Seabird bycatch reduction (small vessel longline fisheries)

Final Report

Updating and auditing of seabird management plans for the snapper (Pagrus auratus) and bluenose (Hyperoglyphe antarctica) Area 1 demersal longline fleet.

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Introduction

All quantitative iterations of the assessment of the risk that commercial fishing poses to seabirds have estimated that black petrels (*Procellaria parkinsoni*) are the most at risk seabird in New Zealand waters and flesh-footed shearwaters (*Puffinus carneipes*) also rank highly in the risk ratio index (MPI 2016). Results indicate that the demersal longline fleet is a large contributor to the risk. Richard and Abraham (2015) estimate that vessels targeting snapper *(Pagrus auratus)*, bluenose (*Hyperoglyphe antarctica*), hapuku (*Polyprion oxygeneios)* and 'minor' species account for 95% of observable black petrel captures, and 75% of observable flesh-footed shearwater captures Consequently, attention has been focussed on the longline fleet operating off the northeast coast of New Zealand and a dedicated fisher liaison role has been implemented.

Fleet description

The characteristics of the demersal longline fleet under consideration have been reported in detail elsewhere (e.g. Goad et al. 2010, Pierre et al. 2013) and a brief summary is provided here.

All vessels are under 20 m and set hand-baited hooks, individually clipped onto a monofilament longline. Baits employed include; barracouta, (*Thyrsites atun*), pilchard, (*Sardinops sagax*), squid, (*Teuthida spp.),* octopus, (*Octopus maorum*), and sanmar *(Cololabis saira)*. The fleet can be split into two groups based on gear type:

'Snapper' vessels typically fish up to 6000 hooks per day, employing size 16-18R 'Tainawa' hooks on a 60 cm snood, clipped onto a 1.2 - 2.5 mm monofilament backbone at intervals of 2.4 – 4 m. Catch is mostly snapper but vessels will also target granddaddy hapuku (*Scorpaena cardinalis*), gurnard (*Chelidonichthys kumu*), hapuku, kahawai (*Arripis trutta*), red snapper (*Centroberyx affinis*), and tarakihi (*Nemadactylus macropterus*). Depths fished are generally less than 200m.

'Bluenose' vessels typically work up to 4000 hooks a day and use Mustad 'Ezibaiter' or 10 - 12/0 circle hooks on a 40 cm 1.8 mm diameter snood clipped onto a 5–6 mm diameter backbone. Snood monofilament is often protected by fluorescent tubing. Target species also include alfonsino *(Beryx splendens, B. decadactylus*), bass (*Polyprion americanus),* hapuku, and ling (*Genypterus blacodes*). Depths fished are generally greater than 200 m and the longline is often suspended above the seabed by adding floats between weights.

Summary of the liaison role

The liaison role has been in place with the snapper fleet in Fisheries Management Area 1 (East Cape to North Cape) since 2010, and with the bluenose fleet since 2011. To date between one and three liaison officers have engaged with fishers each season. Management and reporting has occurred through various combinations of the Department of Conservation (DOC), Ministry for Primary Industries (MPI) and a separately contracted coordinator.

The role works alongside other initiatives such as Southern Seabird Solutions Trust seabird smart training workshops, the National Plan of Action for Seabirds (NPOA-seabirds) (MPI 2013), and more specific action plans such as the black petrel and flesh-footed shearwater action plan (MPI & DOC 2014).

The liaison program has concentrated on improving mitigation and engaging with fishers. Vessel specific documents were introduced in 2014 and these provide details of the approach to reducing seabird interactions on each vessel. More recently, the focus has been on reviewing and auditing these 'seabird management plans' (SMPs) to check whether they are representative of fishing practices and reducing interactions (Goad 2016). Independent reviews of adherence to plans are also undertaken by government fisheries observers.

The approach taken by liaison officers has been consistent over time, and can be summarised as a 'bottom up approach'. Liaison officers have worked with skippers and deckhands, often at sea, to refine and improve

mitigation. The whole fishing operation including gear setup, setting speed, offal and returned bait management has been considered with respect to its influence on seabird interactions. Fishers have been encouraged to apply appropriate mitigation both proactively and reactively in response to instances of increased risk.

Approaches to reducing interactions with seabirds have been discussed elsewhere (e.g. Lokkebourg 2011), and the Agreement for the Conservation of Albatrosses and Petrels (ACAP) provide recommendations on international best practice. Measures most important/applicable to the New Zealand inshore demersal longline fleet include:

Minimising overlap with birds spatially and/or temporally

- Line weighting
- Setting speed
- Use of tori lines and other bird deterrents
- Bait type and bait dye
- Contained lighting
- Altering gear setup
- Offal and used bait management
- Choosing not to fish or stopping setting

In practice, the liaison role has involved a large amount of listening to experienced skippers who have developed mitigation over many years. The role has provided a conduit to share this knowledge between skippers. Conversations with fishers also provide an opportunity to keep them up to date with mitigation developments and best practice advice, as well as pass on concerns to fisheries managers about other fishery related matters. Engagement with skippers, especially in person and at sea, has been focused on increasing the priority of avoiding seabird captures. Similarly involving deckhands, who are often responsible for mitigation, has proved an important part of the process.

Seabird Management Plans

Seabird management plans (SMPs) begin with a short introductory paragraph explaining the purpose of the document and the liaison role. The cover page also includes the vessel and skipper details. The second page details the vessels' mitigation approach, initially describing line setting and the combination of line weighting and setting speed. This largely dictates the distance that baited hooks are available to birds behind the vessel. Other aspects of mitigation are described under the headings of tori lines, other measures, and reactive mitigation. Hauling mitigation is covered under a separate section.

Whilst each plan is vessel specific, several common sentences are employed including:

> "We commit to using a tori line, of an appropriate design to the vessel, for all setting activity where the conditions allow."
>
> We will use more weight in response to bird activity.
>
> If all measures above have been employed and are visibly not working, i.e. birds are continually overcoming the tori line, the vessel will stop setting.

