PISCES RESEARCH

MIT2019-04: Assessing fish waste discharge management in the scampi fishery

DRAFT report for the Conservation Services Programme

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CONTENTS

EXECUTIVE SUMMARY

Batch discharge of fish waste, where the waste is accumulated aboard the vessel then discharged as rapidly as possible, is used as a seabird capture mitigation tool in fisheries, including the New Zealand scampi trawl fishery. Batching aims to reduce seabird feeding around fishing vessels and so reduce the risk of fatal seabird interactions with fishing gear.

Following experimental studies in New Zealand and overseas, batching is considered a best practice mitigation strategy in guidelines from the Agreement on the Conservation of Albatrosses and Petrels (ACAP). ACAP recommends a minimum interval of two hours between batches. The Deepwater Group's Operational Guidelines for scampi fisheries specify a shorter minimum interval between batches (30 minutes), but have a particular focus on avoiding discharges around setting or hauling of the net. Most seabird captures in scampi fisheries are net captures.

Conservation Services Programme project MIT2019-04 was established to review existing observer data with the aim of determining if an 'optimum' batch discharge interval could be identified.

Scampi fishing occurs in five key regional fisheries in New Zealand, using target bottom trawling. Like other crustacean trawl fisheries around the world, bycatch in the scampi fishery is high. Statutory data from the Electronic Reporting regime, introduced gradually from 2018, allows a characterisation of the retained and discarded catch by the different regional scampi fisheries; the SCI 3 fishery on the western Chatham Rise has the highest rates of bycatch fish discards and the greatest proportion of catch retained in processed form.

Numbers of seabirds observed around scampi fishing vessels do not show consistent differences between regions, although the composition of the seabird assemblage does vary regionally. Seabird captures have, however, varied with the highest estimates in

the Chatham Rise and subantarctic scampi fisheries.

Detailed observational protocols on seabird attendance at vessels were developed for particular experimental work and required a dedicated observer. Routine data collection by fisheries observers currently only provides qualitative, trip-level information on vessel batching practices and is primarily focussed on assessing vessels' adherence to their Vessel Management Plans. The limited resolution of data on batching precludes a detailed investigation into the effects of variation in batch interval and batch discharge times on either seabird attendance or seabird captures.

If managers require a more detailed understanding of how variation in batching parameters affects seabird attendance around scampi vessels, we suggest an experimental approach would be more efficient than simply increasing the detail of observational data collection. Experimentation allows the covariates of interest to be modified while others are held constant, whereas analyses of observational data have to address between-vessel variation in addition to temporal and spatial variation, and may see little variation in batching practice. In future, simple data collection technologies could be developed to provide information on both batching practice and seabird attendance in place of intensive data collection by observers.

1. INTRODUCTION

The discharge of fish waste (both whole fish discards and processing waste) from fishing vessels creates a potential food source that can attract large numbers of seabirds. Seabird presence around fishing vessels can lead to interactions with fishing gear ('captures') that may result in seabird injuries or mortalities. Such mortalities are considered a key global threat to seabird populations (Croxall et al. 2012) and a suite of capture mitigation measures have been developed in response.

Batch discharge of fish waste is used as a seabird capture mitigation strategy in New Zealand deepwater trawl fisheries, including the scampi (*Metanephrops challengeri*) fishery (Deepwater Group 2018). Batching involves the accumulation of fish waste aboard the vessel. This is then discharged as rapidly as possible in a 'batch discharge event', with the expectation that intervals between such events are reasonably long and that discharges are scheduled to avoid the parts of the fishing operation that present the highest risk to seabirds.

The aim of batching strategies is to limit the time that vessel activities are attractive to seabirds as a source of food, therefore reducing continuous seabird attendance at the vessels and the resulting risk of interactions with fishing gear. If vessels are continuously discharging fish waste, then seabirds will follow the vessel and are at risk of interacting with trawl warps (the cables used to tow the net) during fishing, or the trawl net itself during shooting and hauling. Although seabirds are attracted to the vessel during batch discharge events, the expectation is that birds will remain with the resulting food patch rather than following the vessel when discharge ceases.

Throughout this report we use the term 'fish waste' to refer to unwanted fish bycatch, which is typically discarded whole, and 'offal' to denote the waste that results from processing fish at sea. Batch discharge of fish waste is one of a range of measures that vessels can employ as a seabird capture mitigation strategy. Other strategies for managing fish waste include (Agreement on the Conservation of Albatrosses and Petrels

2019):

Retention of waste where no discharge of fish waste occurs during fishing trips (full retention) or at least during fishing activity;

Mealing waste where fish waste is converted into fish meal and discharge is restricted to liquid discharge; and

Mincing waste where the fish waste is reduced to smaller particles before discharge.

In addition to managing fish waste, vessel mitigation strategies typically also include the deployment of physical mitigation devices, such as streamer lines, to limit seabird access to higher risk areas such as trawl warps.

A series of experimental studies carried out between 2006–2010 (Abraham et al. 2009, Pierre et al. 2010, Pierre et al. 2012a, Pierre et al. 2012b) investigated the management of trawler waste streams to mitigate seabird captures, with batching of fish waste discharge generally emerging as a better overall strategy for reducing risk to seabirds than mincing waste. Reducing seabird interactions with trawl warps was a key focus of this work.

Pierre et al. (2013) noted that net captures were the prevalent cause of seabird interactions with the scampi fishery. While the contents of trawl nets will always be an attractive food source to seabirds, it was suggested that improving batch discharge regimes to ensure discharge is held on board during shooting and hauling should generally reduce vessel attendance by seabirds and so reduce the risk of net captures.

Management of fish waste to reduce the general attractiveness of fishing vessels to seabirds is considered one of the best practice measures to reduce seabird bycatch in trawl fisheries (Agreement on the Conservation of Albatrosses and Petrels 2019). Storing of fish waste for two hours or longer before 'strategically discharging it in batches' is recommended in situations where fish meal production or full retention of fish waste is impractical. Nevertheless, Rexer-Huber and Parker (2019) reviewed information from

fisheries observers on discharge management in small-vessel (< 28 m) trawl and longline fisheries in New Zealand and recommended further testing of the effectiveness of batch discharging for bycatch reduction, including the influence of holding duration, discharge duration and discharge timing. As a result, the Conservation Services Programme developed project MIT2019-04 with the aim of investigating variation in batching intervals and determining if an 'optimum' batch discharge interval could be identified in terms of reducing both seabird activity around fishing vessels and seabird interactions with fishing gear.

MIT2019-04 was specified in terms of an analysis of past observer data on batching practices in the scampi fishery. However, discussions with Department of Conservation (DOC) and Fisheries New Zealand (FNZ) staff subsequently established that fisheries observers only provide general observations on scampi vessels' fish waste management procedures. In particular, there is no systematic collection of quantitative information on vessel batching regimes, nor is there ongoing collection of detailed information on seabird attendance at vessels. The seabird observation protocols used in previous studies, such as Pierre et al. (2010), were detailed observational protocols, designed for specific experimental studies and requiring a dedicated observer. As such, these have not been adopted for routine data collection by fisheries observers in New Zealand.

This report summarises the data that are available with respect to scampi fisheries, seabird captures and discharge batching, and assesses whether there is evidence of the specific details of batch discharge regimes that minimise the risk to seabirds of interactions with fishing gear. We:

- consider the context for the use of batching as a tool for mitigating seabird captures;
- characterise New Zealand's scampi fisheries and fleet using FNZ statutory data from 2009–2019;
- investigate the discards of the scampi fleet using data available since the

introduction of FNZ Electronic Reporting (ER);

- describe the operational regime, based around individual Vessel Management Plans (VMPs), that aims to ensure vessels are implementing best-practice waste management procedures, and detail the information collected by observers that assists in assessing compliance with VMP expectations;
- investigate patterns in estimated seabird captures by scampi vessels and seabird attendance at scampi vessels, based on data collected by fisheries observers; and
- discuss options for further data collection if managers require additional information on the implementation and impacts of discharge batching.

1.1 Context

Le Bot et al. (2018) note that seabirds have been feeding on fishery waste around the world ever since humans started harvesting marine organisms. In some parts of the world, the energy requirements of large numbers of seabirds are potentially supported by fisheries discards (Sherley et al. 2019). However, foraging around fishing vessels exposes seabirds to a risk of injury or mortality as a result of interactions with fishing gear.

Seabird mortality in trawl fisheries was identified more recently than in longline fisheries, and mitigation initially focussed on devices that aimed to limit seabird access to trawl warps (Sullivan et al. 2006a). However, while some seabird capture mitigation devices provided an immediate solution to reduce warp interactions, it was recognised that management of fish waste discharge was required to address one of the root causes of seabird interactions with fishing gear (Sullivan et al. 2006b).

In addition to the experimental studies in New Zealand (Abraham et al. 2009, Pierre et al. 2010, Pierre et al. 2012a, Pierre et al. 2012b), batch discharging of fish waste has also been studied in the Falkland Islands (Kuepfer et al. 2016, Kuepfer & Pompert 2017).

Studies from both these regions contributed to advice of the Advisory Committee of the Agreement on the Conservation of Albatrosses and Petrels (ACAP) that batching of waste is a proven and recommended mitigation method for both pelagic and demersal trawl fisheries where fish meal production and retention of fish waste are impracticable (Agreement on the Conservation of Albatrosses and Petrels 2019).

1.2 Risks to seabirds from scampi fisheries

The updated assessment of risks to seabirds from New Zealand commercial fisheries included estimation of the proportion of seabird captures in nets or on warps (Richard & Abraham 2020, Table A-2). Mean estimated proportions of net captures in scampi fisheries varied from 0.73 (95% credible interval 0.61–0.84) for the group of mollymawks (*Thalassarche* and *Phoebetria* species) and giant petrel (*Macronectes halli*) to 1.00 for diving seabirds (penguins, shags, boobies, gannets; 95% credible interval 1.00–1.00).

Fisheries New Zealand (2020c) consider that, although observer coverage of the scampi trawl fishery is relatively low (varying from 3% of tows in 2015/16 to 16% in 2018/19), the coverage is relatively representative of effort and, as a result, current estimates of seabird interactions in the scampi fishery are reasonably accurate.

