MITIGATION OF SEABIRD CAPTURES DURING HAULING IN CCAMLR LONGLINE FISHERIES

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Abstract

In recent years there has been an increased focus on reducing seabird captures that occur during hauling in CCAMLR longline fisheries. Haul captures were first recognised by CCAMLR as a problem as early as 1994/95 when steps were taken to reduce the attraction of seabirds to vessels during the hauling process. Since 2003, increased efforts have been made to improve the design and performance of bird exclusion devices (BEDs) placed around the hauling bay. Data collected by scientific observers since 2003 suggest that there are two key aspects of effective BEDs, firstly that they provide a deterrent to seabirds landing adjacent to the line as it is being hauled, and secondly that seabirds are deterred from swimming or 'jumping' into the area around the hauling bay. Based on this analysis, CCAMLR incorporated these two key functional characteristics into the specification of a BED to be deployed by longline vessels to reduce seabird captures during the haul.

Résumé

Depuis quelques années, on s'intéresse de plus en plus à la réduction des captures d'oiseaux de mer au virage dans les pêcheries palangrières de la CCAMLR. La CCAMLR avait déjà reconnu le problème des captures au virage en 1994/95, époque à laquelle elle avait pris des mesures pour réduire l'attirance des oiseaux de mer pour les navires pendant le processus de virage. Depuis 2003, de nombreux efforts ont été accomplis pour améliorer la conception et la performance des dispositifs d'exclusion des oiseaux (BED, pour *Bird Exclusion Device*) placés autour de la rampe de virage. Les données collectées par les observateurs scientifiques depuis 2003 semblent indiquer qu'il existe deux facteurs d'efficacité des BED, le premier étant qu'ils dissuadent les oiseaux de mer de se poser à côté de la ligne lorsqu'elle est remontée, le second qu'ils les empêchent de rester en surface ou de « sauter » dans la zone entourant la rampe de virage. Compte tenu de cette analyse, la CCAMLR a ajouté ces deux caractéristiques fonctionnelles clés à la spécification d'un BED qui sera déployé sur les palangriers pour réduire les captures d'oiseaux de mer au virage.

Резюме

В последние годы все больше внимания уделяется сокращению прилова морских птиц, который происходит при выборке в ходе ярусных промыслов АНТКОМ. АНТКОМ впервые отметил прилов при выборке как проблему еще в 1994/95 г., когда были предприняты меры по сокращению привлечения морских птиц к судам в ходе процесса выборки. Начиная с 2003 г. все больше усилий направляется на совершенствование конструкции и работы защитных устройств для птиц (BED), размещаемых вокруг зоны выборки. Данные, собранные научными наблюдателями начиная с 2003 г., говорят о том, что имеется два ключевых аспекта эффективных BED: во-первых, они отпугивают морских птиц, садящихся на воду рядом с ярусом при его выборке, и во-вторых, мешают птицам заплывать или "запрыгивать" на участок вокруг зоны выборки. На основе этого анализа АНТКОМ включил эти две ключевые функциональные характеристики в спецификации BED, которые должны использоваться ярусоловами с целью сокращения прилова морских птиц во время выборки.

Resumen

En los últimos años se ha prestado creciente atención a la reducción de la captura de aves marinas que ocurre cuando se recogen las líneas en las pesquerías de palangre de la CCRVMA. La CCRVMA había identificado el problema de la captura de aves durante el virado ya en 1994/95, cuando se tomaron medidas para disminuir la atracción de las aves durante esta maniobra. Desde 2003, ha aumentado el esfuerzo dedicado a mejorar el diseño y el funcionamiento de los dispositivos para excluir las aves (BED) colocados alrededor de la estación de virado. Los datos recogidos por los observadores científicos desde 2003 indican que la eficacia de los BED depende de dos factores importantes, siendo el primero la capacidad de impedir que las aves marinas se posen junto a la línea cuando está siendo recogida, y el segundo la capacidad de impedir que las aves marinas naden o "salten" al área que circunda la estación de virado. En base a este análisis, la CCRVMA incorporó estas dos características funcionales claves en las especificaciones de los BED que deberán ser desplegados por los barcos palangreros para reducir la captura incidental de aves marinas durante el virado.

