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Seabird interactions with squid jig fisheries

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Summary

Light pollution from activities such as squid jig fishing is known to affect seabirds. Recent observer coverage in a small squid jig fishery in New Zealand tasked observers to record details of seabird interactions with the fishing operation. A range of interactions were recorded, predominantly seabirds becoming caught on the jigs, but also birds striking the vessel. Many birds were released alive, though no information on post-release survival is available. Because of the large scale of the squid jig fishery and the high degree of spatial overlap between seabird foraging distributions and the fishing fleets operating in the SPRFMO Area, we recommend the need for further data collection through observer programmes to better understand the nature and extent of seabird interactions with the fishery.

Introduction

The attraction of seabirds to lights on vessels or gas flares on oil rigs is a well-known and worldwide phenomenon, with at least 21 species of Procellariiformes (albatrosses, petrels and shearwaters, storm petrels and diving petrels) known to be affected (Reed et al, 1985; Raine et al., 2007). Squid jigging takes place predominantly at night with the use of artificial lighting to attract squid to the vessel. Lights can be located above the deck as well as underwater (FAO, 1992). Management measures have been developed and implemented in relation to the effect of light from squid jig fisheries on seabirds. For example, measures were put in place to limit light emission from squid jig operations in Monterey Bay following concerns this may have contributed to nest abandonment of shorebirds at the Channel Islands (Leet et al 2001). As well as the risk of capture on fishing gear, birds may also be attracted to jig vessels causing them to collide with the vessel resulting in possible injury or death. We refer to such cases as “deck strikes”, where seabirds have been observed grounded onboard a vessel, but not caught in fishing gear directly.

New Zealand squid jig fishery

New Zealand’s squid fishery began in the late 1970s based on two species (*Nototodarus gouldi* and *N. sloanii*) and peaked in the early 1980s with over 200 squid jigging vessels coming to fish in New Zealand’s exclusive economic zone (EEZ). From the late 1980s the number of jigging vessels operating in New Zealand’s EEZ declined from 200 to around 15 by 1994. During this time, the discovery and exploitation of squid stock in the southwest Atlantic resulted in an increased supply to Asian markets, which resulted in a fall in the price of squid. Because of this Japanese squid jigging vessels no longer stopped to fish in New Zealand’s EEZ before continuing on to the southwest Atlantic (MPI, 2016a). Whilst seabird bycatch in New Zealand’s squid trawl fishery is well documented and has led to the introduction of various mandatory seabird bycatch mitigation requirements, data on seabird interactions with squid jig operations in New Zealand has been sparse. This is part due to the low historic levels of observer coverage of squid jigging vessels (MPI, 2016b). In 1998-99, 100 days of

observer coverage of squid jig vessels operating in New Zealand's EEZ were conducted to determine the nature and extent of interactions with seabirds and other protected species. No fishing gear related captures involving seabirds or mammals were recorded; however, information on deck strikes was not recorded, and there were thousands of seabirds observed dispersed around fleet lights (DOC, 1999).

Seabird interactions with squid jig vessels in New Zealand

Between 1 July 2012 and 31 June 2016 eight fishing trips on squid jig vessels operating in New Zealand's EEZ were monitored by Ministry for Primary Industries (MPI) observers. No specific seabird mitigation measures were recorded by the observers. Part of the duties of the observers was to record all seabird interactions, including birds captured on fishing gear, or found on the vessel through deck strike or other/unknown causes. Table 1 summarises the fishing effort, observer coverage and seabird interactions recorded during these trips. Seabird interactions consisted of birds caught on jigs, deck strikes, and others of unknown cause, and included both dead birds and those alive at time of release, though their subsequent fate could not be determined (Table 2).

Table 1. New Zealand squid jig fishing effort, observed effort and seabird interactions for the fishing years 2012-13 to 2015-16 (1 July to 31 June of each year). Note: one fishing trip in 2015-16 was not included as data was not available at the time of analysis.

Fishing year	Number of observed days fishing	Total number of days fishing	Observer coverage %	Total seabird interactions	Total observed seabird interactions per 100 fishing days
2012-13	213	216	98.6	9	4.2
2013-14	98	110	89.1	2	2.0
2014-15	110	159	69.2	29	26.4
2015-16	88	100	88.0	3	3.4

Table 2. Seabird interactions by interaction type and life status.

Fishing year	Seabird interactions	Caught on jig	Deck strike	Unknown	Dead	Alive
2012-13	9	7	0	2	1	8
2013-14	2	0	1	1	0	2
2014-15	29	25	4	0	1	28
2015-16	3	0	0	3	0	3

Although a large proportion of New Zealand's modest jig fishing effort was observed, this still amounts to a small sample relative to the total squid jig fishing effort within the SPRFMO area. Most seabird interactions involved capture on jigs, followed by deck strikes. Most birds were alive at the time of their release. The number of interactions varied greatly from year to year, with the large number of interactions in 2014/15 being driven by interactions on a single day where 25 sooty shearwaters were caught on jigs (all were released alive). A range of seabird species were involved in these interactions

(Figure 1). Shearwaters predominated, but this was driven by the single large event in 2014/15, and in the absence of this single event most interactions involved albatrosses. Captures on jigs were the most common interaction, and were restricted to shearwaters and albatrosses (Figure 1). Figure 2 provides some example images of seabird interactions, both seabird (and fur seal) activity around jig operations during day and at night, as well as a live captured and dead deck strike seabird.