Specific interactions between seabirds and the scampi fishery highlighted in the supporting material for the National Plan of Action (NPOA) - Seabirds 2020 (Fisheries New Zealand 2020c) are:

- Salvin's albatross (*Thalassarche salvini*) and white-capped albatross (*Thalassarche cauta steadi*), primarily on the Chatham Rise and in the subantarctic region, with the scampi fishery contributing 12% of the risk score for Salvin's albatross and 3% of the risk to white-capped albatross (Richard & Abraham 2020);
- flesh-footed shearwaters (*Puffinus carneipes*) in the Bay of Plenty (6% of risk); and
- white-chinned petrel (*Procellaria aequinoctialis*) in the subantarctic.

1.3 Mitigating risks from scampi fisheries

Mitigation standards (Department of Conservation and Fisheries New Zealand 2019) to reduce incidental captures of seabirds in scampi trawl fisheries aim to:

1. manage the discharge of fish waste from vessels so as not to attract seabirds to risk areas;
2. minimise the risk to seabirds from trawl warps;
3. minimise seabird attraction towards, and access to, trawl nets and minimise the risk of harmful interactions to seabirds that do access nets; and
4. minimise the risk of deck landings or impacts against vessels.

Management of fish waste is primarily addressed under the first of these outcomes: the DOC/FNZ mitigation standard 1.1 requires that fish waste is not discharged from the vessel immediately before or during shooting or hauling, while standard 1.2 requires the batch discharge of fish waste occurs whilst the net is being towed.

Some aspects of the mitigation standards for scampi trawl fisheries are implemented through statutory measures, specifically the Seabird Scaring Devices Circular 2010 which specifies the seabird scaring devices that are to be used by trawl vessels >28 m. However, the mitigation standards relating to fish waste management are primarily implemented by non-regulatory management measures as set out in the Deepwater Group's (DWG) Scampi Fisheries Operational Procedures (Deepwater Group 2018).

2. THE SCAMPI FISHERY

Scampi (SCI) was introduced to the Quota Management System (QMS) on 01 October 2004. Statutory catch and effort data from the fishing years 2010–2019 are used in this report to characterise the New Zealand scampi fishery. Throughout the report the fishing year is labelled by the second calendar year; for example 2019 indicates the fishing year from 1 October 2018 to 30 September 2019.

Scampi is managed as eleven fish stocks (Figure 1), but catch history data (Fisheries New Zealand 2020b) demonstrates that the target scampi fishery is currently limited to five of these stocks (SCI 1, SCI 2, SCI 3, SCI 4A and SCI 6A).

2.1 Fishery data

Within these five scampi stocks, 99.6 % of the scampi catch is taken by scampi-targeted bottom trawling.

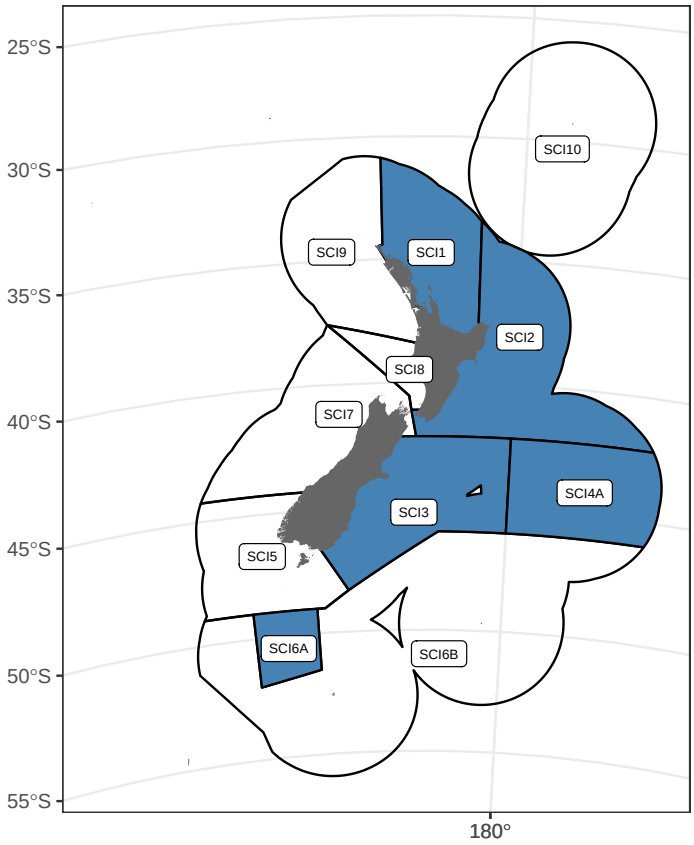

Figure 1: Quota management areas for scampi with key fishing areas SCI 1, SCI 2, SCI 3, SCI 4A, SCI 6A highlighted.

All scampi-target trawl effort since 1 October 2009 has been reported on 'high-resolution' statutory returns that provide at least one latitude/longitude position per tow (Figure 2).

A consequence of the recent migration to the ER regime (the effort denoted by 'ERS - Trawl' in Figure 2) is that vessels must now report all disposals of unwanted catch, including returns of fish below the minimum legal size (sub-MLS fish) that were not recorded in the previous paper-form based recording regime.

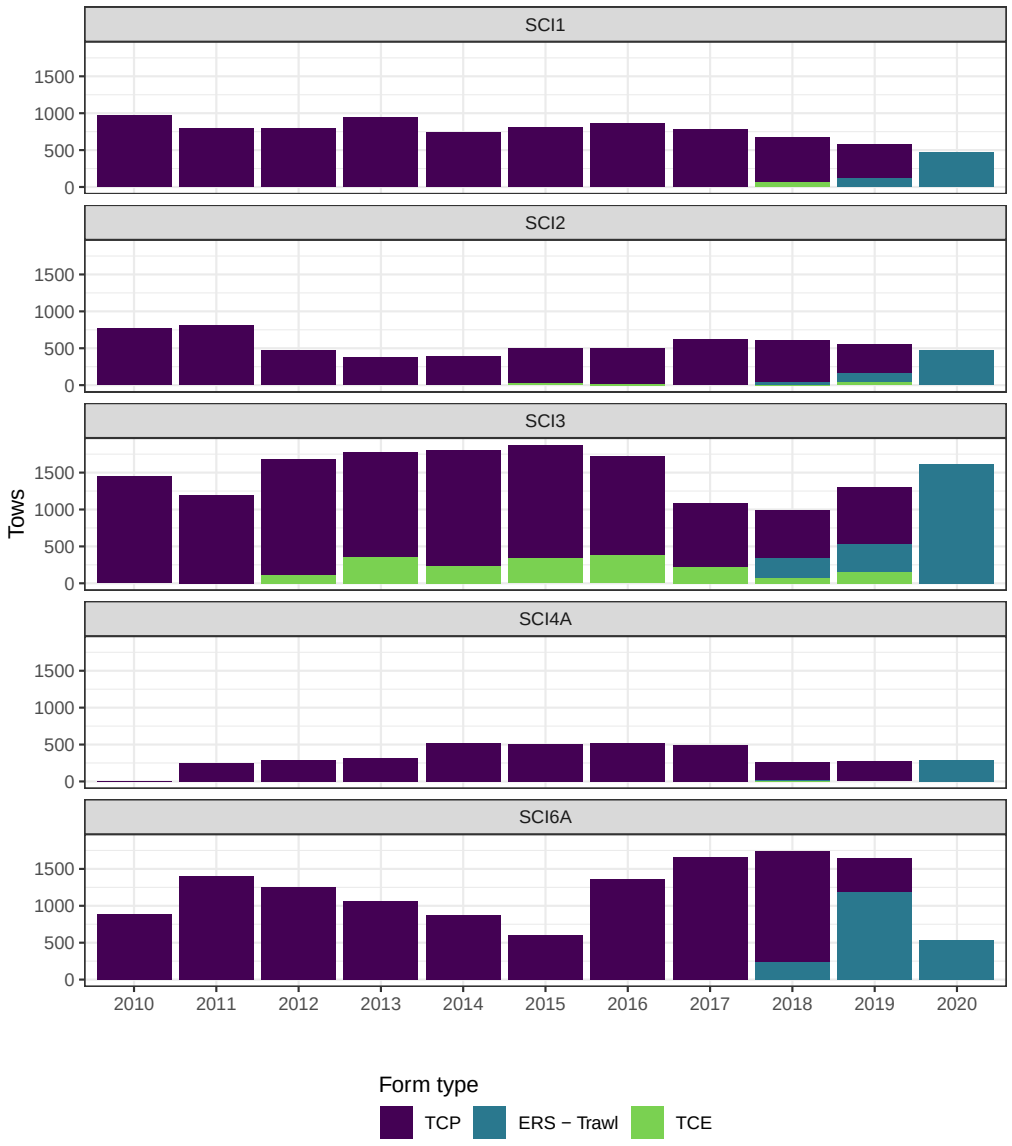

Figure 2: Time series of fishing effort and reporting forms used on trips landing scampi from the fish stocks with scampi target fisheries. The abbreviations TCP and TCE denote the Trawl Catch, Effort and Processing Return and the Trawl Catch and Effort Return, respectively, whereas ERS - Trawl denotes the ER regime. Data from the incomplete 2020 fishing year is included here to demonstrate the transition to the ER regime.

2.2 Fishery overview

The target scampi fisheries occur in localised areas within each quota management area (Figure 3). Fishing occurs year-round in SCI 1 and SCI 3, but some seasonality is evident in the other fisheries (Figure 4).