Keywords: longline fishing, seabird by-catch, haul mitigation, bird exclusion device, CCAMLR

Introduction

The incidental capture of seabirds during line setting in longline operations has been recognised as a major source of mortality in many species of albatrosses and petrels (Varty et al., 2008) and has been a major contributory factor to their unfavourable conservation status. The success of mitigation measures to reduce the risk to seabirds of being hooked, and consequently drowned, during line setting has reduced the total number of dead seabirds in by-catch from over 5 000 in 1997 to near-zero in 2006, 2007 and 2008 in CCAMLR managed fisheries (SC-CAMLR, 2008). These measures include seasonal closures, setting lines only at night and mandatory use of streamer lines. However, this success in reducing the number of seabirds killed during line setting has highlighted the remaining by-catch problem of seabirds being caught, but usually not killed, during the line hauling. Although many of the seabirds caught during hauling may be released alive, once they have been brought aboard they may sustain injuries that compromise their long-term survival. For example, injuries can include puncture wounds, and internal trauma, and may develop further because seabirds are sometimes released with the hook still *in situ*. While the medium- to long-term effects of such capture events are not well understood, it is apparent that effective measures to avoid capture of seabirds on the haul should be encouraged. Hence, the need for the development of mitigation measures reducing seabird exposure to fishing gear during the line-hauling process.

Haul captures were recognised by CCAMLR as a problem as early as 1994/95, when measures were implemented to reduce the attraction of seabirds to vessels during the hauling process. Specifically, a restriction on offal dumping during hauling was introduced, and in situations where this was not possible, vessels had to be configured to ensure that offal was discharged on the opposite side of the vessel to line hauling. The risk of seabird captures during hauling also lead to the amendment of CCAMLR's Conservation Measure 29/XII (Minimisation of the Incidental Mortality of Seabirds in the Course of Longline Fishing or Longline Fishing Research in the Convention Area – available from www.ccamlr.org/pu/e/e_pubs/cm/drt.htm) to include advice on correct handling and the removal of hooks from seabirds.

The first haul mitigation device designed to prevent/scare seabirds from accessing hooks around the hauling bay was developed in the mid-1990s in the Patagonian toothfish (*Dissostichus eleginoides*) longline fisheries in the South Atlantic and became known as the 'Brickle curtain'. This involved creating a 'curtain' of objects suspended from the vessel around the hauling point to scare seabirds from the point where the line came to the surface prior to being brought onto the vessel. Although the United Nations Food and Agriculture Organization's International Plan of Action for Seabirds (FAO, 1999) included a requirement for a bird scaring device specifically for hauling, and the Brickle curtain was provided as an example of such a measure, the detailed configuration of a device was not provided.

An increased focus within CCAMLR on mitigation of seabird captures during hauling began in 2003, due to reports of large numbers of giant petrels (*Macronectes* spp.) and Cape petrels (*Daption capense*) associated with hauling operations in Divisions 58.5.2 and 58.4.2. During that year, although there was zero mortality recorded during line setting in these fisheries, eight seabirds were hooked during the haul. Two vessels from these divisions reported the use of haul mitigation: one used a type of Brickle curtain and the other a fire hose to scare seabirds away from the hauling bay. CCAMLR noted that seabird by-catch around the haul was a potential problem, particularly in areas assessed as having an average to high or high levels of risk of seabird interaction with fisheries (SC-CAMLR, 2003).

In 2005, 68% (n = 77) of seabird captures in the CCAMLR managed fisheries occurred on the haul. This led to the clear recognition that increased attention was needed on mitigating seabird captures on the haul as part of efforts to achieve a continuing reduction in seabird mortality (SC-CAMLR, 2005). As part of this process CCAMLR required vessels to deploy a 'device designed to discourage seabirds from accessing baits during the haul of longlines in areas defined as average to high risk (levels of Risk 4 or 5)'; this includes Subareas 48.3, 58.6, 58.7 and Divisions 58.5.1 and 58.5.2.

Despite the introduction of CCAMLR's requirement for the use of a 'device', no specification for such a device was provided. Consequently, there has been an increased focus by CCAMLR to evaluate the efficacy of different haul mitigation devices (hereafter referred to as bird exclusion devices (BEDs)) in order to provide advice on best practice and to continue to reduce the overall level of seabird mortality. The aim of this paper is to describe research involving scientific observers and the fishing industry to develop effective haul mitigation within the CAMLR Convention Area and to make recommendations for moving toward prescriptive advice on a standard BED.