Other sections in the seabird management plans cover ongoing developments, reporting of captures, information sharing between fishers, training, and audit. A hard copy was provided to each vessel in a waterproof folder along with current ACAP tori line advice, and some notes and advice around birds and tori lines written by liaison officers. A separate sticker for display in the wheelhouse summarises the mitigation section of the SMP. Appendix 1 contains an example SMP.

Objectives for the 2016/17 fishing year

The aims of the project this season were to:

- Update Seabird management plans (SMPs) for demersal longline vessels operating in the Area 1 (North Cape – East Cape) snapper and bluenose fishery.
- To use observer data to audit SMPs both in terms of whether they were followed, and whether they were effective in reducing interactions.

Methods

Initial discussions involved representatives from the Ministry for Primary Industries (MPI) inshore team, MPI aquatic environment team, MPI Observer Services, and the Department of Conservation (DOC) Conservation Services Program (CSP) team. An approach to the project was agreed and is described below.

Initially the fleet list was updated with input from Licensed Fish Receivers (LFRs) and fishers. This list was maintained throughout the season.

An online drive was setup and updated regularly to allow the liaison officer, DOC, MPI inshore team, and MPI Observer Services access to the following data:

- A summary of liaison officer contacts with vessels and SMP progress
- SMPs
- Observer coverage and non-fish bycatch on observed trips
- Observer contact details
- Observer data

In previous years, two liaison officers had covered the Area 1 demersal longline fleet with one liaison officer engaging with vessels based in Whitianga and Coromandel, and some based in Totara North. This year a single liaison officer engaged with all demersal longliners. New vessel/skipper combinations in the fishery and those vessels previously contacted by the departing liaison officer were visited in person to develop and review SMPs. Of the vessels contacted in previous years, with SMPs in place, some were visited in person and some SMPs were reviewed via telephone and email.

Contact with the observer program was ongoing throughout the course of the project, regarding upcoming deployments, mitigation use and any captures. Most observers were briefed on how to collect information regarding seabird interactions and how to audit SMPs. Documentation for observers to complete included a specific 'liaison officer support' form, 'a tori line observation' form and extra notes in diaries.

Selected observer data was provided electronically from all trips and included the following information:

- Vessel name, trip dates and observer contact details
- Effort including approximate location, number of lines and bait type
- Bird abundance during the set and haul
- Non-fish bycatch details
- Mitigation in use, including offal/returned bait management
- Gear description
- Tori line description and use
- Notes on mitigation, birds and bird interaction

- Photos of fishing gear, mitigation gear, and bird interaction
- Tori line observations for sets with enough light to see what was happening.
- SMP audit.

Tori line observations were undertaken as per the instructions and a form drawn up by the liaison officer and detailed in Appendix 2.

Four observer trips were in place before the contract began therefore some observers were not briefed prior to deployment. Observers were debriefed from all trips, once the data they had collected had been reviewed.

Following observer debriefs skippers of observed vessels were contacted, to provide feedback and clarify any points raised during the observer debrief.

No additional formal mechanism was put in place for addressing capture events. However, one observer-reported capture was discussed with the vessel manager. A second LFR-reported capture was discussed with the fisher and LFR representative, and a short 'contact report' produced. Several fisher-reported captures were discussed with skippers in more general terms.

Reporting included monthly progress reports and an end of term summary document detailing all SMP reviews and audits, and conversations with skippers. In addition, data is summarised in this report at a fleet level in line with confidentiality constraints imposed when working with commercially sensitive data.

Results

Fleet summary

Forty demersal longliners were active in the Area 1 fishery over the contract period (November 2016 – April 2017). Of these, eleven spent some of the year fishing in other areas and/or with different gear, including set nets and surface longlines.

Seven vessels left the fishery for reasons including retirement, lack of access to quota, and not meeting survey standards. One of these seven may return, and two are up for sale, but the other four are unlikely to re-enter the fishery in the future.

New SMPs were produced for eight vessels, six of which represented new skipper/vessel combinations. In two instances, a vessel has been replaced and the same skipper/owner is running a similar setup on the new vessel. Two other vessels entered the fishery, one from Australia and one switched over to demersal lining.

SMP review

SMPs were reviewed for 39 vessels (Table 1). For approximately half of the vessels no changes were made, and these skippers felt that the mitigation they had in place was working well. Following feedback from a skipper there were changes to wording related to hauling in some SMPs. These changes gave skippers more flexibility regarding the discarding of returned baits or offal at the haul, to draw birds away from high-risk situations such as dropped baited hooks.

One vessel had the weight spacing on the SMP increased to reflect that recorded during an observed trip. Otherwise, all changes represented improvements in mitigation, including increased tori line use, slower setting speeds and more weight.

Table 1: Details of Seabird Management Plan reviews and changes. SNA = snapper, BNS = bluenose.

Vessel	Gear type	Not fishing	SMP new	SMP updated	Changes
1		1			
2		1			
3	BNS			1	Now working short tori for all sets
4	SNA		1		New owner, new skipper
5	SNA		1		Vessel replaced another one so essentially the same gear on a different vessel
6	SNA			1	No changes
7	SNA	1			
8	BNS & SNA			1	Tori all sets and now snapper fishing too
9	SNA			1	No changes
10	SNA	1			
11	BNS		1		Vessel replaced, similar SMP on new vessel
12	SNA			1	No changes
13	SNA			1	Reduced setting speed, tori all sets
14	SNA	1			
15	SNA		1		New skipper, more weight earlier sets
16	SNA				
17	SNA		1		New owner, new skipper
18	SNA				
19	SNA		1		New vessel
20	SNA			1	Tori all sets
21	SNA			1	Slightly larger weight spacing
22	SNA			1	No changes
23	BNS			1	No changes
24	BNS			1	Minor hauling wording changes
25	BNS			1	No changes
26	SNA			1	No changes
27	BNS	1			
28	SNA			1	No changes
29	SNA			1	Minor hauling wording changes
30	SNA			1	Minor hauling wording changes
31	SNA	1			Vessel and owner / skipper no longer fishing
32	SNA			1	Minor hauling wording changes
33	SNA			1	Increased weighting
34	SNA			1	No changes
35	BNS			1	Now exclusively owner / operator rather than having a separate skipper, no changes
36	SNA			1	No changes
37	SNA			1	No changes
38	SNA			1	No changes
39	SNA			1	No changes
40	SNA		1		New vessel
41	SNA & BNS			1	Now fishing BNS as well, hauling wording changes
42	SNA			1	Minor hauling wording changes
43	BNS			1	No changes
44	SNA			1	Minor hauling wording changes
45	BNS			1	No changes, no Area 1 fishing this year
46	SNA			1	No changes, less BLL effort this year
47	SNA		1		New skipper
48	SNA			1	No changes
Totals		**7**	**8**	**31**	

New skipper/vessel combinations produced SMPs broadly in line with the rest of the fleet, and all incorporated reactive mitigation, and most agreed to stop setting if necessary. Visiting these skippers in person, and following up by telephone, allowed for productive discussions around birds, mitigation and fishing operations, as well as writing SMPs.

