South Pacific Regional Fisheries Management Organisation

2nd Meeting of the Scientific Committee

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Seabird risk and trawler discharge

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Purpose

The Roadmap for the Scientific Committee (Annex D of the Report on the Second Meeting of the Commission of SPRFMO) requests the Scientific Committee to consider the level of risk to seabird species in a range of trawl fisheries, with reference to discarding of biological material. This paper reviews existing research on the bycatch risk to seabirds, using attraction of birds to vessels as a measure of risk, across a range discharge and discard regimes.

Background

In trawl fisheries, seabird bycatch occurs due to birds interacting with the trawl warps or the trawl net. The discharge of fish processing waste from trawl vessels is a risk factor well-documented to increase the incidence of seabird captures (ACAP 2013). For example, in South African trawl fisheries targeting hake (*Merluccius* spp.), seabird mortalities due to birds striking trawl warps were observed to occur at a rate of 0.56 birds per hour (95% confidence interval: 0.32 – 0.82) during processing waste discharge. In contrast, mortalities occurred at a rate of 0.09 birds per hour (95% confidence interval: 0.02 – 0.19) when processing waste was not being dumped[1] (Watkins et al. 2008; Maree et al 2014).

Eliminating the discharge of solid waste streams was reported as a likely factor reducing seabird strikes on trawl warps in the early 2000s (Wienecke and Robertson 2002). The potential for a relationship between different rates of processing waste discharge and seabird bycatch risk was also suggested in a South Atlantic trawl fishery (Sullivan et al. 2006). Subsequent work has quantitatively established the relationship between types of processing waste discharge and seabird bycatch. This paper reviews New Zealand work quantifying the effects of different types of processing waste discharge on seabird bycatch risk.

Effect of types of processing waste discharge on seabird bycatch risk

Three bodies of work are used to demonstrate the relationships between discharge patterns and seabird bycatch risk. Datasets were collected (i) during trials of mitigation devices intended to reduce seabird strikes on trawl warps, (ii) by fisheries observers quantifying the incidence of seabird

[1] values for trawling during winter; seabird species included albatross and petrels

strikes on trawl warps and seabird bycatch, and (iii) during experimental testing of discharge management regimes intended to reduce seabird bycatch risk.

Two metrics were employed to describe seabird bycatch risk: seabirds landed dead when trawl gear is hauled, and the abundance of seabirds within a specified area astern vessels. The relationship between these metrics is explored in Pierre and Debski (2013). Discharge types considered include offal discharge (e.g., including fish heads, guts, frames), discards (whole fish not retained as part of the target catch), mince or cutter pump discharge (offal and discards macerated to smaller chunks) and sump water discharge (water and factory floor wash automatically discharged from vessel sumps). “No discharge” is used below to describe the situation when none of these types of material were being released from vessels.

Across the studies and metrics considered, seabird bycatch risk increased with the amount of discharge released. Bycatch risk was lowest when no discharge was occurring, and generally highest when offal and discards were discharged. However, the release of sump discharge, whilst this is predominantly water, still increased bycatch risk, especially when sumps were discharging at higher frequency. Specific examples are provided below.

Discharge during testing of trawl warp strike mitigation devices

During trials of mitigation devices intended to reduce seabird strikes on trawl warps, Middleton and Abraham (2007) showed that seabird abundance astern vessels increased when there was any discharge from the vessel. When no mitigation devices were in place, discharge from factory sumps resulted in more than double the number of seabirds being present astern the vessel compared to when there was no discharge. The discharge of offal and discards approximately doubled that number again (Figure 1). In this work, large seabirds were albatrosses and giant petrels, and small seabirds were all other seabird species.

Fisheries observers monitoring the incidence of seabird strikes on trawl warps

New Zealand government fisheries observers document seabird captures on trawl warps, i.e., birds landed on deck for which capture was due to a warp interaction. Between 2004 and 2009, the relationship between these captures and the types of discharge present in a defined area astern the vessel was examined (Abraham and Thompson 2009; Abraham 2010). Observer data shows that no large seabirds were caught on trawl warps in the absence of discharge. However, captures increased from zero with the presence of sump water and were highest when offal and discards were discharged (Abraham and Thompson 2009) (Table 1). Similar to Middleton and Abraham (2007), large seabirds in this study were albatrosses and giant petrels.

