

**Improving and documenting seabird bycatch mitigation practices
in the North Eastern New Zealand longline fishery.**

FINAL REPORT

Contract reference: Liaison Officer - 4621 Seabird mitigation: MIT 2014-03

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Introduction

Fisheries Management Area 1 (FMA1 North cape to Cape Runaway) is home to a number of seabird species of conservation concern, most notably, black petrels (*Procellaria parkinsoni*) and flesh-footed shearwaters (*Puffinus carneipes*). These and other seabird species have been captured in longline fisheries on the North East coast of the North Island (<https://data.dragonfly.co.nz/psc/>). The capture rates of these species are likely to be above sustainable limits (Richard and Abraham 2013).

The National Plan of Action - 2013 to reduce the incidental catch of seabirds in New Zealand Fisheries (NPOA) lays out a management framework to work towards the following long term goal:

“New Zealand seabirds thrive without pressure from fishing related mortalities”.

Beneath the long term goal sit the objectives of the NPOA, of which there are high level subsidiary objectives and five year objectives.

Particularly relevant to this project is the specific five year objective below:

- all New Zealand commercial fishing vessels are shown to be implementing current best practice mitigation measures relevant to their area and fishery;

Previous work has highlighted the importance of tailoring mitigation strategies to individual vessels and fishing operations (e.g. Pierre et. al. 2013).

A ‘Seabird Liaison Officer’ project, jointly funded by the Ministry of Primary Industries (MPI) and Department of Conservation (DOC) was undertaken by the authors over the 2013/14 summer. Skippers in the snapper fleet were contacted face to face, and individual seabird management plans (SMPs) detailing each vessel’s approach to minimising seabird interactions were drawn up (Goad and Williamson 2014). Following positive feedback the liaison role was continued and expanded, this time managed primarily under the Department of Conservation (DOC) Conservation Services Programme (CSP).

This report describes work carried out under contract “Liaison Officer - 4621 Seabird mitigation: MIT 2014-03” with the objective of:

- Assisting the (North East coast longline) fleets in reducing their risk to seabirds.

Approach taken

Following an initial planning meeting the following specific objectives were agreed:

- Visit all bottom liners operating in FMA1 to review and develop SMPs. Some rewording of SMPs was to be incorporated into the review to change the emphasis and include a commitment to use a tori line for all sets. An example SMP is shown in Appendix 1.
- Visit all surface longliners operating in FMA 1 and discuss their approach to mitigation, potential for improvements, and novel mitigation options. A set of questions was provided by MPI (Appendix 2).
- Undertake sea time as part of the 200 days observer coverage allocated to the bluenose target longline fishery.

To support the project a briefing document for observers was drawn up. This outlined what information observers should collect to assist in the audit of SMPs and for liaison officers to subsequently refine and improve mitigation based on observer feedback (Appendix 3).

Liaison officer reporting was in three stages: Firstly, close to real time reporting into an online spreadsheet recorded all vessel visits and a brief summary of each conversation. Secondly, monthly progress reports summarised the

current state of play and highlighted any issues / areas of interest, and thirdly this final summary report was produced.

Two individuals undertook the liaison officer role over the period of October 2014 to May 2015. A summary of port visits is shown in Table 1.

Table 1: Summary of timing of port visits during the liaison contract.

Port	Date/s	Port	Date/s
Tauranga	Throughout contract period	Whangarei	Nov '14, Mar '15
Whitianga	Throughout contract period	Tutukaka	Nov '14, Mar '15
Coromandel	Nov '14, Mar '15,	Totara North	Nov, Dec 14, Feb, Mar, Apr '15
Whangamata	Nov '14	Whangaparaoa	Feb '15, Apr '15
Auckland	Nov '14, Jan, Feb, Mar, May '15	Mangonui	Nov '14, Dec '14, Feb, Apr '15
Leigh	Jan , Mar '15	Awanui	Nov '14, Mar '15
Opua	Nov '14, Feb '15	Houhora	Nov '14, Apr '15.

When talking to skippers, liaison officers initially relayed information about bird population parameters, and behaviour, particularly for black petrels and flesh-footed shearwaters. This helped fishers understand the impacts that small number of captures can have and also instilled the need for minimising their interactions with seabirds. Similarly a brief overview of the Level 2 Seabird Risk Assessment (Richards and Abraham 2013) and NPOA was discussed.

Recognising that there is no unilateral mitigation prescription for the longline fleet, liaison officers continued to encourage a responsible and reactive approach be taken by skippers. It was not possible to prescribe fleet wide best practice guidelines, so in order to foster the need for skippers to assess risk and react accordingly; the SMPs describe the vessel's approach to mitigation in three levels:

1. The basic 'every set' mitigation standard (e.g. a tori line and line weighting);
2. The precautionary measures taken (e.g. secondary tori lines in 'birdy' areas);
3. Reactive mitigation (e.g. adding more weight in response to foraging behaviour).

The SMPs also describe how the vessel will react to very high risk situations, when the mitigation described is seen to be not working, for example by suspending or stopping setting or foregoing the opportunity to fish.

Whilst this approach does not facilitate a 'tick box' audit, it does place the emphasis on skippers and crew being constantly aware of bird activity. Liaison officers continued to act as a pathway for sharing ideas between fishers and were able to make suggestions and help fishers to make improvements themselves. Overall SMPs aimed to provide an accurate representation of what happens on the vessel on a day to day basis. In a fishery with very low levels of observer coverage or electronic monitoring successful and appropriate implementation of mitigation is largely unverifiable and so relies on the desire of skippers and crews to fish responsibly.

As part of the role both liaison officers provided input at collaborative working group meetings and a seabird SMART training development workshop¹.

¹ <http://southernseabirds.org/projects/seabird-smart-training-for-skippers-crew/>

Results

Initially progress was efficient in terms of time and distance travelled. However, as the contract progressed, more time and effort was required to catch up with the remaining skippers. Overall the time and distance travelled involved were close to that estimated. Liaison Officers were generally able to contact skippers directly to arrange meetings however, where difficulty was encountered, they had access to the fleet managers for the main licensed fish receivers as well as the MPI Compliance Communications Centre. These resources were used on a few occasions, particularly to update the supplied list of vessels. Overall, the project was well received and built on relationships forged with fishing companies and fishers in the previous summer's work.

During the contract period 47 boats were found to be actively fishing bottom longlines in FMA1. Bottom longliners fell into two distinct groups with very little overlap: those predominantly catching snapper (*Pagrus auratus*), and those targeting mainly bluenose (*Hyperoglyphe antarctica*).

The 'snapper' fleet fish lighter gear, work shorter trips and fish almost exclusively in FMA1 (e.g. Pierre et. al. 2013). Hooks are set from 'cards'; wooden trays with baited hooks held in place with slotted rubber strips until they are pulled away from the rubber after being clipped onto the mainline. Although their main catch is snapper they will also at times target other species such as tarakihi (*Nemadactylus macropterus*), granddaddy hapuku (*Scorpaena cardinalis*), red snapper (*Centroberyx affinis*) and kahawai (*Arripis trutta*).

The 'bluenose' fleet have several ways of setting gear; some use cards similar to those in the snapper fleet, others set hooks from the hand and others use a magazine system. These different methods have the potential to influence the attractiveness of the operation to birds, notably by the amount of scraps of bait lost during the setting process. 'Bluenose' vessels will also switch target species to fish for hapuku/bass (*Polyprion oxygeneios*, *P. americanus*) and ling (*Genypterus blacodes*) using similar gear. Being generally larger vessels and fishing further offshore they work longer trips and some will fish in other management areas, notably FMA2 and FMA9, and outside the New Zealand Economic Zone (<200 nm). There are several vessels in this fleet which fish surface longlines or set nets for part of the year. Generally switches between areas, gear types, and target species are driven by quota availability, and the profitability and seasonality of the different fisheries.