Feedback from the fleet

Whilst talking to skippers feedback was sought on any other matters. Several skippers noted the lower than usual numbers of birds in the Firth of Thames over the snapper spawning period and some noted that the birds seemed to arrive and move between areas a bit later this year.

The liaison officer also got a better feel for where, when, and how different skippers fish, and how this relates to overlap with birds over the season. Many experienced skippers have settled on fishing patterns which minimise overlap such that they rely on 'mitigation measures' somewhat less than others.

Feedback from skippers on the camera trials was mixed. Some skippers welcomed the opportunity to get better capture data, without the need for observers, as this can be trying on a small vessel. Others were more wary and raised concerns of lack of information on the data collected and particularly how discarding related issues would be dealt with. There was concern that safeguarding of the privacy of fishers had been overlooked, especially for those living on the boat, and that systems could easily be put in place to allay these concerns.

Several fishers raised the use of fish oil as a mitigation measure, and felt that this should be supported.

Tori lines always produce interesting and varied discussions. Supplying poles and tori lines as part of a separate project was well received and resulted in better tori lines behind the vessels involved. Some skippers noted that increasing overlap with, and awareness of, recreational fishers resulted in more tori line use. Similarly, cameras resulted in some vessels switching to working tori lines for all sets. Several skippers were reluctant to work tori lines at night in areas of low overlap due to tangling issues and the associated safety concerns. Several bluenose skippers noted that they have an excellent record of very low capture rates whilst shooting several hours before dawn and not working tori lines, including on observed trips over a number of years. They believe that adding tori lines into their setting operation was not particularly feasible or safe and that it was unnecessary. Skippers noted that fishing precise locations over foul ground, setting slowly, often working poor weather, reduced visibility at night, and strong currents all contributed to tori line tangles with the longline or propeller. To some extent these skippers welcomed the opportunity cameras and observer coverage, gave them to prove this point. Some skippers questioned where safety fits in and how they should deal with a legislated hazard. Looking forward discussions between fishers and the MPI inshore and compliance personnel may be productive.

SMP audit

Observers collected sufficient data to fully audit mitigation measures employed against the vessels SMP on most trips. For some vessels and sets clarification was sought during the observer debrief and some assumptions were made regarding gear setup. In some cases there were several months between observer trips and debriefs which made it harder for observers to recall missing details. Data quality was variable but generally better from experienced and enthusiastic observers that had been briefed by the liaison officer.

All vessels had been previously observed with the same skipper, and five of these were observed last year with the same SMP in place, and were again fishing in line with their SMP. A single vessel was setting the gear with slightly larger weight spacing than that in their SMP, otherwise SMPs were representative of observed fishing.

The frequency of bird counts at the haul was variable between observers. Average bird numbers present at the haul were not calculated. This was due to bird numbers generally increasing through hauls and few hauls having multiple counts conducted. More precise data collected electronically was not available. The variation in bird

numbers present around the vessels is high (Table 2). Vessels fishing with bluenose gear overlapped with larger numbers of black petrels, whereas flesh-footed shearwaters were generally seen in higher numbers than black petrels around vessels fishing snapper gear. Several trips and many sets had very few flesh-footed shearwaters or black petrels recorded. Very few diving birds were observed from snapper vessels fishing close inshore, particularly in the Firth of Thames and Doubtless Bay during the snapper spawn. Black petrels were recorded in greater numbers further offshore.

A single dead flesh-footed shearwater was recorded during the observer coverage and this was returned from a daylight set when the vessel was operating in line with their SMP. Baits were dyed blue and a short tori line was deployed.

Several live captures were recorded by observers and all birds were deemed to be released unharmed by observers. Where hook location was recorded it was in the wing or the bird was tangled in the snood rather than hooked. Twelve out of fourteen live captures recorded on observed trips were of black petrels were from vessels working bluenose gear.

Table 2: Summary of SMP audit using observer data. Gear notation: SNA = snapper, BNS = bluenose. Bird notation: FS = flesh-footed shearwater, BP = black petrel and BG = black-backed gull. [1]SMP noted as not ok relates to larger weight spacing. [2] Some bluenose sets in close proximity were recorded as one by observers.

			Observed		Bird captures		Birds at haul		
Vessel	**Gear**	**SMP OK**	**Days**	**Sets[2]**	**Dead**	**Live**	**FS**	**BP**	**Area fished**
6	SNA	yes	15	11	0	0	0-13	0-1	Bream Bay
8	BNS	yes	20	16	0	0	9-60	039-40	White Island - Tuhua
9	SNA	yes	20	20	0	1 BP	0-30	0-30	Three Kings
13	SNA	yes	3	2	0	0	2-5	6-30	Aldermans
20	BNS	yes	23	32	0	6 BP	0-3	16-185	Outside Great Barrier Island
21	SNA	no [1]	12	14	0	0	0-15	0	Inner Hauraki Gulf
23	BNS	yes	23	22	0	6 BP	0-60	3-150	NE Bream Head, Pandora Bank
25	BNS	yes	17	24	0	0	0	2-20	Three Kings
28	SNA	yes	14	9	0	0	0	0	Doubtless Bay
30	SNA	yes	7	7	0	0	0-2	0	Close inshore ex Coromandel
33	SNA	yes	13	11	0	0	0-15	0-2	Papamoa Beach
34	SNA	yes	50	82	1 FS	0	0-40	0	Mostly Firth of Thames, Kawau
36	SNA	yes	10	8	0	1 BP	0-30	0-20	North of Whangarei
37	SNA	yes	10	9	0	2 BG	0	0-2	Doubtless Bay
41	SNA	yes	13	12	0	0	0-4	0	Bay of Plenty SE of Town Point
	Totals		**250**	**279**					

