Conservation Services Programme Annual Research Summary 2016-17

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Table of Contents

1. Introduction

1.1 Purpose

This report outlines the research carried out through the Conservation Services Programme Annual Plan 2016/17, and provides updates on multi-year projects started in previous years.

1.2 Background

The Department of Conservation has the statutory duty to protect certain marine animals as defined in the Wildlife Act 1953 and the Marine Mammals Protection Act 1978. While the sustainable management of fishery resources is the statutory responsibility of the Minister of Fisheries (Fisheries Act 1996), the protection and conservation of seabirds, marine mammals and other protected species is the responsibility of the Minister of Conservation.

Since 1995, the New Zealand government has been implementing a scheme to recover from the domestic commercial fishing industry a proportion of funding required to investigate and mitigate the impacts of fishing on protected species of marine wildlife (Conservation Services). Conservation Services are defined in the Fisheries Act 1996 (as amended in 1999) as being outputs produced in relation to the adverse effects of commercial fishing on protected species, as agreed between the minister responsible for administering the Conservation Act 1987 and the Director-General of the Department of Conservation.

1.3. CSP Vision and Objectives

The Conservation Services Programme (CSP) vision is that:

> "Commercial fishing is undertaken in a manner that does not compromise the protection and recovery of protected species in New Zealand fisheries waters".

The suite of research and other conservation services delivered as part of the CSP falls into three categories:

1. Understanding the nature and extent of adverse effects on protected species from commercial fishing activities in New Zealand fisheries waters.
2. Developing effective solutions to mitigate adverse effects of commercial fishing on protected species in New Zealand fisheries waters.
3. Developing population management plans, where appropriate.

Detailed outcome-based objectives for CSP are provided in the Conservation Services Programme Strategic Statement 2015[1].

[1] Available to download from http://www.doc.govt.nz/csp-strategic-statement-2015

1.4 Development of the Annual Plan

The Conservation Services Programme Annual Plan 2016/17[2] described the conservation services to be delivered as the Conservation Services Programme (CSP), and subject to cost recovery from the commercial fishing industry. As such, this Annual Plan formed the basis for levying the commercial fishing industry under the Fisheries Act 1996. For further background information on CSP, including extracts of relevant legislation, refer to the Conservation Services Programme Strategic Statement. In the development of this Annual Plan a series of discussions were held with Ministry for Primary Industries (MPI) staff to harmonize the CSP and MPI research programmes for 2016/17 and to ensure there was no duplication. A formal consultation process was also used as described below.

1.5 Consultation process

The Annual Plan took account of feedback from stakeholders, and was approved, along with the final costs to be levied, by the Minister of Conservation.
The collaborative processes used to develop the 2016/17 Annual Plan are as follows:
Inshore observer coverage is based on a continuation of delivering objectives identified by a process conducted in preparation for the CSP Annual Plan 2016/17. This process was developed jointly by the CSP team at the DOC and the Inshore Fisheries team at MPI.
Deepwater and highly Migratory Species (HMS) observer coverage was developed jointly by the CSP team at DOC and the deepwater and HMS fisheries team at MPI.

Key stages for stakeholder input, including formal consultation on this plan, were as follows:

2 December 2015	Initial CSP RAG meeting – review and gap analysis.
12 February 2016	Updated medium term research plans, initial list of research proposals and draft CSP RAG prioritisation framework circulated to CSP RAG.
20 February 2016	Feedback on prioritisation framework and additional research proposals from CSP RAG
25 February 2016	Second CSP RAG meeting to discuss and prioritise initial research proposals. Note: there was disagreement between RAG members on implementation of the prioritisation framework, but feedback on relative priority between proposals was recorded.
28 April 2016	Additional feedback received from CSP RAG on research proposals and their prioritisation.
30 March 2016	Draft Conservation Services Programme Annual Plan 2016/17 released for public consultation
27 April 2016	Public consultation period closes
11 June 2016	Summary of public submissions and response to comments completed

[2] Available to download from http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/plans/csp-annual-plan-2016-17.pdf

June 2016	Director-General of Conservation conveys the Conservation Services Programme Annual Plan 2016/17, amended in accordance with public submissions, to the Minister of Conservation for agreement

1.6 Explanation of reporting structure

This report first describes the objectives and rationale for each project, then provides an update on project status and a summary of the key results and recommendations from the projects. A project logistics summary statement is included detailing the service provider, the project budget (excluding administration costs), identification of the relevant provisions within the Fisheries (Cost Recovery) Rules 2001 that determine cost allocation and review milestones. Finally, a citation and weblink are provided to enable ease of access to the final research reports.

Conservation Services Programme activities in 2016/17 were divided into three main areas:

1. Fisheries interactions projects
2. Population studies
3. Mitigation projects

2. Interaction Projects

2.1 INT2016-01 Observing commercial fisheries

Overall objective

To understand the nature and extent of protected species interactions with New Zealand commercial fishing activities.

Specific objectives

1. To identify, describe and, where possible, quantify protected species interactions with commercial fisheries
2. To identify, describe and, where possible, quantify measures for mitigating protected species interactions
3. To collect information relevant to identifying levels of cryptic mortality of protected species resulting from interactions with commercial fisheries
4. To collect other relevant information on protected species interactions that will assist in assessing, developing and improving mitigation measures

Rationale

Understanding the nature and extent of interactions between commercial fisheries and protected species can identify where the most significant interactions are occurring and can be used to inform development of ways to mitigate those interactions and adverse effects. Such data contribute to assessments of the risks posed to protected species by commercial fishing and whether mitigation strategies employed by fishing fleets are effective at reducing protected species captures.

The CSP Observer Programme continued to purchase baseline services for “offshore” fisheries from MPI Observer Services, given the scale of their operation, which allowed observers to be placed strategically across New Zealand Fisheries. For the purposes of providing costings, the rate provided by MPI Observer Services has been used.

Project status

Complete.

Summary of the methods and key findings

One of the tools to gain a better understanding of the nature and extent of interactions between commercial fisheries and protected species is the placement of Government observers on board commercial fishing vessels operating within the New Zealand Exclusive Economic Zone (EEZ). The observers collect both quantitative and qualitative information on interactions, both of which can and have been used to identify key areas of importance. The observations can also help in the development and assessment of mitigation strategies aimed at reducing the impact of commercial fisheries on protected species.

Observer coverage is, where possible, planned jointly with the Ministry for Primary Industries to

ensure that coverage objectives are aligned. For the purposes of planning observer coverage, fisheries are divided into two broad categories: firstly, those fisheries that are poorly known and generally characterised by small vessel, owner operated fleets operating in the inshore, the second; better understood deepwater fisheries which have been subject to long-term monitoring.

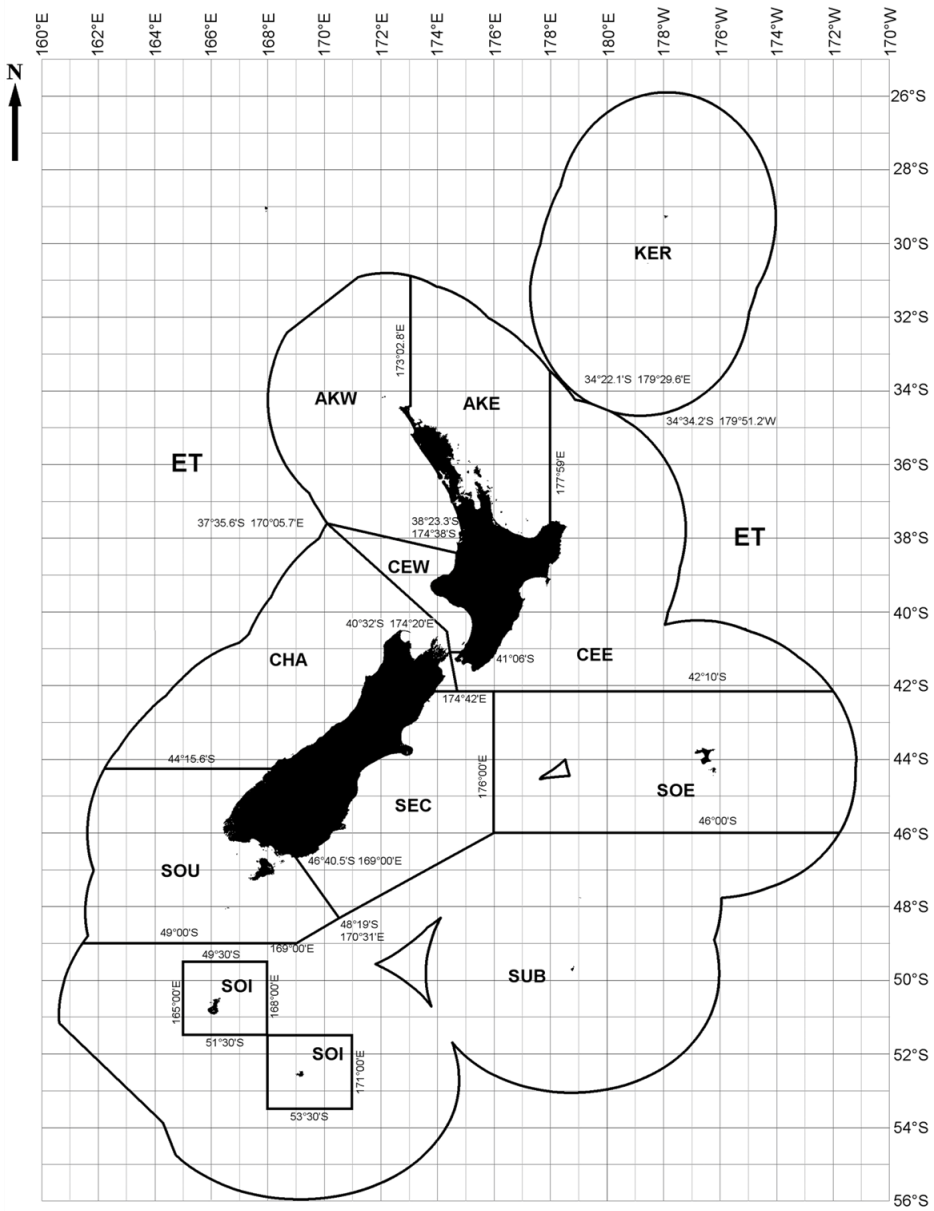
While the majority of the 'poorly understood' fisheries operate in the inshore area (i.e. to around 200 m depth), some small vessels, particularly bottom longline vessels under 36 m, will operate in deeper waters such as the Chatham Rise. Details of the approach used to set days in these fisheries are described in the Joint Department of Conservation/Ministry of Fisheries Inshore Observer Programme 2011/12 plan. In general, coverage in these fisheries was aimed at reducing uncertainty around the risk to particular protected species identified in both the level 1 and level 2 risk assessments and assessing mitigation options for interactions identified.