Methods

Scientific observers are deployed on all longline vessels in CCAMLR managed fisheries; these observers record the capture of all seabirds and, to the extent possible, record whether these captures occurred during the haul or the set.

In addition to recording mandatory data on seabird captures, observers also provide descriptions of different haul mitigation and an assessment of the effectiveness of those measures by means of detailed descriptions of the devices deployed, providing information on the number of seabirds attracted to the vessel, the number accessing the line during hauling and how the device operated as a deterrent under differing conditions. By providing this information, albeit often on an ad hoc basis, the observers play a key role in the iterative development of effective haul mitigation measures.

In order to evaluate the configuration of specific haul mitigation measures and to assess their effectiveness, the information from all observers was used to match the numbers of seabirds caught during hauling to the design of the BEDs used during the period 2000–2008. To refine this analysis, the commentary provided by the observers on the operational aspects of each BED design was used to categorise the BEDs into one of three types.

Type I – Single boom with single or multiple suspended objects

This consists of a single boom (between 2–6 m long) extending at a right angle from the vessel and positioned any distance between 1–8 m aft from the hauling gear. In some cases it could be moved forward if conditions require. In simplest terms, it consists of a single rope with a buoy or 25 l oil canister and streamers attached to the seaward end of the boom (Figure 1). The device acts like a pendulum, swinging around on its axis and bouncing on the water to frighten the seabirds. Observers reported these were most effective in bad weather, when their movement was greatest, but were less effective or ineffective in calmer conditions. Another version of this type of single-boom device had a number of weighted ropes, with streamers attached, suspended from the boom reaching the water surface. Observers again reported that these were of little deterrent in calm weather as they did not provide a barrier to access to the area adjacent to the hauling bay.

Type II – Two booms with streamers attached (the traditional Brickle curtain)

This consists of two booms (3–7.5 m long) positioned forward and aft (distances varying between 1 and 11 m) of the hauling bay. Streamers/ropes are suspended from the booms and a rope strung between the two booms, effectively 'curtaining off' the haul area (Figure 2). The number of streamers

Figure 1: Type I BED – Single boom with single or multiple suspended objects.

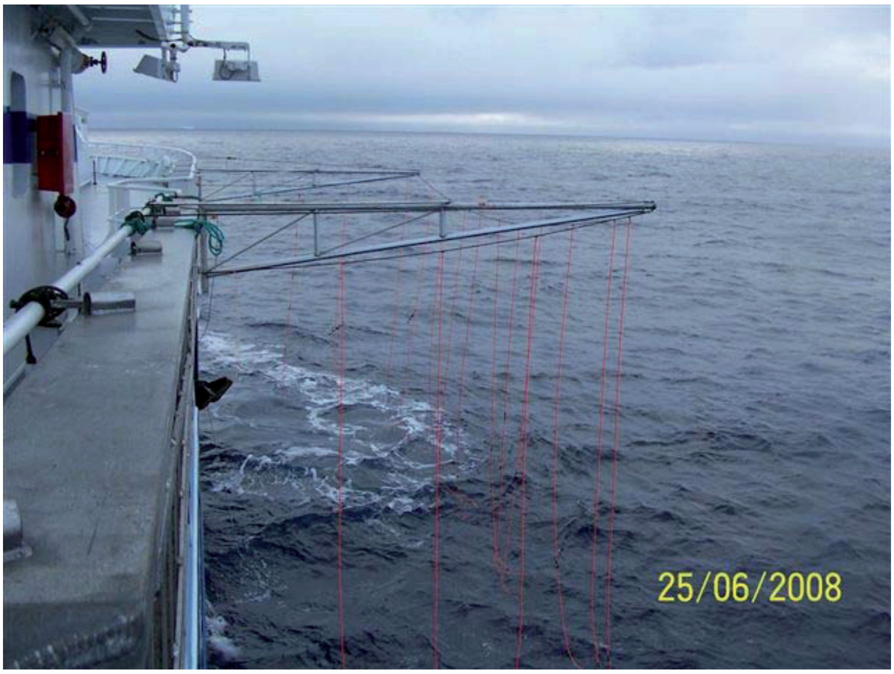

Figure 2: Type II BED – Two booms with streamers attached (traditional Brickle curtain design).