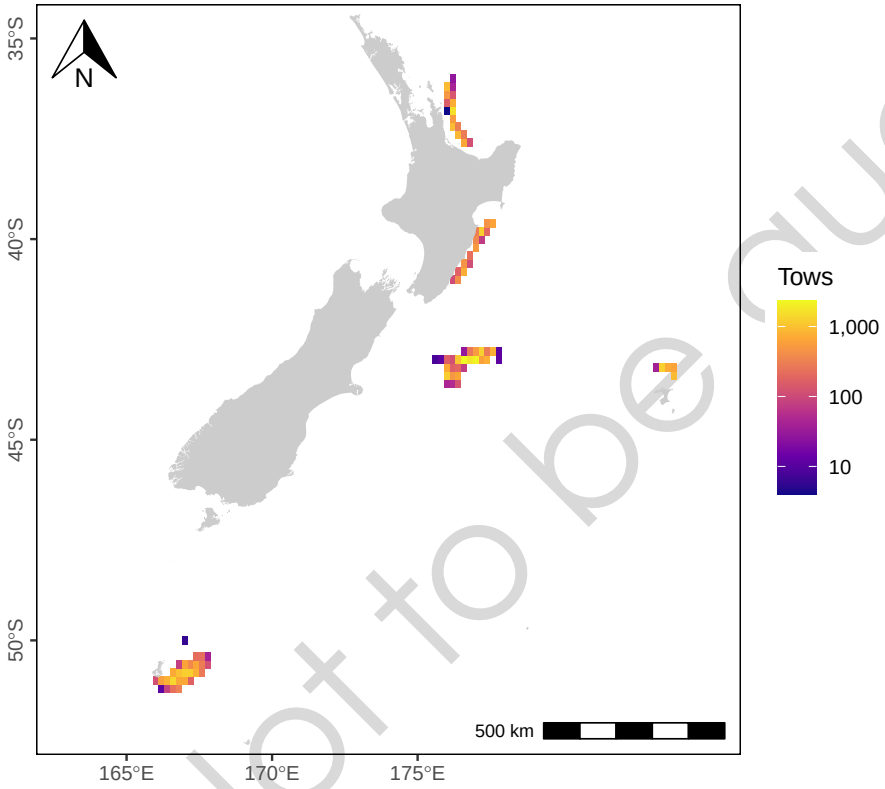

Figure 3: Total scampi target bottom trawl effort in the five key scampi fisheries (SCI 1, SCI 2, SCI 3, SCI 4A, SCI 6A) from 1 October 2009 to 30 September 2019.

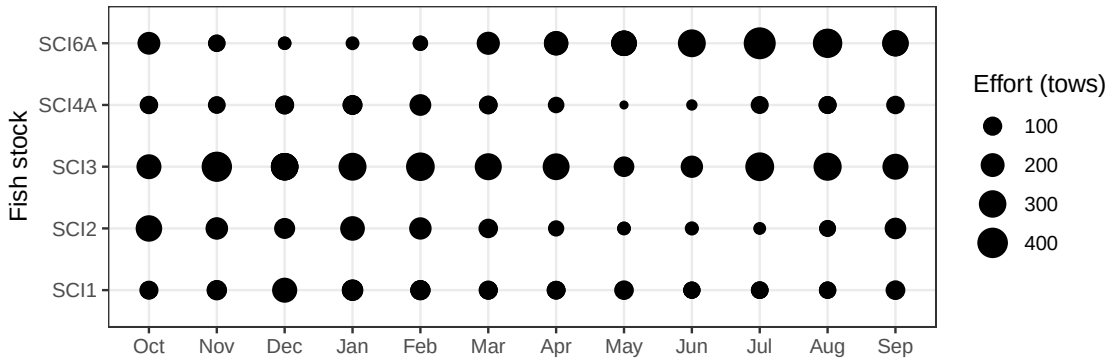

Figure 4: Total scampi target bottom trawl effort by month in the five key scampi fisheries from 1 October 2009 to 30 September 2019.

2.3 The scampi fleet

240 In the period since 1 October 2009, fourteen vessels have been part of the scampi fleet (after removing a vessel that only carried out two scampi-target trawls in this period). Three vessels left the fleet in this period (Figure 5). Only three scampi vessels fishing in the period had registered lengths >28 m (Figure 6).

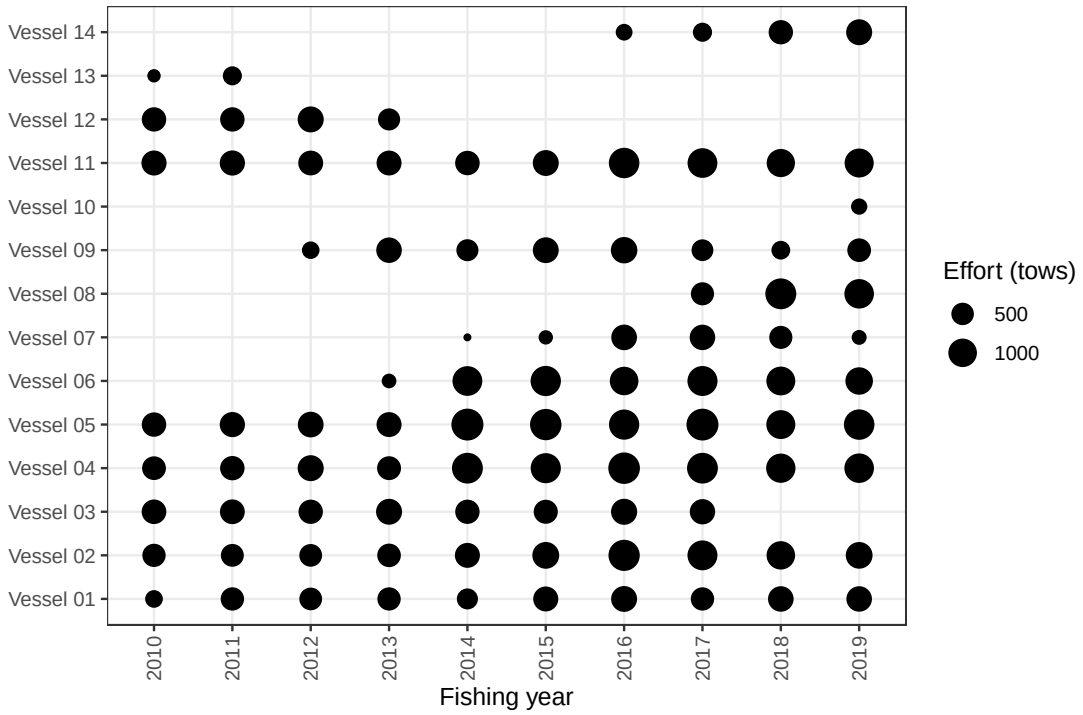

Figure 5: Total scampi target bottom trawl effort by individual vessels (anonymised vessel IDs) aggregated across the five key scampi fisheries (SCI 1, SCI 2, SCI 3, SCI 4A, SCI 6A) from 1 October 2009 to 30 September 2019.

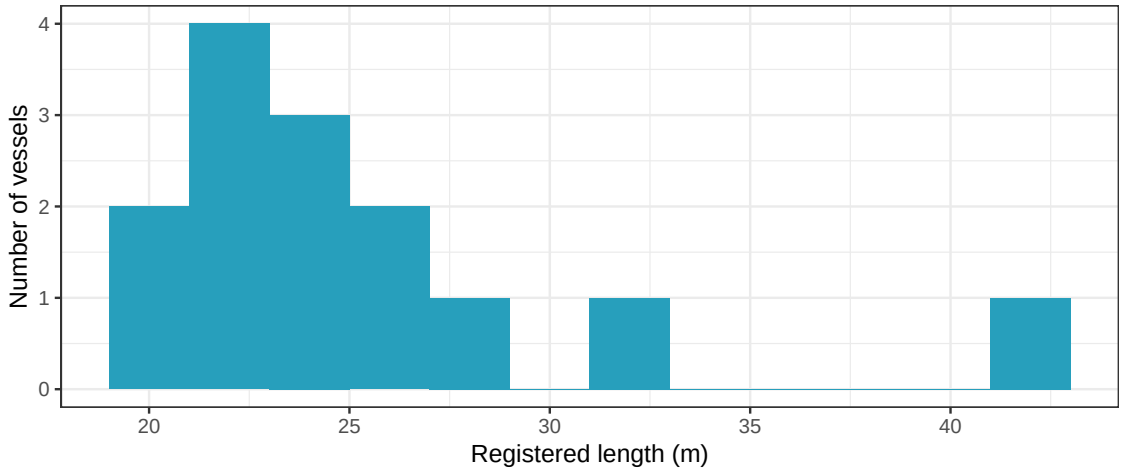

Figure 6: Registered vessel lengths for vessels in the scampi trawl fleet from 1 October 2009 to 30 September 2019.

Three to five vessels have participated in the SCI 1 fishery over the last decade, but in the other four stocks the number of vessels involved has shown a gradual increase (Figure 7), with the greatest change in the SCI 4A fishery which had a single vessel operating in the 2010 fishing year but peaked at eight vessels in 2018.

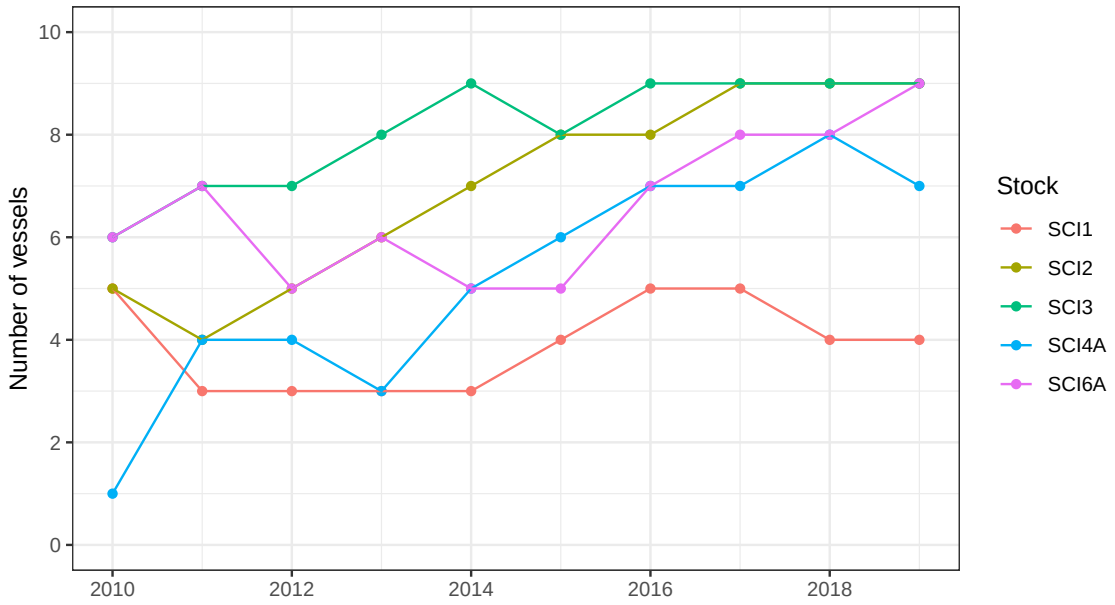

Figure 7: Vessel numbers in the five key scampi fisheries from 1 October 2009 to 30 September 2019.