Tori line observations

Tori line observations were conducted on seven observed vessels, and on the other eight vessels it is was either too dark to see birds at the set, or no tori line was used. Tori lines were not used on three vessels and not for all sets on a further two vessels. Skippers stated that they weren't practical for their operation, due to tangling risks. One vessel was fishing bluenose gear and one was targeting snapper and working single-handed. Observations provided a qualitative measure of tori line efficacy. Visibility was limited during some sets due to low light levels and/or sea conditions, such that bird activity was not always observable. For the majority of observations bird

numbers were very low and very little foraging activity was observed. When birds were present in small numbers, tori lines tended to push any foraging activity behind the aerial section, and often behind the whole tori line. When more birds were present, foraging activity increased and was observed closer to the boat, often beside the aerial section of the tori line but not underneath it. (Table 3)

Observers reported that they felt tori line observation forms were providing representative data, providing the recorded limitations were considered. Birds putting their heads under the water was counted by all observers with some also noting fully submerged dives, believing this to be a more accurate measure of risk.

Feedback on the liaison program and associated work was positive, though observers noted that there was some duplication of tasks and reporting. Several observers noted that there was a lack of knowledge and consistent messaging around the use of tori lines between MPI Observer Services, MPI Compliance and SMPs.

Table 3. Summary of tori line data collected by observers. ID = vessel number from Table 1, obs = observations, FS = flesh-footed shearwater, BP = black petrels. For protocols and form see Appendix 2.

ID	Tori line use	Aerial extent (m)	Total sets	Number of sets with obs	Number of 5 min obs	Summary of results
6	Early morning setting only	not recorded	11	6	24	No birds seen
8	Initial catchups then all sets		16	0	0	Too dark
9	All sets	25	20	12	33	2-55 FS+BP present. Generally activity behind aerial extent except for 1 set with 40+ FS+BP
13	All sets		2	0	0	Too dark
20	Day initially, then all sets	50	32	19	42	0-75 BP+FS present, Tori helping but not totally excluding birds. Some beside and along 50 m aerial section but most activity behind aerial section, very few fully submerged dives.
21	All sets	20-25	14	11	30	Very low / nil bird numbers, 1 FS dive behind tori.
23	All sets	40	22	3	8	7-25 BP and 2-15 FS present very little foraging activity
25	None		24	0	0	
28	None		9	0	0	
30	All sets	45-50	7	3	3	1-3 Gulls present but not foraging
33	None		11	0	0	
34	All sets, sometimes 3	20-22	82	49	194	No BP seen, typically very few birds and no FS, 40 FS on one set, otherwise max 10 FS. Foraging activity around and behind tori line when FS present.
36	All sets	not recorded	8	0	0	Too dark
37	Briefly on one set	not recorded	9	0	0	
41	All sets		12	0	0	Too dark

Discussion

Fleet changes

A similar trend was apparent in the snapper fleet to that seen in previous years. Some snapper vessels are leaving the fishery and fewer larger vessels are replacing them. Those leaving the fishery tended to have fished fewer hooks closer inshore, with owner operators holding some quota. In contrast, those joining the fishery tend to be exclusively ACE fishers. Also of note is that these larger vessels are more able to fish poor weather, tend to work more hooks per day, and target a more 'mixed' catch in deeper water. Target species of note include tarakihi, gurnard and hapuku. The snapper fleet has probably seen a slight increase in number of hooks set. There has been an increase in effort from Tauranga this season with another two vessels full time and some nomadic vessels spending some time there. This is partially driven by good catch rates of relatively good quality fish, especially post spawn. Similarly there has been an increase in effort from Houhora with two new vessels based there, and other vessels visiting more. Skippers indicated that this is partly driven by vessels seeking a more mixed catch.

The bluenose fleet appears to have seen a reduction in effort this season. One vessel has fished fewer trips and three others have spent more time in other areas or fishing with different methods. Consequently, there is now only one boat exclusively targeting bluenose year round in area 1. Changes are due to a combination of factors including poor catch rates, access to quota and other fishing opportunities.

More effort in deeper water with snapper rather than bluenose gear may mean increased risk to birds. Snapper gear seems to be more likely to catch birds when setting. A number of factors contribute to this, including snapper gear using softer fish baits, smaller hooks, and shorter, lighter, and less visible snoods. When fishing deeper, with more overlap with flesh-footed shearwaters and black petrels, snapper boats will have to have good mitigation in place to maintain low capture rates.

SMP review

SMPs continue to change over time. For those boats established in the fishery changes are generally minor and are not necessarily changes in practices on the water but rather SMPs better reflecting what is happening at sea. There is a limit to the improvements in mitigation that can be made on the same vessels. Many skippers are at the stage where they feel the mitigation they have in place is adequate and that this has been verified by observer coverage. Owners and skippers noted that setting capture rate targets and reductions, as described in the NPOA, would give fishers a better idea of where the goal posts are and whether they are performing at an acceptable standard. Similarly reporting on observed captures to fishers would provide some tangible measure of performance at the fleet level. When talking to fishers the liaison officer has always taken the approach that fishers should aim for zero captures, but that some level of captures is inevitable. The liaison officer has then emphasised that if a capture has occurred the important thing is to examine events leading up to it, with the benefit of hindsight. If the capture can be attributed to something under the control of the fisher then lessons can be learnt and changes made in the future. Ultimately the aim is then for any captures for be attributable to things beyond control of the fisher, such as equipment failure.

It should be noted, however, that some vessels have made improvements in mitigation that is likely to reduce risk. In general there seemed to be more acceptance of the 'if all the above measures are not working then the vessel will stop setting' sentence this year.

For vessels/skippers new to the fishery, SMPs provide an extra layer of advice and expectations as to how to minimise captures. However, it is important to back this up in the future with support and verification at sea as well as ashore.

