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The Warp Deflector (pinkie system): Practical implications of a physical seabird bycatch mitigation device trialled in the Falkland Islands trawl fishery

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SUMMARY

Besides their efficacy, seabird bycatch mitigation devices should be practical and safe to use at all time. Since 2004, the Falkland Islands trawl fishery has been using compulsory tori-lines to mitigate incidental seabird mortalities. These bird scaring lines have been shown to reduce contact rates with the fishing gear, but numerous issues relating to their practical, effective and safe use have been identified. In line with the Falkland Islands National Plan of Action for Reducing Incidental Catch of Seabirds in Trawl Fisheries (FI-NPOA-S-T-2014), the Falkland Islands Fisheries Department is researching alternative seabird mitigation tools. Following the positive results of the pinkie buoy system (dubbed *warp deflector*) in a previous study undertaken in Australia, we conducted preliminary trials of the device on a finfish bottom trawler in 2015. During the trials, we identified numerous practical issues which we felt impacted sufficiently on the safe and effective deployment of the warp deflector to consider this device unsuitable as a stand-alone bycatch mitigation tool. This paper reports on observations made during trials and discusses implications.

1. INTRODUCTION

1.1. Background

The major cause of seabird mortality in the Falkland Islands trawl fishery is the result of cable strikes during periods of fisheries waste discharges (Sullivan & Reid 2003; Kuepfer 2016a, b). Fisheries waste includes unwanted whole fish and processing waste (offal), and is collectively referred to here as 'discard'. Although compulsory bird scaring lines (also known as tori-lines) have shown to reduce contact rates with the fishing gear, numerous issues relating to the practical, safe and effective use of these devices have been identified (e.g. Snell et al. 2011; Løkkeborg 2011; ACAP 2016a; Kuepfer 2016a, b). Discard management is recognised as the most effective form of mitigation (e.g. Munro 2005; Middleton & Abraham 2007; Abraham et al. 2009; Bull 2009; Pierre et al. 2010; Løkkeborg 2011; Pierre et al. 2012a, b; Pierre et al. 2014; ACAP 2016a; Kuepfer et al. 2016); however, recognising that practicalities such as actual vessel configurations and the volume of discard to be stored can constrain this option as an immediate solution, the Falkland Islands Fisheries Department (FIFD) seeks to improve its short-term mitigation measures in the interim.

1.2. The pinkie system (warp deflector)

A device dubbed the *warp deflector* was first tested in 2012-2013 in the Southern and Eastern Scalefish and Shark Fishery (SESSF) in Australia as part of a comparative study on seabird mitigation devices for trawlers (Pierre et al. 2014). The device comprises a plastic pinkie buoy that is attached to the trawl warp cable by a clip and connected back to the vessel via a retrieval line (Figure 1). The buoy is intended to hang from the warp cable forward of where the warp enters the water and act as a visual and physical deterrent to seabirds at the warp-water interface area. Seabirds that come into contact with the pinkie are intended to be deflected or pushed out of the way of the warp wire. The study by Pierre et al. (2014), conducted aboard trawl vessels measuring 18 – 26 m in length, found the device to significantly reduce heavy interactions of shy-type albatross (*Thalassarche*) with trawl warps by 75%. The authors, however, urged for wider testing of the device to support results. Following the study, the pinkie system was until recently accepted by the Australian Fishery Management Authority (AFMA) as a stand-alone mitigation measures in the south east Australian trawl fishery.

Based on the positive results found by Pierre et al. (2014), the pinkie system was trialled in the Falkland Islands trawl fishery in 2015 in order to assess its effectiveness as a mitigation tool compared to the standard tori-line. Here we focus on the practical limitations that we encountered during observations, and which we considered sufficient to abandon the trials.