Seabird management plans were drawn up for the majority of the fleet, visits to vessels are summarised in table 2, and progress to date is summarised in Figure 1. A current SMP status and summary of improvements over the last year for each vessel is detailed in Appendix 4.

Table 2: Summary of vessel visits and SMP uptake for vessels fishing in fisheries management area 1. Note that vessels that fit into more than one category have been assigned to the one in which they spend most time, rather than being double-counted.

Fishery	Number of active boats	Number with SMPs	Number visited this year to date	Notes
Snapper bottom line	33	30*	31	*One has a company code of practice, 2 others are almost retired, fish only rarely, and have not been contacted yet.
Bluenose bottom line	14	14	14	One vessel on the supplied list was fishing outside FMA1 and was contacted by the deepwater group.
Surface line	12	0	11	

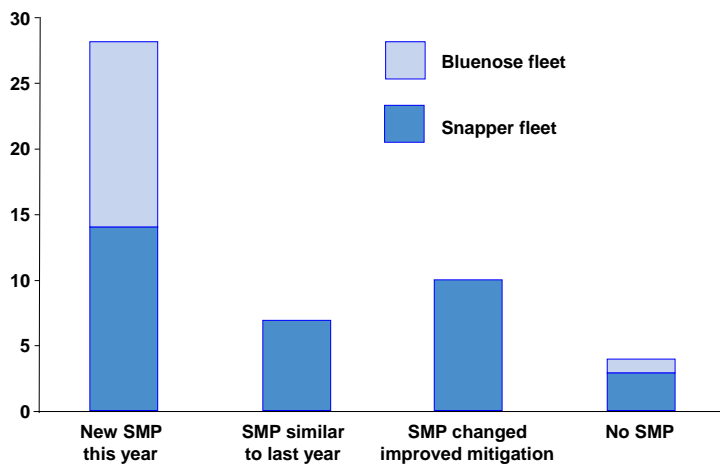


Figure 1: Summary of seabird management plan progress.

Sea time

Once most bluenose skippers had been visited, liaison officers undertook some short trips on 4 vessels, totalling 37 sea days. This time was particularly valuable and allowed liaison officers to work with skippers at sea to study interactions and improve mitigation as well as learning, and talking through ideas. This built a much more productive relationship compared to a meeting alongside the wharf. Where two trips were undertaken on a vessel this was found to be particularly productive. The first trip was more fact finding and understanding the operation and working with the crew. By the second trip all parties were more comfortable in making changes to mitigation and trialling ideas. The benefit of observing and discussing interactions whilst they were happening was huge. The liaison officer was then best placed to make suggestions and refinements and observe the results. Being at sea in the fishery also meant liaison officers were more in tune with what was happening with the fleet and provided efficiencies in terms of meeting other skippers when at the wharf.

A few observed daylight sets provided the opportunity to trial a protocol for estimating tori line efficacy, and this is described in Appendix 5.

Two haul mitigation options were conceived, but lack of access to further sea time precluded testing of these this year.

Bottom longline fleet

Since the previous summer several ‘new’ boats had entered the fishery. Similarly several skippers had changed vessels or retired and a few boats had been tied up. Although not at a particularly high rate these changes to the fleet highlight the importance of updating SMPs regularly. The new skippers entering the fishery had experience as crew or in other inshore fisheries, showed good awareness of the issues, and were very proactive regarding mitigation.

Snapper fleet

Most snapper skippers committed to working a tori line for all sets but some still have safety concerns and did not feel that they worked or were necessary at night. Consequently, the new sentence committing to tori line use for all sets has not been added to all SMPs. However all vessels will work tori lines during daylight or full moon sets.

Based on increased awareness of the at risk species, and improvements to mitigation, SMPs appear to be working. Some vessels had not changed their mitigation approach since the previous year, as they felt it was working well, whereas others had improved their mitigation. Changes noted included improved tori lines and more weight, especially in response to foraging behaviour of birds.

Those boats that made changes did not make them due to direct pressure from a liaison officer, rather each skipper and/or crew had independently thought about what worked best in their particular circumstances and had taken action accordingly.

An example of how the SMPs work has recently been highlighted by a live capture and is described below:

The vessel in question has never recorded a live capture from almost half a million observed hooks hauled, and when asked, say they cannot remember if they have ever encountered any before. As a result, mitigation effort on this vessel has been concentrated (very effectively) at the set and any suggestion of haul mitigation has been met with “why, we don’t have a problem?” For this reason the sentence in the SMP for haul mitigation was as follows:

“The vessel hauls at a speed which discourages congregations around the hauler. Any feeding off discarded baits generally occurs well behind the mainline being hauled. If problems occur in the future other methods will be looked at.”

Then in early May this year the vessel had a live capture of a sooty shearwater (*Puffinus griseus*), a species they interact with rarely. The bird was tangled in a snood and was released seemingly unharmed. Going forward the vessel has several options:

1. To consider this as a one off event and continue as before.
2. Experiment with different mitigation methods to find the best solution.
3. Implement hard and fast rules such as keeping all bait/discards and constructing a full baffler cage.

The liaison officer has geared the response towards option 2, including conveying all techniques that have been successfully implemented by other vessels. The vessel has a camera on-board as part of a separate trial of electronic monitoring to detect seabird captures. This may provide an ideal opportunity to monitor any hauling interactions and the success of any haul mitigation options that might be implemented.

Liaison officers have not taken a prescriptive approach to hauling mitigation and have seen different approaches work well in different situations. Retaining bait generally has been seen to be effective, particularly closer inshore where other feeding opportunities often attract birds away from the vessel more quickly. Birds have been seen to lose interest and numbers following the vessel remain and low or drop off when baits are not routinely discarded. However, it should be noted that bait scraps, regurgitated stomach contents, and deck wash will always provide some level of attraction, and that when fishing further offshore, birds have been observed to follow the vessel more persistently. Discarding baits has generally been seen to result in more birds following the vessel, but feeding away from the hauling station and it is important to ensure baits enter the water in a safe area for the birds. Occasionally, for example at the beginning of some hauls, birds have been observed to be more aggressive and attempt to feed from baited hooks. This behaviour tended to continue for longer if baits are retained rather than discarded. At high risk times such as these batch discarding of baits can provide a short term solution, albeit potentially drawing in greater numbers of birds in the longer term. The long term net effects of this action, such as further training birds to pursue boats for bait scraps, are unknown and a cautious approach to applying this as a recommended mitigation technique should be taken.

The tori line material distributed last year was well received, with skippers liking the kraton tubing – either in sections around the mainline or as streamers. Feedback on holographic ‘irri’ tape was more mixed and not conclusive. More material was sourced and distributed so that all bottom liners and those surface liners working tori lines have received streamer material, and those interested have received ‘flapper boards’ to trial. Several skippers noted that increasing this financial support to other mitigation equipment would be welcomed, for example tori poles.

One black petrel capture was reported directly to the liaison officers by a vessel operator, and two other vessel skippers have reported flesh-footed shearwater captures, however most skippers assumed that captures reported to MPI through statutory protected species capture forms were also received by the liaison officers. During this year’s liaison officer project this did not occur.

Bluenose fleet

Historically the FMA1 bluenose fleet has had very little exposure to observers, and efforts to increase awareness and improve mitigation have focused on the snapper fleet. However observer coverage in the bluenose fleet has reported captures, with a greater proportion of live captures in the bluenose and hapuku observer data compared to snapper target sets (<https://data.dragonfly.co.nz/psc/>).