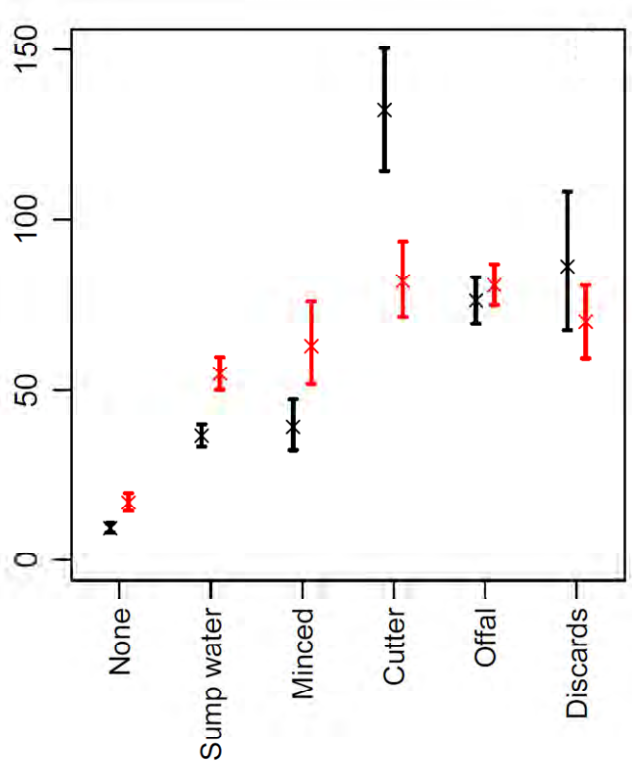

Figure 1. Mean ± 95% percent confidence intervals (based on 5 000 bootstrap samples) of counts of large (black) and small (red) seabirds during the discharge of different forms of fish processing waste. Counts are from an area 40 m by 40 m, around the point at which the focal trawl warp entered the water. Source: Middleton and Abraham (2007).

Table 1. Large seabird captures per 100 trawl tows, in accordance with the presence of different types of processing waste, when no mitigation measures were in place (Abraham and Thompson 2009).

	Discharge categories			
	No discharge	Sump	Minced	Offal and discards
Captures/100 tows	0.0	1.1	12.4	17.3

Also using data collected by government fisheries observers, Abraham (2010) explored the relationship between discharge type and rate and seabird captures on trawl warps. This analysis focused on identifying the relationship of sump discharge to warp capture rates. Five categories of discharge were identified:

- discharge high: intermittent or continuous discharge of mince or offal
- discharge low: negligible discharge of mince or offal
- sump high: intermittent or continuous discharge of sump water
- sump low: negligible discharge of sump water
- no discharge

The results of this study broadly confirm the findings of Abraham and Thompson (2009). There were fewest seabird captures on trawl warps when there was no discharge. Seabird captures increased substantially when there were high levels of sump discharge, and were highest when offal and discard discharges were high (Table 2).

Table 2. Large seabird captures per 100 trawl tows in accordance with discharge categories across all mitigation measure categories (Abraham 2010).

	Discharge categories				
	No discharge	Sump low	Sump high	Discharge low	Discharge high
Captures/100 tows	0.2	0.3	1.0	2.3	8.0

Experimental testing of discharge management regimes

Over a period of approximately seven years, New Zealand researchers tested a series of regimes for managing the discharge of fish processing waste to reduce the risk of seabird bycatch (reviewed in Pierre et al. 2012). Bycatch risk was reflected using the number of seabirds present in defined areas astern trawl vessels. One experiment tested the effect on seabird abundance of holding processing waste onboard a trawl vessel, and discharging waste in batches every 30 minutes, 2 hours, 4 hours, and 8 hours. Holding periods changed daily. Factory sumps remained automated during this experiment, and so could discharge at any time. Observers recorded the types of discharge they saw in a defined area astern the vessel. In addition, when discharge was due to occur in accordance with the designated holding period but there was no material available for discharge, observers still followed data collection protocols for recording seabirds present astern the vessel (Pierre et al. 2010). Bird bafflers were deployed during this experiment.

Similar to the findings of work described above, fewest seabirds were present when there was no discharge, across all four holding period treatments. When there was sump discharge, seabird abundances increased astern the vessel. The discharge of offal and discards in batches tended to cause increases in the abundance of large seabirds (albatrosses and giant petrels) astern. However, for small seabirds (all other species), abundance was comparable during periods of sump discharge and when batches of offal and discards were discharged (Figure 2).

