Agreement on the Conservation of Albatrosses and Petrels

Eleventh Meeting of the Seabird Bycatch Working Group

Edinburgh, United Kingdom, 15 - 17 May 2023

Extension arms for bird-scaring lines: performance and crew safety onboard small trawl vessels

Cristián G. Suazo, David Suazo, Patricio Ortiz Soazo, Esteban Frere, Rory Crawford, Oliver Yates

SUMMARY

The use of bird-scaring lines (BSL) has been widely discussed and justified in its effectiveness in fisheries such as trawl fisheries. However, there are still fisheries that have infrastructure that is not prepared for even this type of measure. Here, we review the development of an extension arm system to facilitate the attachment and deployment of BSL onboard small trawlers in south-central Chile. From the requirement of domestic regulations for compliance with mitigation measures in Chile, the story of the development of this system comes to complement aspects of mitigation compatibility with the facilities and fishing operation itself (side-haul), as well as dimensions related to crew safety, particularly in reduced working spaces on board.

1. INTRODUCTION

The implementation of new regulations for mitigation measures in Chilean trawl fisheries (Subpesca Res. No. 2941/2019, https://www.subpesca.cl/portal/615/w3-article-105375.html), included minimum standards for the construction and deployment of bird scaring lines (BSL) as a fundamental mitigation measure.

BSL had previous experience on their construction and use in demersal and mid-water industrial trawl fisheries, such as for South Pacific hake *Merluccius gayi gayi* and hoki *Macruronus magellanicus* in south-central Chile (ATF-Chile 2013).

In contrast, Chile's semi-industrial crustacean trawl fisheries do not have the stern infrastructure for installation and deployment for the height required for BSL by the local regulations (5 m high). In addition, these fisheries present side-haul operations, where this type of maneuvers are recently being explored in their potential for seabird bycatch (Tamini et al. 2021).

Here, we present the development of extension arms for BSL assembly and performance from the stern of side-setting trawlers, as well as minimum standards for BSL construction *ad hoc* for the available facilities and speed tow of semi-industrial trawlers.

We also review the development of this type of devices in relation to minimum safety standards for crew safety on board, with emphasis on BSL handling and deployment.

2. NEW FACILITIES ONBOARD AND CREW SAFETY

The installation of mitigation measures on board is a very variable task depending on the type of fishery, but also affected by the scale of the vessel and its number of crew members.

In fact, there are fewer experiences in small-scale fisheries (artisanal, semi-industrial), which are less known in their impact on birds, but also in the onboard infrastructure to carry out conservation actions (Pott and Wiedenfeld 2017; Melvin et al. 2023).

In demersal trawl fisheries for crustaceans in the Humboldt Current System (HCS), regulations in Chile instruct the installation of BSL to cover the aerial extent of warp cables during trawling from about 2 m high from the center of shieve where the warp cable passes to complete a BSL attachment height of ~5 m high (Subpesca Res. No. 2941/2019, above).

However, there are two aspects that in practice were unknown in the current regulation: i) compatibility of the BSL with the fishing operation, and ii) safety of the crew members in charge of BSL deployment and handling.

2.1. BSL compatibility with side-haul trawl vessels: facilities onboard

The warp cable passage system is formed by two bows at the stern, from which the net is supported at the time of tow (Fig. 1).

Figure 1. Stern arch system for warp cables in demersal trawl for crustaceans, at HCS, Chile. Stern view with port side bow (right) and starboard bow (left). The latter has a curved steel tube at the top (10-15 cm diameter), to facilitate the sliding of the cod-end for discharge of catch on deck.

The tow is at low speed (~2-3 knots) and during the haul, the loaded net is lifted by a winch and pulley system that moves the cod-end of the net for catch discharge on deck (Fig. 2). Thus, in both setting and hauling the height of BSL use must be reduced on each cast to avoid entanglement and damage to the fishing net with the BSL attachment-height system.

Figure 2. Side-haul process for small trawl vessels for crustaceans in the HCS, Chile. Note the pass of the cod-end over the stern arch of the starboard side.

2.2. BSL compatibility with side-haul trawl vessels: the development of extension arms

To address the challenge of maintaining the necessary height of BSL aerial coverage for the warp cable in tow (5 m high), we developed an extension (telescopic) arms device. Divided into three sections, these arms also prevent entanglement of the BSL attachment with the cod-end while hauling the net due to its retrieve (Fig. 3).