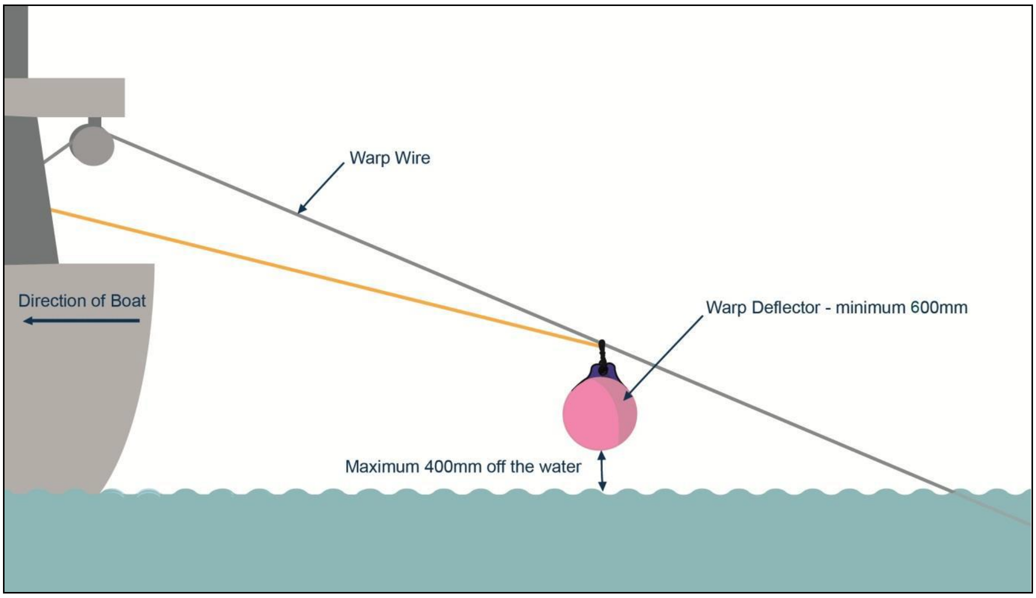


Figure 1 The standardised 'warp deflector' (pinkie system) tested in the Southern and Eastern Scalefish and Shark Fishery. Source: Pierre et al. (2014).

2. TRIALS OF THE PINKIE IN THE FALKLAND ISLANDS

2.1. Experimental set-up and data collection

Trials of the pinkie system were conducted by the dedicated FIFD Seabird Observer between the 24 July and 8 August 2015 aboard a 75.4 m long bottom stern trawler targeting finfish inside the Falkland Islands Conservation Zone. It was envisaged to conduct trials on the basis of a randomised block-design, with either the warp-deflector or the standard FIFD tori-line deployed randomly in trawls within treatment blocks. However, due to various practical limitations encountered, trials of the pinkie system were abandoned early.

In total, the pinkies were deployed on eight separate days on a total of eight trawls. During six of the trials, a 500 mm buoy was deployed on either warp (Figure 2). During the final two trials, the portside 500 mm buoy was replaced with a 700 mm buoy. A 600 mm buoy, as used by Pierre et al. (2014), was not available. On two trawls, extra weights were added to the 500 mm buoy to try and reduce entanglements with the warp (Figure 3, see section 2.2.3.).