For better observed fisheries, long-term datasets exist which allow for ongoing monitoring to detect whether changes are occurring in the nature and extent of captures. In these offshore fisheries where higher levels of coverage are already undertaken CSP purchases a portion of existing observer time to allow data collection to be spread strategically over the fishing fleet.

The observer coverage presented in this report extends work conducted in previous years.

The remainder of this project report is divided into separate 'fisheries' where certain target species are grouped according to fishing method. For each 'fishery' an overall summary of commercial effort, observer effort and protected species bycatch is provided by Fisheries Management Area (Figure 1). Protected species interactions are then broken down by fate of the animal (live or dead) and method of interaction.

Figure 1: New Zealand Fisheries Management Areas (source: Ministry of Fisheries)



Key:

AKE	FMA 1	East North Island from North Cape to Bay of Plenty
CEE	FMA 2	East North Island from south of Bay of Plenty to Wellington
SEC	FMA 3	East coast South Island from Pegasus Bay to Catlins
SOE	FMA 4	Chatham Rise
SOU	FMA 5	South Island from Foveaux Strait to Fiordland
SUB	FMA 6	Subantarctic including Bounty Island and Pukaki Rise
SOI	FMA6A	Southern offshore islands – Auckland and Campbell Islands
CHA	FMA 7	West Coast South Island to Fiordland including Kaikoura
CEW	FMA 8	West North Island from South Taranaki Bight to Wellington
AKW	FMA 9	West North Island from North Cape to North Taranaki Bight
KER	FMA 10	Kermadec
ET		Outside NZ EEZ

Middle Depth Trawl Fisheries

Hoki, Hake, Ling and Warehou species

The hoki, hake, ling, warehou trawl complex spans all months, FMAs and vessel sizes. Within the fishery complex there is a distinct subset targeting the hoki spawn in the Cook Strait. This occurs between June and September and is fished only by vessels under 42m, in an area straddling the CHA and CEE FMAs. The remaining fishing effort occurs during the other months with hoki, hake, ling and warehou targeted largely in SEC, SUB, SOE and partly SOU areas. All vessels over 28m in this fishery are required to used one of the three permissible forms of regulated bird scaring equipment and offal management. Industry defined codes of practice can also apply.

Table 1 presents a summary of commercial fishing effort, observer effort and protected species captures in the fishery during the 2016/17 observer year. In the 2016/17 Observer year the commercial effort increased slightly from the previous year (2015/16) and the observed tows decreased slightly, resulting in a 9.5% drop in the observer coverage (Hjorvarsdottir 2017).

The number and rate of seabird captures increased slightly, with 100 seabird interactions recorded in this observer year in comparison to 95 in the previous observer year (2015/16) (Hjorvarsdottir 2017). The rate of marine mammal captures increased by 6.9%, while the rate of protected fish captures was comparable to the previous observer year. A total of 65.9kg of coral catch was observed this year, with a 63.3% decrease in coral catch in comparison the previous observer year (2015/16) (Hjorvarsdottir 2017). 40.5% of the coral catch was observed in the SOE FMA, with stony cup corals being the most commonly observed coral catch.

In summary, 118 trips were conducted on board 35 vessels, with protected species captures occurring on 39 trips on board 22 vessels.

Table 1. Summary of commercial effort, observer effort and protected species captures in the hoki, hake, ling and warehou middle depth trawl fisheries during the 2016/17 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures *	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows	Protected fish captures	protected fish per 100 tows	Coral catch (kg)	Coral catch per 100 tows
1. AKE	303	20	6.6	0	0.0	0	0.0	0	0.0	0.0	0.0
2. CEE	1,476	121	8.2	2	1.7	20	16.5	0	0.0	0.0	0.0
3. SEC	3,605	766	21.2	23	3.0	0	0.0	0	0.0	15.3	2.0
4. SOE	1,835	425	23.2	22	5.2	0	0.0	0	0.0	32.8	7.7
5. SOU	1,367	390	28.5	15	3.8	0	0.0	2	0.5	7.2	1.8
6. SUB	918	271	29.5	20	7.4	0	0.0	1	0.4	1.9	0.7
7. CHA	6,369	2,124	33.3	18	0.8	24	1.1	0	0.0	8.7	0.4
8. CEW	43	1	2.3	0	0.0	0	0.0	0	0.0	0.0	0.0
9. AKW	18	3	16.7	0	0.0	0	0.0	0	0.0	0.0	0.0
Total	**15,934**	**4,121**	**25.9**	**100**	**2.4**	**44**	**1.1**	**3**	**0.1**	**65.9**	**1.6**

Table 2 reports on the numbers of interactions by species and fate immediately post interaction for the 2016/17 observer year. Of the observed seabird interactions, 65% resulted in mortalities.

White-chinned petrels and sooty shearwaters were the most commonly caught seabird species, and New Zealand fur seals the most commonly caught marine mammal. Three basking shark captures occurred in the 2016/17 observer year, all resulting in mortalities.

Table 2. Protected species interactions in the hake, hoki, ling and warehou middle depth trawl fisheries during the 2016/17 observer year.

Species Name	Alive	Dead	Decomposing	Unknown (not recovered)	Grand Total
Birds					
Albatrosses (Unidentified)		4			4
Buller's albatross	1	2	1	1	5
Buller's and Pacific albatross	1				1
Campbell albatross		1			1
Cape petrels		1			1
Fairy prion	3				3
Giant petrels (Unidentified)	1				1
Prions (Unidentified)	1				1
Procellaria petrels	1				1
Salvin's albatross	8	8			16
Shearwaters		1			1
Sooty shearwater	8	11			19
Southern giant petrel	1				1
Southern royal albatross		1			1
Storm petrels	1				1
Westland petrel	1	1			2
White-capped albatross	4	9			13
White-chinned petrel	6	22			28
Birds Total	**37**	**61**	**1**	**1**	**100**
Marine Mammals					
Common dolphin		2			2
New Zealand fur seal	10	31	1		42
Marine Mammals Total	**10**	**33**	**1**		**44**
Protected Fish					
Basking shark		3			3
Protected Fish Total		**3**			**3**
Grand Total	**47**	**97**	**2**	**1**	**147**

Tables 3a, b & c detail the broad method of interactions for each species. Net capture was the most prevalent form of interaction overall, with over 50 % resulting in mortalities. There were 22 observed captures of white-chinned petrels, all resulting in mortalities. Twelve of those captures occurred in the SUB FMA, onboard two vessels. The 31 captures of New Zealand fur seals that resulted in mortalities occurred in two FMA's, CEE and CHA, in July and August 2016 and June 2017. All of the mammal interactions were recorded as net captures.

Table 3. Method of interaction for a) Protected species released alive, b) dead protected species, c) decomposing protected species and d) protected species with unknown fate observed in the hake, hoki, ling and warehou middle depth trawl fisheries during the 2016/17 observer year.

a) Protected species released alive

Species	Caught in net	Caught on warp or door	Impact against vessel	Other	Grand Total
Birds					
Buller's albatross	1				1
Buller's and Pacific albatross	1				1
Fairy prion			2	1	3
Giant petrels (Unidentified)	1				1
Prions (Unidentified)			1		1
Procellaria petrels			1		1
Salvin's albatross	7		1		8
Sooty shearwater	8				8
Southern giant petrel		1			1
Storm petrels			1		1
Westland petrel			1		1
White-capped albatross	4				4
White-chinned petrel	5			1	6
Birds Total	**26**	**1**	**7**	**2**	**37**
Marine Mammals					
New Zealand fur seal	10				10
Marine Mammals Total	**10**				**10**
Grand Total	**36**	**1**	**7**	**2**	**47**

b) Dead protected species

Species	Caught in net	Caught on warp or door	Impact against vessel	Other	Tangled in line	Grand Total
Birds						
Albatrosses (Unidentified)	2			2		4
Buller's albatross	2					2
Campbell albatross	1					1
Cape petrels				1		1
Salvin's albatross	6	1			1	8
Shearwaters	1					1
Sooty shearwater	11					11
Southern royal albatross			1			1
Westland petrel	1					1
White-capped albatross	3	4	1	1		9
White-chinned petrel	22					22
Birds Total	**49**	**5**	**2**	**4**	**1**	**61**
Marine Mammals						
Common dolphin	2					2
New Zealand fur seal	31					31
Marine Mammals Total	**33**					**33**
Protected Fish						
Basking shark	3					**3**
Protected Fish Total	**3**					**3**
Grand Total	**85**	**5**	**2**	**4**	**1**	**97**

c) Decomposing protected species

Species	Caught in net	Unknown	Grand Total
Birds			
Buller's albatross		1	1
Birds Total		**1**	**1**
Marine Mammals			
New Zealand fur seal	1		1
Marine Mammals Total	**1**		**1**
Grand Total	**1**	**1**	**2**

d) Decomposing protected species

Species	Caught on warp or door	Grand Total
Buller's albatross	1	1
Grand Total	**1**	**1**

Southern Blue Whiting

The southern blue whiting fishery is both spatially and temporally distinct from other middle depth trawl fisheries. The location of fishing effort is variable and dependent on the presence of spawning aggregations of southern blue whiting. Most effort occurs in the waters around Campbell Island. Unlike other middle depth trawl fisheries, protected species interactions tend to be dominated by marine mammal captures, specifically fur seals. Sea lion captures, however, have occurred in most years at variable levels (up to 14) (Rowe 2009, Rowe 2010, Ramm 2010, Ramm 2012a, Ramm 2012b, Clemens-Seely et al. 2014., Clemens-Seely & Hjorvarsdottir 2016, Hjorvarsdottir 2016, Hjorvarsdottir 2017).