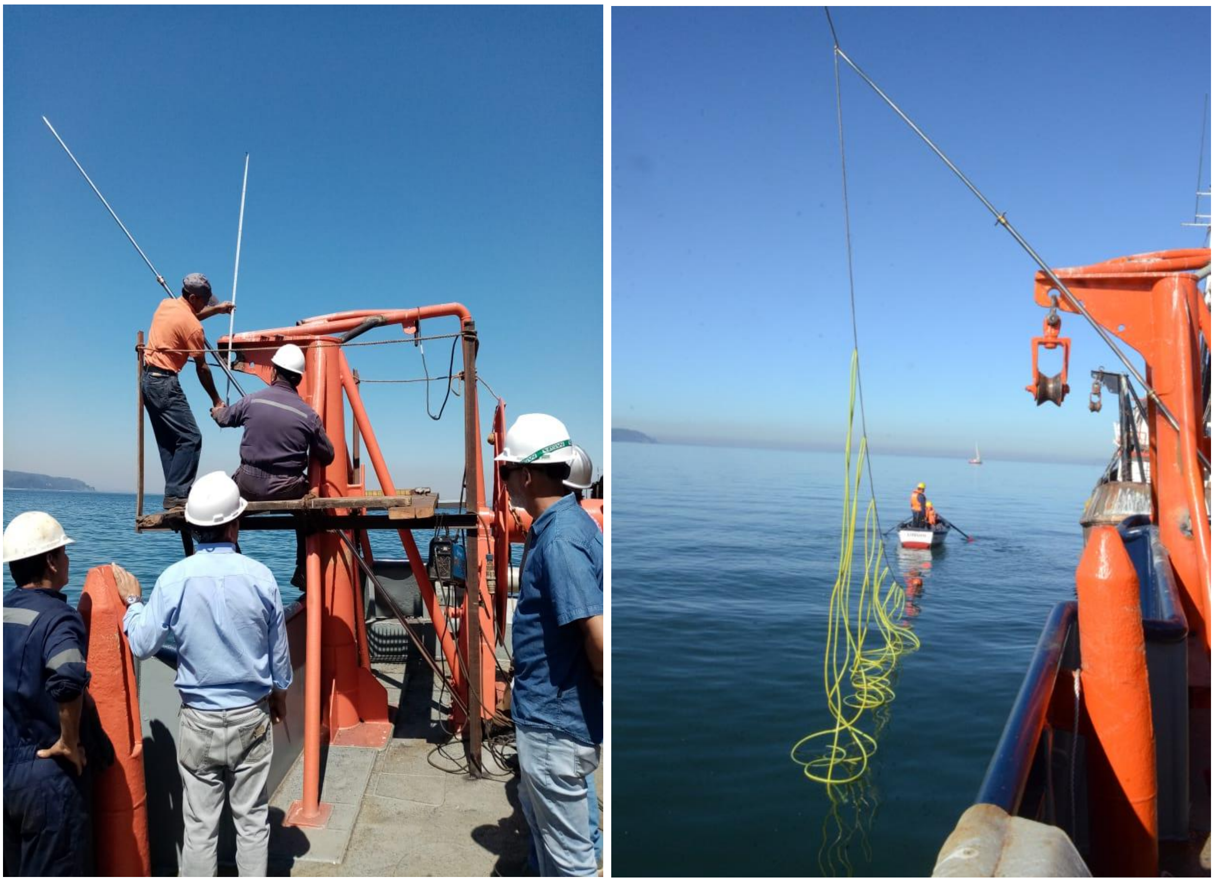

Figure 3. Extension arm prototype for side-haul small trawl vessels in the HCS, Chile.

The sections of the extension arm were joined by manually adjustable nuts. This characteristic of this prototype later allowed us to identify the risk of crew members falling as they had to climb up the side of the ship to deploy the sections and fix the safety nuts.

Given this scenario, we were able to develop a second prototype of the extension arm, which consists of a handle-crank system and a toothed belt for the extension of the BSL arm from the deck (**Figure 4**; a first version of the mechanism https://bit.ly/3A3WKev).

Figure 4. Extension arm with handle-crank system for small demersal trawl vessels in the HCS, south-central Chile.

As we noticed that the extension arms must be adapted for anchoring to the stern bows of each vessel, as well as to ensure safe access to the entire device, we developed a mobile base with "patella" that allows the arm to rotate 360º (Fig. 5).