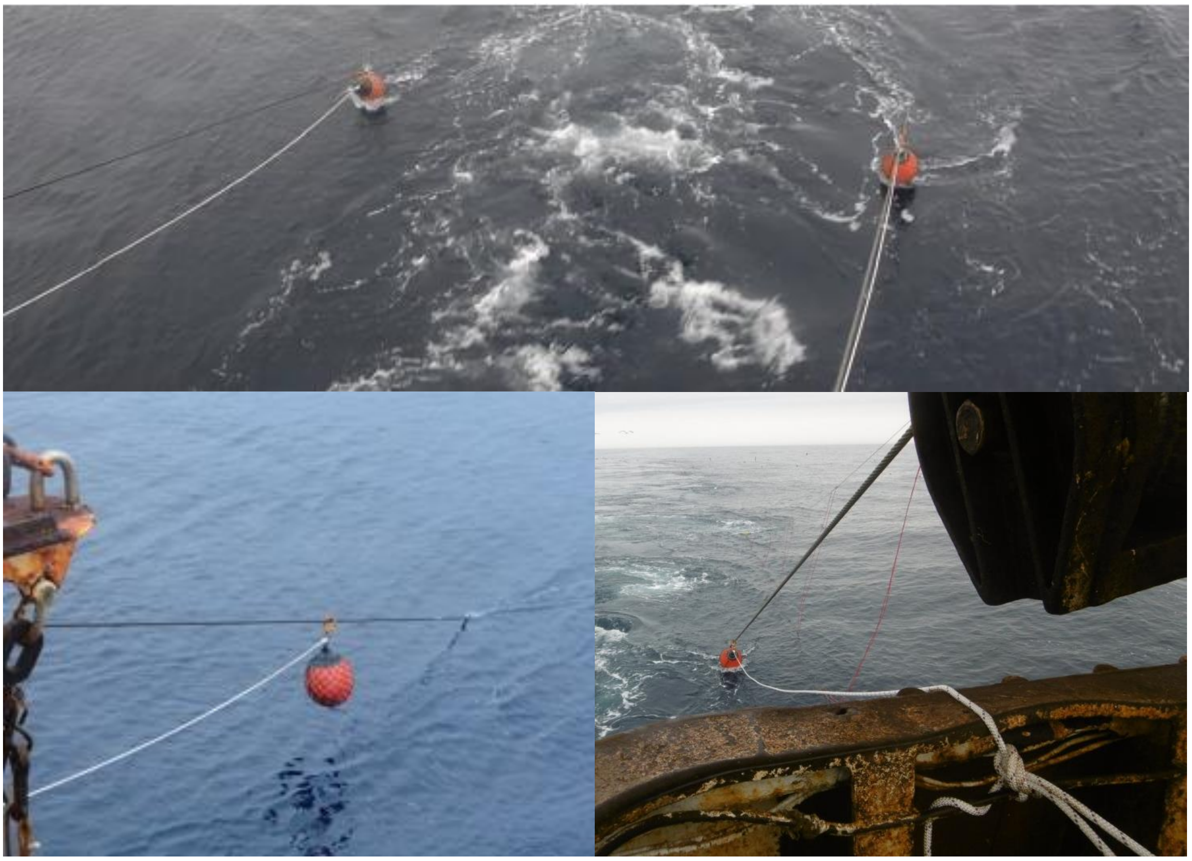


Figure 2 Deployed pinkies intended to act as warp deflectors (note the tori-line was also deployed when the bottom right picture was taken; all pictures were taken outwith discarding periods).

Figure 3 Pinkie with added weight in an attempt to reduce entanglement issues.

2.2. Observations and comments

The efficacy of the pinkie system as a warp deflector that reduces warp strikes could not be assessed in the current study due to the low sample size of trials conducted. Trials were abandoned early in response to a number of observed issues relating to the practical, safe and effective deployment of the device. At least one of the key issues was identified in every trial. Here we report the relevant observations made and discuss implications.

2.2.1. Device deployment: Practicalities

- The position of the pinkie along the warp is critical to its effectiveness as a seabird deterrent (see Figure 4). Ideally, the pinkie should hang near the warp-water interface (the area where the cable enters the water), for this is the most dangerous part of the cable to birds on the water.
- If the pinkie is positioned too high up the warp, this leaves a substantial gap between the buoy and the warp-water interface, and results in the most dangerous part of the cable remaining unprotected (Figure 4).
- If the pinkie is positioned too close to the waterline, it risks being knocked backwards to be dragged along behind the warp, as the warp cuts forward through the water (Figure 4, Figure 5). The warp is most dangerous to birds as it cuts forward through the water at high speed, so a pinkie sitting semi-submerged behind the warp at this critical point is unlikely to act as an effective deterrent. In addition, the clip and the retrieval line may pose an entanglement risk, potentially exacerbating the bycatch risk.
- Pierre et al. (2014) recommend the pinkie to hang maximum 400 mm above the water (Figure 1), and mention that for their trials, the length of the retrieval rope that positions the buoy appropriately on the trawl warps was adjusted for each vessel's warp length. However, observations from the current and other trips have shown that the warp length (the distance from the vessel to the warp-water interface) can vary between and even within tows of a given vessel, depending primarily on sea state and swell height, but also on factors such as trawl depth and tow speed (A. Kuepfer pers. obs. 2015 – 2017). This implies that the pinkies require frequent re-adjustment to maintain their ideal position and efficacy.
- It is not practical for the crew to have to regularly re-adjust the pinkie, and regulation of correct deployment would be difficult in the absence of an observer.