The number of seabird captures in the 2016/17 observer year were 28% less than the previous year (2015/16) (Hjorvarsdottir, 2017) due to a decrease in fishing effort in the 2016/17 observer year. Mammal captures on the other hand increased by 14.6% from the previous observer year (2015/16) (Hjorvarsdottir 2017). In addition, one protected fish capture was observed this year.

In summary, ten trips were conducted on board eight vessels, with protected species captures occurring on seven trips on board seven vessels.

Table 4. Summary of commercial effort, observer effort and protected species captures in the southern blue whiting fishery during the 2016/17 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures *	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows	Protected fish captures	protected fish per 100 tows	Coral catch (kg)	Coral catch per 100 tows
1. AKE	-	-	-	-	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-	-	-	-	-
5. SOU	-	-	-	-	-	-	-	-	-	-	-
6. SUB	477	474	99.4	7	1.5	55	11.6	1	0.2	1.5	0.3
7. CHA	-	-	-	-	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-	-	-	-	-
Total	**477**	**474**	**99.4**	**7**	**1.5**	**55**	**11.6**	**1**	**0.2**	**1.5**	**0.3**

Table 5 reports the numbers of interactions by species and fate immediately post interaction for the 2016/17 observer year. In comparison to the 2015/16 fishing year, observed interactions declined by 12.5%, mainly due to fewer seabird interactions (Hjorvarsdottir 2017). 95% of the observed interactions resulted in mortalities.

Table 5. Protected species interactions in the southern blue whiting fishery during the 2016/17 observer year.

Species	Alive	Dead	Grand Total
Birds			
Campbell albatross		1	1
Cape petrel		1	1
Grey petrel	2	2	4
Salvin's albatross		1	1
Birds Total	**2**	**5**	**7**
Marine Mammals			
New Zealand fur seal	1	51	52
New Zealand sea lion		3	3
Marine Mammals Total	**1**	**54**	**55**
Protected Fish			
Basking shark		1	1
Protected Fish Total		**1**	**1**
Grand Total	**3**	**60**	**63**

Tables 6 a & b detail the broad method of interactions by species. Net capture was the most prevalent form of interaction and exclusively resulted in mortalities. 90% of the protected species interactions that resulted in mortalities involved marine mammals.

Table 6. Method if interaction for a) protected species released alive and b) dead protected species observed in the southern blue whiting fishery during the 2016/17 observer year.

a) Protected species released alive

Species	Caught in net	Caught on warp door	Impact against vessel	Grand Total
Birds				
Grey petrel		1	1	2
Birds Total		**1**	**1**	**2**
Marine Mammals				
New Zealand fur seal	1			1
Marine Mammals Total	**1**			**1**
Grand Total	**1**	**1**	**1**	**3**

b) Dead protected species

Species	Caught in net	Other	Grand Total
Birds			
Campbell albatross	1		1
Cape petrel	1		1
Grey petrel	2		2
Salvin's albatross	1		1
Birds Total	**5**		**5**
Marine Mammals			
New Zealand fur seal	51		51
New Zealand sea lion		3	3
Marine Mammals Total	**51**	**3**	**54**
Protected Fish			
Basking shark	1		1
Protected Fish Total	**1**		**1**
Grand Total	**57**	**3**	**60**

Scampi

Observations in the scampi fishery are undertaken primarily to monitor interactions with seabirds and New Zealand sea lions. Historically, captures of seabirds by this fishery have been recorded in most areas, with known captures of black petrels in AKE, along with captures of New Zealand sea lions in the SUB FMA.

The observer coverage for the scampi fishery in the 2016/17 observer year increased by 47% from the previous observer year (2015/16). Similar to that of the previous observer year, observed tows were distributed between AKE, CEE, SOE and SUB FMAs, with the greatest number of tows recorded in SOE (Hjorvarsdottir 2017).

Seabird captures increased by 28.6% from the previous observer year (2015/16), while the capture rate for marine mammals was similar (Hjorvarsdottir 2017). There was a 50% increase in the amount of coral catch this observer year from 2015/16, with majority of the catches occurring in the SOE FMA.

In summary, nine trips were conducted on board seven vessels, with protected species captures occurring on three trips on board all three vessels.

Table 7. Summary of commercial effort, observer effort and protected species captures in the scampi fishery during the 2016/17 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures *	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows	Coral catch (kg)	Coral catch per 100 tows
1. AKE	812	0	-	-	-	-	-	-	-
2. CEE	564	0	-	-	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-	-	-
4. SOE	1,886	73	3.9	6	8.2	1	1.4	51.2	70.1
5. SOU	-	-	-	-	-	-	-	-	-
6. SUB	1,557	354	22.7	8	2.3	1	0.3	0.2	0.1
7. CHA	26	0	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-	-	-
9. AKW	23	0	-	-	-	-	-	-	-
Total	**4,868**	**427**	**8.8**	**14**	**3.3**	**2**	**0.5**	**51.4**	**12.0**

Table 8 reports the number of interactions by species and fate immediately post interaction. The number of interactions leading to mortality was 75% higher in comparison to the previous observer year (Hjorvarsdottir 2017), all of which were seabird species. Salvin's albatross were the most commonly caught species.

Table 8. Protected species interactions in the scampi fishery during the 2016/17 observer year.

Species	Alive	Dead	Decomposing	Grand Total
Birds				
Albatrosses (Unidentified)		1	1	2
Buller's albatross	1			1
Fairy prion	1			1
Salvin's albatross	1	5		6
White-capped albatross	2	2		4
Birds Total	**5**	**8**	**1**	**14**
Marine Mammals				
New Zealand fur seal	1		1	2
New Zealand sea lion			1	1
Marine Mammals Total	**1**		**2**	**3**
Grand Total	**6**	**8**	**3**	**17**

Tables 9 a, b & c detail the broad method of interactions for each species. All interactions leading to mortality were net captures of seabirds. From the three observed marine mammal captures, one resulted in the live release of the animal, while the other two were recorded as decomposing.

Table 9. Method of interaction for a) Protected species released alive and b) dead protected species observed in the scampi fishery during the 2016/17 observer year.

a) Protected species released alive

Species	Caught in net	Impact against vessel	Other	Grand Total
Birds				
Buller's albatross			1	1
Fairy prion		1		1
Salvin's albatross			1	1
White-capped albatross	1	1		2
Birds Total	**1**	**2**	**2**	**5**
Marine Mammals				
New Zealand fur seal	1			1
Marine Mammals Total	**1**			**1**
Grand Total	**2**	**2**	**2**	**6**

b) Dead protected species

Species	Caught in net	Grand Total
Birds		
Albatrosses (Unidentified)	1	1
Salvin's albatross	5	5
White-capped albatross	2	2
Birds Total	**8**	**8**
Grand Total	**8**	**8**

c) Decomposing protected species

Species	Caught in net	Grand Total
Birds		
Albatrosses (Unidentified)	1	1
Birds Total	**1**	**1**
Marine Mammals		
New Zealand sea lion	1	1
Marine Mammals Total	**1**	**1**
Grand Total	**2**	**2**

Squid

Observer coverage in the squid fishery is often higher than other trawl fisheries due to previous high rates of bycatch of New Zealand sea lions and seabirds. The bulk of the seabird captures have included white-capped albatross, sooty shearwaters and white-chinned petrels and this trend continues into the current year. Being over 28m in length, all vessels in this fishery are required to deploy one of the three permitted types of seabird mitigation devices (tori line, warp scarer, or bird baffler), industry defined codes of practice also apply and are monitored against by observers. Offal has been identified as a key issue leading to warp captures in this fishery. Vessel Management Plans have been developed to ensure each vessel has a specific plan to manage discharge of offal during fishing activity.

Particularly in the SQU6T area around the Auckland Islands, the observer coverage is focused on recording New Zealand sea lion captures. Sea Lion Exclusion Devices (SLEDs) are used by all vessels operating in the SQU6T fishery. The majority of observer coverage in the squid fishery has been targeted at the SQU6T area, with high levels of coverage also being achieved in SOU as the vessels trawl enroute to and from SQU6T.

Seabird captures in this fishery tend to vary between years dependent upon the spatial and temporal activity of vessels and its overlap with breeding seabirds, in particular, white-chinned petrels and sooty shearwaters.

