	BPUE
2	3543	507	0.684
3	1153	284	0.247
4	2570	254	0.279
5	3343	266	0.504
6	7895	587	0.165

Fishing areas.

Results of these trials were first presented to the ACAP in 2024 (SBWG12 Doc 16). While the Working Group welcomed the report and study overall there was some concern that that it was not clear where the trials been conducted in relation to ACAP sites and that should fishing occur in areas that overlap with ACAP-listed species then NMCs pose an additional threat.

All the trials all took place in CCAMLR Area 48, specifically for trial 6 they shown in Figure 5. Fishing effort and strikes for previous trials are shown in Annex 1. Although there are Conservation Measures set out for Divisions 58.4.1 and 58.4.2, in reality, apart from a few hundred tonnes taken in 2017 and 2018 all fishing takes place in Area 41. The Area is further divided into a number of Subareas for which a krill quota has been distributed between Subareas 48.1 to 48.4 (although no fishing takes place in 40.4). It can be assumed therefore that the area in which this trial has been undertaken is representative of the area where the fishing will take place. It should be noted however that since the 2024/25 season, the CM for dividing the quota between the different Subareas had lapsed leading to a shift in fishing patterns, with more effort being concentrated in 48.1

There are currently 8 ACAP species that occur in Area 48 and over 80 nesting sites and while fishing has occurred around some of these sites there has been no interaction with ACAP species during the period of this particular trial and only one (a giant petrel, unidentified) throughout the trial from the beginning. Table 5 gives an indication the proportion of fishing effort and strikes in each Subarea, these data are taken from all three vessels that were undergoing the trial, between 2020 and 2024.

Table 5 Proportion of fishing effort and strikes in each CCAMLR Subarea (2020 – 2024).

Subarea	% Fishing Effort	% Bird Strikes
48.1	27	39
48.2	50	60
48.3	23	1

Subarea 48.3, containing South Georgia and Bird Island, has the largest number of breeding seabirds in the of all the areas fished (and the largest number of ACAP breeding sites), it also has the lowest strike rate. Conversely Subarea 48.2, containing the fewest number of ACAP sites, has the highest proportion of strikes. The reasons for this are unclear, both areas contain large cape and snow petrels, the common species to interact with the NMCs and could be related to factors such as the time of year or proximity to shore

While any conclusions from this should be treated with caution, it does appear that the use of NMCs, along with the mitigation measures put in place, are of low risk to ACAP species in this area of operation.