Skippers were less aware of the different bird species they interact with than the snapper fleet, but they were all interested and keen to learn, and when contacted for a second time would happily report a summary of bird abundance, by species, around their vessel.

Based on at sea observations undertaken by the liaison officers it seems that black petrels attend fishing operations in greater numbers further offshore while flesh-footed shearwaters are more dominant closer inshore. This is consistent with available information on the foraging ranges of these species (e.g. Richard and Abraham 2013). With longer trips and fewer alternative feeding opportunities birds seem to stay with the vessel for longer.

With less risk of bait loss, bluenose lines were generally set earlier than snapper lines (typically 0300) and left to soak for several hours before hauling in the morning. Observed bird activity was very low or usually nil when setting at night. However occasionally vessels would set in the afternoon and on the two observed sets this resulted in more bird interaction. Several skippers mentioned that compared to snapper gear the combination of large circle hooks, short rigid snoods, and large clips with the hooks hung directly below the backbone, reduced the risk of captures at the set.

Bluenose lines are usually deployed with separate down lines such that the vessel stops at the beginning and end of the hook section to attach the down line. With hook spacing usually being closer, bluenose lines are set slower and skippers may split the gear into several shorter lines when fishing distinct seabed features. All of these factors, plus potentially working in poorer weather, make it harder to work tori lines successfully. That said, one vessel successfully worked a tori line for nearly all sets, through a combination of perseverance, patience and by retrieving it mechanically.

At the haul birds would at times chase those hooks that still had bait on, usually just under the surface. This was most common when bait scraps were retained. Liaison officers observed two haul captures during their time at sea. In both cases the birds had become entangled in a snood while chasing baits on hooks. Both were released alive, seemingly unharmed.

Another factor in the bluenose and hapuku/bass fishery is the presence of lost fish, commonly referred to as 'floaters'. As the line is retrieved the swim bladders of the caught fish inflate causing them to float to the surface. Some of the fish would occasionally come off the line as it was being brought up. Birds would congregate around these and attempt to feed, resulting in fewer birds around the boat. Due to the cumulative buoyancy effect of a large number of fish, big bluenose catches can also cause sections of the line can float on or near the surface, often some distance from the vessel. In these cases bait returns are lower than normal but there is still the potential for baited hooks to be held near the surface. There was no obvious mitigation for this other than to haul the floating line as quickly and efficiently as possible.

Deeper bluenose lines are generally hauled at a slower speed (than shallower snapper lines) through the water, and they are more susceptible to line tangles or snags when fishing on features. These factors allow birds to more easily hold position around the hauling station leading to easier access to, and increased and more frenzied competition for, returned baits. Birds can also chase baits underwater more easily as they do not have to travel very far horizontally.

Surface line fleet

Liaison officers generally received a good reception from the surface line fleet. It is probably fair to say that their relationship with MPI and DOC is somewhat strained, often because they feel disillusioned by what has happened in the past and a perception of a lack of progress and openness.

Whilst each fishing operation was slightly different and skippers stressed different aspects of mitigation as working particularly well for them, there was a general consensus in many of their responses. Overall skippers felt that they are doing enough and that capture events are sufficiently rare. Many stated that the situation has improved hugely from the days of a large, less mitigation savvy, fleet years ago. Several skippers mentioned seeing more birds in recent years (though this maybe because there are less boats for birds to congregate around).

Skippers liked the individual approach and were keen on working collaboratively towards the best solution for their boats and the New Zealand fleet in general rather than adopting regulations driven from overseas.

Skippers were interested in the 'safer' sliding weights but were generally wary from a safety and cost perspective, and most would be unlikely to adopt them voluntarily. Weights at the clip and / or on float ropes may be more acceptable safety wise, and the majority of the gear set is currently weighted at the clip. Similarly the perception was that higher tech options (e.g. hook pod, underwater setter and smart hook) are likely to be too large a cost burden. Several skippers mentioned concerns regarding adding things to snoods, or temporarily protecting baits, as this could reduce their fishing efficiency. Dyed bait was not used extensively and skippers may be happy to use it more, though it is considered a messy and time consuming endeavour.

Overall skippers noted that if further mitigation efforts are deemed necessary then they would appreciate the maximum amount of flexibility to uptake methods they felt were most appropriate for their operation. This was preferred to legislative prescription of, for example, line weighting.

Liaison officers identified a need to communicate more information on the most at risk birds, so that fishers can appreciate that the odd captures, when added up across the fleet, can have significant impacts.

Discussion

The high level subsidiary practical objective of the NPOA sets out that: "All New Zealand fishers implement current best practice mitigation measures relevant to their fishery and aim through continuous improvement to reduce and where practicable eliminate the incidental mortality of seabirds". In order to meet this objective it is first necessary to define what current best practice is. Whilst there is useful literature available, a common theme encountered as part of the liaison officer project was that what has been determined as best practice in one fishery may not translate to be reasonable, practical or appropriate in another fishery. The implementation of seabird management plans in the bluenose and snapper fleets has gone a long way towards addressing this dilemma by taking a boat by boat approach. Provided these SMPs are regularly updated and refined based on new developments they should provide an effective mechanism for the structured uptake of mitigation and making continued improvements to mitigation equipment and techniques.

The SMPs in these fisheries have been drawn up such that they are an accurate record of what happens at sea on a daily basis, rather than being a more ambitious but unachievable suite of practices. With SMPs, fishers take ownership of mitigation and exercise their judgement in a structured manner to first assess the risk and then apply mitigation accordingly. It has been reassuring to see and hear of skippers, and particularly crew, constantly scanning for birds and observing their behaviour whilst setting, and making it a personal goal to maximise mitigation efficiency and thus catch no birds.

Throughout the liaison officer project, if an SMP was shown not to be working, for example by observer or fisher reported captures, then changes were made. This 'bottom up' approach has gained traction and, more importantly, has been shown to be effective where there is no 'top down' legislative approach.

Over the last two summers of liaison officer work SMPs have been put in place onboard the vast majority of vessels in the FMA1 snapper and bluenose bottom long line fleets, with many of the snapper vessels being on their second SMP iteration. The key next step is the implementation of a process for verification, both in terms of whether they are being followed, as well as whether they are successful in reducing captures. Getting skippers thinking about the numbers in relation to the population size and other threats would be a good way of putting things in perspective and highlighting that ‘small numbers of captures can have big impacts’.

Working with the bluenose fleet was useful and, combined with other initiatives such as colony visits, skipper awareness has increased markedly in this fleet. The SMPs developed in this fishery were very much a snapshot of the current practice. Building on this in the future and further developing mitigation, particularly workable tori lines and hauling mitigation options, is the logical next step.

Engaging the surface longliners on an individual basis proved an effective way of canvassing their thoughts and current mitigation practices. Liaison officers were well received and skippers welcomed the chance to express their views. They were also generally keen to develop ideas. It is important to maintain this momentum and continue to engage with this fleet, however progress may well be best made by supporting ideas and facilitating uptake of ‘extra measures’ rather than formalising mitigation practices in a SMP. Sourcing pre-dyed bait and trialling a small weight on the hook itself are examples of liaison officer and fisher suggestions (respectively) that may be well worth exploring further.

Recommendations for the development of the liaison officer role

All skippers contacted were happy to meet and engage with the liaison officers, and attitudes to the role were positive, many commenting on the benefits of a face to face approach. The ability to freely converse with fishers in their own environment was valuable for understanding the range of various perspectives. Conversations would often wander to cover fisheries and other environmental topics. The liaison officers were able to communicate these fisher views back to government and the perspectives of the fleet could then be more accurately represented at the relevant fisheries management and environmental forums. Using the liaison role to canvass fishers for feedback to DOC / MPI on other matters could be very useful, and it would be beneficial to set up a mechanism for responding to skippers personally on any points raised, even if no specific action is taken.