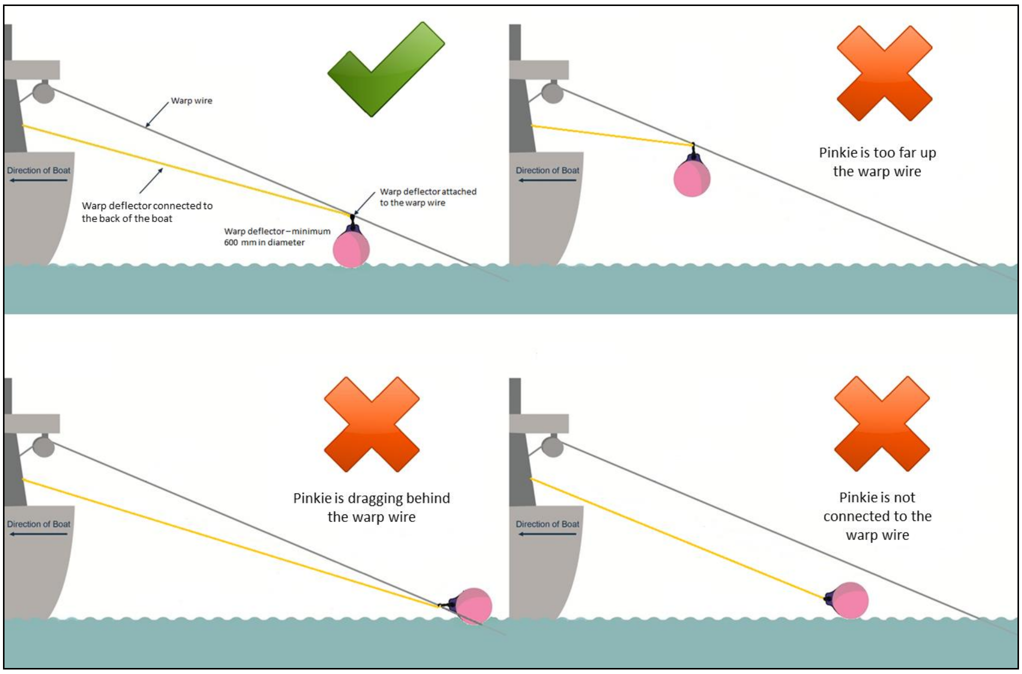


Figure 4 Correct positioning of the pinkie. Source: www.afma.gov.au.

Figure 5 Semi-submerged pinkie as the warp cuts forward through the water.

2.2.2. Device deployment: Safety

- Whilst no rough weather was encountered during the trials, Pierre et al. (2014) report that deploying the pinkies in rough weather was difficult.
- Safety concerns relating to the deployment and retrieval of physical mitigation devices from out-board of the stern of trawl vessels have been raised in previous work (e.g. Sullivan et al. 2006; Middleton and Abraham 2007; ACAP 2016a).

2.2.3. Retrieval line entanglement

- Even in mild conditions (Beaufort 2-3), the retrieval lines became readily entangled with the warp cables as the pinkies rotated around the warps when they were repeatedly pushed underwater as the vessel pitched (Figure **6**).

- On one particular trial, the lines entangled with the warps at both sides to the extent that both lines became taut and eventually snapped. As a result, both pinkies sank under the tension of the warp and could only be retrieved during hauling.
- Adding weights to the pinkies, or increasing the size of the buoy, did not improve the issue of entanglements in the limited trials conducted.
- These persistent entanglements caused a practical and safety issue when crew members had to work aft of the warp block to disentangle the device. Manual disentanglement was required in 7 out of 8 trials, with one disentanglement required during the haul, and sometimes an additional disentanglement required during the trawl to correctly reposition the device.
- In order to reduce entanglement issues, the pinkies were generally positioned too high up the warp in the absence of the observer's comments. This implies that the device does not suit a non-experimental set-up.
- The practical issue of retrieval line entanglement with the warp cable was also recognised by the south east Australian trawl industry and stimulated a recent change in policy regarding the use of pinkies (see Discussion below).
- During trials, the retrieval lines were attached to the stern wall on the bottom deck (see Figure 2). Perhaps if the retrieval lines were fixed to a much higher point (such as the gantry), the problem of entanglement could be reduced. This was not trialled (because of the other issues encountered).

Figure 6 The pinkie retrieval line starting to become entangled with the warp cable.