The management of offal and used baits at the haul is dealt with differently on different vessels. Some skippers are happy to retain it onboard and batch discard or hold for the whole haul. In practice, offal is rarely produced as most fish are landed green, and bait returns are low for snapper gear fishing on the sea bed. However, at times birds will feed on discarded fish, baits, and offal. Some skippers believe that risk is minimised by continually discarding away from the hauling station, in order to stop birds chasing baited hooks. These different approaches are represented in individual SMPs, but it is important to note that the goal is consistent – to reduce risk to birds. In several cases SMP wording was changed to cover brief batch discarding of baits at the haul to pull birds away from risky situations such as baited hooks.

Tori line use has increased again this season with fishers stating a number of reasons, including the tori line project, cameras and the prosecution of a fisher last year. At present SMPs reflect when tori lines are used by fishers. The wording does not contradict the regulations and all efforts have been made to encourage fishers to consistently work tori lines. However, in some cases they have genuine safety concerns and feel that they can fish without tori lines and not catch birds. As the proposed line weighting for surface longliners is considered it is hoped that a clear message can be sent to fishers as to where safety concerns fit within the legislation and whether some workable changes to the regulations can be made.

Observations of foraging behaviour around tori lines indicate that they do help deter birds from baited hooks but that, especially when large numbers of birds are present, they are only part of a successful mitigation approach. Many skippers avoid overlap with birds and thereby avoid relying on a tori line, and this should be recognised and encouraged as appropriate mitigation.

Several of the skippers contacted also fish outside of New Zealand waters, where mitigation is managed by the South Pacific Regional Fisheries Management Organisation (SPRFMO). Mitigation regulations in this fishery are stricter than those in New Zealand but are relaxed if a fleet has low seabirds capture rates. Such an approach could be adopted for this fishery on a vessel-by-vessel basis.

SMP audit

In terms of auditing SMPs the results from observer coverage were very positive. A single SMP was changed on the back of observer coverage and this is not so much a change in at sea practice but rather the SMP better representing all variations in gear setup. In this case the weights are still closely spaced (every 15 hooks) and in line with that required for daylight setting.

A single dead bird from 250 days coverage is the lowest observed capture rate over a season in the fishery. This result highlights the need for higher levels of monitoring in order to estimate captures and the frailty of models using observer data, as well as improvements in performance of the fleet. However, the low capture rate is likely to be at least partially attributable to observer coverage in areas and at times of very low overlap with diving birds, and prolonged coverage on one such trip. Observed bird abundance was in line with previous observer coverage, the author's experience at sea, reports from skippers and known 'hot spots', though several fishers noted birds were 'a bit late' this year

The observer coverage does highlight areas for improvement. Several live captures were observed and deterrents at the hauling station and improvements to offal and bait management have the potential to reduce this. Based on the author's experience fishers are likely to be most accepting of a simple 'Brickle curtain' type device that can be easily removed.

Where tori line observations were conducted useful data was collected to show increases in aerial extent could reduce risk to birds. Several skippers chose not to deploy tori lines for some or all observed sets, and no birds were caught during these sets. However, compliance with the regulations is mentioned in the NPOA and support from outside the liaison program is likely to be necessary to achieve this. The black petrel and flesh-footed

shearwater action plan (MPI & DOC 2014) outlines the importance of fishery officer inspections ashore, at sea and from the air. Consistent messaging and clarifying the role of regulations in relation to the responsibility of the skipper to operate the vessel safely would also help towards this goal. In the meantime, it is important to continue to monitor tori line usage and identify situations where they could have potentially reduced captures.

This year more data was received from observer services and generally in a more timely fashion than in previous years. Dealing directly with observer services was efficient and resulted in much better access to data than in previous years, and a more complete audit of SMPs. However, having observers out on the water before the liaison role started resulted in lessons learnt from previous years not being implemented for all observer trips. In the future, starting the liaison role earlier and finalising observer reporting and tasking prior to the birds arriving in New Zealand waters, would maximise returns from observer days. Similarly, having clear goals of observer coverage and communicating these to fishers is important.

Cameras

The advent of cameras on vessels is likely to reduce captures, via the observer effect. Cameras have the potential to monitor tori line use and line weighting. At present, the fleet does not comply with these regulations for all sets. Vessel monitoring and camera systems could have an algorithm built in to calculate nautical dawn and dusk. Skippers could then have a warning light to indicate when they are liable to meet line-weighting regulations.

From a liaison point of view, cameras hold some major benefits. Views of hauling and setting could allow remote observation of seabird interactions and performance of mitigation measures in a quantitative manner. This could then lead to identifying and designing improvements to mitigation. Of potentially greater value would be to examine the circumstances leading up to captures. Each capture event could be investigated with a view to improving mitigation, and SMPs, to address problems.

In a broader sense, cameras provide the opportunity for fishers to be judged on their performance i.e. how many birds they catch. This provides an exciting opportunity to move away from a regulatory-based approach. At present fishers, at times, need to operate mitigation in excess of that regulated in order to not catch birds. Equally at times the regulations are in excess of what is required to not catch birds. Cameras have the ability to empower fishers to use appropriate mitigation and minimise captures.

Conclusions

Seabird management plans are a good vehicle for engaging with fishers and tracking and encouraging progress in mitigation.

The level of turnover of vessels and personnel in the fleet warrants ongoing attention to maintain and improve performance.

An audit of SMPs indicates that they are representative and that appropriate mitigation is in place. Full review of observer data provides a better understanding of fishing practices and mitigation and the drivers behind these.

Opportunities exist for further improvements to the liaison role, and the performance of the fleet, as outlined in the recommendations.

Recommendations

Operational improvements

Start the liaison role earlier in the season prior to birds arriving and observer trips starting.

Observe the fleet systematically. Suggestions include randomly, until all vessels have been observed, or targeted, with a transparent rationale. More importantly communicate the methods to fishers and avoid covering the same vessels repeatedly, especially in areas of low overlap.

Include effort fishing west of North Cape, and south of East Cape, particularly for the bluenose fleet. This has occurred to some extent in the past but it should be addressed systematically and cost recovered correctly.