All skippers committed to reporting bird captures on MPI forms so it is important that liaison officers receive this data in a timely manner so they can focus their efforts in a responsive manner, and demonstrate to fishers the value of reporting.

The liaison role has supported, encouraged, and recognised efforts to develop and improve mitigation. In some cases small mitigation ‘grants’ directly to vessels could help skippers to explore improvements, if not pay for the time involved. This may well provide the best returns for funding invested into research and development of mitigation measures.

Steps forward

The liaison officer role has developed during the past two seasons, largely to deliver seabird management plans. There is no precedent for how best to engage such a diverse and widespread fleet and consequently the learning curve has been steep. Recommendations to further improve the role are summarised below, split into three sections: Firstly, those that can directly increase the efficacy of the liaison role, secondly, those that can directly support fishers by increasing awareness and improving mitigation, and finally those that sit in a broader management context, but can provide information and support towards improving mitigation and reducing captures.

Liaison Role

- Define the liaison role with the involvement of all parties to provide some terms of reference including:
 - Overall objectives
 - Stakeholder roles and responsibilities (e.g. industry representatives, fishers, DOC / MPI managers, observer programme)
 - What information liaison officers have access to and how this can be used and / or distributed.
 - Work plan (e.g. vessel visit requirements, sea time, responding to capture events, lines of reporting).
- Gradually undertake sea-time on all vessels in the fleet as part of liaison role in order to provide more complete picture of mitigation and be better placed to offer suggestions for improvement. Experience this year suggests that two short trips are likely to be most efficient.
- Refine management of the liaison officer role to allow for flexible tasking from MPI, DOC and the fishing industry in order to make best use of liaison officer time. Examples could include targeting sea time on specific vessels, and responding to capture events. (SLO Role).
- Investigate the possibility of using camera data to monitor and investigate haul mitigation options.

Support for fishers

- Provide more species specific information on bird life histories, population status and distribution etc. to fishers.
- Investigate the possibility of assisting fishers financially to develop and improve mitigation, possibly with small scale expenses only 'mitigation grants'.
- Provide government support for the development of mitigation techniques such as the discharge of small quantities of vegetable or fish oils to mitigate seabird bycatch. This would require dispensation to maritime pollution laws and as such is outside the remit of fishers on their own.

Wider considerations

- Collate all seabird, mitigation and vessel specific information collected on the fleet to date, agree terms of use, and have this available electronically.
- Foster and develop an information sharing approach between (particularly) the fishing industry and DOC/MPI, especially regarding reporting captures and then responding to these.
- Update protected species capture information available at <https://data.dragonfly.co.nz/psc> to include the last 4 years, and include fisher reported captures. This is a particularly useful resource as it provides a good summary of the data used to drive management decisions.
- Clarify the role of seabird management plans, particularly with respect to legislation and / or action plans.
- Auditing and validation of SMPs is the logical next step to identify whether they are sufficient to reduce captures to an acceptable level, and if not what improvements need to be made. In the short term any independent audit is likely to be through observer coverage.
- Review observer tasking and reporting, and include testing the tori line efficacy form developed, before undertaking more observer coverage in the bottom longline fishery.

References

Goad, D. and Williamson, J. (2014). Improving and documenting seabird bycatch mitigation practices in the snapper (*Pagrus auratus*) bottom longline fishery. Contract reference: Liaison officer – seabird mitigation 16880. (Unpublished report held by the Ministry of Primary Industries, Wellington). 27 pages.

Pierre, J.P.; Goad, D.; Thompson, F.N.; Abraham, E.R. (2013). Reducing seabird bycatch in bottom-longline fisheries. Final Research Report for Department of Conservation project MIT2012-01. (Unpublished report held by Department of Conservation, Wellington). 60 pages.

Richard, Y. and Abraham E.R. (2013). Risk of commercial fisheries to New Zealand seabird populations. New Zealand Aquatic Environment and Biodiversity Report No. 109. Available at: <http://www.mpi.govt.nz/news-resources/publications.aspx>

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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	EXAMPLE
Call Sign	
Registration Number	
Home port	
Fishing Permit Holder	
Skipper	
Date reviewed	

Mitigation

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

Setting

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	Weight spacing	Float usage
5 knots	1 - 1.5kg lead	120m (30 hooks)	130mm hard float on 1.8 – 4m dropper
5 knots*	1 - 1.5kg lead	60m (15 hooks)	130mm hard float on 1.8 – 4m dropper

*The second weight set up will be used when birds are thought to be at risk during the set.

Additional weighting for mitigation purposes will be added over and above that indicated above as deemed necessary. A set of 3kg weights has been made up for this purpose.

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.”

A single tori line is routinely deployed for all sets. This has 4 ‘flapper boards’ along the drag section and the tow point can be moved across the vessel to keep the tori line directly over the longline.

If the vessel is fishing in an area where they expect to encounter diving birds, and / or the tori line is blown away from the longline, then one or two further tori lines, each with a single flapper board, will be towed beside the main tori line.

Other measures

No offal, baits or bait pieces will be discarded at least one hour prior to setting.

Any deck lighting during the set is minimal and is largely contained within the shelter deck.

Reactive mitigation

Extra 3kg weights are carried by the vessel and will be used reactively in response to bird activity near the line.

If a bird is visibly observed caught on the surface a 3kg+ weight will be immediately deployed onto the mainline to prevent more captures.

A larger than normal weight will be deployed when turning, to sink the line rapidly whilst the tori line comes back on track.

If birds do overcome the tori line and gain access to the bait entry point a weight will be immediately deployed and clipping on suspended until the birds have left the danger zone.

If all measures above have been employed and are visibly not working i.e. birds are continually overcoming the tori lines and getting to the bait entry point the vessel will stop setting.

Precautionary approach

We will deploy extra tori lines and weight when fishing in unfamiliar areas

Hauling

We will hold old baits in a fish bin during the entire haul and/or discard away from the hauling station. Other measures may be employed as necessary including deck hose, noise, and suspending hauling.

Ongoing developments

This year we will look into developing a 'hauling curtain'.

Guide to Releasing Live Seabirds

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

- without putting themselves at risk, and;
- 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.

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)

Jamie Williamson 0277755451 jamiebirdman@gmail.com (Liaison Role)

Jacob Hore (MPI) 09 820 7684 Jacob.Hore@mpi.govt.nz

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

Some Notes on Birds

Identifying the bird species around the vessel, and their behaviour relative to the line, can help mitigation efforts, particularly when adjusting tori lines.

Flesh-footed shearwater

For the SNA1 area this is the most likely species that will interact with fishing operations in inshore waters. They migrate to New Zealand waters around October and leave again around May. They are highly agile birds that can dive to considerable depths and will scavenge baits / offal and any loose pieces of bait that fall off during setting. If a fisher can successfully mitigate against this species it is likely that all other species would also be protected by the same mitigation. Flesh-footed shearwaters nest on 15 islands around northern New Zealand and in Cook Strait, with the largest colonies on the Chickens and Mercury groups plus Ohinau and Karewa Islands. Often increased activity can be localized around these islands, as most fishers know well, although they will range far and wide throughout inshore waters and beyond – they have been recorded east of the Chathams.

Their behaviour can range from casual interest and being easily distracted, to highly frenzied foraging with no sign of caution. The level interaction will depend largely on areas fished and prevailing wind strengths; there have been many reports of increased foraging behaviour during or just before strong winds. It is also apparent that the greater the numbers (i.e. the more competition) the more frenzied the foraging can be.