2.4 Discarding in scampi fisheries

Tropical shrimp trawl fisheries have been identified as having the highest discard rates amongst the world's marine fisheries (Kelleher 2005). In New Zealand, analyses of observer data from 2003–2016 indicated that scampi comprised 19% (by green weight) of the catch of scampi target trawling (Anderson & Edwards 2018); by way of contrast, 79% of the catch of the squid target trawl fishery was estimated to be arrow squid.

Key non-scampi catches in scampi target trawls included the non-QMS species javelinfish (18%) and other rattails (12%), and the QMS species sea perch (10%), hoki (5%), ling (4%), and ghost shark (3%). Observers recorded that 95% of javelinfish and 91% of rattails were discarded (Anderson & Edwards 2018).

With the introduction of the ER regime, fishers are now required to complete a disposal report for all fish returned to the sea. Landings reports for retained catch indicate whether catch is landed whole ('green') or in a processed state. As a result, the ER data should provide a full picture of fish waste discarding by vessels targeting scampi.

Because the ER regime has not been in place for all scampi trawl effort for a complete fishing year (Figure 2), the potential of these data is examined here by considering the available ER data (i.e. from 2018–2020). Data were restricted to trips that landed a single scampi stock in order that regional differences could be evaluated. As ER data have been available for a short time period, these results should be considered preliminary.

Regional differences in the fate of catch from scampi trips are evident (Figure 8). In SCI 1 and SCI 4A >50% of the catch (by weight) is retained in an unprocessed form. Discards are slightly lower in SCI 1 than SCI 4A (approx. 24% of catch vs. 28%), but more of the retained catch is processed in SCI 1 (approx. 22% of catch vs. 14%). Discards are greatest in SCI 6A with <50% of the catch weight retained. Similar quantities of catch are retained unprocessed in SCI 6A and SCI 3, but a higher proportion of the catch is processed at sea in SCI 3.

Tows in SCI 1 provide high yields of scampi with the lowest average discards, whereas tows in SCI 3 have both the greatest quantities of discards and the greatest quantity of processed catch (Figure 9). The greatest average catch of scampi per tow is from SCI 4A (>400kg), associated with intermediate quantities of discards (around 260kg) and processing (approx. 14% of catch). Fishing patterns are similar across the scampi stocks (Table 1), although the average number of tows and fishing duration per vessel-day is lower in SCI 4A.

These patterns reflect a reasonably current snapshot of catch, discarding and fishing patterns across the scampi stocks; changes will occur over time in response to variation in the abundance of scampi and associated bycatch stocks. Nevertheless, the information is informative in terms of the regional variation in quantities of material

285 that must be managed via the batch-discharge regime, the available non-fishing time for safe discharge, and the number of setting/hauling periods when discharge must be avoided altogether.

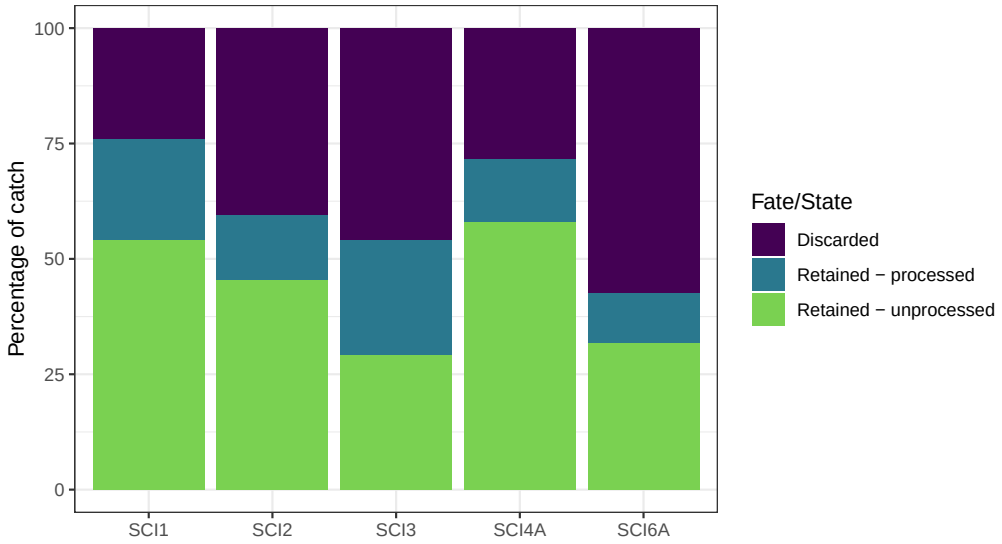

Figure 8: Percentage of catch (by weight) retained unprocessed, retained but processed at sea, and discarded, for trips reporting using the ER regime and landing to a single scampi stock.

Table 1: Average daily tows and fishing duration per vessel, for trips reporting under the ER regime and landing to a single scampi stock. The ER regime was introduced from the 2018 fishing year but was not used by all scampi vessels until 2020.

Scampi stock	Tows per day	Fishing duration (hrs)
SCI1	2.6	18.3
SCI2	2.5	17.7
SCI3	2.4	17.0
SCI4A	2.0	13.7
SCI6A	2.5	18.0

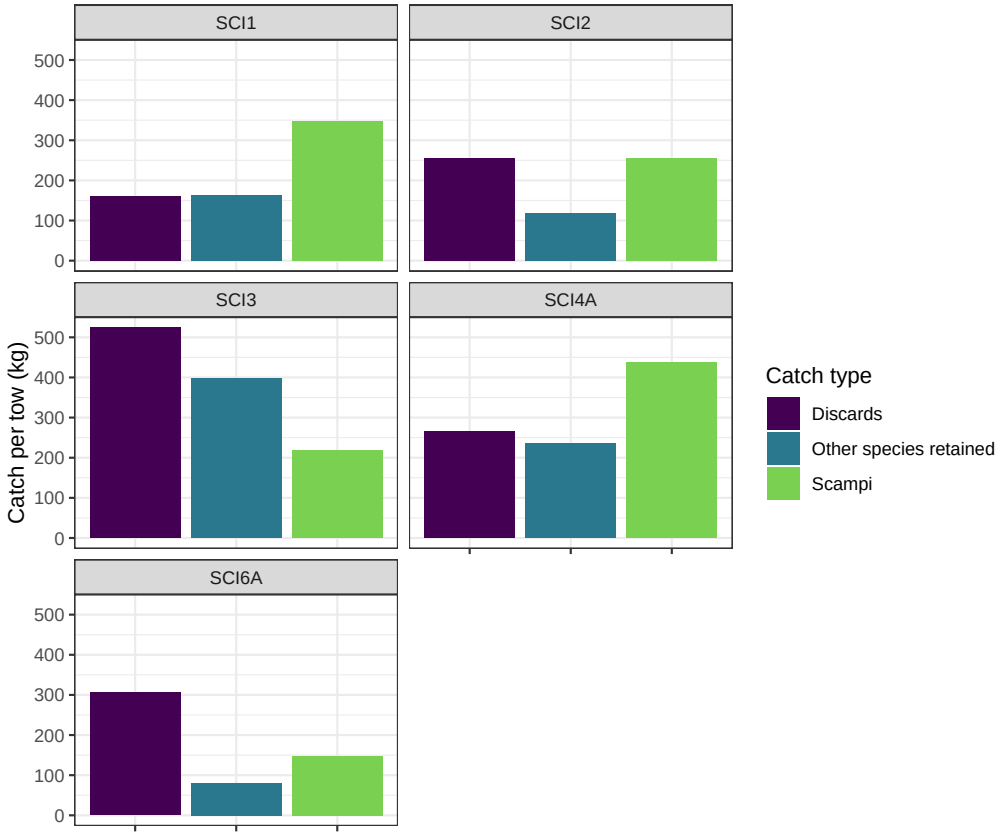

Figure 9: Overall catch per tow of scampi and other retained catch and discards, for trips reporting using the ER regime and landing to a single scampi stock.

2.5 Reported seabird captures

Fisher reporting of seabird captures indicates that annual captures are generally under
290 50 birds per year in all areas (Figure 10), with SCI 6A in 2011 being the key outlier when the annual captures exceeded 100 birds. For the recent period under the ER regime, reported seabird capture rates have been lowest in the northern scampi fisheries (SCI 1 and SCI 2) and highest in the subantarctic (SCI 6A; Table 2).

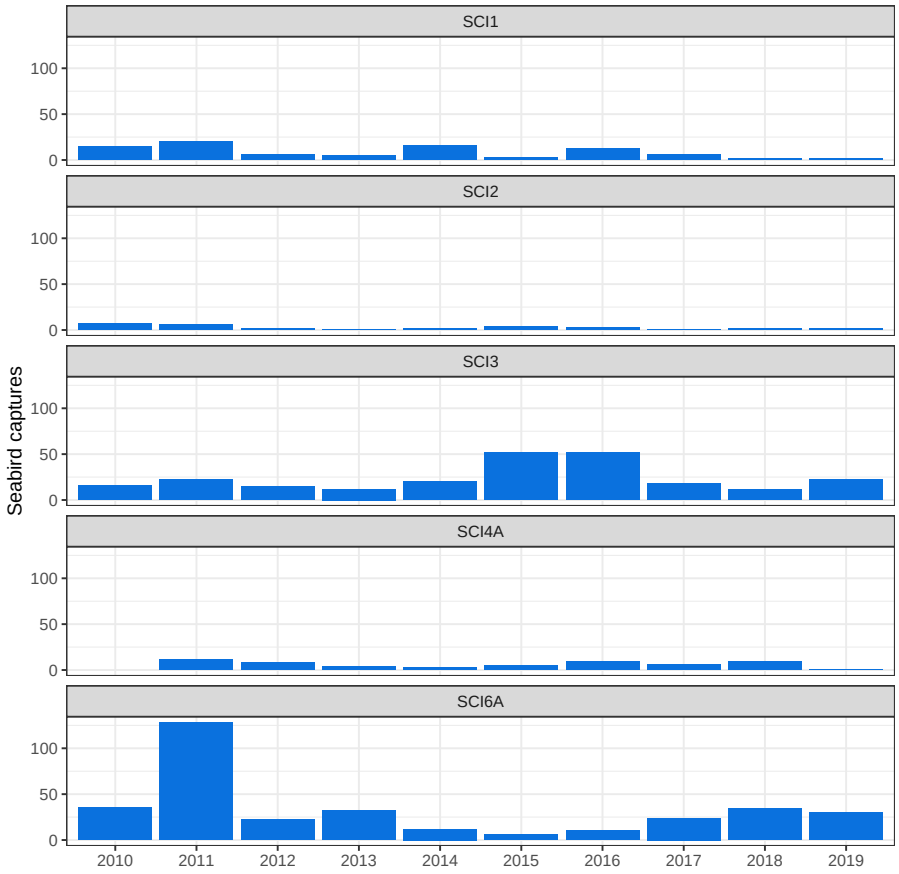

Figure 10: Seabird captures from scampi target bottom trawls reported via the FNZ statutory catch and effort data between 1 Octover 2009 and 30 September 2019.