2.2.4. Reducing harmful contacts for birds on the water and in the air

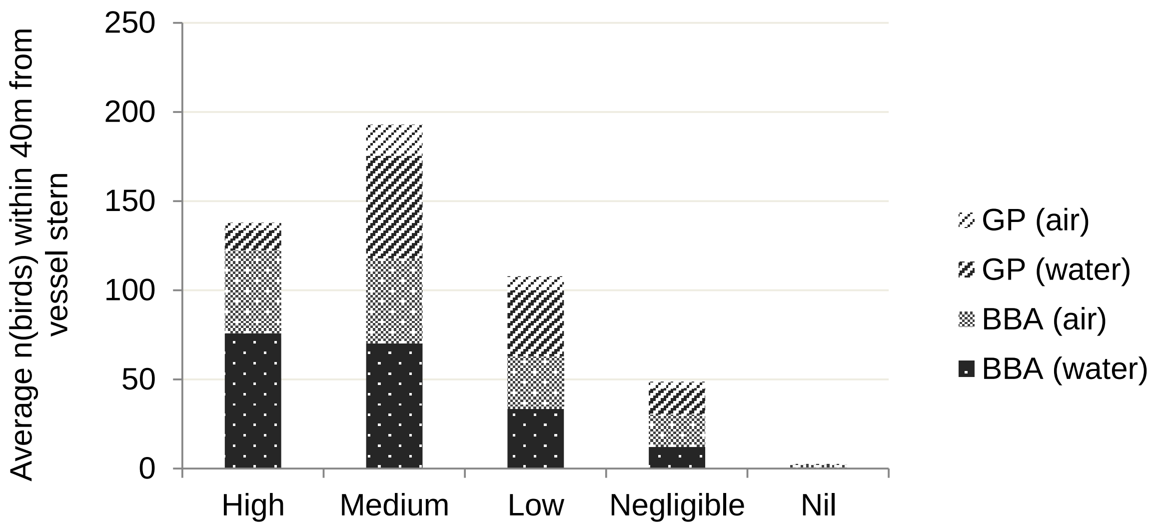
As mentioned above, we have insufficient data for a robust analysis to determine the efficacy of the pinkie at reducing interactions. However, the following observations are worth highlighting:

- Whilst the pinkies occasionally showed their potential as a 'warp cushion' (i.e. cushioning the birds from what could have resulted in a (heavy) warp strike), birds were also observed to become trapped between the buoys and the warp at the warp-water interface.

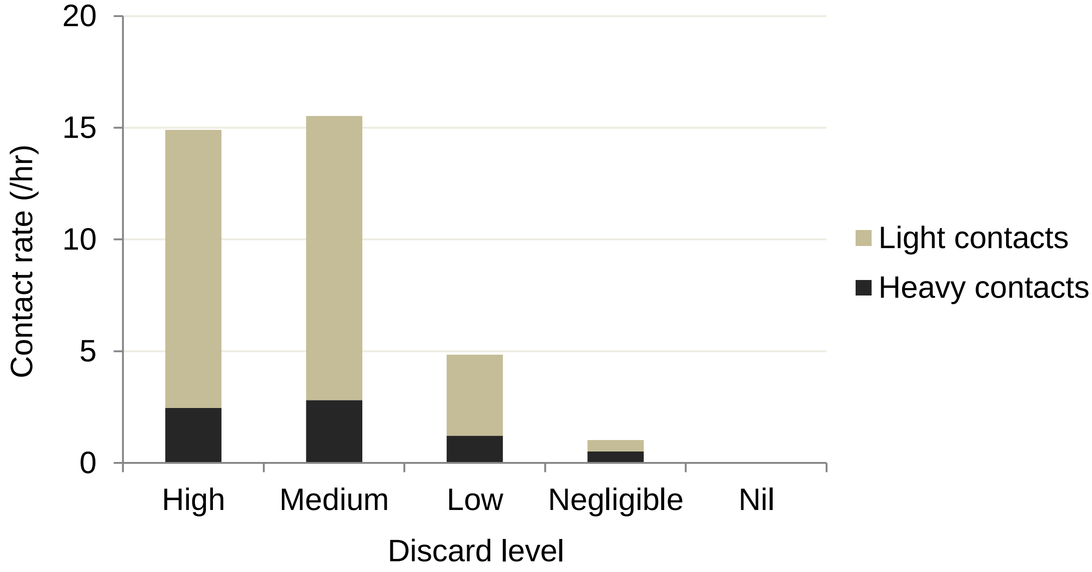
- On one occasion, a white-chinned petrel (*Procellaria aequinoctialis*) also became temporarily trapped between the buoy and the clip as the buoy was pushed upwards by the water.
- The pinkies did not appear to offer any mitigation against warp strikes by birds in the air. Small birds such as Cape petrels (*Daption capense*) were seen to fly into the retrieval line and drop down into the water at the warp-water interface.
- No evidence exists from Pierre et al. (2014) for the effectiveness of the pinkies for birds in flight. It should be noted, however, that heavy and harmful interactions by (large) seabirds in flight are generally far less common than by birds on the water (see also Pierre et al. 2014).
- During trials of the pinkie system, at least one black-browed albatross (*Thalassarche melanophris)* mortality occurred following a heavy warp strike.