Black petrel

In many respects this species is similar to the flesh-footed shearwater. The easiest way to tell the difference is the black petrel has black feet as opposed to the pink feet of the flesh-footed shearwater, The two are often seen around fishing vessels together and between them represent the majority of observed captures in the SNA1 longline fishery. They arrive and leave around the same time of year, are both capable divers that are easily attracted to a fishing vessel and can be difficult to tell apart. The black petrels' only known breeding sites are on Great Barrier and Little Barrier Islands. Although activity will be more likely near those islands, they also roam far and wide. They differ slightly to the flesh footed shearwater in that their distribution is more often offshore, and hence are seen as more stubborn followers of vessels. Strong easterlies can bring them further inshore, as can a fishing vessel that has been operating around them. Unfortunately birds, and particularly black petrels, can start their foraging behaviour at a time well before the sun comes up. This can make them difficult to spot and possibly for them to see the mainline or tori line. If you have identified this behaviour it is essential that this knowledge is shared amongst the all vessels operating in the area so that a full precautionary approach can be taken.

Buller's shearwater

This is the grey-brown and white species with a black M across its wings. It can dive and will occasionally be seen around vessels often for short periods before getting distracted. Although there is a possibility of interaction the above two species will likely be in larger numbers around fishing vessels, and show more persistence than the Buller's Shearwater. They can be seen in large numbers, particularly feeding over surface schools of fish.

Sooty shearwater and short tailed shearwater

Sooty shearwaters breed on a number of islands off the North Island, and large numbers migrate through on their way to or from the southern islands. These species seen less frequently from snapper liners, but both are capable divers, often off the wing. Visits are often from one individual but they will readily join black petrels and flesh-footed shearwaters in foraging behind a vessel.

Fluttering shearwater

These are much smaller birds and are the most coastal of the shearwaters. The vast majority of the year this species fly past fishing operations in large flocks paying no attention, although occasionally they can show interest in a vessel and captures have been recorded.

Mollymawks, giant and cape petrels, and albatrosses

Generally seen more frequently during the winter months when other migratory species have left. None of these species can dive well or swim underwater, so are therefore less of a challenge mitigation wise.

Gannets, shags, and gulls

Captures of these species have been recorded by observers so there is a need to be aware of them particularly closer inshore and during the haul.

Tori Lines

This is a summary of what we have learnt to date from watching birds around boats and talking to skippers. It is by no means complete and we'd like to think that it will need to be updated and changed regularly as tori lines are further developed and refined to suit 'clip on' bottom liners.

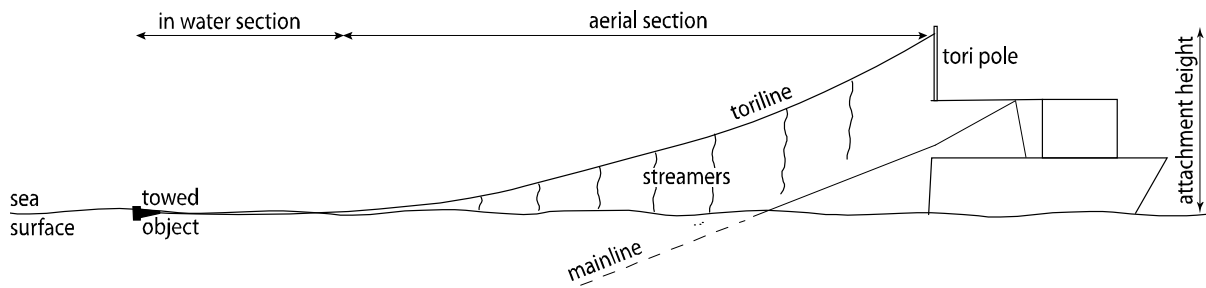
Overall the tori line provides an obstacle that will usually disrupt the birds from following their usual foraging pattern behind a vessel setting a longline.

Foraging behaviour can vary depending on what and how many birds are around, wind strength and direction, sea state, and basically how hungry they are. The most common and preferred method used by the birds is to gain a steady holding pattern following the boat until an opportunity presents itself for a feed. Both flesh-footed shearwaters and black petrels will then on most occasions land on the water, then look underwater for an opportunity, and then may or may not dive. At some locations and times of the year large numbers of flesh-footed shearwaters can adopt a more aggressive approach and dive straight off the wing. In the absence of a tori line birds will typically try and take baits just after the line has entered the water, but a successful tori line can exclude birds from this area far enough back such that the mainline is at a depth where baits are no longer easily located or attractive.

The tori line disrupts the normal foraging behaviour in two ways:

Firstly the aerial section provides coverage over the bait entry point. Streamer lines made from tubing, strapping, rope, tape or a combination of the above, provide yet more of an obstacle. The area directly behind the boat is a particularly favourable spot for birds to fly when following a vessel. If this aerial section is high enough off the water this will be off putting to their strategy. Some of the larger autoliners have tori line 'jigglers' which appear to make the aerial section more visible to birds.

Secondly the part of the tori line in the water, and especially the towed object, has been observed to deter birds from landing on the water in front of it. Erratic movement, visible and noisy towed objects seem to be most effective.



A basic tori line setup

Different towed objects

Road traffic cones have been used by several fisheries and they provide considerable drag and so are fairly resistant to cross winds. The addition of a plywood base gives them even more rigidity. These have large visible bow waves when towed through the water.

Plastic oil drums have the benefit of being able to be half filled with water to increase drag and give a lower wind profile. They also give the line movement by not towing smoothly.

Intermediate polystyrene float lines which are deployed on the mainline are often used by smaller vessels as a form of tori line. These appear to deter birds, particularly when two are used in combination. Attachment points to the float work best when off centre so the flow profile is disruptive, resulting in the float moving around and jiggling the tori line.

Splash boards weighted at the trailing edge have a splashing effect and a very low wind profile. Several of these have been used in a series down the towed part of the line.

Smooth trawl floats of around 8 inch diameter a quarter filled with water have been used as a towed object. These tend to dig into the water and then pop to the surface repeatedly, providing reasonable drag and an 'active' jiggling action. Using a 4ft section of bungee near the attachment to the boat further improves the movement of the tori line but be sure to add in the bungee such that it can't over extend and if it breaks the tori line will still be attached.

Other towed devices include sections of mooring line, windy buoys and hard ball floats. The lay of three strand rope can have a ruddering effect when towed, braided rope may alleviate this and also seems to twist up less, eliminating the need for lots of swivels.

Wind direction and strength

This is important for two reasons:

Firstly the effectiveness of the tori line can be diminished due to cross winds pushing it off the mainline being set. Ingenious fishers have developed several methods of maintaining of tori lines coverage when setting across the wind, including the following:

Lower wind profiles, for example using smaller diameter rope for the aerial section.

Several vessels have developed adjustable tori poles, or a bridle system, to allow the tori line attachment point to be moved upwind, which helps keep the tori line over the mainline.

Some vessels will only set into or with the wind to keep the tori line on track.

Running multiple tori lines is likely to be considerably more effective than a single line, and can exclude birds from a larger area either side of the mainline. Some vessels will run twin tori lines of a similar length, whereas other will use one or two 'supplementary' shorter tori lines. These can fill in the gap caused by moving the attachment of the primary tori line upwind when setting across the wind.

Secondly the birds' foraging behaviour changes with wind strength and wind direction relative to the setting direction. When setting in strong winds the birds can fly with little effort and will circuit around the vicinity, apart from when the vessel is heading into wind when the birds will keep in their desired position fairly easily.

Important points

One bird overcoming the tori line and getting, or appearing to get, a feed will usually result in several more birds throwing caution to the wind and attacking the same spot, with much less regard for a tori line. This can lead to a 'frenzy' of bird activity and render the tori line much less effective. In these situations adding an extra weight and even suspending clipping hooks on, can cause birds to move out of the danger area and reverting back to a more normal holding pattern.