Table 2: Average seabird captures per tow, for trips reported using the ER regime and landing to a single scampi stock. The ER regime was introduced from the 2018 fishing year but has only extended to all scampi vessels in the 2020 fishing year.

Scampi stock	Captures per 100 tows
SCI1	0.00
SCI2	0.24
SCI3	1.19
SCI4A	1.04
SCI6A	1.88

3. SCAMPI VESSEL MANAGEMENT PLANS

Vessel-specific procedures for the management of discards and processing waste to minimise risks to seabirds are specified in scampi VMPs, required as part of the Operational Procedures of the DWG.

The DWG represents participants in New Zealand's major deepwater commercial fisheries, working in conjunction with FNZ. DWG maintains Operational Procedures[1] for participants in the fishery that detail best practices for aspects of commercial fishing activity, particularly with respect to managing interactions with marine protected species. These procedures have recently been reflected and codified as 'Mitigation Standards' (Department of Conservation and Fisheries New Zealand 2019).

DWG's 'Ten Commandments', which summarise operational requirements for scampi vessels (Appendix C), include having a well-managed fish waste control system that ensures no continuous, uncontrolled or ad hoc discharge occurs when towing and ensuring all fish waste, discards and offal are held during shooting and hauling. In their more detailed Operational Procedures, Deepwater Group (2018) indicate that vessels employing batching should have a dedicated storage/holding/batching bin/tank/conveyor with the capacity to hold all offal, fish waste and discards. Vessels are required by the Procedures to hold fish waste for a minimum of 30 minutes and batch discharge in less than five minutes when towing (and specifically not when shooting or hauling).

A key part of the DWG Operational Procedures is the requirement that each vessels has an individual VMP that details the vessel-specific procedures and processes to reduce risks to protected species, especially seabirds and marine mammals.

VMPs were originally introduced by DWG in 2008, and Sanford Ltd agreed to adopt these for their scampi vessels (John Cleal, pers. comm.). The initial VMPs for the

[1] https://deepwatergroup.org/newsresources/op-manual/

scampi fleet were based on a shared template that detailed generic procedures that also applied to larger fresher vessels (i.e. vessels that primarily pack fish whole rather than processing at sea).

A new scampi VMP template was introduced in 2014 and extended to the entire scampi fleet. As a result of a large number of observed seabird captures in the 2011 fishing year (Figure 11), there was a particular focus on the mitigation of net captures in the centre trawl of vessels using triple-rig (three net) trawls. This work included the development of a net-restrictor (Pierre et al. 2013). The 2014 updates also included the production of individual vessel risk management plans.

Scampi VMPs were then updated in 2018, with the separation of the fleet-wide Operational Procedures from the individual vessel-specific plans (John Cleal, pers. comm.).

All scampi vessel operators gave the DWG permission to share their scampi VMPs with Pisces Research for the purposes of this project. These detail the vessel specific equipment and systems in place for managing fish waste in order to meet the requirements of the DWG Operational Procedures, but do generally not give information to infer whether vessels would routinely exceed the minimum standards for batching intervals and discharge time.

Holding tank capacities used in fish waste batching were stated for two vessels (350 kg and 500 kg), but otherwise the current scampi VMPs simply indicated the use of batching to prevent discharge of waste when shooting and hauling, and to prevent continuous discharge when towing.

3.1 Observer review of vessel procedures

On observed trips, FNZ observers currently collect two types of information on the implementation of the VMPs and fish waste management practices, as follows.

A review form for observers to assess vessels' adherence to their VMPs was introduced in 2011 (Department of Conservation and Fisheries New Zealand 2019) and is used in annual reporting against the targets set under the National Deepwater Fisheries Plan (Fisheries New Zealand 2020a). This information is essentially qualitative (i.e. yes or no answers to a series of questions; see Appendix B), but is the most consistent and reliable information available on vessel practices on a trip-by-trip basis.

In addition to carrying out structured data collection, observers also gather ad hoc information on vessel practices. Information on a vessel's fish waste management strategy is typically obtained during discussions between FNZ staff and the observer during the observer's post-voyage debrief (Daniel Kerrigan, pers. comm.). If a debrief is not possible then the fish waste management strategy used during the trip is reconstructed from the observer's trip report or comments on the VMP audit form.

FNZ managers share this information with operational staff in the DWG who manage the implementation of, and conformance with, VMPs across the deepwater fleet. Summary information on the fish waste management strategies utilised on board scampi vessels during all observer trips between 1 October 2017 and May 2020 was provided by MPI and is reproduced in Appendix A. In most cases, the observer comments indicate that vessels are following their VMPs. However, the commentary does highlight some occasions where vessels have failed to implement batch discharge processes, although with little information on why this might be occurring. There is also evidence of active management to correct onboard procedures to meet the requirements of the VMP (i.e. skippers monitoring and correcting crew practices) and of vessels implementing additional measures to reduce the risk to seabirds when waste is discharged.

3.2 Vessel Management Plan review form data

MPI provided copies of 45 VMP review forms from scampi trips carried out on 16 vessels between 2011 and 2020. The information from the first page of the form (Appendix B) was keyed. There were three versions of the form: version three was used during the 2009–10 fishing year, with only one version three form being keyed; version four was used from 2010–11, with 31 version four forms being keyed; an updated version (which we refer to as version five) was used from 2018–19, with 13 version five forms being keyed.

Information from the forms that was related to potential seabird bycatch was standardised between the forms, focussing on information available from each version of the form. Of the trips that had the VMP field completed, 95.2% were reported as having a VMP, and on the trips that carried VMPs, the crew were reported as being familiar with its content on 97.5% of trips.

The observers recorded whether the vessel held fish processing waste during shooting and hauling, with the waste being held during 85.7% of trips. As reported by the observers, 66.7% of the vessels had systems in place (such as grating) to prevent fish waste from being discharged during processing. The recording of this feature appeared inconsistent, however, with some vessels being reported as having and not having systems in place during different trips.

Other management measures to reduce the attraction of seabirds to the vessel during fishing include the net being cleaned of fish ('stickers') before being re-shot: this was carried out for 51.1% of trips. The Mitigation Standards (Department of Conservation and Fisheries New Zealand 2019) only require the removal of as many stickers 'as practicable' recognising that removal of all stickers could require the net to be on the surface for longer than is necessary. Observers also assessed that the time period for which the net was on the surface was minimised during 90.9% of trips. This is a qualitative judgement by observers, and does not include recording data on the time

that the net was on the surface. Gear failure, which can lead to the net being on the surface of the water for longer than normal, is a potential factor that could lead to increased seabird bycatch and was reported as occurring on 15.6% of trips.

A net restrictor has been proposed as a solution to reducing seabird bycatch in scampi trawl fisheries (Pierre et al. 2013). The net restrictor prevents an increase in the opening height of the centre net from occurring when the net is being hauled, thus making it harder for diving seabirds to enter the net. The use of a net restrictor was included on version five of the VMP review forms, however this information was only available for five trips. The net restrictor was recorded as being used on two trips. It should be noted that the DWG guidelines (Appendix C) only specifically advise net restrictors as a strategy for triple-rig trawlers.

Version five of the VMP review form also introduced two new items that are specifically relevant to the assessment of batch discharge; item 10 and 11 require the observer to assess whether the discharge of fish waste was managed as per the VMP, and to confirm whether any periods of continuous fish waste discharge occurred during towing. This information is available for 13 trips between 2018–2020. Vessels were assessed as managing waste in accordance with their VMP on 100% of these trips, but continuous waste discharge was nevertheless recorded on one trip. This may represent a recording error, as no explanation was included.

The VMP forms were sometimes not fully completed by the observers. Leaving aside the fields that were only introduced on the recent version of the form, the other fields of potential relevance to seabird bycatch were only fully recorded for 77.8% of trips. However, this includes cases where the VMP review question was answered as 'Unknown' or 'Not Applicable'. The latter option was only available on VMP review form version 5, and so missing information may be confounded in older forms.

4. SEABIRD CAPTURE ESTIMATES AND ABUNDANCE AROUND VESSELS

Fleet-scale estimates of seabird captures in scampi fisheries have been made by fitting generalised linear models to the capture data collected by observers (Abraham & Richard 2018). During the 2017–18 fishing year, an estimated 130 (95% credible interval: 99 to 165) were caught in scampi trawl fisheries, with 12.5% of scampi trawl fishing being observed (Abraham & Richard 2018). Estimated captures of seabirds are highest in the Chatham Rise (most of SCI 3, SCI 4) and Auckland Island (SCI 6A) areas, at around 50 birds per annum, with lower numbers of captures in the Bay of Plenty (SCI 1) and East Coast North Island (SCI 2) areas (Figure 11).

The estimated captures reflect changes in fishing effort and in the underlying estimated capture rate. No clear trends in the captures are apparent. The large peak in captures (a mean of 141 birds; Figure 11) during the 2010–11 fishing year in the Auckland Islands (SCI 6A) was due to a high number of observed captures (86; Abraham & Richard 2018) in that fishery during that year. In interpreting these plots however, it is important to note that the scampi fishery includes vessels that are <28 m long, and vessels that are >28 m. In the estimation, estimates of captures by trawl vessels <28 m is made using a model that has no annual variation (due to the generally low observer coverage in small-vessel trawl fisheries). For this component of the fishery, the estimated seabird capture rates do not vary annually.