2.2.5. Other relevant observations

- In the Falkland Islands it is prohibited to discharge discards from the factory without mandatory mitigation in place. During shooting and hauling, when standard tori-lines are out of the water, factory work and associated waste discharge has to stop. The standard tori-lines are generally deployed as soon as the trawl doors are submerged during shooting of the net to allow factory work to resume. In contrast, the pinkies can only be deployed once all gear has reached fishing depth and the warp cables have been fully paid out. This means that factory work is required to remain halted for an additional 5-10 minutes during shooting and that cables are left unprotected for that period for every tow.
- Seabird abundance in the current study was generally strongly associated with the level of discard available (Figure 7a and Figure 8a). Contact rates directly mirrored the abundance trend, suggesting that contact rates were strongly associated with discard availability and associated seabird abundance, regardless of the type of physical mitigation that was deployed (tori-line or pinkie) (Figure 7b and Figure 8b). No contacts occurred in the absence of discards.

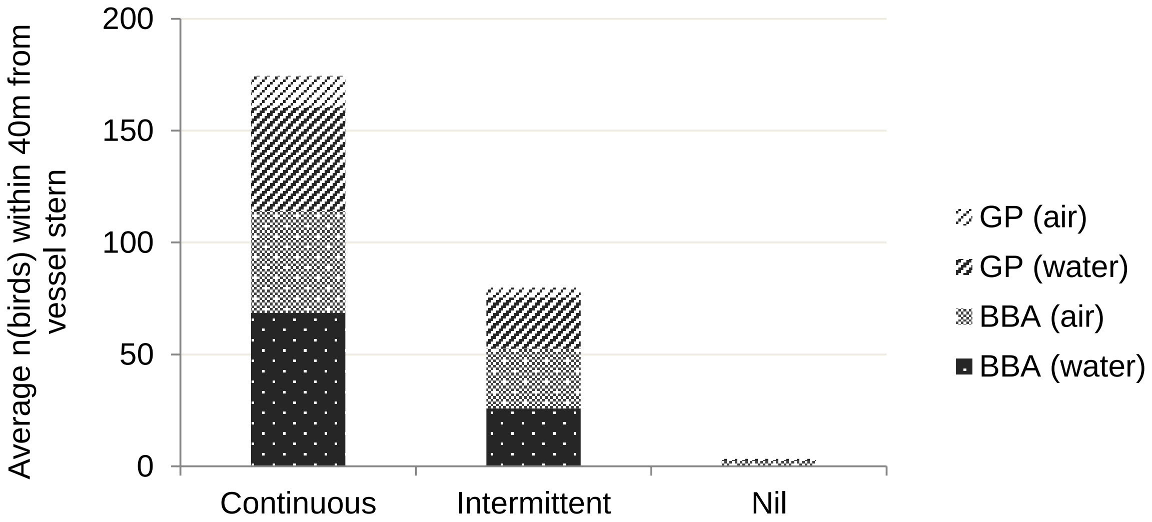


a)



b)

Figure 7 Discard level (volume discharged) and associated a) average number of birds in the vicinity of the vessel (BBA = black-browed albatross, GP = giant petrel species), b) contact rates (by both GP and BBA) with the warp cable. Observation periods for the various discard levels are 5.85 hr (high), 17.77 hr (medium), 4.13 hr (low), 1.95 hr (negligible), 6.47 hr (nil). Heavy contacts are contacts that have the potential to cause stress, injury or death. Light contacts are contacts that result in no apparent stress or harm.



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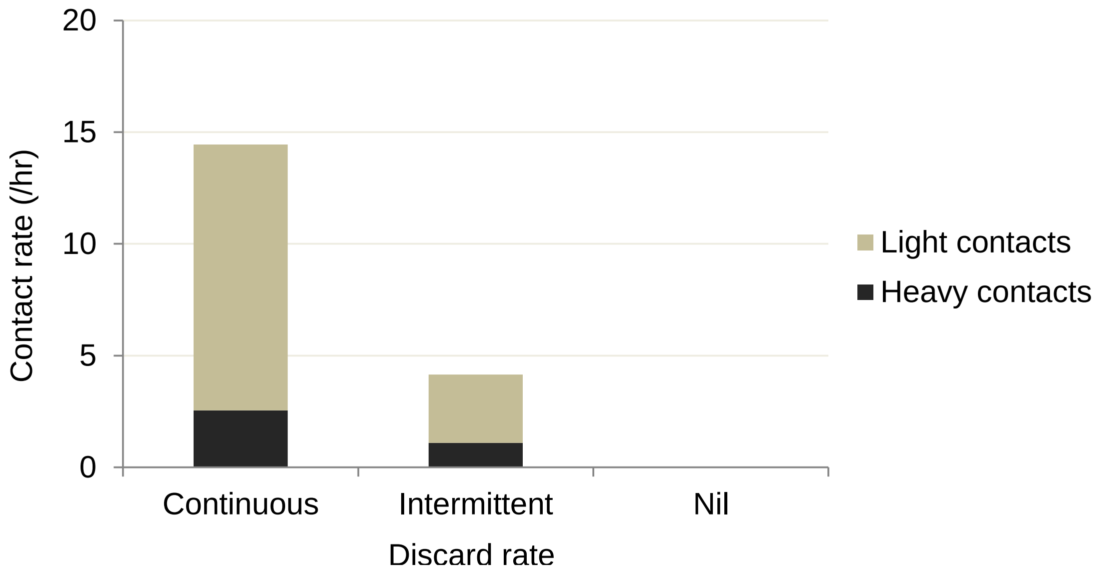