Review observer tasking and data collection protocols to provide more consistent and reliable data, to reduce duplication and to reduce repeated mistakes.

Continue direct contact between observers, observer officers, liaison officers and fishers. Further streamline the observer data pathway to get data to a liaison officer as soon as possible. Continue to brief and debrief observers and read their diaries. Include a telephone debrief after an observer's first voyage on a boat.

Mitigation improvements

Have liaison officers spend time at sea with new entrants to the fishery as part of an 'induction'. This could include setting up tori lines and discussing mitigation and bird interaction more thoroughly, at sea, while it is happening.

Develop a Brickle curtain type device suitable for, particularly, bluenose vessels.

Investigate all captures rather than using trigger points for observer reporting. Trigger points are arbitrary and imply that catching less than a given number of birds is acceptable, and does not warrant attention. Investigation does not need to be hugely time consuming or confrontational but it could raise two important points with skippers: All captures require attention, and: What can we do to reduce the chances of this happening again? This will require access to fisher-reported captures, and maybe even access to camera footage.

Reporting

Report to a wider audience during the contract period including LFRs, working groups, MPI, NGOs etc.

Report on capture rates and set targets for improvement.

Cameras

Publish results of camera trials.

Use camera footage to judge fishers on their performance rather than applying a 'tick box' regulatory approach.

Regulations

Review regulations, particularly with regard to tori lines, use of oil, and cameras. Clarify the relationship between minimising hazards and meeting regulations. Consider a SPRFMO type approach.

Proactively encourage and support compliance. Set more boats up with tori lines. Put an indicator on VMS systems to show when line-weighting regulations apply. If fishers are to be prosecuted for lack of compliance then warn and educate them as a first step with port visits and inspections from fishery officers. Ensure clear and consistent messaging.

Separate the liaison role from compliance with regulations, and use fisheries officers instead.

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Appendix 1: Example seabird management plan

Minimising seabird interactions,

Seabird Management Plan

Bottom Longline Fishing

FV Example

Rationale – Working to minimise seabird bycatch to ensure healthy seabird populations and a sustainable fishery.

Fisheries Management Area One (FMA1) is home to a wide range of seabird species. The populations of many of these species are small and as such their sustainability is at particular risk to any mortality, including fishing bycatch. By fishing in this area we recognise that there is a risk of interacting with seabirds and that ***even a few odd captures, when added up over the fleet, can have big impacts.***

By documenting our current mitigation practice in a vessel specific seabird management plan (SMP) we will have an auditable document detailing the commitments we have made to deploying mitigation in a consistent and structured manner. This will also allow the relevant Government and non Government agencies to understand the mitigation measures we use and to work with us, over time, to develop practical improvements to the effectiveness of our mitigation. By treating each fishing operation individually there is the potential to tailor the seabird mitigation that is best suited to our vessel. Through the seabird liaison officers and our seabird management plan we see the value of sharing mitigation ideas between skippers to help develop the best possible solutions across the fleet.

We recognise that the success of our mitigation strategies is best achieved through the awareness of both captain and crew. This SMP is designed to reflect that through our awareness and proactive actions we are able to minimise the potential for incidental seabird captures.

Vessel Details

Vessel Name

Call Sign

Registration Number

Home port

Owner/Operator

Date reviewed

Mitigation

This section details the mitigation equipment and practices that we employ on FV Example to reduce seabird interactions.

Setting

The vessel usually sets (time of day) and (number of hooks)

A combination of line weighting, sink rate and vessel speed contribute to the availability of hooks to birds. The following line setups are employed.

Setting speed	Weight size and type	Weight spacing	Float usage
knots			

Note on when different setups are employed

Tori Line details

“We commit to using a tori line, of an appropriate design to the vessel, for all setting activity where the conditions allow.”

Other measures

We will not discard offal or bait pieces for at least an hour prior to setting.

Bait types

Reactive mitigation

Line-weighting will be increased in response to bird activity

If birds do overcome the tori line, and dive on the line, then a weight will be deployed and clipping on of hooks will be suspended.

Clipping on will be resumed when birds have left the area immediately behind the boat. If birds are consistently gaining access to and diving on the line then the vessel will stop setting.

Precautionary measures including, for example; dye, extra tori lines

Hauling

Baits may be retained or discarded to minimise risk to birds (for example distracting birds from a dropped snood).

If we have a break in hauling we will ensure that no baited hooks are left near the surface.

Ongoing developments

Guide to Releasing Live Seabirds

On our vessel crew have been trained to release seabirds by the skipper

1) without putting themselves at risk, and;
2) maximising the chances of the bird surviving (see SSS card).

For the safety of the crew and the bird gloves, long sleeves and protective eyewear are worn when handling live birds.

Reporting Captures to Reduce Uncertainty.

Currently fisher – reported capture rates are much lower than observer reported capture rates, and so are not considered reliable. By reporting all captures in detail, whether live or dead, fishers can contribute to reducing the uncertainty around capture rates and help paint a more realistic picture of the effect fishing has on seabirds.

A capture is defined by MPI and DOC as when a bird has become fixed, entangled or trapped, so that it is prevented from moving freely or freeing itself.

All captures of birds whether live or dead should be recorded under the capture of protected species box in the Lining Trip Catch Effort Return, form and a more detailed description recorded on a Non-Fish / Protected Species Catch Return.

Information Sharing

We agree to share seabird related information with other vessel operators in the area. This could include large or changes in bird numbers in an area, conditions that lead to higher risks of bird interactions, mitigation techniques found to be particularly effective in certain conditions etc.

Training

All crew / visitor inductions include seabird mitigation practices. Skipper has attended a SSST seabird smart workshop.

Verification / Audit / Accountability

This vessel management plan is freely available to interested parties and we are happy to discuss any aspects of our approach to minimising seabird interactions.

When carrying an observer we will ensure they are made aware of this seabird management plan and have the opportunity to confirm that it is representative of our fishing operations. We will also communicate our intentions to the observer.