Although not fully comparable in terms of area or time period, the seabird capture estimates based on observer data for the 2018 fishing year (Table 3) confirm the impression from the fisher reporting (Table 2) that capture rates are higher on the Chatham Rise and in the subantarctic.

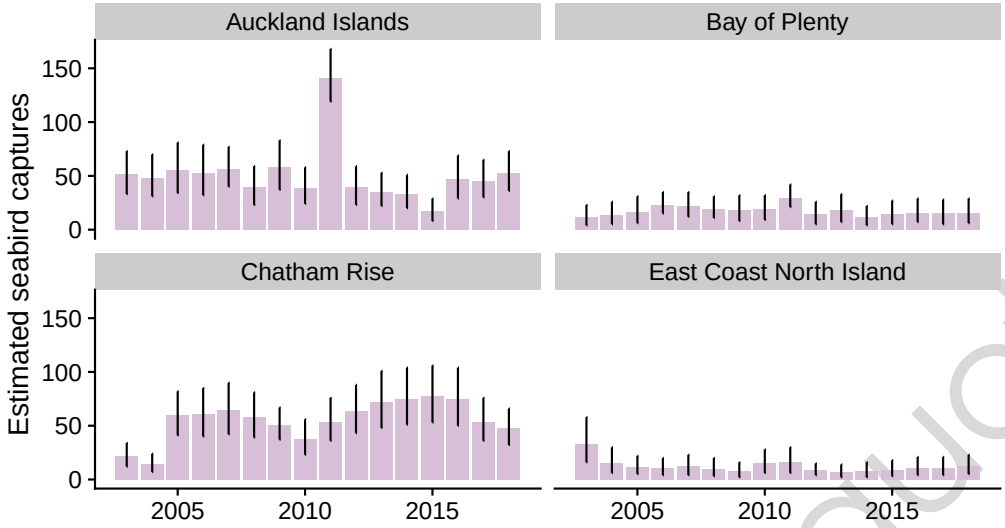

Figure 11: Estimated capture of seabirds during scampi fishing, by the areas used in protected species capture (PSC) reporting. The bars indicate the mean annual estimated captures, with the lines showing the 95% credible intervals. Fishing within the scampi QMAs is associated with the areas as follows: Auckland Islands (SCI 6A), Bay of Plenty (SCI 1), Chatham Rise (SCI 3, SCI 4) and East Coast North Island (SCI 2)

Table 3: Average seabird captures per tow in the scampi fishery in the 2018 fishing year, for the standard estimation areas (Abraham & Richard 2018).

Area	Captures per 100 tows
Auckland Islands	3.05
Bay of Plenty	2.27
Chatham Rise	3.80
East Coast North Island	2.06

Observers also make counts of seabirds around fishing vessels, generally during the first fishing event of the day but sometimes more frequently depending on the other duties of the observer (for a detailed description of the data collection and processing see Richard et al. 2020). An initial analysis of these data demonstrated that they are informative about seabird distribution, supplementing maps based on expert knowledge and data from seabird tracking (Richard et al. 2011). This dataset has recently been updated to

include data up to November 2018 (Richard et al. 2020), and the dataset consists of 6563 observations periods when counts were made of seabirds around trawl vessels targeting scampi.

On average, around 150–250 seabirds are attending scampi trawl vessels during the haul. In most of the QMAs the most frequently attending genus of seabirds is *Thalassarche* (mollymawk), while in the Bay of Plenty fishery (SCI 1) *Puffinus* (sooty shearwater and flesh-footed shearwater) is the most frequently attending genus.

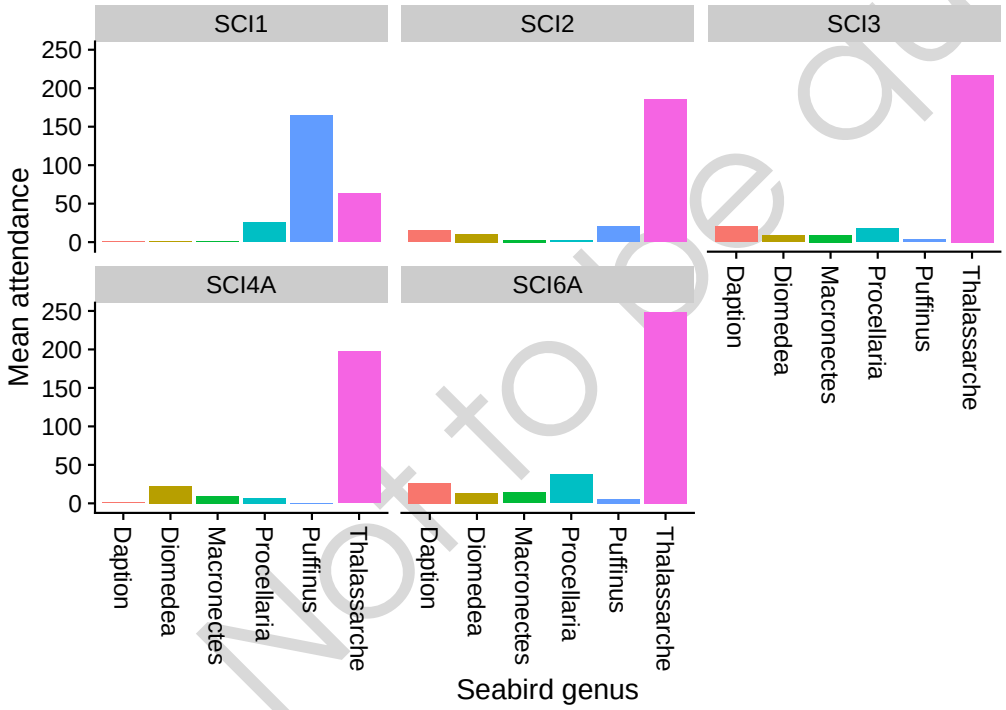

Figure 12: Mean attendance of seabirds at scampi fishing vessels, by genus and QMA, during the haul. Genera with a mean attendance of <1 bird are not shown. The genera are *Daption*: Cape petrel; *Diomedea*: great albatross; *Macronectes*: giant petrel; *Procellaria*: e.g. black petrel, white-chinned petrel; *Puffinus*: e.g. sooty shearwater, flesh-footed shearwater; *Thalassarche*: mollymawk.

Of the 45 trips in the seabird count dataset, 26 are represented in the VMP review data. However, some of the trips in the count data but missing from the VMP data are recent (i.e. after 2011) so it is likely that VMPs were in place on those vessels. The dataset is not well balanced in terms of important covariates such as area and year (Figure 14). While there are trips in SCI 6A in 2011 and 2012 on vessels with and without VMPs in place,

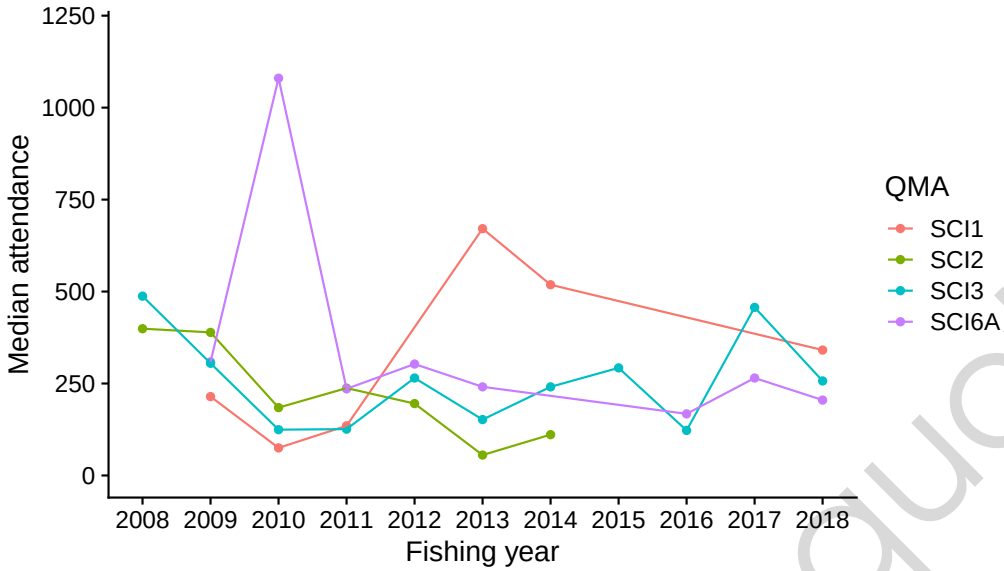

Figure 13: Median attendance of seabirds at scampi fishing vessels, by year and QMA.

and the trips with VMPs have lower median seabird attendance, there is clearly limited opportunity to explore other important covariates (e.g., vessel effects) with these data.

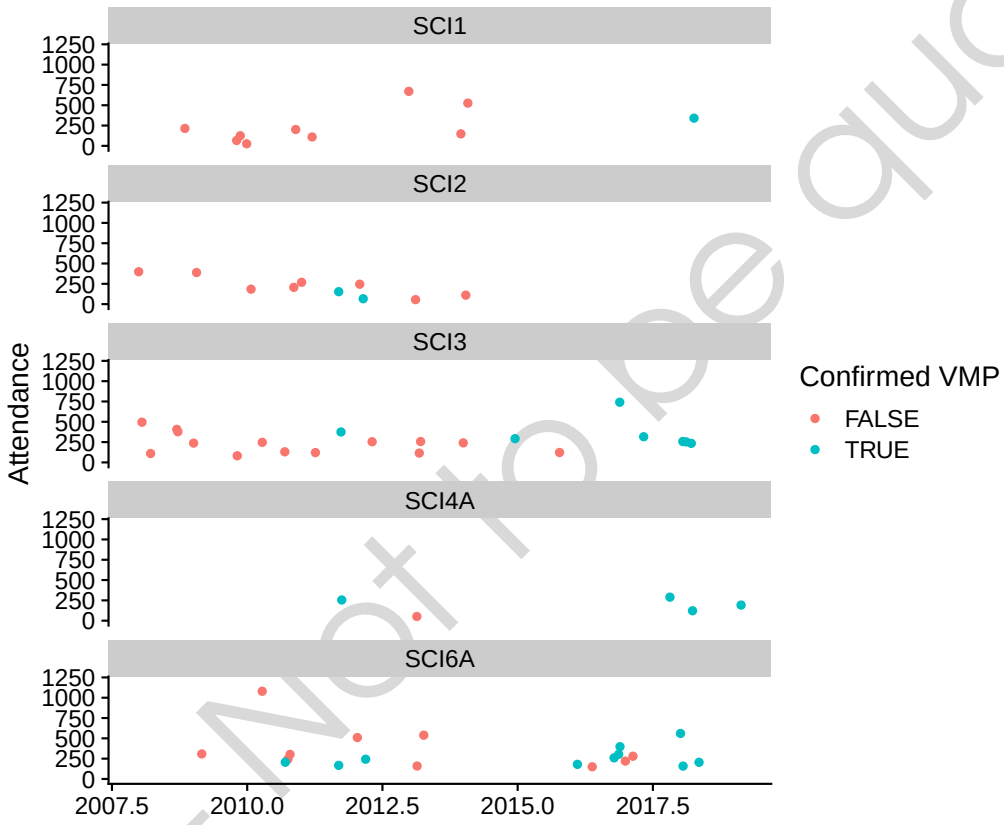

Figure 14: Median attendance of seabirds at scampi fishing vessels, by trip, year and VMP status.