Figure 5. Base of the extension arm with patella for its movement and attachment.

2.2. BSL compatibility with side-haul trawl vessels: tailored short BSL

The infrastructure and space of small trawlers, we also recommend the use of BSL of a total length of 30 m mainline extension (Subpesca Res. No. 2941/2019, above).

However, to complement the use of the extension arm with reduced stern clearance and tow speeds not exceeding 4 knots, we built short BSLs of 15 m as an *ad hoc* measure that suits for the infrastructure and operation of small side-haul trawlers.

As main line, we used 10 mm diameter Nylon rope and double 2 mm thick 2.5 cm wide PVC slat line streamers for each streamer. Streamers were cut by hand by personnel from the Camanchaca Pesca Sur net workshop, based in Tomé (Fig. 6).

For the installation of streamers on the main line, the spacing between streamers was measured every 1.80 m. In turn, these streamers were passed through the strands of the main line and finally anchored with Nylon thread (Fig. 6).

Figure 6. En el sentido del reloj, construcción de BSL de 15 m de largo. Streamers dobles attachment every 1.80 m.

To build 15 m long BSLs (including a drag system; Tamini et al. 2015), the sequence of double streamers every 1.80 m consisted of seven streamers, starting from the stern including lengths to the contact with the ballast system of: 5.0 m; 4.5 m; 4.0 m; 3.5 m; 3.0 m; 2.5 m; 2.0 m.

The performance of extension arms is under monitoring during 2023 (Fig. 7), although for the moment we can highlight from direct observation of test sets (n=20) in commercial crustacean demersal trawl operations:

(i) BSL deployment and removal has proven to be expeditious in times that require deployment of mitigation measures (< 10 min in both extension arms).

ii) The use of short 15 m BSLs has facilitated complete aerial coverage for tows at low speed of navigation (up to 4-5 knots).

iii) No crew entanglement with the main line or streamers has been observed when handling BSLs at the stern of the ship.

iv) The short BSL type allows a better retrieve and orderly deployment of this system aft, since the smaller dimensions compared to long BSL (30 m) allow its location in narrow spaces available for work aft of small vessels.

v) The mobile extension arms base allows adjusting the installation of this device in different types of aft infrastructure.

vi) The extension arm with handle-crank system ensures safety on board for the crew, as well as avoiding damage to the fishing equipment. Both aspects have had an impact on its use.

vii) The extension arm with handle-crank system is simple to use and maintain, key aspects for its implementation in small trawling fleets.

viii) The extension arm with handle-crank system is an adaptable system, which in 2023 will have versions including an electric motor for deployment and retrieval.

Figure 7. Bird-scaring lines deployed with extension arms onboard a small trawl vessel in the Humboldt Current, Chile.

ACKNOWLEDGMENTS

We would like to thank for all the support in the management and preparation of mitigation measures and infrastructure, to Camanchaca Pesca Sur, particularly: Fernando Jiménez, Juan Carlos Duhalde, Jenaro Riquelme, Pablo Contreras, Eloy Inzunza, José Molina, and all the crew members onboard PAM Antares based in the port of Tomé, south-central Chile.

REFERENCES

ATF-Chile (2013) Demersal Trawl Report (2011-2012). Albatross Task Force – Chile, BirdLife International.

Melvin EF, Wolfaardt A, Crawford R, et al (2023) Bycatch reduction. In: Young L, VanderWerf E (eds) Conservation of Marine Birds, 1st edn. Academic Press, pp 457–496

Pott C, Wiedenfeld DA (2017) Information gaps limit our understanding of seabird bycatch in global fisheries. Biol Conserv 210:192–204. https://doi.org/10.1016/j.biocon.2017.04.002

Tamini LL, Chavez LN, Dellacasa RF, et al (2021) Incidental capture of seabirds in Argentinean side-haul trawlers. Bird Conserv Int 31:591–604. https://doi.org/10.1017/S0959270920000623

Tamini LL, Chavez LN, Góngora ME, et al (2015) Estimating mortality of black-browed albatross (Thalassarche melanophris, Temminck, 1828) and other seabirds in the Argentinean factory trawl fleet and the use of bird-scaring lines as a mitigation measure. Polar Biol 38:1867–1879. https://doi.org/10.1007/s00300-015-1747-3