b)

Figure 8 Discard rate (frequency of discharge) and associated a) average number of birds in the vicinity of the vessel (BBA = black-browed albatross, GP = giant petrel species), b) contact rates (by both GP and BBA) with the warp cable. Observation periods for the various discard rates are 25.12 hr (continuous), 4.58 hr (intermittent), 6.47 hr (nil). Heavy contacts are contacts that have the potential to cause stress, injury or death. Light contacts are contacts that result in no apparent stress or harm.

3. DISCUSSION AND SUMMARY

Besides their efficacy, seabird bycatch mitigation measures should ideally be straightforward and safe to use in all weather conditions in order to ensure their adoption and correct use by the fleet (see ACAP 2016a; ACAP 2016b). In an initial study by Pierre et al. (2014), the pinkie system (warp deflector) was found to reduce heavy warp strikes by up to 75%, although the authors highlighted potential safety concerns and the difficulties experienced in deploying the device in adverse weather conditions. Whilst the device was initially accepted by AFMA as a stand-alone mitigation tool for trawlers in south east Australia, practical limitations such as the entanglement of the retrieval line with the warp cable due to wind, waves and high trawl speed resulted in the south east Australian trawl industry developing improved alternative mitigation, and calling for a change in policy regarding the use of pinkies (S. Boag pers. comm. July 2017). Since May 2017, pinkies must now be accompanied by stringent discard management (i.e. no waste discharge during towing) (AFMA 2016; S. Boag pers. comm. July 2017). At the time of writing, only one part-time vessel continues to use pinkies with the rest of the fleet using new devices (S. Boag pers. comm. July 2017).

Observations from the current study support the decision that the pinkie system is unsuitable as a stand-alone seabird bycatch mitigation tool for trawl fisheries. Firstly, the efficacy of the pinkies depends on their correct positioning along the warp, and this ideal position is not a fixed distance from the vessel. As a result, effective deployment is both impractical for the crew and difficult to regulate. Secondly, entanglement of the retrieval line with the warp cable presents a real practical problem as well as a safety concern, as crew are required to work aft of the warp block to disentangle the line. Our observations have shown that the practical response, from a crew's point of view, is to attach the pinkies further up the warp to reduce the risk of entanglement, compromising its ideal positioning for the purpose of seabird deterrent.

Various other ‘warp-protection’ devices have been trialled in the past, including in the Falkland Islands (Sullivan et al. 2006a), New Zealand (Middleton and Abraham 2007) and in Australia (Pierre et al. 2014), and all suffered from the same safety concerns, relating to the need of direct attachment to the warp cables. Various captains of the Falkland Islands fleet have also explicitly expressed to the FIFD Seabird Observer that any mitigation device that requires routine deployment and retrieval is likely to be less practical, less popular, and ultimately more prone to compliance issues as opposed to a fixed or automated system such as for example the baffler system (e.g. see AFMA website), the Falkland Islands’ Fixed Aerial Array (in development), or indeed, waste discharge management.

Whilst the aim of this current work was to establish a short-term mitigation tool in the interim of the more long-term solution of waste discharge management, our data once again demonstrate that, in the absence of fisheries waste discharge, seabird abundance is greatly reduced and that warp interactions are practically eliminated. This is concurrent with previous findings by e.g. Middleton and Abraham 2007; Abraham et al. 2009; Bull 2009; Pierre et al. 2010; Pierre et al. 2012a; Pierre et al. 2012b; Kuepfer et al. 2016). As such, we recommend that, whilst it is important to continue the research and development of alternative physical mitigation, effective discard management options should continue to be prioritised.