5. DISCUSSION

Batch discharge is considered a proven and recommended method for managing discards and fish processing waste in pelagic and demersal trawl fisheries where fish meal production and retention of offal and discards are impracticable (Agreement on the Conservation of Albatrosses and Petrels 2019). ACAP recommends that, where feasible, waste should be retained for at least two hours between batches, and preferably four hours or longer.

Batching of fish waste is the key approach adopted in scampi VMPs in order to prevent the continuous discharge of fish waste while towing. Operational procedures (Deepwater Group 2018) require a minimum retention period of 30 minutes. Experimental work in New Zealand (Pierre et al. 2010, Pierre et al. 2012b) previously established that holding periods of at least four hours were required to reduce seabird attendance at fishing vessels, but noted that shorter retention periods may still be effective. Specifically, Pierre et al. (2012b) concluded:

> Second to holding waste for discharge when fishing gear is out of the water, discharging waste rapidly in maximally large batches, as infrequently as possible, is the recommended practice for reduction of seabird interactions with trawl warps.
>
> (a) Holding waste for 30 min can reduce the abundance of small species of seabirds attending vessels. However, holding periods of up to 8 h may be required.
>
> (b) Holding waste for 2 h can reduce the abundance of large seabird species at vessels. However, holding periods of 4 h may be required.
>
> (c) Eight-hour holding periods are preferable to 4-h holding periods, to further reduce seabird abundance at vessels.

However, (Pierre et al. 2010) also noted that timing of batch events relative to net setting

and hauling is important. Longer holding times can also impact on the practicality of discharging the batch as rapidly as possible. The discharge of a batch results in birds rapidly transferring from the air around the vessel to the water to feed. Avoiding discharge of waste batches prior to hauling may, therefore, assist in mitigating seabird net captures, which is of particular relevance in scampi trawl fisheries (Pierre et al. 2013).

In reviewing discharge management on small (<28m) vessels in New Zealand, Rexer-Huber and Parker (2019) noted that they could 'not assess the effect of trawl batching on seabird capture rates since our information was constrained by a high proportion of trips with unknown batching, and when batching was mentioned, we could not assess how it was conducted from the information available' and recommended that the 'timing, location and efficacy of small-trawler batching should be investigated further'.

The present project (MIT2019-04) aimed to use existing observer data to investigate variation in batching intervals in the scampi fishery and determine if an 'optimum' batch discharge interval could be identified in terms of reducing both seabird activity around fishing vessels and seabird interactions with fishing gear. Unfortunately, it became apparent that observers have not been tasked to collect quantitative information on batching activity. The detailed observation protocols used for the studies between 2006–2010 (Abraham et al. 2009, Pierre et al. 2010, Pierre et al. 2012a, Pierre et al. 2012b) were onerous, requiring a dedicated observer to collect seabird abundance data at 5–minute intervals for a period straddling the batch discharge event. It is unlikely that this work could be readily incorporated into the duties of routine observer coverage in the scampi fishery where a range of data collection tasks are carried out on behalf of the FNZ and DOC.

Although there is no data collection protocol for the collection of quantitative information on batching, *qualitative* information is available. The free-form comments in observer reports, collated by MPI and communicated to the DWG (Appendix A), provide general information on whether a vessel is successfully implementing its VMP

and if any specific issues have arisen. During the project, we also identified the use of the standardised VMP review forms (Appendix B). These data are not currently entered into the Centralised Observer Database (COD) but are valuable because they provide a standardised approach for observers to report on a vessel's adherence to its VMP, albeit in a qualitative sense and at the resolution of a trip.

However, while this information is clearly valuable to fisheries managers in assessing whether vessels are successfully implementing their VMPs and minimising risks to seabirds, there is spatial and temporal confounding that limits the potential for investigating the extent to which these factors explain variation in seabird attendance at vessels. In general, we suggest that any further investigations of the effect on variation in batch discharge time on seabird attendance at vessels would be better served by an experimental approach where time between discharge is varied while holding other covariates constant. Observer comments (Appendix A) indicate that some vessels in the scampi fleet are capable of holding processing waste for an entire tow, so these vessels could provide suitable platforms for comparing these long holding intervals with the minimum (30 minute) intervals required by the current Operational Procedures.

There is currently limited information on the extent to which scampi vessels are, in fact, routinely discharging at the minimum required interval, or typically achieving much longer intervals. Characterising actual batching behaviour would be a sensible first step, before embarking on further experimental trials. Although data on batching practices could be collected by observers, it may also be possible to collect this information from the fleet by requesting logs be kept of discharge times and volumes. Consultation with vessel operators would be required to determine whether a simple paper log could be kept, or if some form of electronic recording would be appropriate. For example, on vessels with specific holding tanks, a photograph of the tank prior to each discharge would provide discharge times (from the photo timestamps) and allow an estimate of fish waste volume to be made.

Richard et al. (2020) have demonstrated the value of existing observer seabird count data, and also some of the limitations of these data. While the observer counts provide a wide scale dataset, they do not provide counts at the fine temporal scale used in previous experimental studies. Pierre et al. (2010) noted that, when batch discharges occurred, numbers of birds on the water increased faster than could be resolved with the 5 minute observation interval. In future, any detailed studies of the response of seabirds to batches should consider the potential to quantify attendance from video records rather than counts by onboard observers.

All New Zealand commercial fisheries have recently transitioned to the ER regime introduced under the Fisheries (Reporting) Regulations 2017. Although there is not yet a complete fishing years ER data for any of the scampi fisheries, the fact that the ER data provide comprehensive data on fish disposals is clearly helpful in identifying where the discarding of unwanted bycatch and fish processing waste is most prevalent. Our preliminary analysis highlights the fact that the SCI 3 fishery has the greatest per tow quantities of discards, and this is also the fishery with the greatest proportion of processed catch.

6. ACKNOWLEDGEMENTS

This work was funded by the Department of Conservation's Conservation Services Programme project MIT2019-04, with funds cost-recovered from quota owners in all eleven scampi fish stocks. Dr Karen Middlemiss (DOC marine science adviser) managed the project for CSP. Scampi vessel operators gave the DWG permission to share the Scampi Vessel Management Plans referred to in this report, and this was facilitated by Richard Wells and John Cleal. FNZ gave permission to use extracts from their databases, supplied summaries of observer reports from scampi vessels, and provided copies of VMP review forms from observed trips. FNZ replogs 11790 and 13105 were used to provide the statutory catch and effort data used in this report. Daniel Kerrigan and

570 William Gibson (both MPI) clarified the data collection undertaken by MPI observers placed on scampi vessels.

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APPENDIX A MPI summaries of observed scampi vessel fish waste management strategies

This appendix contains summaries of observer information on scampi vessel fish waste management procedures for 2017/18 to 2019/20. These are by MPI fisheries management staff following observer debrief meetings and shared with DWG operational staff who provide feedback and support to vessels.

In most cases, the observer comments indicate that vessels are following their VMPs. Highlighting (added for this report) illustrates cases where there is evidence:

Yellow highlight of vessels failing to implement batch discharge processes;

Blue highlight of active management to correct onboard procedures to meet the requirements of the VMP; and

Green highlight of vessels implementing additional measures to reduce the risk to seabirds when waste is discharged.

Vessel	Fishing year	Fish waste management strategy
g	2019/20	Unwanted fish accumulated in a hopper during sorting and were then batch discharged through the scuppers whilst towing. Processing offal (LIN/STA heads etc.) were discharged in ad-hoc fashion whilst towing; crew would initially throw over starboard side but skipper spoke to crew and instructed them to discharge waste over the stern. Crew would remove stickers as practicable
h	2019/20	Batch discharged. Fish waste would accumulate in batching tank during sorting and be discharged when crew thought a sufficient amount had accumulated. No grating on scuppers however crew would take to ensure fish did not fall to the deck with only small quantities (estimated at a couple of kgs per sort) discharged through the scuppers. Crew did not remove stickers as this would increase the amount of time the net spent on the surface.
b	2019/20	Fish waste batch discharged outside shooting hauling.
j	2019/20	Fish waste generally held on board during shooting/hauling. On occasion, discharge occurred during shooting. When sorting, fish waste would be continuously discharged. If the catch was small, the two nets would be on board when sorting occurred but with larger catches, one net would remain in the water while the other was sorted on deck. All practicable stickers removed prior to shooting.
d	2018/19	Batch discharged. Turn conducted just before discharging to keep the fish waste away from the warp.
f	2018/19	Batch discharged. Stickers removed when practicable.
e	2018/19	Fish waste would be stored in a discharge hopper during sorting and batch discharged when full. Between three and four discharge events per haul. On one occasion the hopper overfilled resulting in small amounts of fish waste being discharged overboard. Skipper spoke to crew and reminded them to empty hopper when full. On one occasion during hauling the crew were observed to be washing down the deck resulting in small amounts of fish waste being discharged through the grates. Skipper spoke to the crew and told them not to do this during hauling.
k	2018/19	Batch discharged.
c	2018/19	All batch discharged on starboard side via a discharge chute
a	2018/19	All discards and offal was held in a purpose made holding bin which was large enough to hold all of a tows discards/offal. This resulted in only one batch to be discarded for each tow which was emptied during the hours of darkness when possible. No discards were made during any shooting or