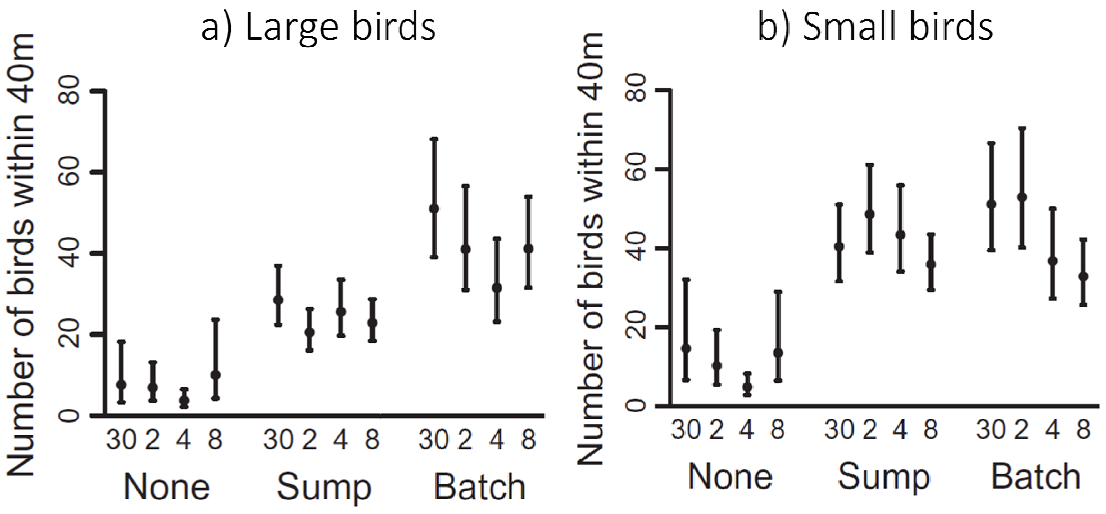

Figure 2. Number of seabirds present within a 40-m radius astern the trawl vessel (median ± 95% credible intervals for model-predicted counts) with no discharge (none), as well as during sump discharge (sump) and the discharge of offal and discards (batch), across four experimental waste-holding periods for a) large birds and b) small birds (Source: Pierre et al. 2010).

Recommendations

There are a number of key findings from this review are relevant in assessing risk of seabird bycatch in trawl fisheries. This paper **recommends that the Scientific Committee recognise** that:

- discharge of fish processing waste is a key attractant to seabirds that increases the risk of seabird bycatch;
- research has shown that when offal, discards, and minced waste are not discharged, the presence of sump pump discharge from trawlers still exacerbates seabird bycatch risk;
- because sump pump discharge can exacerbate seabird bycatch risk, this must be considered when defining the presence or absence of discharge; and
- there is a continuum of offal and discard management strategies available to minimise the attractiveness of fishing vessels to seabirds.

References

Abraham, E.R. 2010. Warp strike in New Zealand trawl fisheries, 2004–05 to 2008–09. New Zealand Aquatic Environment and Biodiversity Report No. 60, Ministry of Fisheries, Wellington.

Abraham, E. R. and Thompson, F. N. 2009. Warp strike in New Zealand trawl fisheries, 2004–05 to 2006–07. New Zealand Aquatic Environment and Biodiversity Report No. 33. Ministry of Fisheries, Wellington.

ACAP. 2013. 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 Seventh Meeting of the Advisory Committee La Rochelle, France, 6 – 10 May 2013. Version: 29 August 2013. Available at: http://acap.aq/index.php/en/bycatch-mitigation/cat_view/128-english/392-bycatch-mitigation/391-mitigation-advice

Maree, B.A.; Wanless, R.M.; Fairweather, T.P.; Sullivan, B.J.; Yates, O. (2014). Significant reductions in mortality of threatened seabirds in a South African trawl fishery. Animal Conservation; Article first published online: 29 Apr 2014, DOI: 10.1111/acv.12126

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.

Pierre, J.P., Abraham, E.R., Middleton, D.A.J., Cleal, J., Bird, R., Walker, N.A., and 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.

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

Pierre, J.P. and Debski, I. 2013. SBWG5-22-Rev-1: Use of lethal and non-lethal approaches for testing seabird bycatch reduction methods. Fifth Meeting of the Seabird Bycatch Working Group La Rochelle, France, 1-3 May 2013. Agreement on the Conservation of Albatrosses and Petrels. Available at: www.acap.aq/index.php/en/working-groups/doc_download/2046-sbwg5-doc-22-rev-1-use-of-lethal-and-non-lethal-approaches-for-testing-seabird-bycatch-reduction-methods

Sullivan, B.J., Reid, T.A. and Bugoni, L. 2006. Seabird mortality on factory trawlers in the Falkland Islands and beyond. Biological Conservation 131: 495–504.

Watkins, B.P., Petersen, S.L. and Ryan, P.G. 2008. Interactions between seabirds and deep-water hake trawl gear: an assessment of impacts in South African waters. Animal Conservation 11: 247–254.

Wienecke, B. and Robertson, G. 2002. Seabird and seal-fisheries interactions in the Australian Patagonian toothfish *Dissostichus eleginoides* trawl fishery. Fisheries Research 54: 253 – 265.