In comparison to the previous observer year (2015/16), the rate of seabird captures decreased by 12.6% (Hjorvarsdottir 2017), with 300 observed seabird interactions. Similar to the previous observer year, the majority of the seabird captures occurred in the SOU and SUB FMAs. The rate of mammal captures increased by more than 50% from the previous observer year (Hjorvarsdottir 2017). The rate of coral catch decreased by 37% from the previous observer year, with the overall weight of observed coral catch being 1,025.8 kg, in comparison to last years observed catch of 1985.7 kg (Hjorvarsdottir 2017).

In summary, 57 trips were conducted on board 20 vessels, with protected species captures occurring on 46 trips on 17 vessels.

Table 10. Summary of commercial effort, observer effort and protected species captures in the squid fishery during the 2016/17 observer year.

FMA	Effort Tows	Observed Tows	Coverage (%)	Seabird captures *	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows	Protected fish captures	Protected fish per 100 tows	Coral catch (kg)	Coral catch per 100 tows
1. AKE	3	0	0.0	-	-	-	-	-	-	-	-
2. CEE	-	-	-	-	-	-	-	-	-	-	-
3. SEC	297	212	71.4	22	10.4	6	2.8	0	0.0	15.6	7.4
4. SOE	21	25	119.0	0	0.0	1	4.0	0	0.0	0.0	0.0
5. SOU	979	802	81.9	188	23.4	9	1.1	2	0.2	1,007.9	125.7
6. SUB	1,285	907	70.6	90	9.9	5	0.6	3	0.3	2.3	0.3
7. CHA	6	0	0.0	-	-	-	-	-	-	-	-
8. CEW	-	-	-	-	-	-	-	-	-	-	-
9. AKW	-	-	-	-	-	-	-	-	-	-	-
Total	**2,591**	**1,946**	**75.1**	**300**	**15.4**	**21**	**1.1**	**5**	**0.3**	**1,025.8**	**52.7**

Table 11 reports the numbers of interactions by species and fate immediately post interactions. Similar to previous years, white-chinned petrel, sooty shearwater and white-capped albatross accounted for a large part of the seabird interactions, with an increase in sooty shearwater interactions compared to the previous observer year (2015/2016) (Hjorvarsdottir 2017). In addition, the number of Buller's albatross captures decreased from the previous observer year, with only eight recorded this observer year, in comparison to 34 in the 2015/16 observer year. White-chinned petrel interactions decreased in the current observer year by 25.6% compared to the previous observer year (Hjorvarsdottir 2017).

Table 11. Protected species interactions in the squid fishery during the 2016/17 observer year.

Species	Alive	Dead	Decomposing	Grand Total
Birds				
Albatrosses (Unidentified)	1		1	2
Black-bellied storm petrel	1			1
Buller's albatross	4	4		8
Buller's and Pacific albatross	1			1
Common diving petrel	1	1		2
Fairy prion	1			1
Grey-backed storm petrel	1			1
Petrel (Unidentified)	7			7
Petrels, Prions and Shearwaters	4			4
Prions (Unidentified)	1			1
Procellaria petrels	3		1	4
Royal albatrosses	3			3
Shearwaters	4			4
Smaller albatrosses	1			1
Sooty shearwater	11	90		101
Southern royal albatross		1		1
Westland petrel	2			2
White-capped albatross	19	35	6	60
White-chinned petrel	20	76		96
Birds Total	**85**	**207**	**8**	**300**
Marine Mammals				
New Zealand fur seal	16		1	17
New Zealand sea lion	3			3
Whale (Unspecified)		1		1
Marine Mammals Total	**19**	**1**	**1**	**21**
Protected Fish				
Basking shark		1	1	2
White pointer shark	3			3
Protected Fish Total	**3**	**1**	**1**	**5**
Grand Total	**107**	**209**	**10**	**326**

Tables 12a, b, c, and d detail the broad method of interactions for each species. Net capture was the most prevalent form of interaction, and was responsible for 90% of the interactions that resulted in mortalities. Twenty-two captures were recorded as 'other', with various remarks noted by the observers, but included; birds landing on net, birds landing on deck, as well as two captures of birds in the buoy of the tori line.

Table 12. Method of interaction for a) protected species released alive, b) dead protected species, c) Decomposing protected species and d) protected species with unknown fate in the squid fishery during the 2016/17 observer year.

a) Protected species released alive

Species	Caught in net	Impact against vessel	Other	Grand Total
Birds				
Albatrosses (Unidentified)	1			1
Black-bellied storm petrel			1	1
Buller's albatross	4			4
Buller's and Pacific albatross	1			1
Common diving petrel		1		1
Fairy prion		1		1
Grey-backed storm petrel			1	1
Petrel (Unidentified)	7			7
Petrels, Prions and Shearwaters	4			4
Prions (Unidentified)		1		1
Procellaria petrels	3			3
Royal albatrosses	2		1	3
Shearwaters			4	4
Smaller albatrosses	1			1
Sooty shearwater	2	4	5	11
Westland petrel	2			2
White-capped albatross	12	1	6	19
White-chinned petrel	19		1	20
Seabirds Total	**58**	**8**	**19**	**85**
Protected Fish				
White pointer shark	2		1	3
Protected Fish Total	**2**		**1**	**3**
Grand Total	**60**	**8**	**20**	**88**

b) Dead protected species

Species	Caught in net	Caught on warp or door	Other	Unknown	Grand Total
Birds					
Buller's albatross	2	2			4
Common diving petrel			1		1
Sooty shearwater	90				90
Southern royal albatross		1			1
White-capped albatross	17	15	1	2	35
White-chinned petrel	75			1	76
Seabirds Total	**184**	**18**	**2**	**3**	**207**
Marine Mammals					
New Zealand fur seal	16				16
New Zealand sea lion	3				3
Marine Mammals Total	**19**				**19**
Protected Fish					
Basking shark	1				1
Protected Fish Total	**1**				**1**
Grand Total	**204**	**18**	**2**	**3**	**227**

c) Decomposing protected species

Species	Caught in net	Grand Total
Birds		
Albatrosses (Unidentified)	1	1
Procellaria petrels	1	1
White-capped albatross	6	6
Seabirds Total	**8**	**8**
Marine Mammals		
Whale (Unspecified)	1	1
Marine Mammals Total	**1**	**1**
Protected Fish		
Basking shark	1	1
Protected Fish Total	**1**	**1**
Grand Total	**10**	**10**

d) Protected species with unknown fate

Species	Caught in net	Grand Total
Marine Mammals		
New Zealand fur seal	1	1
Marine Mammals Total	**1**	**1**
Grand Total	**1**	**1**

Pelagic Trawl Fisheries

Jack Mackerel and Barracouta

In previous years, common dolphins have been captured in the pelagic trawl fishery and in some instances multiple capture events have occurred. A Marine Mammal Operating Procedure (MMOP) has been developed by industry to reduce dolphin captures. These practices include not setting or hauling at certain times of the day in certain areas, a watch being kept for dolphins in the vicinity of fishing operations, trawl doors being hauled partially on deck whilst turning (in order to close off the mouth of the net) and not setting while dolphins are present close to the vessel. All the vessels in this fishery are larger than 28m and are required by law to deploy bird capture mitigation devices.

The observer coverage levels in this fishery remained consistent with the previous observer year (2015/16) (Hjorvarsdottir 2017), with the highest number of tows reported in CEW, CHA and SOU FMAs.

The number of seabird captures increased by 10% in the 2016/17 observer year in comparison to the previous year (2015/16) and the rate of mammal captures increased by 15% (Hjorvarsdottir, 2017), with eight recorded interactions.

In summary, 72 trips were conducted onboard 16 vessels, with protected species captures occurring on 22 trips on board nine vessels.

Table 13. Summary of commercial effort, observer effort and protected species captures in the jack mackerel and barracouta pelagic trawl fishery during the 2016/17 observer year.

FMA	Effort tows	Observed tows	Coverage (%)	Seabird captures *	Seabirds per 100 tows	Mammal captures	Mammals per 100 tows	Coral catch (kg)	Coral catch per 100 tows
1. AKE	16	0	0.0	-	-	-	-	-	-
2. CEE	67	0	0.0	-	-	-	-	-	-
3. SEC	1,460	412	28.2	17	4.1	3	0.7	1.0	0.2
4. SOE	206	162	78.6	5	3.1	0	0.0	0.6	0.4
5. SOU	516	432	83.7	30	6.9	1	0.2	0	0.0
6. SUB	0	-	-	-	-	-	-	-	-
7. CHA	928	457	49.2	0	0.0	4	0.9	0	0.0
8. CEW	705	542	76.9	0	0.0	0	0.0	0	0.0
9. AKW	70	62	88.6	0	0.0	0	0.0	0	0.0
Total	**3,968**	**2,067**	**52.1**	**52**	**2.5**	**8**	**0.4**	**1.6**	**0.1**

Table 14 reports the number of interactions by species and fate immediately post interaction. Sooty shearwater and white-capped albatross were the most commonly caught species. Unlike the previous fishing years (2013/14, 2014/15 and 2015/16) (Clemens-Seely & Hjorvarsdottir 2016, Hjorvarsdottir 2016, Hjorvarsdottir 2017), there were no common dolphin interactions. New Zealand fur seals were the only marine mammal with observed interactions; 87.5% of those interactions resulted in mortalities.

Table 14. Protected species interactions in the jack mackerel and barracouta pelagic trawl fisheries during the 2016/17 observer year.