		hauling operations. Each codend was suspended from the gantry during the tows turnaround enabling the crew to shake and pull stickers out of the codend. Offal was batch discarded throughout the trip and stickers were removed from the codend before shooting.
i	2018/19	All fish waste from each tow retained and batch discharged. One discharge event per tow.
j	2018/19	Continuous discharge of whole fish during sorting (up to 15-20 minutes for the biggest catches). During this time the remaining cod ends would be under the surface or on deck (un-tipped). Either two or three periods of fish discharge each haul (depending on the number of codends). All processing offal (from bycatch) was discharged whilst net was on board.
a	2018/19	All fish waste batch discharged. No discharge during shooting/hauling.
h	2018/19	All fish waste batch discarded. Whole fish discarded first then offal. For first half of trip batch discarding began as soon as the doors left the surface (and before warp scarer deployed), after a seabird warp capture all fish waste retained until brakes came on and warp scarer deployed
d	2018/19	All fish waste batch discarded on port side. No discharge occurred whilst the winches were on. After a seabird warp capture, the vessel would make a turn to starboard when discharging.
b	2017/18	Offal and whole fish discards batch discarded whilst towing. No discarding during shooting and hauling
f	2017/18	Batched. Offal held on chute prior to discarding. Approx. 3 'batches' per tow.
i	2017/18	Offal was discarded from the vessel. Discards happened when doors were below the surface. When discarding, the vessel would turn to port while the discard occurred through the starboard side discard chute, so as to reduce the chance of bird captures.
c	2017/18	Vessel refrained from discarding whole fish and offal during shootings and hauls
g	2017/18	Whole fish batch discarded by storing on discard chute until sorting was finished and then discarding (discarding took less than 5 minutes). Small amount of processing (e.g. max of 5 ling per tow and occasional tailed scampi) with processing offal discarded on an ad-hoc basis. No discarding of offal/whole fish during shooting/hauling.

k	2017/18	Offal and whole fish discharge was held in a large hopper at the end of the sorting conveyor until shooting was complete.
a	2017/18	Whole fish and offal were batch discharged overboard from a large hopper bin on the port side of the vessel but not during hauling and shooting operations. Before emptying the hopper bin the captain turned the vessel slightly so that the port trawl warp lay in close to the side of the vessel, which kept it well out of the offal stream and avoided the risk of birds striking it.
k	2017/18	Discarding of whole fish and offal was completed in batches. Discarding never occurred during shooting or hauling operations and the crew ensured the winches had stopped before commencing in batch discarding.
a	2017/18	Fish and offal were held in a batch tank and discarded after birds were showing less interest in the vessel. This was generally a few hours after processing was completed.
h	2017/18	The vessel used a batch dumping system for most of the discarded species and was used for all tows during the sorting process. All of the large discards were thrown over the side when the vessel was steaming or after the doors were shot away.

690

APPENDIX B VMP observer review form

Observers carry out qualitative reviews of vessel knowledge of, and adherence to, VMP on a trip by trip basis. Thse are structured reviews using a series of yes or no questions, as illustrated below. The forms have a second page that allows the observer to provide comments on the nature of any deviations from the VMP requirements.

The form has been revised a number of times, but all but one of the 45 examples provided were either on the original 2011 form ('Version 4 - Jun 2011') or the revised form with FNZ branding introduced in 2018 (but without a version number).

Vessel Management Plan/Marine Mammal Operating Procedure Observer reviews (Version 4 - Jun 2011)

Ministry for Primary Industries
Manatū Ahu Matua

1. Write the trip number ☐☐☐☐ start date of trip ☐☐/☐☐/☐☐

and vessel name ☐

2. If any of items 1-10 are "U" or "N" then a comment is required in section 5:		Y/N/U
Item 1.	Did the vessel have a copy of the Marine Mammal Operating Procedure?	
Item 2.	Was a Vessel Management Plan onboard and was it specific to this vessel?	
Item 3.	Were key crew members familiar with the contents of the above documents?	
Item 4.	Did the crew clear the net of "stickers" before shooting?	
Item 5.	Did the vessel attempt to minimise the amount of time the net spent on the surface?	
Item 6.	Did the vessel refrain from discarding plastic or netting?	
Item 7.	Did the vessel use mechanisms or procedures that reduced accidental discharge of floor offal and fish to the sea (e.g. grates)?	
Item 8.	Did the vessel steam away from large congregations of marine mammals?	
Item 9.	Did the vessel refrain from setting gear when dolphins were nearby?	
Item 10.	Was there a designated crew member looking for marine mammal captures?	

3. Items 11-13 use "Y" to indicate which options were present:

Item 11.	The seabird scaring devices available during this trip were:	None	Tori Line	Bird Baffler	Warp Scarer	Other
		☐	☐	☐	☐	☐
Item 12.	The most regularly used seabird scaring device was:	None	Tori Line	Bird Baffler	Warp Scarer	Other
		☐	☐	☐	☐	☐
Item 13.	The main offal management strategy employed during this trip was:	Meal	Held	Batch	Mince	Other
		☐	☐	☐	☐	☐

4. If any of items 14-20 are "Y" or "U" then a comment is required in section 5:		Y/N/U
Item 14.	When targeting JMA, was there evidence to suggest that the net was shot or retrieved between 2:30am and 4:30am (Only applies north of 40 deg 30 mins S)	
Item 15.	Was offal or fish discharged during net shooting or net retrieval periods?	
Item 16.	Was an additional seabird mitigation device(s) deployed during this trip?	
Item 17.	During turns, were the doors ever fully submerged with a headline depth of less than 50m?	
Item 18.	Were any marine mammal or seabird 'trigger' points activated during this trip?	
Item 19.	Were there equipment failures that increased seabird/marine mammal capture risk?	
Item 20.	Were there any other notable seabird or marine mammal related events during this trip?	

Deepwater Trawl VMP & MMOP
Fisheries New Zealand observer review form

Fisheries New Zealand
Tini a Tangaroa

Trip Number	Vessel Name	FMAs fished	Trip start date	Trip end date
			/ /	/ /

Target species		Observer name		Tows observed	

Record Yes (Y), No (N), Unknown (U) or Not Applicable (N/A) in the box provided. If you answer N or U to any questions, or Y for items 3, 4 or 19, then please make detailed comments on the reverse.

Item 1. Were copies of the DWG vessel specific *Vessel Management Plan (VMP)* and *Marine Mammal Operating Procedures (MMOP)* carried on board and made available upon request?

Item 2. Were the senior crew familiar with and have access to the above documents?

Item 3. Were any seabird, marine mammal or protected shark 'trigger-points' activated during the trip?
(if Y record details of the triggers and the action taken by the vessel)

Item 4. Did a gear or equipment failure event occur that increased the risk of seabird or marine mammal captures? *(if Y detail the event and the action taken by the vessel)*

Item 5. Were there any changes in crew behaviour, fishing activity, mitigation devices or gear used following 'trigger-point' events or during high risk periods?

Seabird/Marine Mammal Mitigation Devices

Item 6. Record what mitigation devices were carried by the vessel and when they were utilised

	Carried on board	Deployed all tows	Deployed some tows	Not deployed
Bird Baffler				
Tori line				
SLED				
Other *(describe on reverse)*				

Item 7. Was an additional seabird mitigation device deployed when required by the VMP?

Item 8. Was a Dolphin Dissuasive Device deployed on every JMA7 night tow (JMA7 only)?

Item 9. Were net restrictors fitted into the centre net of a triple-rig configuration when required? **(SCI only)**
(i.e. once a 'trigger point' was reached)

Fish Waste Management:

Item 10. Was the discharge of fish waste from the vessel managed as per the VMP?

Item 11. Were there any periods of continuous fish waste discharge during the tow *(apart from minced offal)*

Item 12. Was all fish waste (including offal and whole fish) held on board during shooting and hauling?

Item 13. Was the net cleared, as practicable, of all stickers prior to shooting?

Item 14. Was a grating or trap system used to prevent fish or offal accidentally lost to the factory floor or deck from being discharged overboard via scuppers or sump-pumps *(whilst still allowing the free egress of water)*

General Procedures:

Item 15. Were all plastics and netting retained on board?

Item 16. Was shooting fishing gear near congregations of marine mammals avoided?

Item 17. Was the amount of time the net spent on the surface minimised as much as practicable?

Item 18. Were any turns conducted with the doors fully submerged and a headline depth of less than 50 m?

Item 19. Were all seabird, marine mammal or protected shark captures reported by the vessel?

Item 20. Were all seabirds, marine mammals or protected sharks released alive handled with due care?

Item 21. Was gear shot between 02:30 and 04:30 (NZST) when targeting JMA North of 40.30^0 S? **(JMA7 only)**

700

APPENDIX C DWG guidelines

TEN COMMANDMENTS

FOR SCAMPI VESSELS

1. Ensure your vessel has the current Scampi Fisheries Operational Procedures (OPs) on board.

2. Ensure crew understand and follow the OPs and your Vessel Management Plan (VMP).

3. Have a well-managed fish waste control system that ensures no continuous or ad-hoc discharge occurs when towing.

4. Ensure all fish waste, discards and offal are held during shooting and hauling.

5. Always deploy fit-for-purpose seabird mitigation devices as risk dictates.

6. For triple rig trawlers, if there's a risk of multiple captures or the DWG Trigger Point has been reached for net captures, fit net restrictors. If captures continue, remove centre net until risk reduces.

7. Minimise the time that gear is on or near the surface; shoot and haul the trawls as quickly as practicable.

8. Mark any dead marine mammals with a cable tie or twine and take two photos of all seals captured in SCI 6A before returning to the sea.

9. Advise DWG (same day) when seabird captures reach Trigger Point. Email DWG Trigger Point Report to . Assess event and implement further risk reduction measures. Trigger points are:
   - Within any 24-hour period, 5 dead small (e.g. petrel/shearwater) or 3 dead big (albatross/mollymawk); or
   - Within any 7-day period, 10 birds dead or released alive (all species).

10. As legally required, record all protected species captures in your ERS or on the Non-fish / Protected Species Catch Return.