One of the most common problems is the intermediate floats becoming entangled on the towed object. When thrown down wind the floats usually pass by with no problem. However a missed throw or swirling wind can push the float over the tori line to be picked up by the towed object. For these occasions it is worth making sure the towed object will slip over a line with nowhere for the line to catch.

Safety is a key consideration as working a tori line adds another level of complexity and risk to an already potentially hazardous operation. Particular care is needed when deploying and retrieving tori lines and keeping them out of the prop when backing up. If a tori line does hook up with the mainline then a lot of tension will come onto it and the mainline will go slack until the tori line breaks, potentially with the line drum over-winding. A weak link in the tori line will cause it to break earlier but it may have to be cut. Minimising the chance of hook ups with streamers and towed objects is obviously the best way of reducing this risk and identifying catch ups quickly makes life a bit easier.

The tori line on its own is not necessarily enough to prevent bird captures. Many other measures are also important, for example a suitable regular weighting regime. Experienced skippers will often relate a whole series of factors which have the potential to increase the risk of a capture, and maintaining awareness of the birds and the whole fishing operation seems to be the best practice approach.

Thanks heaps for reading and (please!) any suggestions / comments to either Dave or Jamie.

Appendix 2: Questions and messages for surface longliners.

Questions for vessel operators.	
What seabird mitigation do you currently use onboard your vessel?	
What mitigation techniques do you find work best on your vessel?	
What do you think are the key factors that affect the success of mitigation in terms of deterring birds and reducing the risk of seabird interactions on your vessel?	
Are there circumstances where you do not use mitigation? What are they?	
Are you aware of the legal requirements for the use of seabird mitigation?	
What do you see as the biggest barriers to implementing the mitigation currently required by the regulations?	
Mitigation is only effective if it is used. What refinements do you think would make current mitigation techniques more usable?	
Have you attended a seabird smart training workshop or participated in an MPI HMS working group in relation to seabird or seabird mitigation?	
What feedback would you like pass to MPI/DOC in relation to seabirds and seabird mitigation?	
What information do you think would increase your understanding of seabirds and the rationale for mitigation?	
Do you think you would benefit from a seabird management plan and development work with a liaison officer to refine the mitigation you use?	
Are you aware of the reporting requirements if you capture a seabird?	
Are you and your crew aware of how to safely handle seabirds if they are caught alive?	

Key messages to the fisher	
The seabird mitigation that is included in the regulations is driven by international best practice and is regularly reviewed.	
MPI has commitments both internationally and under our own NPOA Seabirds to make steps forward in terms of seabird mitigation.	
The more information we can get the less the uncertainty associated with the SLL fleet and the more realistic the risk assessment process will be. This is in the fishers interests.	

Appendix 3: Briefing document prepared for observers.

Documenting Seabird Interactions and Mitigation Practices

Background

The latest risk assessment suggests that demersal longliners in area one have the potential to pose a substantial risk to seabird populations, notably black petrels. Consequently coverage has been put in place this year on vessels which have landed bluenose, to supplement coverage in the snapper fleet in previous years. As part of MPI and DOC initiative liaison officers have been tasked with documenting mitigation practices in a 'Vessel Management Plan'. The vessel may or may not have one of these in place, but either way it is important that you fully describe the gear used, seabird interactions and any mitigation employed.

Please forward this form to the office in the envelope supplied after your first weeks fishing.

If at any point you or the skipper have any questions contact the liaison officers: either Dave on 0273643098 (goad.dave@gmail.com) or Jamie on 0277755451 (jamiebirdman@gmail.com)

Please take the following photos

All mitigation equipment – close up and in use

Hooks – with and without bait

Snoods

Backbone

Floats

Weights

Deck layout

Any floating lines

A short video of the wake and gear and tori line at the set - especially when there are birds around

A short video of the hauling station whilst hauling - especially when there are birds around

Gear Details

Fill in the following gear parameters, note some will require a several values, and if this is the case note the range and the typical or 'estimated average' value.

Target species	Snood material
Height of backbone above water at the stern (m)	Snood length including clip and hook (cm)
Grapnel or end weight description and weight (kg)	Hook type and size
Backbone material	Intermediate surface floats used? and how often?
Backbone diameter (mm)	Weight material and size (kg)
Crimp / stopper type	Line length (m) and number of hooks
Crimp spacing (m)	Min distance behind vessel backbone enters water (m)
Snood spacing (m)	Max distance behind vessel backbone enters water (m)
Snood breaking strain (lbs or kg)	Estimated width of visible propeller wash (m)
Snood diameter (mm)	Estimated distance astern propeller wash visible (m)

Seabird Management Plan Form

The idea of this form is to provide details on the skipper's approach to mitigation so that this can be documented in a vessel management plan (VMP). If the vessel already has a VMP in place then you can use this form to make any notes about whether it is followed and any updates which need to be made. In this case it is not a compliance exercise the aim is to ensure the VMP reflects current practice as closely as possible.

It is important if you are an observer coming onto a vessel with a VMP in place that you read the relevant VMP to the vessel you are observing. It is up to you to make an assessment whether the vessel is following the measures placed out in their VMP. Apart from general measures to prevent initially attracting birds the majority are centred around what the vessel does when diving birds turn up. For example does the person clipping on stop when a bird gets to the bait entry point., or if extra weights are used how much and how often. (you might have to wait until the haul to weigh the weights).

To fill this out you are going to have to have a chat with the skipper about why they do things the way they do mitigation wise, and what they do under different circumstances, for example at different times of year, in different areas and for different target species.

Vessel Details

Vessel Name	
Call Sign	
Registration Number	
Home port	
Owner (plus contact number)	
Skipper (plus contact number)	
Date	
Observer	

Fully describe the longline system in use – is it clip on from cards, clip on from loose snoods, partially auto or fully auto.

Draw a complete labelled diagram of each line setup including weight spacing in terms of hooks and distance (stoppers), float size and placement. Also note bottle placement for sink rate tests.

Setting

Describe operation – target species, number of sets a day, number of hooks per set and per day, setting and hauling time of day, set duration, soak duration, trip duration. (If the vessel targets several species in different ways then note how the above differ for different targets.)

List bait types and describe when each are used and why, and thaw status. The vessel might use one type of bait for the start of the set or trip and then a different bait or mix of baits. It is important to document this and if possible the reason for it.

Details of line weighting and setting speed.

Setting speed	Weight size and material	Weight spacing	Float usage	Bottle test times to 10m depth

Note which setups are used when and why.

Tori Line

Note on when it is used, why it is the way it is, and how well it works in different conditions. Attach a copy of the tori line form.

Offal management

Are offal and bait scraps held on board prior to and during setting?, if not is this something they could do easily / are prepared to do?

Other measures

Does the vessel use any other mitigation measures – for example oil, avoiding birds temporally or spatially. Do they consider the potential for bird captures?, and how does this affect the way they fish?

Precautionary mitigation

For example using an extra tori line and extra weighting in ‘unknown’ areas.

Reactive mitigation

Time of day / year... differences in mitigation approach. Examples include extra weight, more tori lines, oil in response to perceived higher risk situations / areas, such as birds present during the set / known ‘birdy’ areas.

Is the skipper prepared to stop clipping on or even setting if birds are seen diving on the line?

Hauling

Management of offal / discards / returned baits

Is the vessel processing? – if so what do they process, when do they do this, and what happens to the offal. Is it possible to hold all offal on board whilst hauling as well as setting? If not do they discard on the off side?

Is it possible to have nothing over the side for an hour before shooting?

Does the vessel retain returned baits during the haul – or are they prepared to if and when they think it would reduce the risk of captures?