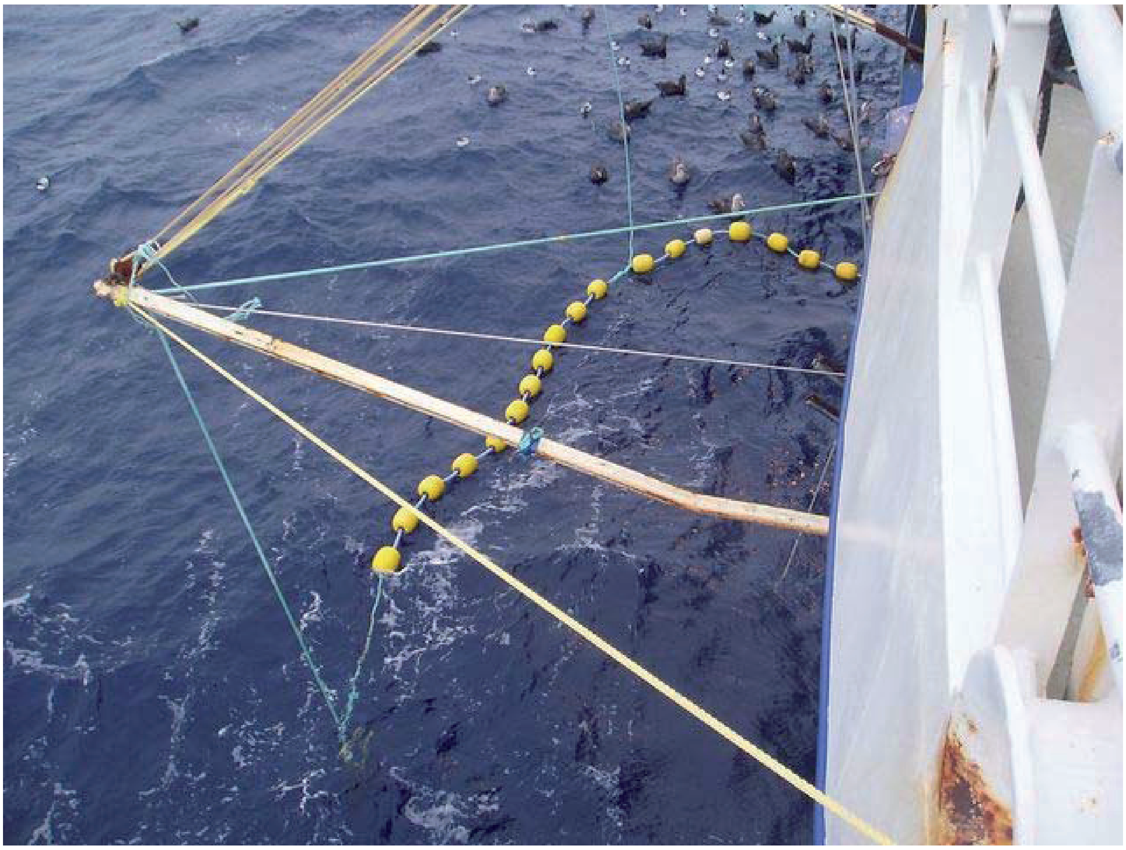

Figure 3: Type III – Two booms with purse seine buoys (with or without streamers).

ranged from 5 to 34, and their length varied between reaching the water's surface and half way toward the water. Observers reported that weighting the streamers with objects that would 'jib' about in the wind and water, such as stainless steel tubing or bottles, increased the effectiveness of the device. It was also noted that there were some problems with entanglement in the hookline/hauling gear in bad weather but that the heavier weighted streamers were less prone to becoming entangled.

Type III BED – Two booms with purse seine buoys (and streamers)

This consists of two booms joined by rope, one forward and one aft of the hauling point (Figure 3). At the seaward end of the boom, a line of purse seine buoys is suspended by a rope and float on the sea surface. Variations of this design have streamers that hang toward the water's surface attached to the booms and/or above the purse seine buoys. All observers reported these BEDs as being extremely effective.