Species	Alive	Dead	Grand Total
Birds			
Buller's albatross	1	5	6
Common diving petrel	1		1
Grey-backed storm petrel		1	1
Petrel (Unidentified)	1		1
Salvin's albatross		6	6
Sooty shearwater	4	11	15
Westland petrel	1		1
White-capped albatross	9	4	13
White-chinned petrel		8	8
Seabirds Total	**17**	**35**	**52**
Marine Mammals			
New Zealand fur seal	1	7	8
Marine Mammals Total	**1**	**7**	**8**
Grand Total	**18**	**42**	**60**

Table 15a and b detail the broad method of interaction for each species. Net capture was the most prevalent form of interaction overall, and was responsible for 98% of the interactions that resulted in mortalities. Majority of interactions that lead to mortality involved seabirds, with 31% of those being sooty shearwater captures.

Table 15. Method of interaction for a) protected species released alive and b) dead protected species observed in the jack mackerel and barracouta pelagic trawl fisheries during the 2016/17 observer year.

a) Protected species released alive

Species	Caught in net	Caught on warp or door	Impact against vessel	Other	Unknown	Grand Total
Birds						
Buller's albatross	1					1
Common diving petrel			1			1
Petrel (Unidentified)	1					1
Sooty shearwater	3			1		4
Westland petrel					1	1
White-capped albatross	4	5				9
Seabirds Total	**9**	**5**	**1**	**1**	**1**	**17**
Marine Mammals						
New Zealand fur seal	1					1
Marine Mammals Total	1					1
Grand Total	**10**	**5**	**1**	**1**	**1**	**18**

b) Dead protected species

Species	Caught in net	Unknown	Grand Total
Birds			
Buller's albatross	5		5
Grey-backed storm petrel	1		1
Salvin's albatross	5	1	6
Sooty shearwater	11		11
White-capped albatross	4		4
White-chinned petrel	8		8
Seabirds Total	**34**	**1**	**35**
Marine Mammals			
New Zealand fur seal	7		7
Marine Mammals Total	**7**		**7**
Grand Total	**41**	**1**	**42**

Deep Water Bottom Trawl Fisheries

Orange Roughy, Cardinal and Oreo Species

In deep water bottom trawl fisheries, one of the main focuses of observer coverage is to describe the impact of the trawls on benthic communities, more specifically protected corals, particularly on the Chatham rise. Seabird behaviour and abundance is also monitored around the vessels in this fishery. Discard, offal and management, as well as the mandatory use of bird scaring devices are employed by the fleet to mitigate seabird interactions.

The observer coverage in the orange roughy, cardinal, and oreo deep water bottom trawl fisheries decreased by 30% in comparison to the previous observer year (Hjorvarsdottir 2017), resulting from a slight increase in the total effort, as well as a 24% decrease in observed tows.

The rate of seabird captures decreased by 78% from the previous observer year, with only two observed captures in comparison to nine captures in the 2015/16 observer year (Hjorvarsdottir 2017). The rate of coral catch for this observer year was 745.7 kg per 100 tows, in comparison to 714.1 kg in the previous observer year (Hjorvarsdottir 2017). However, the overall coral catch decreased in the current observer year by 21% from the previous observer year. Majority of the coral catch was coral rubble, mainly coming from the SOE FMA. In addition, 136.8 kg of bubblegum coral was caught in the SOE FMA.

In summary, 22 trips were conducted onboard eight vessels, with protected species captures occurring on 13 trips on board six vessels.

Table 16. Summary of commercial effort, observer effort and protected species captures in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2016/17 observer year.

FMA	Effort tows	Observed tows	Coverage (%)	Seabird captures *	Seabirds per 100 tows	Coral catch (kg)	Coral catch per 100 tows
1. AKE	127	39	30.7	0	0.0	3	7.7
2. CEE	569	178	31.3	0	0.0	2.4	1.3
3. SEC	504	89	17.7	0	0.0	0.0	0.0
4. SOE	2,189	502	22.9	1	0.2	237.1	47.2
5. SOU	12	9	75.0	0	0.0	0	0.0
6. SUB	198	165	83.3	0	0.0	8,429.0	5,108.5
7. CHA	641	172	26.8	1	0.6	38	22.2
8. CEW	0	0	0.0	-	-	-	-
9. AKW	336	14	4.2	0	0.0	0	0.0
Total	**4,576**	**1,168**	**25.5**	**2**	**0.2**	**8,709.6**	**745.7**

Table 17 reports the number of interactions by species and fate immediately post interactions. Observed interactions this fishing year decreased from ten in the 2015/16 observer year (Hjorvarsdottir 2017), down to two. Both of the interactions involved seabirds and resulted in mortality.

Table 17. Protected species interactions in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2016/17 observer year.

Species	Dead	Grand Total
Birds		
White-capped albatross	1	1
White-chinned petrel	1	1
Grand Total	**2**	**2**

Table 18 details the broad method of interaction for each species. Two forms of capture method were recorded, net capture and warp/door capture.

Table 18. Method of interaction for dead protected species observed in the orange roughy, cardinal and oreo deep water bottom trawl fisheries during the 2016/17 observer year.

Species	Caught in net	Caught on warp or door	Grand Total
Birds			
White-capped albatross		1	1
White-chinned petrel	1		1
Grand Total	**1**	**1**	**2**

Inshore Fisheries

Inshore Trawl

Inshore fishing within the New Zealand EEZ is an immensely diverse activity, with large amounts of variation in individual practice and effort. In the case of trawl and bottom longline, it becomes difficult to draw a simple distinction between the inshore and offshore sectors, as a number of vessels make seasonal shifts across this artificial boundary. Individual vessels can range in size from just two metres in length to over thirty metres. Equally, activity can range from 20 days per year to over 300 for each vessel. Overly simplified characterisation of the inshore sector is problematic and may lead to false conclusions about the fishery. Therefore, it is critical when gathering information on the inshore fishing sector to get as broad and representative coverage as possible.

Observer coverage of inshore fisheries has historically been at very low levels due to the inherent difficulties of placing observers on small vessels in remote ports. Additionally, many of the fishers only operate part time, either seasonally or sporadically. As a result, observers often spend much of their time on shore or travelling between ports.

Coverage decreased slightly this observer year, with an overall coverage of 4.3%, in comparison to 4.5% in the 2015/16 observer year (Hjorvarsdottir 2017). Similar to that of the previous observer year, the coverage in the AKW FMA increased by 14%, accounting for 67% of the overall observed tows across all FMAs.

The rate of seabird captures decreased by 89% in comparison to the 2015/16 observer year. The shift of observer coverage from AKE to AKW might be accountable for this drop, as 20 seabird captures were recorded in the AKE FMA in the 2015/16 observer year (Hjorvarsdottir 2017). Only one marine mammal interaction was observed, in comparison to seven observed marine mammal captures in 2015/16, four of which were reported from the AKE FMA (Hjorvarsdottir 2017).

In summary, 42 trips were conducted onboard 22 vessels, with protected species captures occurring on three trips on board three vessels.

Table 22. Summary of the commercial effort, observer effort and protected species captures in the inshore trawl fisheries during the 2016/17 observer year.

FMA	Effort tows	Observed tows	Coverage (%)	Seabird captures *	Seabirds per 100 tows	Marine Mammal captures	Marine mammals per 100 tows	Coral catch (kg)	Coral catch per 100 tows
1. AKE	5,555	244	4.4	0	0.0	0	0.0	3.0	1.2
2. CEE	7,654	227	3.0	0	0.0	1	0.4	0.2	0.1
3. SEC	10,696	119	1.1	3	2.5	0.0	0.0	11.9	10.0
4. SOE	150	0	0.0	-	-	-	-	-	-
5. SOU	3,343	0	0.0	-	-	-	-	-	-
6. SUB	0	-	-	-	-	-	-	-	-
7. CHA	11,875	17	0.1	0	0.0	0	0.0	0.0	0.0
8. CEW	1,145	5	0.4	0	0.0	0	0.0	0.0	0.0
9. AKW	2,954	1,259	42.6	1	0.1	0	0.0	10.2	0.8
Total	**43,372**	**1,871**	**4.3**	**4**	**0.2**	**1**	**0.1**	**25.3**	**1.4**

Table 23 reports the number of interactions by species and fate immediately post interaction. Only four seabird interactions and one marine mammal interaction were recorded this observer year, with 80% of the interactions resulting in mortalities.

Table 23. Protected species interactions in the inshore trawl fisheries during the 2016/17 observer year.

Species	Alive	Dead	Grand Total
Birds			
Sooty shearwater		3	3
White-capped albatross	1		1
Birds Total	**1**	**3**	**4**
Marine Mammals			
Common dolphin		1	1
Marine Mammals Total		**1**	**1**
Grand Total	**1**	**4**	**5**

Table 24a and b detail the broad method of interaction for each species. Only two forms of interaction were recorded, warp or door capture, which resulted in the live release of the animal involved, and net capture, which resulted in mortalities in all cases.

Table 24. Method of interaction for a) protected species released alive, b) dead protected species and c) protected species with unknown fate observed in the inshore trawl fisheries during the 2016/17 observer year.

a) Protected species released alive

Species	Caught on warp or door	Grand Total
White-capped albatross	1	1
Grand Total	**1**	**1**

b) Dead protected species

Species	Caught in net	Grand Total
Birds		
Sooty shearwater	3	3
Birds Total	**3**	**3**
Marine Mammals		
Common dolphin	1	1
Marine Mammals Total	**1**	**1**
Grand Total	**4**	**4**

Inshore Setnet

Setnet fisheries have received low levels of observer coverage due to the difficulty of placing observers on board these generally very small vessels. However, in recent years increased monitoring has occurred in some areas, driven by Threat Management Plans for Hector's and Māui dolphins. Captures of a number of protected species have been reported in the past, including Hector's dolphins, yellow-eyed penguins, shags, sooty shearwaters and Westland petrels. Setnet is one of the few fisheries, like inshore trawl by vessels under 28m, which does not have any regulated mitigation device requirements. As with inshore trawl, spatial closures have been put in place to reduce the risk of interaction with Hector's and Māui dolphins.