Reactive mitigation

Note any other measures used if captures seem likely, examples include: deck hose, noise, oil, suspending hauling, use of a brickle curtain – like device?

Is there a plan in place to release live captures?

Ongoing developments

This section provides an opportunity to record any aspects of mitigation the vessel is refining / trialling this year.

Please fill in the following summary of birds observed in the vicinity of the vessel whilst setting and hauling, for each area fished. Absolute accuracy isn’t important – a summary from memory and a quick scan of your other forms is fine.

Species	Max Set	Min Set	Typical Set	Max Haul	Min Haul	Typical Haul	Notes on behaviour / interactions with gear

Sink Rate Bottle tests

Measuring the time taken for the line to reach 10m depth.

The idea here is to clip a bottle onto the backbone with a 10m length of line between the bottle and the clip. The line is wound around the bottle and will unwind as the line sinks. The time between when the bottle was clipped onto the line and when it is pulled underwater is recorded and used in conjunction with the vessel speed to calculate a distance astern the line reaches 10m. In practice the distance behind the boat is what provides the best visual indication of sink rate, and best practice is to have the tori line excluding birds for far enough behind the boat for the line to reach 10m. Reducing the length of tori line required to do this can be achieved by either slowing down or adding more weight.

So all you need to do is:

Check that the line can unwind freely from the bottle.

Hand the bottle to the crew to clip on as they would a weight or float, instructing them to clip the bottle on at the slowest sinking part of the line – usually somewhere in the middle section of the line, midway between weights.

Start a stopwatch when the clip leaves the boat.

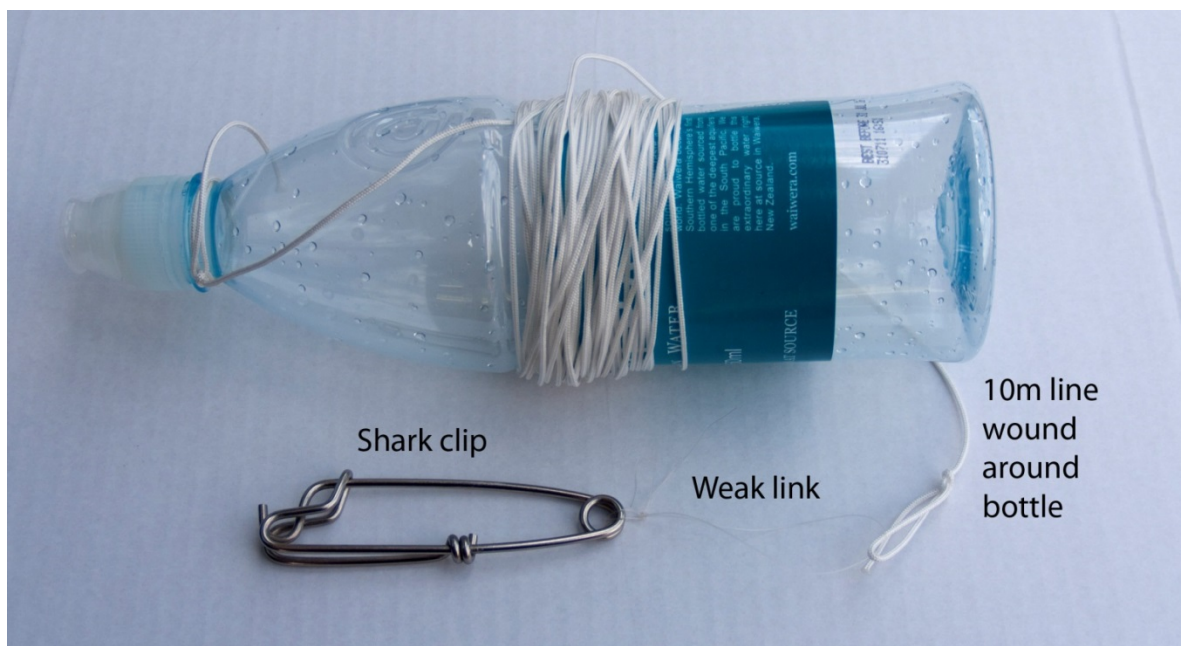
Stop the stopwatch when the line becomes tight and the bottle starts to get pulled under.

Record the vessel speed.

Note other gear variables – i.e. which setup the test relates to in the forms above.

Note that:

- There is a weak link between the clip and the line so that if the bottle gets caught on the tori line then this will break.
- There are holes in the bottle to allow water in and air out – leave the cap of the bottle open.
- If it is dark put a lightstick in the bottle.
- It is best to do the tests on a nice day otherwise you may well lose sight of the bottle behind waves.



Appendix 4a : Current status of seabird management plans and details of improvements in mitigation over the last year, for the snapper fleet.

Vessel code	Status of SMP and summary of any changes
S01	retired, had SMP from last year
S02	SMP from last year re worded, no major changes
S03	new SMP this year
S04	not fishing area 1
S05	new SMP this year, new skipper
S06	new SMP this year
S07	SMP in place from last year, not fishing at the moment
S08	no longer fishing
S09	new SMP this year
S10	not fishing - retired
S11	SMP from last year re worded, tori line all sets
S12	SMP from last year re worded, more weight, tori line all sets
S13	new SMP this year
S14	new SMP this year
S15	new SMP this year
S16	SMP from last year re worded, no major changes
S17 / B06	BNS boat really - new SMP this year
S18	SMP from last year in place, haven't caught up with him this year
S19	SMP from last year re worded, more reactionary weight
S20 / B8	BNS boat really - new SMP this year
S21	new SMP this year, for new vessel, similar details
S22 / B11	contacted by deepwater group regarding ling certification
S23	not fishing BLL
S24	new SMP this year
S25	not fishing BLL
S26	SMP from last year re worded this year, improved tori line
S27	not fishing much at all almost retired
S28	SMP from last year re worded, more weight, tori line all sets
S29	SMP from last year re worded this year, tori line all sets
S30	Need to review last year's SMP, not currently fishing
S31	SMP from last year re worded this year, tori line all sets
S32	tied up, have spoken to owner
S33	has company code of practice instead of SMP, no concerns
S34	new SMP this year
S35	not fishing
S36	SMP from last year re worded, no major changes
S37	No longer fishing
S38	No longer fishing
S39	SMP from last year re worded this year, more weight, tori line all sets
S40	new SMP this year
S41	not contacted yet - fishing very little, building another boat
S42	SMP from last year re worded, improved tori line for all sets
S43	SMP from last year re worded, no major changes
S44	new SMP this year
s45	SMP from last year re worded, more reactionary weight, tori line all sets
s46	new SMP this year
S47	new SMP this year

SMP = seabird management plan, BLL = bottom longline, SLL = surface longline

Appendix 4b : Current status of seabird management plans and details of improvements in mitigation over the last year, for the bluenose fleet.

Vessel Code	Status of SMP
B01	new SMP this year plus one short trip
B02	new SMP this year plus 2 trips to sea.
B03	new SMP this year, more of a gillnetter really - odd short BLL
B04	new SMP this year, usually fishes area 2
B05	not fishing
B06 / S17	new SMP this year, plus one trip to sea
B07	new SMP this year
B08 / S20	new SMP this year
B09	not fishing
B10	not fishing
B11 / S22	contacted by deepwater group regarding ling certification
B12	new SMP this year
B13	new SMP this year
B14	new SMP this year, mixture of SLL and BLL
B15	not fishing area 1
B16	new SMP this year
B17	new SMP this year in place, now SLL
B18	new SMP this year, mixture of SLL and BLL
B20	new SMP this year

SMP = seabird management plan, BLL = bottom longline, SLL = surface longline

Appendix 5: Tori line efficacy form.