Contact Details

For any questions on aspects of mitigation or seabirds you can contact the following:

Dave Goad 0273643098 goad.dave@gmail.com (Liaison Role) or

Kris Ramm (DOC) 04 4961963 CSP@doc.govt.nz or

Sonja Austin (MPI) 09 909 3043 sonja.austin@mpi.govt.nz

Appendix 2: Tori Line Observation Form and Instructions

Rationale

By recording bird behaviour in relation to the tori lines currently in use the advantages and disadvantages of different designs can be recorded and quantified. This data can then be used to inform data users, fishers, and help develop better tori lines.

Before starting observations

Before starting observations you should complete the tori line details form and note the aerial extent of the tori line(s). The tori line id from the tori line details form will tie the observation form to the particular tori line used so remember to add it in the box on the back of the form.

Complete the diagram showing the position of the tori line and mainline relative to the vessel. Note the vertical and horizontal scales are different in order to capture sideways differences more accurately. Record the line weighting employed and fill in the boxes on the top of the form.

Each observation period will comprise of an initial abundance count, by species or species group, followed by a 5 minute dives count. At the beginning of each observation period record with an arrow the wind and swell direction relative to the vessel.

Abundance counts

Initially make an abundance count of birds within a circle with 200m radius, centred on the stern of the vessel.

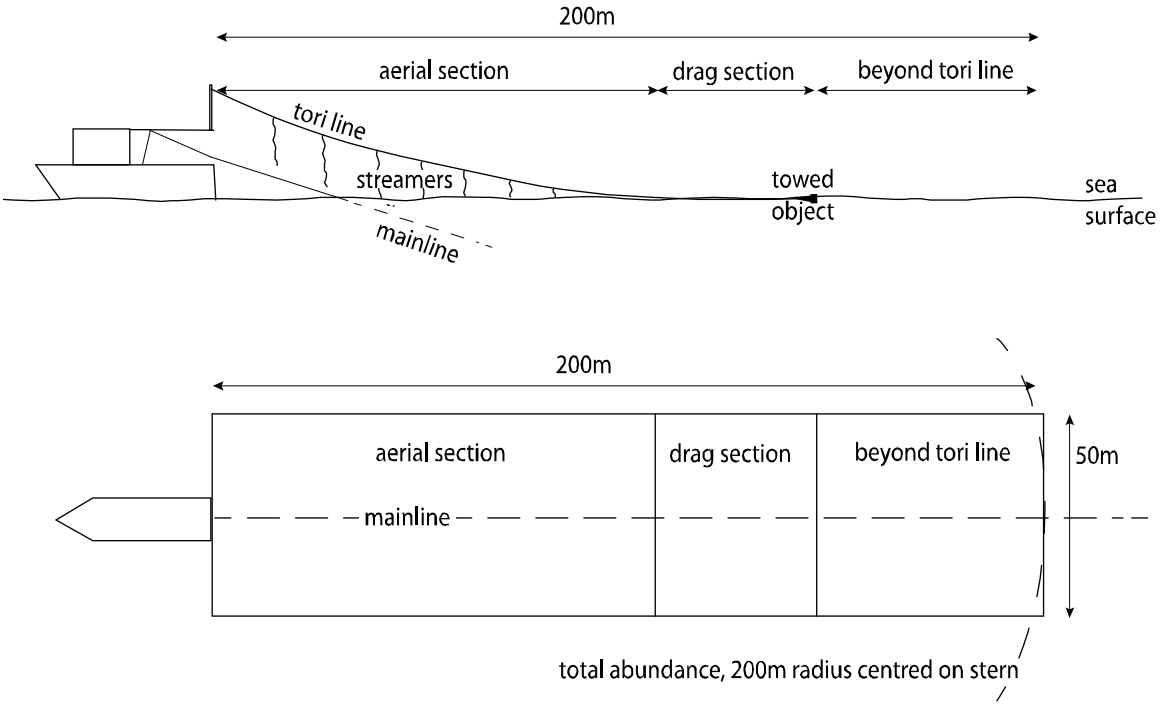


Diagram showing abundance count boxes

Note in the comments any birds not following / interacting with the vessel (e.g. following a surface school of fish). Note that in low light levels and/or for birds seen at a distance you can, as always, record group codes which are preferable to sketchy identifications.

Then, as far as possible, make an estimate of average abundance in a box 200 m long by 20 m wide, centred on the mainline, and split three sections behind the vessel:

Between the stern and the distance astern where the tori line enters the water (the aerial section),

Between where the tori line enters the water and the end of the tori line (the drag section), and

Beyond the tori line.

If the vessel is using more than one tori line use the primary (longest) tori line to define the boxes.

Dive counts

Then count the number of 'dives' of petrels and shearwaters (excluding cape petrels and storm petrels) in a 5 minute period inside a box 20m wide centred on the mainline, again split into three sections:

Between the stern and the point where the tori line enters the water (the aerial section),

Between where the tori line enters the water and the end of the tori line (the drag section), and

Beyond the tori line.

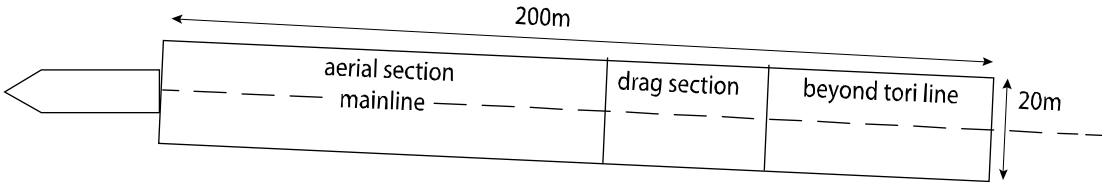


Diagram showing boxes for dive counts (note in this example the line leaves the vessel at an angle)

Use tallies or 3 clicker counters to count the dives in each area in the same 5 minutes. If the number of dives is too high to count individually make an estimate to the nearest 10. If birds are diving in two or more areas then focus on the area closest to the stern, and record an estimate for the other area(s). You may also record, for example, '100+' to indicate that there were more than 100 dives in that area in the 5 minutes.

If the vessel alters course, or mitigation deployed changes (e.g. oil is used), or any other factors likely to skew the results change during the observation period then terminate it early and record the end time and a comment.