Observer coverage was initially low in this fishery but increased in 2008/09 due to concerns about Hector's dolphin bycatch. However, in recent years, the coverage has dropped again due to other priorities, such as observer coverage of inshore trawling on west coast North Island and black petrel interactions in the Hauraki gulf. The observer coverage decreased slightly this observer year, dropping to 1.8% from 2.0% in the 2015/16 observer year (Hjorvarsdottir 2017). This drop was caused by a higher increase in fishing effort in comparison to observed sets.

In comparison to the previous observer year (2015/16), the rate of seabird captures increased to 24 observed seabird interactions all occurring in the SEC and SOE FMAs. The number of mammal captures increased from only two captures in the 2015/16 observer year (Hjorvarsdottir 2017) to six observed captures this year. This year, one protected fish species was also caught.

In summary, 21 trips were conducted onboard 13 vessels, with protected species captures occurring on nine trips onboard seven vessels.

Table 25. Summary of commercial effort, observer effort and protected species captures in the inshore setnet fishery during the 2016/17 observer year.

FMA	Effort sets	Observed sets	Coverage (%)	Seabird captures *	Seabirds per 100 sets	Mammal captures	Mammals per 100 sets	Protected fish captures	Protected fish per 100 sets	Coral catch (kg)	Coral catch per 100 sets
1. AKE	2,211	0	0.0	-	-	-	-	-	-	-	-
2. CEE	868	0	0.0	-	-	-	-	-	-	-	-
3. SEC	9,953	183	1.8	2	1.1	2	1.1	0	0.0	7.4	4.0
4. SOE	0	0	0.0	-	-	-	-	-	-	-	-
5. SOU	5,670	193	3.4	22	11.4	3	1.6	0	0.0	18.6	9.6
6. SUB	3	0	0.0	-	-	-	-	-	-	-	-
7. CHA	3,682	0	0.0	-	-	-	-	-	-	-	-
8. CEW	3,454	139	4.0	0	0.0	1	0.7	1.0	0.7	0.0	0.0
9. AKW	2,107	0	0.0	-	-	-	-		-	-	-
Total	**27,948**	**515**	**1.8**	**24**	**4.7**	**6**	**1.2**	**1**	**0.2**	**26.0**	**5.0**

Table 26 reports the number of interactions by species and fate immediately post interaction. Less than half of the interactions resulted in the mortality of the species involved. There was a slight increase in the number of marine mammal interactions, with six observed captures in comparison to one in the 2015/16 observer year (Hjorvarsdottir 2017). One white pointer shark capture was observed, and the animal was retained whole for further study.

Table 26. Protected species interactions in the inshore setnet fishery during the 2016/17 observer year.

Species	Alive	Dead	Unknown (not recovered)	Grand Total
Birds				
Buller's albatross	1			1
Cape petrels		1		1
Common diving petrel	1			1
Fairy prion	1			1
Fiordland crested penguin		2		2
Little blue penguin		8		8
Sooty shearwater	3	2		5
Stewart Island shag		1		1
White-capped albatross	3			3
White-fronted tern		1		1
Birds Total	**9**	**15**		**24**
Marine Mammals				
Common dolphin		1		1
Hector's dolphin		1		1
New Zealand fur seal		3	1	4
Marine Mammals Total		**5**	**1**	**6**
Protected Fish				
White pointer shark		1		1
Protected Fish Total		**1**		**1**
Grand Total	**9**	**21**	**1**	**31**

Tables 27a, b and c detail the broad method of interaction for each species. Net capture was the most prevalent form of interaction, with 90% of the interactions resulting in mortality of the species involved. One Hector's dolphin net capture was observed, which resulted in the mortality of the animal. The observer noted that the dolphin had small bite marks around the head.

Table 27. Method of interactions for a) protected species released alive and b) dead protected species observed in the setnet fishery during the 2016/17 observer year.

a) Protected species released alive

Species	Impact against vessel	Other	Grand Total
Birds			
Buller's albatross	1		1
Common diving petrel		1	1
Fairy prion	1		1
Sooty shearwater	2	1	3
White-capped albatross	3		3
Birds Total	**7**	**2**	**9**
Grand Total	**7**	**2**	**9**

b) Dead protected species

Row Labels	Caught in net	Impact against vessel	Grand Total
Birds			
Cape petrels	1		1
Fiordland crested penguin	2		2
Little blue penguin	8		8
Sooty shearwater	1	1	2
Stewart Island shag	1		1
White-fronted tern		1	1
Birds Total	**13**	**2**	**15**
Marine Mammals			
Common dolphin	1		1
Hector's dolphin	1		1
New Zealand fur seal	3		3
Marine Mammals Total	**5**		**5**
Protected Fish			
White pointer shark	1		1
Protected Fish Total	**1**		**1**
Grand Total	**19**	**2**	**21**

c) Protected species with unknow fate

Species	Caught in net	Grand Total
Marine Mammals		
New Zealand fur seal	1	1
Marine Mammals Total	**1**	**1**
Grand Total	**1**	**1**

Surface Longline Fisheries

Domestic Tuna and Swordfish

The domestic tuna and swordfish fishery (targeting bigeye, southern bluefin and swordfish) has historically had low levels of observer coverage. This is primarily due to the inherent difficulties in placing observers on these small vessels, which generally work irregular patterns. Consequently, data on this fleet's interactions with protected species are poor. Southern bluefin tuna, bigeye tuna and swordfish were introduced into the quota system at the start of the 2004/05 fishing year. After a large capture event in November 2006, regulations were put in place requiring departure notices and seabird mitigation use (deployment of a streamer line and either line weighting or night setting). CSP has also distributed turtle dehookers to aid in the quick and efficient release of not only turtles but also fur seals and a number of shark species.

Observer coverage in domestic tuna and swordfish increased to 14.2% this observer year, in comparison to 11.2% in the previous observer year (2015/16) (Hjorvarsdottir 2017). There was an overall increase in the number of observed lines this observer year, with double the amount of observed lines within the AKE FMA.

The rate of seabird captures decreased by 40.6% compared to the previous observer year (2015/16) (Hjorvarsdottir 2017), with 54 seabird interactions observed. The number of mammal captures had a minor increase from 21 observed interactions in the 2015/16 observer year to 22 this year. In addition, one protected fish and two marine reptile captures were observed this year.

In summary, 27 trips were conducted onboard 21 vessels, with protected species captures occurring on 17 trips onboard 16 vessels.

Table 28. Summary of commercial effort, observer effort and protected species captures in the domestic tuna and swordfish fishery during the 2016/17 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird captures *	Seabirds per 1000 hooks	Mammal captures	Mammals per 1000 hooks	Protected fish captures	Protected fish per 1000 hooks	Marine Reptile captures	Marine Reptiles per 1000 hooks
1. AKE	1,033	127	12.3	108,074	18	0.2	3	0.03	1	0.01	0	0.00
2. CEE	521	67	12.9	68,925	5	0.1	5	0.1	0	0.00	0	0.00
3. SEC	0	-	-	-	-	-	-	-	-	-	-	-
4. SOE	0	-	-	-	-	-	-	-	-	-	-	-
5. SOU	0	0	0.0	0.0	-	-	-	-	-	-	-	-
6. SUB	0	-	-	-	-	-	-	-	-	-	-	-
7. CHA	634	134	21.1	124,767	31	0.2	13	-	0	0.00	0	0.00
8. CEW	2	1	50.0	725	0	0.0	0	0.0	0	0	0	0.00
9. AKW	316	24	7.6	21,130	0	0.0	1	0.05	0	0.00	2	0.09
10. KER	6	3	50.0	3,550	0	0.0	0	0.0	0	0.00	0	0.00
Total	**2,512**	**356**	**14.2**	**327,171**	**54**	**0.2**	**22**	**0.1**	**1**	**0.00**	**2**	**0.01**

Table 29 reports the number of interactions by species and fate immediately post interaction. The number of interactions this observer year decreased to 79 interactions, in comparison to 160 from the 2015/16 observer year (Hjorvarsdottir 2017). New Zealand fur seals were the most commonly caught marine mammal and white-capped albatross the most commonly caught seabird species. 80% of the interactions resulted in mortalities.

Table 29. Protected species interactions in the domestic tuna and swordfish fishery during the 2016/17 observer year.

Row Labels	Alive	Dead	Grand Total
Birds			
Black (Parkinson's) petrel	5	5	10
Black-browed albatross (Unidentified)		1	1
Buller's albatross	4	6	10
Great-winged (Grey-faced) petrel	1		1
Grey petrel		1	1
Grey-backed storm petrel	1		1
Petrel (Unidentified)		3	3
Prions (Unidentified)	2		2
Shearwaters	2		2
Shy albatross	1		1
Southern royal albatross	1		1
Westland petrel	2	6	8
White-capped albatross	2	11	13
Birds Total	**21**	**33**	**54**
Marine Mammals			
Beaked whales	1		1
Bottlenose dolphin	1		1
Common dolphin	1		1
New Zealand fur seal	17	2	19
Marine Mammals Total	**20**	**2**	**22**
Protected Fish			
Spine-tailed devil ray	1		1
Protected Fish Total	**1**		**1**
Marine Reptiles			
Leatherback turtle	2		
Marine Reptiles Total	**2**		**2**
Row Labels	**44**	**35**	**79**

Table 30a and b detail the broad method of interaction for each species. Hook capture was the most prevalent form of interaction, with 77% resulting in mortalities. The number of interactions leading to mortality by hook capture decreased to 65%, in comparison to the previous observer year (2015/16) where 97% of species interactions with hook capture lead to mortality (Hjorvarsdottir 2017). The spine-tailed devil ray capture was recorded as a manta ray, however, after examination of the observer images from the trip, the ID was corrected.