Most observers reported that on occasions, e.g. due to calm weather conditions or high densities of seabirds, the crew augmented these haul mitigation devices with noises, e.g. banging a gaff on the side of the ship, or using a fire hose, to scare seabirds from the area adjacent to the hauling bay.

In order to make a comparison between the effectiveness of the different BED types, data from the longline fishery around South Georgia (Subarea 48.3) were used as this is the only fishery in which all three BED types have been used and where Type I and Type II have been used in the same season. In considering the more general design configurations, information from fisheries elsewhere was utilised.

Results

Since there are many potential covariates which are not possible to control and, for a number of reasons, it is not possible to conduct full controls (i.e to remove the BED completely and to compare by-catch rates with and without mitigation) the analyses of the data are necessarily limited to simple comparisons.

In Subarea 48.3 the 13 vessels that used Type I BEDs caught 43 seabirds, on the haul, while the 20 vessels using Type II BEDs caught 28 seabirds

Table 1: Use of bird exclusion devices (BEDs) in the Subarea 48.3 longline fishery and number of seabirds caught during hauling (in parentheses). Sp – Spanish method; A – autoliner.

Year	Number of seabirds caught on haul	Number of vessels using each BED type					
		Type I	Method	Type II	Method	Type III	Method
2005	20	2 (1)	Sp	4 (19)	3 Sp; 1 A		
2006	21	3 (14)	Sp	6 (7)	2 Sp; 4 A		
2007	10	5 (9)	Sp	4 (1)	4 A		
2008	20	3 (19)	Sp	6 (1)	1 Sp; 5 A	1 (0)	Sp

(Table 1). Although it is not possible to consider the circumstances of each individual bird capture, it is noteworthy that 12 of the 19 seabirds caught using the Type II BED in 2005 were associated with a single incident where the line broke and came to the surface outside the area 'protected' by the BED.

It would appear that BED Type II is relatively more effective than Type I and its improved relative performance in 2007 and 2008 is likely to be related to an increased number of weighted streamers that have been used. The sample size for BED Type III is too small to make any meaningful comparison with the other designs. Nevertheless, no seabirds have been captured on vessels where Type III BEDs have been used in fisheries in Division 58.5.2 over the period of three years.

Discussion

While the design and function of a BED is obviously critical to its performance, the probability of a capture during hauling depends on a range of variables. Seabird density and sea state are obvious environmental factors, but operational factors, such as the experience of the captain and his ability to position the vessel so the line exits the water as close as possible to the haul bay, are critical, as they determine the length of the line (and hooks) exposed to seabirds during hauling. Spanish system vessels also need to be prepared to take effective action to prevent a major capture event in cases when the hauling line breaks, as a long length of the hookline can be exposed to seabirds around the hauling bay and therefore outside the area protected by the BED. In such cases, the use of additional deterrents (e.g. banging the gaff on the side of the vessel or spraying water over the danger area) could play an important role in preventing captures.

This investigation, both analytical and from discussion with observers and operators, suggests that there are two key aspects of effective BEDs: firstly that they provide a deterrent to seabirds landing near the line as it is being hauled, and secondly that seabirds are deterred from swimming or jumping into the area around the line having landed on the water away from the hauling point.

Conclusion

Results achieved in Subarea 48.3 and Division 58.5.2, albeit with a significantly lower fishing effort and often lower seabird densities and a different assemblage of seabird species associated with vessels than in Subarea 48.3, suggest that a Type III BED, which combines streamers hanging down to the water and a connected line of floats on the surface is the best design to achieve these objectives.

Progress

Based on the analysis presented here, CCAMLR agreed in 2009 to amend Conservation Measure 25-02 'Minimisation of the Incidental Mortality of Seabirds in the Course of Longline Fishing or Longline Fishing Research in the Convention Area' (www.ccamlr.org/pu/e/e_pubs/cm/09-10/25-02.pdf) to include advice on the operational characteristics of effective BEDs as outlined above and to provide examples of designs that met those specifications. Thus, rather than specify a particular 'optimum' design, the recommendation of CCAMLR was to identify these two key requirements of a BED and to provide examples of configurations that achieved this. In doing so, this provided improved advice but also allowed for continued development and design improvement.

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