Defining dives

A 'dive' at this stage is defined as a bird putting its head under the water in the sampling area (which we interpret as the intention of foraging in the near future, and therefore potentially eating a bait).

Other options for counts include:

Defining a dive as when the bird is fully submerged - it goes for a swim completely underwater (probably the best measure for petrels and shearwaters but may not happen very often and result in too little data coming back)

Counting landings on the water – when birds move into the area and land on the water (might be better with low interaction rates)

Just a snapshot count of birds on the water in each area (might be easier in poor weather)

Birds seen taking a bait (again a good measure but will – hopefully- only be seen very rarely)

If you think one of these other measures is more appropriate for the situation you have behind the boat then please try it out instead of the 'dives' definition above. BUT be sure to clearly note this on the form. Alternatively you can swap between them for different observation periods and / or make general comments on bird behaviour.

Record the approximate location of dives counted on the tori line diagram with a circle or circles.

Comments

If any conditions change during the observation period, end it prematurely, take a note of the time and add in a comment. Possible changes include adding an extra tori line, using more weight, using oil, a course change etc. etc.

If there aren't any birds visible behind the vessel don't worry about completing a form!

Tori Line Observation Form

Trip | Set

Bait 1 | % | salted (y/n) | Bait 2 | % | salted (y/n)

Wind speed (knots) | Setting speed (knots) | Swell height (m) | Observer eye height (m)

OBSERVATION PERIOD 1

Bird count by species (feel free to use group codes) | Visibility score | Wind direction | Swell direction

Species						
Total < 200m						
Aerial section						
Drag section						
Behind tori line						

5 min count of dives for petrels and shearwaters only, excluding cape pigeons and storm petrels

Start time		End time	
Aerial section			
Drag section			
Behind tori line			

OBSERVATION PERIOD 2

Bird count by species (feel free to use group codes) | Visibility score | Wind direction | Swell direction

Species						
Total < 200m						
Aerial section						
Drag section						
Behind tori line						

5 min count of dives for petrels and shearwaters only, excluding cape pigeons and storm petrels

Start time		End time	
Aerial section			
Drag section			
Behind tori line			

OBSERVATION PERIOD 3

Bird count by species (feel free to use group codes) | Visibility score | Wind direction | Swell direction

Species						
Total < 200m						
Aerial section						
Drag section						
Behind tori line						

5 min count of dives for petrels and shearwaters only, excluding cape pigeons and storm petrels

Start time		End time	
Aerial section			
Drag section			
Behind tori line			

OBSERVATION PERIOD 4

Bird count by species (feel free to use group codes) | Visibility score | Wind direction | Swell direction

Species						
Total < 200m						
Aerial section						
Drag section						
Behind tori line						

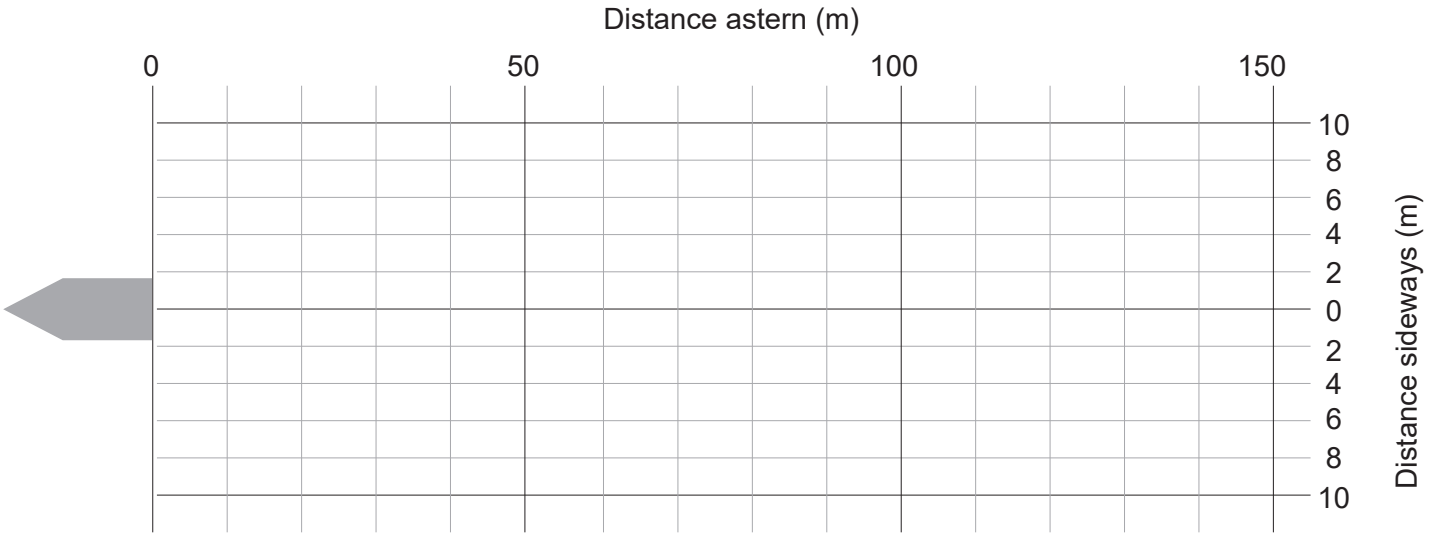
5 min count of dives for petrels and shearwaters only, excluding cape pigeons and storm petrels

Start time		End time	
Aerial section			
Drag section			
Behind tori line			

Weighting description Including size, spacing, floats used etc.

Primary tori line ID		Primary tori line aerial extent	
2nd tori line ID		2nd tori line aerial extent	
3rd tori line ID		3rd tori line aerial extent	

Tori line diagram showing position mainline, tori line(s) and location of dives recorded



Dive definition used: heads under ☐ (tick box) or other - describe

Obs Period	Comments: Include bird behaviour, birds unrelated to the vesssel, any change in the variables recorded, use of extra mitigation (e.g. extra weight, oil).

Visibility score describing how well you can see bird interactions due to light / weather conditions.
1 = could see enough to be worth conducting observations but have little confidence in counts.
2 = could see less than half of the bird interaction
3 = could see more than half of the bird interaction
4 = could see over 90% of interaction.