Table 30. Method of interaction for a) protected species released alive, and b) dead protected species observed in the domestic tuna and swordfish fishery during the 2016/17 observer year.

a) Protected species released alive

Species	Caught on hook	Impact against vessel	Other	Tangled in line	Unknown	Grand Total
Birds						
Black (Parkinson's) petrel		3	2			5
Buller's albatross	4					4
Great-winged (Grey-faced) petrel					1	1
Grey-backed storm petrel		1				1
Prions (Unidentified)			2			2
Shearwaters		2				2
Shy albatross	1					1
Southern royal albatross	1					1
Westland petrel		2				2
White-capped albatross	2					2
Birds Total	**8**	**8**	**4**		**1**	**21**
Marine Mammals						
Beaked whales	1					1
Bottlenose dolphin				1		1
Common dolphin				1		1
New Zealand fur seal	17					17
Marine Mammals Total	**18**			**2**		**20**
Protected Fish						
Spine-tailed devil ray	1					1
Protected Fish Total	**1**					**1**
Marine Reptiles						
Leatherback turtle	2					2
Marine Reptiles Total	**2**					**2**
Grand Total	**29**	**8**	**4**	**2**	**1**	**44**

b) Dead protected species

Species	Caught on hook	Tangled in line	Grand Total
Seabirds			
Black (Parkinson's) petrel	1	4	5
Black-browed albatross (Unidentified)		1	1
Buller's albatross	6		6
Grey petrel	1		1
Petrel (Unidentified)		3	3
Westland petrel	6		6
White-capped albatross	11		11
Seabirds Total	**25**	**8**	**33**
Marine Mammals			
New Zealand fur seal	2		2
Marine Mammals Total	**2**		**2**
Grand Total	**27**	**8**	**35**

Bottom Longline Fishery

Offshore Bottom Longline

The offshore bottom longline fishery is observed to monitor seabird and marine mammal interactions. A relatively small fleet conducts a large amount of fishing effort in terms of hook set, mainly in the areas of SOE, SUB and CEE. Regulations on this fishery require the use of tori lines and either night-setting or line weighting. Other industry applied mitigation techniques include gas cannons and offal and bait discard management.

Because of the high variety of vessels and fishing grounds in the bottom longline fisheries, a new characterisation was applied in the 2014/15 annual research summary. In addition, the 2013/14 observer year was back-calculated for comparison (Hjorvarsdottir 2016). In this new grouping, the offshore bottom longline fishery is characterised as: all bottom longline vessels over 34m in overall length, and all vessels between 20-34m in overall length that set over 5000 hooks per day.

In comparison to the 2015/16 observer year the observer coverage decreased from 9.1% to 6.9% (Hjorvarsdottir 2017). This decrease was due to less observer coverage in the SOE, SUB and CHA FMAs. The number of seabird captures significantly decreased, with 27 observed captures this year in comparison to 95 captures in the 2015/16 year (Hjorvarsdottir 2017).

In summary, five trips were conducted onboard four vessels, with protected species captures occurring on four trips onboard four vessels.

Table 31. Summary of commercial effort, observer effort and protected species captures in the deep-sea bottom longline fishery during the 2016/17 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird captures *	Seabirds per 1000 hooks	Coral catch (kg)	Coral catch per 1000 hooks
1. AKE	26	0	0.0	-	-	-	-	-
2. CEE	175	0	0.0	-	-	-	-	-
3. SEC	385	0	0.0	-	-	-	-	-
4. SOE	2,491	90	3.6	1,302,120	8	0.01	39.00	0.03
5. SOU	89	0	0.0	-	-	-	-	-
6. SUB	718	183	25.5	1,544,322.0	5	0.00	61.50	0.04
7. CHA	195	11	5.6	49,500	14	0.28	0.00	0.00
8. CEW	51	0	0.0	-	-	-	-	-
9. AKW	1	0	0.0	-	-	-	-	-
Total	**4,131**	**284**	**6.9**	**2,895,942**	**27**	**0.01**	**100.50**	**0.03**

Table 32 reports the numbers of interactions by species and fate immediately post interaction. There was a 72% decrease in the number of species interactions in comparison to the number of interactions in the previous observer year (2015/16) (Hjorvarsdottir 2017). White-chinned petrels accounted for 88% of all observed interactions.

Table 32. Protected species interactions in the offshore bottom longline fishery during the 2016/17 observer year

Species	Alive	Dead	Grand Total
White-capped albatross		2	2
White-chinned petrel	1	23	24
White-faced storm petrel	1		1
Grand Total	**2**	**25**	**27**

Tables 33 a & b details the broad method of interaction for each species. Hook capture was the most prevalent form of interaction, resulting in only one interaction resulting in the live release of the animal involved, the other 25 interactions all resulted in mortality.

Table 33. Method of interaction for a) protected species released alive, and b) dead protected species in the offshore bottom longline fishery during the 2016/17 observer year.

a) Protected species released alive

Species	Caught on hook	Other	Grand Total
White-chinned petrel	1		1
White-faced storm petrel		1	1
Grand Total	**1**	**1**	**2**

b) Dead protected species

Species	Caught on hook	Grand Total
White-capped albatross	2	2
White-chinned petrel	23	23
Grand Total	**25**	**25**

Inshore Bottom Longline - Ling, Bluenose, Hāpuku, and Bass

As with other inshore fishing methods, observer coverage in the inshore bottom longline fishery has generally been limited. In the past, coverage has been focused at certain time periods in selected ports or regions. Mitigation techniques used and tested (to varying extents) in this fishery include; weighting regimes, night setting, use of tori lines and use of fish oil to deter birds. In April 2008, regulations on mitigation were introduced for all bottom longline vessels, covering night setting or line weighting, tori line, and offal/discard management.

Bottom longline vessels targeting the species assemblage of ling, bluenose, hāpuku and bass tend to fish over wide areas with fishing occurring in all FMAs and ranging from 'inshore' to the Chatham rise. These fishing grounds overlap with a number of protected species' ranges, including a number of petrel and albatross species.

Because of the high variety of vessels and fishing grounds in the bottom longline fisheries, a new characterisation was applied in the 2014/15 annual research summary. In addition, the 2013/14 observer year was back-calculated for comparison (Hjorvarsdottir 2016). In this new grouping, the inshore bottom longline fishery is characterised as: all bottom longline vessels under 20m in overall length, and all vessels between 20-34m in overall length that set 5000 hooks or less per day.

In comparison to the previous observer year (2015/16), the coverage increased by 52%. which can be attributed to the increase in the number of observed lines. The number of seabird captures increased by 98%, with 328 captures observed this year compared with nine from the previous year (Hjorvarsdottir 2017). No protected fish or mammal captures were observed.

Table 34. Summary of commercial effort, observer effort and protected species captures in the inshore bottom longline fisheries during the 2016/17 observer year.

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird captures *	Seabirds per 1000 hooks	Coral catch (kg)	Coral catch per 1000 tows
1. AKE	1,185	69	5.8	119,002	14	0.12	1.5	0.01
2. CEE	2,152	163	7.6	189,892	6	0.03	0.0	0.00
3. SEC	424	13	3.1	39,888	0	0.00	0.0	0.00
4. SOE	65	0	0.0	-	-	-	-	-
5. SOU	299	97	32.4	125,894	307	2.44	8.0	0.06
6. SUB	0	-	-	-	-	-	-	-
7. CHA	829	1	0.1	1,281	0	0.00	0.0	0.00
8. CEW	418	25	6.0	24,420	1	0.04	0.0	0.00
9. AKW	629	30	4.8	28,800	0	0.00	0.0	0.00
Total	**6,001**	**398**	**6.6**	**529,177**	**328**	**0.62**	**9.5**	**0.02**

Table 35 reports the number of interactions by species and fate immediately post interaction. Common diving petrel was the most commonly caught species, with 286 observed interactions, all of which resulted in the live release of the animals involved. Only 3% of the interactions resulted in mortalities.

Table 35. Protected species interactions in the inshore bottom longline fisheries during the 2016/17 observer year.

Species	Alive	Dead	Grand Total
Seabirds			
Black (Parkinson's) petrel	12		12
Common diving petrel	286		286
Flesh-footed shearwater		1	1
Gibson's albatross	2		2
Mottled petrel	5		5
Prions (Unidentified)	9		9
Salvin's albatross		1	1
Seabird - Small	1		1
Southern black-browed albatross		1	1
Storm petrels	1		1
Westland petrel		1	1
White-chinned petrel	1	7	8
Grand Total	**317**	**11**	**328**

Table 36a and b detail the method of interaction for each species. Majority of the interactions were recorded as “other”, with observer remarks stating that the animals landed on the vessel are were helped off uninjured and alive. 284 of the common diving petrel interactions occurred in September in the SOU FMA.

Table 36. Method of interaction for a) protected species released alive and b) dead protected species observed in the inshore bottom longline fisheries during the 2016/17 observer year.

a) Protected species released alive

Species	Caught on hook	Impact against vessel	Other	Tangled in line	Grand Total
Black (Parkinson's) petrel	11			1	12
Common diving petrel			286		286
Gibson's albatross	1		1		2
Mottled petrel			5		5
Prions (Unidentified)			9		9
Seabird - Small		1			1
Storm petrels		1			1
White-chinned petrel			1		1
Grand Total	**12**	**2**	**302**	**1**	**317**

b) Dead protected species

Species	Caught on hook	Tangled in line	Unknown	Grand Total
Flesh-footed shearwater	1			1
Salvin's albatross	1			1
Southern black-browed albatross	1			1
Westland petrel		1		1
White-chinned petrel	5	1	1	7
Grand Total	**8**	**2**	**1**	**11**

Bottom Longline - Snapper

Throughout the past eight years, coverage has been irregular in the snapper fishery. Fluctuating between under 1% up to 8% (Hjorvarsdottir 2016). In the 2014/15 observer year, there was no observer coverage due to a switch in observer focus to the bluenose bottom longline fishery.