During two daylight sets on one observed trip the 'tori line efficacy form' attached below was trialled. By recording bird foraging behaviour in relation to different sections of the tori line it is possible to methodically examine how well a given tori line is excluding birds from the area behind the boat. It then follows that tori line improvements can then be tailored to bird behaviour. Simply put if birds are observed diving between the boat and the end of the aerial section then this needs to be improved with, for example, more streamers, adjusting the position over the longline or working multiple tori lines. Likewise if birds are diving beside the drag section of the tori line then the aerial extent can be increased or the drag section altered to provide more of a deterrent.

Allowing the observer flexibility to choose a suitable measure of foraging behaviour makes the protocol less standard, but also allows it to be tailored to different bird assemblages exhibiting different behaviours. Different proxies for risk will be more appropriate in different situations, depending on level of bird activity. For example with few birds present counting landings on the water or 'heads under the water' may be appropriate, whereas with more birds, and more aggressive foraging, counting fully submerged dives may be the best option as it was hard to keep track of large number of the previous proxies. It was also deemed necessary to include a measure of visibility to estimate the proportion of foraging attempts that were visible to provide some standardisation for different height of eye, swell and light conditions.

Overall the concept worked well and holds potential to compare the relative efficacy of different tori line designs tested under similar conditions. Providing an absolute measure of efficacy is not so achievable as it would be difficult to remove environmental and, especially, bird abundance influences on counts.

Importantly tasking observers with providing a more detail description of tori line efficacy, and hopefully discussing this with the skipper provides a spur to make improvements.

The latest version of the form and instructions for filling it out are shown below:

Tori Line Observation Instructions

Rationale

Tori lines have been used for many years in the domestic longline fishery, and vessels have developed (and are still developing) a range of designs to suit their vessel, fishing operation and the birds encountered. However to date no data has been collected to assess the efficacy of these different designs. It is thought that 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 and also fishers and help develop better tori lines.

Please follow the instructions in your briefing as to when to conduct these observations.

Trial form

This form is still very much in the trial stage so any comments / feedback you have WILL be acted upon and WILL be gratefully received. This is particularly important when considering the definition of a 'dive' described below. This definition may not be the best one for estimating the risk to birds.

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.

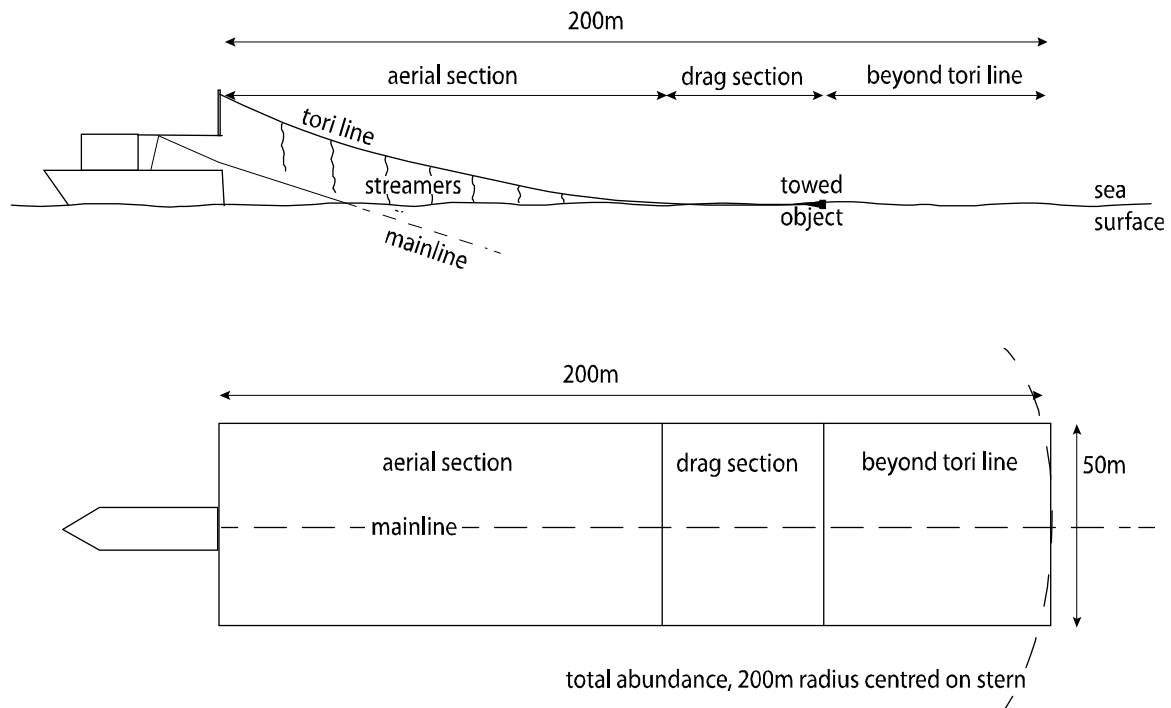


Diagram showing abundance count boxes

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 200m long by 50m 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.

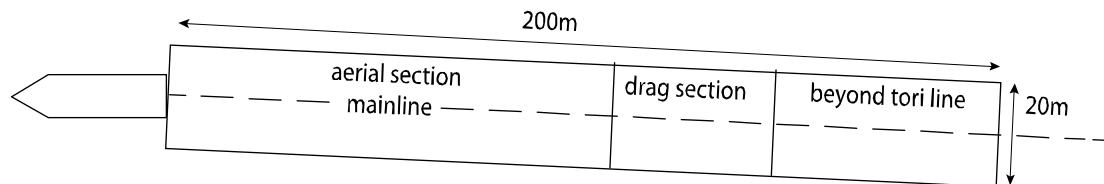


Diagram showing boxes for dive counts (note in this example the line leaves the vessel at an angle)

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 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.

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			

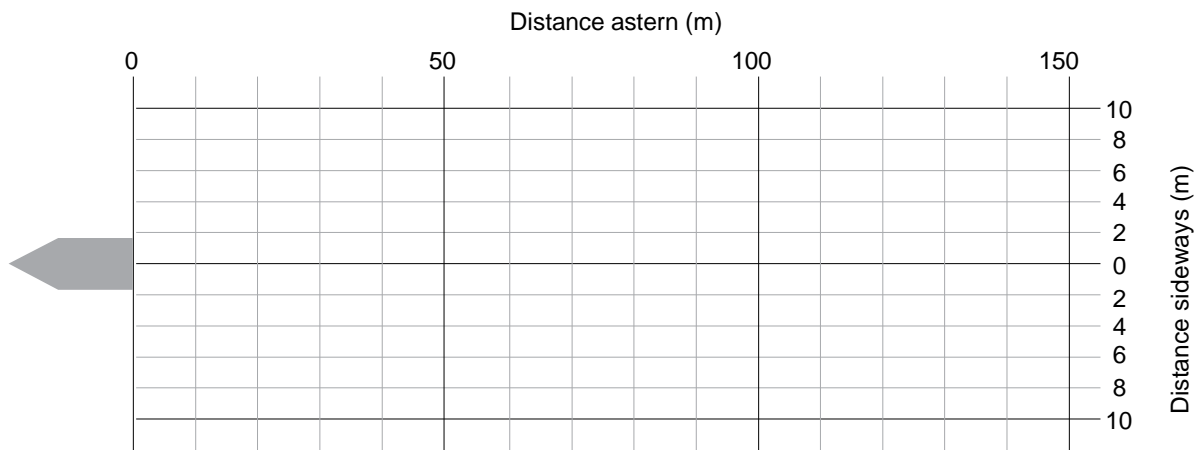
Weighting description Including size, spacing, floats used etc.

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



Obs Period	Comments: Include bird behaviour, birds unrelated to the vessel, 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.