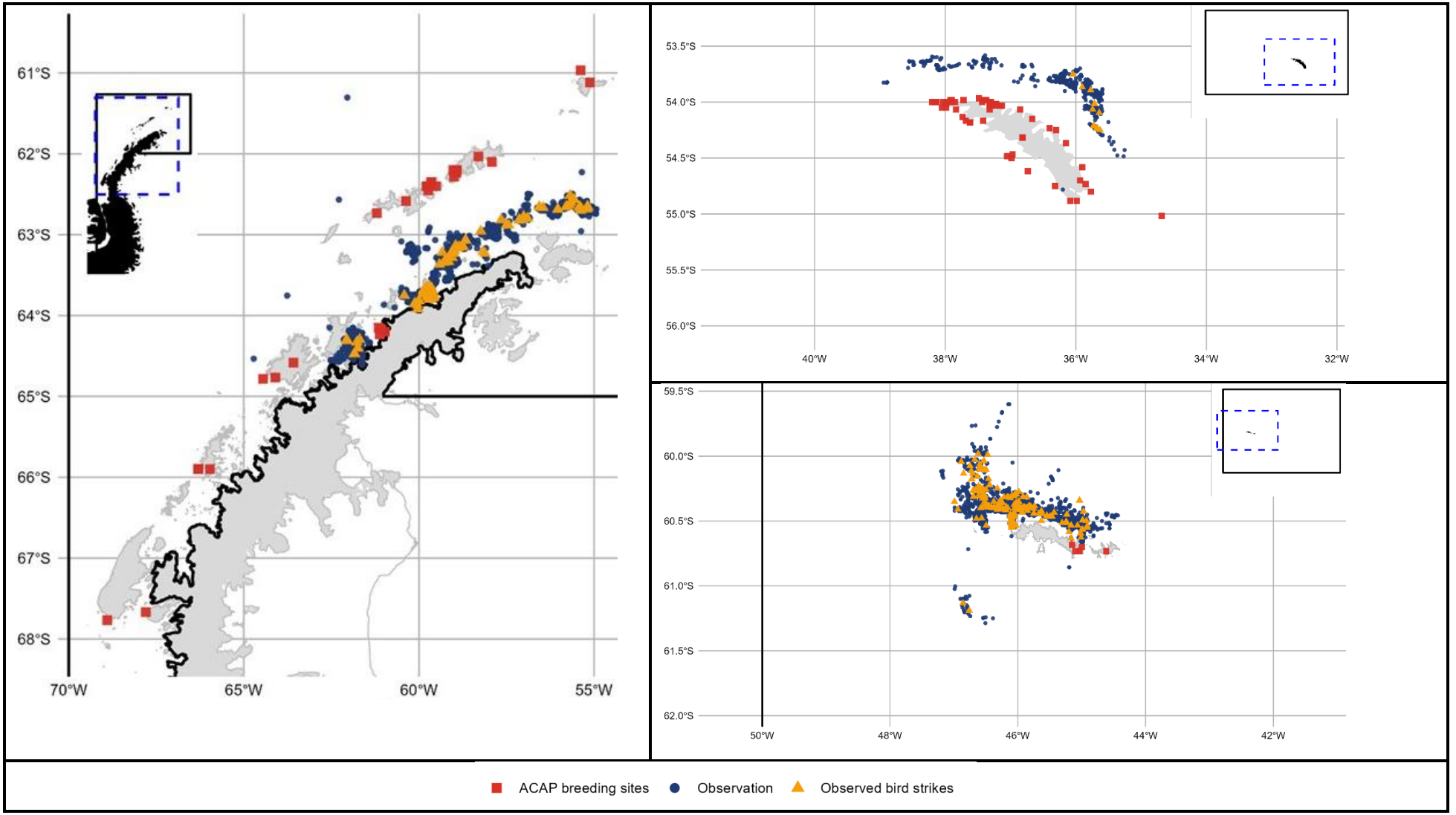


Figure 5 ACAP sites in Subareas 48.1, 48.2 and 48.3. Yellow represents observation periods when a strike was observed, blue when none were observed.

CONCLUSION

There were no mortalities observed following any of the strikes, with birds seen to recover and either fly or swim away and there had been no interactions with ACAP species. This is also reflective from the previous trials.

The question to the SGWG needs to be, do the benefits of using a NMC outweigh the potential risks to seabirds, specifically those associated with ACAP? It has been shown, through nearly six years of trial, which given the measures in place and the species potentially being impacted that the mitigation measures in Place are effective in reducing this.

8. ACKNOWLEDGEMENTS.

This work was financed by the Institute of Marine Research, Norway, and Aker Biomarine AS, Norway. We also thank the officers, crew, onboard the vessels for their cooperation and for the work performed to facilitate and maintain mitigation devices, cameras and other equipment.

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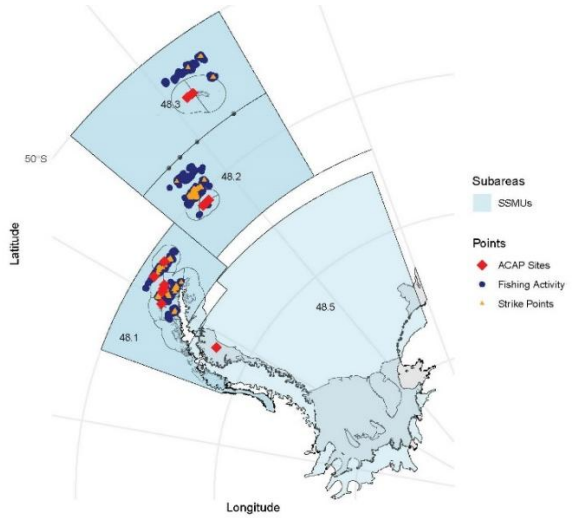
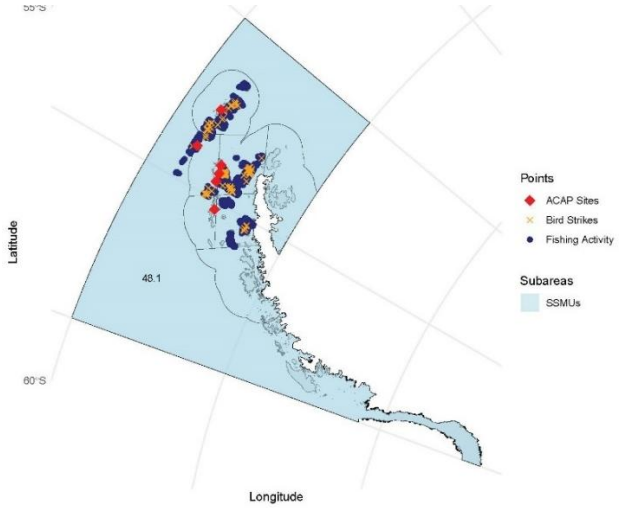
ANNEX 1 – Locations of strikes from previous trials (2020-2024).

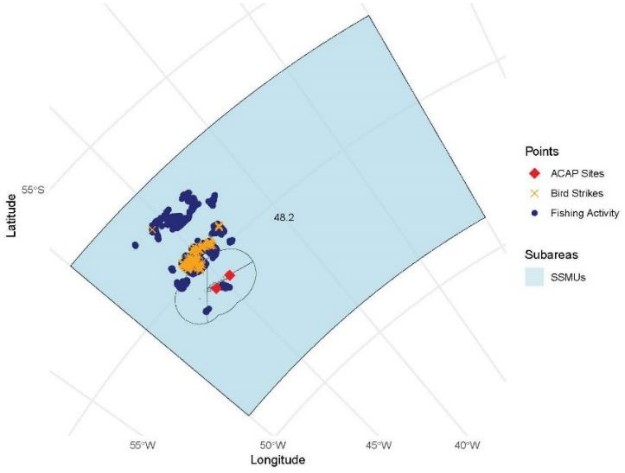
Area 48



Subarea 48.1



Subarea 48.2



Subarea 48.3