4. ACKNOWLEDGEMENTS

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5. REFERENCES

Abraham, E.R., Pierre, J.P., Middleton, D.A.J., Cleal, J., Walker, N.A., Waugh, S.M. 2009. Effectiveness of fish waste management strategies in reducing seabird attendance at a trawl vessel. Fisheries Research, 95: 210-219.

ACAP 2016a. ACAP summary advice for reducing impact of pelagic and demersal trawl gear on seabirds. Agreement on the Conservation of Albatrosses and Petrels. Reviewed at the Ninth Meeting of the Advisory Committee. Version: 7 July 2017. Available from: https://acap.aq/resources/bycatch-mitigation/mitigation-advice/202-acap-review-of-mitigation-measures-and-summary-advice-for-reducing-the-impact-of-pelagic-and-demersal-trawl-gear-on-seabirds/file?lang=en.

ACAP 2016b. Best Practice Seabird Bycatch Mitigation Criteria and Definition. Reviewed at the Ninth Meeting of the Advisory Committee La Serena, Chile, 9 -13 May 2016. Version 7 July 2017. Available from https://acap.aq/en/bycatch-mitigation/mitigation-advice/2595-acap-best-practice-seabird-bycatch-mitigation-criteria-and-definition/file.

AFMA 2016. AFMA moves to strengthen seabird safety. Version 7 July 2017. Available from http://www.afma.gov.au/afma-moves-strengthen-seabird-safety/.

Bull, L.S. 2009. New mitigation measures reducing seabird bycatch in trawl fisheries. Fish and Fisheries, 10: 408–427.

Kuepfer, A. 2016a. An assessment of seabird bycatch in Falkland Islands trawl fisheries, July 2014 to June 2015. Falkland Islands Fisheries Department, 1–33. Stanley, Falkland Islands.

Kuepfer, A. 2016b. An assessment of seabird bycatch in Falkland Islands trawl fisheries, July 2015 to June 2016. Falkland Islands Fisheries Department, 1–3p. Stanley, Falkland Islands.

Kuepfer, A., Gras, M., Pompert, J. 2016. Discard management as a seabird bycatch mitigation tool: The effect of batch-discarding on seabird interactions in the Falkland Islands trawl fishery. ACAP SBWG7 Inf 25, La Serena, Chile, 2016.

Løkkeborg, S. 2011. Best practices to mitigate seabird bycatch in longline, trawl and gillnet fisheries – efficiency and practical applicability. Marine Ecology Progress Series, 435: 285–303.

Middleton, D.A.J. and Abraham, E.R. 2007. The efficacy of warp strike mitigation devices: trails in the 2006 squid fishery. Final Research Report IPA2006-02, Ministry of Fisheries, Wellington. Available at: http://fs.fish.govt.nz/Page.aspx?pk=113&dk=22910.

Munro, G. 2005. Waste Discard Management in the Falkland Islands Trawl Fishery. In: Falklands Conservation. Falklands Conservation: Stanley, 3-61.

Pierre, J., Gerner, M., Penrose, L. 2014. Assessing the Effectiveness of Seabird Mitigation Devices in the Trawl Sectors of the Southern and Eastern Scalefish and Shark Fishery in Australia. 28 pp.

Pierre, J.P., Abraham, E.R., Cleal, J., Middleton, D.A.J. 2012a. Reducing effects of trawl fishing on seabirds by limiting foraging opportunities provided by fishery waste. Emu-Austral Ornithology, 112: 244–254.

Pierre, J.P., Abraham, E.R., Cleal, J., Middleton, D.A.J. 2012b. Controlling trawler waste discharge to reduce seabird mortality. Fisheries Research, 131–133: 30–38.

Pierre, J.P., Abraham, E.R., Middleton, D.A.J., Cleal, J., Bird, R., Walker, N.A., Waugh, S.M. 2010. Reducing interactions between seabirds and trawl fisheries: responses to foraging patches provided by fish waste batches. Biological Conservation, 143: 2779–2788.

Sullivan, B. and Reid, T. 2003. Seabird Mortality and Trawlers in Falkland Island Waters 2002/2003. Falklands Conservation, 1–53. Stanley, Falkland Islands.

Sullivan, B.J., Brickle, P., Reid, T.A., Bone, D., Middleton, D.A.J. 2006. Mitigation of seabird mortality on factory trawlers: trials of three devices to reduce warp cable strikes. Polar Biology, 29: 745-753.