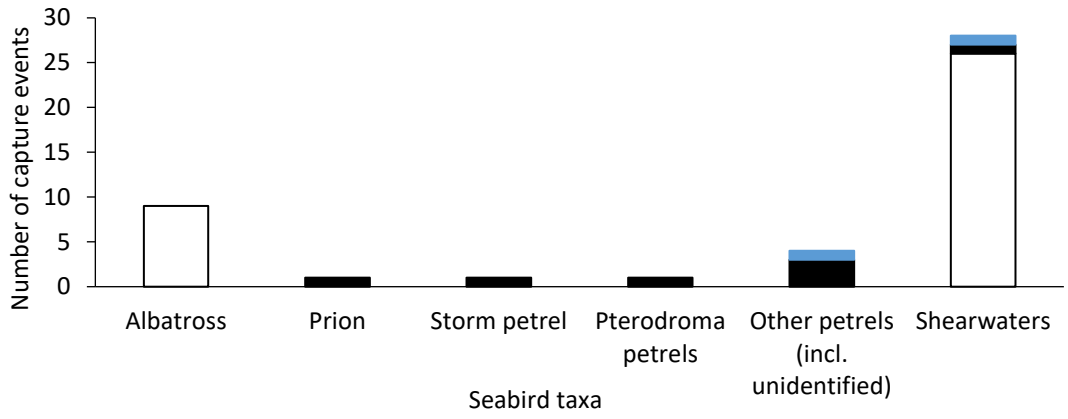

Figure 1. Seabird interactions by seabird taxon and interaction type over the 4 years of observations. Jig capture is white, deck strike is black and unknown is blue.

Conclusion

Recent observer coverage of squid jig operations in New Zealand, where observers are specifically tasked with recording seabird interactions, has revealed variable interaction rates, predominantly of birds captured on jigs which were released alive. There is no data on the post-release of survival. Deck strikes were also recorded, where birds collided with the vessel.

Given the large scale of squid jig operations in the SPRFMO Area, and the overlap with many seabird species of conservation concern, such as those described by Baird et al in SWG-11-INF-02a, it is important to fully understand the types of interactions occurring, the frequency of these interactions, and the possible implications for seabird conservation. This will be best achieved through the implementation of adequate and representative observer coverage within the squid jig fishery. Observers should be specifically trained and tasked to describe all seabird interactions with the fishing operation, and subsequent reporting and analysis of the findings should be undertaken to extrapolate to the scale of total squid jig fishing effort within the SPRFMO Area.

Figure 2. Example seabird interactions observed in New Zealand squid jig fishery. a) and b) birds and fur seals attracted to jig operations, c) sooty shearwater that was captured on a jig, d) dead deck strike petrel.

Recommendations

It is recommended that the Scientific Committee:

- **Recognises** the potential for seabirds to interact with squid jig fishing activity at levels that may pose conservation concern for some seabird species.
- **Encourages** all Members and CNCPs operating squid jig vessels in the SPRFMO Area to implement observer programmes that specifically task observers to document seabird interactions, and report all data in the prescribed manner.
- **Assesses** data provided on seabird interactions with squid jig fishing to determine the nature and extent of these interactions at the scale of combined SPRFMO fishing activity.

References

Baird K, Taylor P., Small C. 2012. Seabird distribution maps for the SPRFMO Area. 11th Meeting of the Science Working Group. Lima, Peru, 15-19 October 2012. SWG-11-INF-02a.

Department of Conservation 1999.Observer reports from squid jigging vessels off the New Zealand coast 1999. Wellington.

FAO. 1992. Hand lining and squid jigging (FAO Training Series, no. 23.) Retrieved from http://www.fao.org/docrep/003/t0511e/T0511E02.htm

Leet WS, Dewees CM, Klingbeil R, Larson EJ. 2001. California's Living Marine Resources: A Status Report. California Department of Fish and Game Resources Agency.

Ministry of Primary Industries. 2016a. Fisheries Assessment Plenary May 2016: Stock Assessments and Stock Status. Retrieved from http://fs.fish.govt.nz/Page.aspx?pk=113&dk=24066.

Ministry of Primary Industries. 2016b. Review of Management Controls for the Arrow Squid Jigging Fishery (SQU 1J) in 2016 (MPI Discussion Paper No: 2016/12). Wellington: Author.

Raine, H., Borg, J. J., Raine, A., Bairner, S., & Cardona, M. B. 2007. Light Pollution and its effects on Yelkouan Shearwaters in Malta; Causes and solutions. Retrieved from https://www.researchgate.net/publication/242353437_Light_Pollution_and_its_Effect_on_Yelkouan_Shearwaters_in_Malta_Causes_and_Solutions

Reed, J. R., Sincock, J. L., & Hailman, J. P., 1985. Light attraction in endangered procellariiform birds: Reduction by shielding upward radiation. The Auk 102: 377-383.

Rich, C., & Longcore, T., 2006. Ecological consequences of artificial night lighting. Island Press, Chapter 5, Influences of artificial lights on marine birds, pg 94-113.