The observer coverage this year was more widely distributed across FMAs in comparison to the previous observer year (2015/16) (Hjorvarsdottir 2017). Although there was only a slight increase in the observer coverage from the previous year, there was a 70% increase in the number of hooks observed (Hjorvarsdottir 2017). In this observer year, 35 seabird captures were observed, in comparison to seven captures in the 2015/16 observer year, resulting in the seabird capture rate more than doubling between the years.

In summary, 13 trips were conducted onboard 12 vessels, with protected species captures occurring on four trips on four vessels.

Table 37. Summary of commercial effort, observer effort and protected species captures in the snapper bottom longline fishery during the 2016/17 observer year

FMA	Effort lines	Observed lines	Coverage (%)	Number of hooks observed	Seabird captures *	Seabirds per 1000 hooks	Coral catch (kg)	Coral catch per 1000 hooks
1. AKE	4,701	167	3.55	457,393	5	0.01	1.1	0.00
2. CEE	2	0.0	0.00	-	-	-	-	-
3. SEC	-	-	-	-	-	-	-	-
4. SOE	-	-	-	-	-	-	-	-
5. SOU	-	-	-	-	-	-	-	-
6. SUB	-	-	-	-	-	-	-	-
7. CHA	48	0	0.00	-	-	-	-	-
8. CEW	20	10	50.00	9,150.0	0	0.00	0.0	0.00
9. AKW	57	11	19.30	25,700.0	30	1.17	3.1	0.12
Total	**4,828**	**188**	**3.89**	**492,243**	**35**	**0.07**	**4.2**	**0.01**

Table 38 reports the numbers of interactions by species and fate immediately post interaction. There was an 80% increase in the number of interactions in comparison to the previous observer year (2015/16) (Hjorvarsdottir 2017). However, majority of the interactions resulted in the animal involved being released alive, with only two observed mortalities.

Table 38. Protected species interactions in the snapper bottom longline fishery during the 2016/17 observer year.

Birds	Alive	Dead	Grand Total
Black (Parkinson's) petrel	1		1
Black-backed gull	2		2
Flesh-footed shearwater		1	1
Sooty shearwater		1	1
White-faced storm petrel	30		30
Grand Total	**33**	**2**	**35**

Tables 39 a and b detail the broad method of interactions. Thirty white-faced storm petrels were recorded as “impact against vessel”, however all individuals were recorded to have landed on deck while the boat was at anchor and were assisted off the vessel uninjured.

Table 39. Method of interaction for a) protected species released alive and b) dead protected species observed in the snapper bottom longline fishery during the 2016/17 observer year.

a) Protected species released alive

Species	Caught on hook	Impact against vessel	Tangled in line	Grand Total
Black (Parkinson's) petrel			1	1
Black-backed gull	2			2
White-faced storm petrel		30		30
Grand Total	**2**	**30**	**1**	**33**

b) Dead protected species

Species	Caught on hook	Unknown	Grand Total
Flesh-footed shearwater	1		1
Sooty shearwater		1	1
Grand Total	**1**	**1**	**2**

Purse Seine Fisheries

Skipjack Tuna

In July 2011, the spinetail devil ray (*Mobula japanica*) and manta ray (*Manta birostris*) became fully protected under Schedule 7A of the Wildlife Act (1953). Since these two species of rays are caught in purse seine fisheries for tuna in New Zealand and worldwide, CSP observer coverage of the purse seine fishery began in the 2011/12 observer year. This season marks the sixth year of reported coverage of the purse seine fishery.

The observer coverage slightly decreased in comparison to the previous observer year (2015/16) (Hjorvarsdottir 2017), resulting from an increase in the fishing effort, but a decrease in the observed tows. Seabird and mammal captures are mostly non-existing or very low in this fishery (Clemens-Seely et al. 2014, Clemens-Seely & Hjorvarsdottir, 2016). Once again, this year no seabird or mammal captures were observed. However, seven captures of spine-tailed devil rays were observed, all in the AKE FMA.

In summary, three trips were conducted onboard three vessels, with protected species captures occurring on two trips onboard two vessels.

Table 40. Summary of commercial effort, observer effort and protected species captures in the purse seine fishery during the 2016/17 observer year.

FMA	Effort tows	Observed tows	Coverage (%)	Protected fish captures	Protected fish per 100 tows
1. AKE	227	25	11.0	7	28.00
2. CEE	0	-	-	-	-
3. SEC	0	-	-	-	-
4. SOE	0	-	-	-	-
5. SOU	0	-	-	-	-
6. SUB	0	-	-	-	-
7. CHA	34	18	52.9	-	-
8. CEW	1	0	0.0	-	-
9. AKW	48	26	54.2	-	-
Total	**310**	**69**	**22.3**	**7**	**10.14**

Table 41 reports the numbers of interactions by species and fate immediately post interaction, and the method of the interaction recorded. Seven interactions were recorded this year, all of them being spine-tailed devil ray. Net capture was the only method of interaction, and resulted in the live release of the animal in each case.

Table 41. Protected species interactions, and the method of interaction for species release alive in the purse seine fishery during the 2016/17 observer year.

Species	Alive	Grand Total
Spine-tailed devil ray	**7**	**7**
Caught in net	7	7
Grand Total	**7**	**7**

Mackerel & Other

The purse seine fishery targeting English mackerel, jack mackerel, kahawai, pilchard, snapper, trevally and other minor species is observed independently from the purse seine fishery targeting skipjack tuna because of temporal differences in fishing seasons as well as some differences in fishing practices and net construction.
The commercial fishing effort of the fishery was mainly carried out in the AKE FMA, although some fishing effort was conducted in CEE and AKW FMAs. There were 21 observed tows recorded this year, all within the AKE FMA. No bycatch of protected species was observed.

In summary, only one trip was conducted onboard a single vessel, with no protected species captures.

Table 42. Summary of commercial effort, observer effort and protected species captures in the purse seine mackerel fishery during the 2016/17 observer year.

FMA	Effort tows	Observed tows	Coverage (%)
1. AKE	486	21	4.3
2. CEE	7	0	0
3. SEC	0	-	-
4. SOE	0	-	-
5. SOU	0	-	-
6. SUB	0	-	-
7. CHA	0	-	-
8. CEW	0	-	-
9. AKW	15	0	0
Total	**508**	**21**	**4.1**

Precision Seafood Harvesting (PSH)

PSH testing started in October 2012 and has been active every year since then. PSH uses a prototype harvesting system, called the Modular Harvest System or 'MHS', that aims to target specific species and fish sizes, as well as enabling fish to be landed in much better condition than traditional trawls. The method also opens the opportunity for holding and on-rearing live fish to enable fresh fish to be provided on demand. PSH uses a new system that replaces a part of the traditional trawl net with a flexible PVC landing liner which is dotted with escape portals, which is developed to increase the likelihood of undersized and non-target species escaping the net through these portals. Targeted fish then continue to swim at a natural pace, within the liner, until such time as they are landed.

Although PSH falls under the trawling sector, the technology used differs in fundamental ways, which could cause differences in the incidental capture rate of protected species, thus observer reporting will be carried out separately. As this is the first time PSH is reported on, no comparisons will be made to fisheries using PSH gear in previous years.

The observer coverage in this fishery, reached 61% in the 2016/17 observer year. Fishing effort was recorded in all FMA's, except from the SOU and SUB FMA's, with the highest fishing effort carried out in the AKE and CEE FMA's, which were also the only FMA's with observed protected species interactions. Twenty-one seabird interactions were recorded in the PSH fisheries this year, with a capture rate of 1.5 seabirds per 100 tows. In addition, four marine mammal captures, and one protected fish capture were observed this year. 82.9 kg of protected coral catch was observed in the 2016/17 observer year, majority of which was caught in the AKE FMA.

In summary, 21 trips were conducted onboard five vessels, with protected species captures occurring on nine trips on board three vessels.

Table 19. Summary of commercial effort, observer effort and protected species captures in the Precision Seafood Harvesting trawl fisheries during the 2016/17 observer year.

FMA	Effort tows	Observed tows	Coverage (%)	Seabird captures *	Seabirds per 100 tows	Marine Mammal captures	Marine Mammals per 100 tows	Protected Fish captures	Protected Fish per 100 tows	Coral catch (kg)	Coral catch per 100 tows (kg)
1. AKE	1,260	1,075	85.3	16	1.5	1	0.1	1	0.1	56.3	5.2
2. CEE	668	40	6.0	2	5.0	3	7.5	0	0.0	0.0	0.0
3. SEC	32	28	87.5	0	0.0	0.0	0.0	0	0.0	0.0	0.0
4. SOE	32	32	100.0	`	0.0	0.0	0.0	0	0.0	2.0	6.3
5. SOU	0	0	0.0	-	-	-	-	-	-	-	-
6. SUB	0	0	0.0	-	-	-	-	-	-	-	-
7. CHA	84	0	0.0	-	-	-	-	-	-	-	-
8. CEW	1	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
9. AKW	239	239	100.0	3	1.3	0	0.0	0	0.0	24.6	10.3
Total	**2,316**	**1,415**	**61.1**	**21**	**1.5**	**4**	**0.3**	**1**	**0.9**	**82.9**	**5.9**

Table 20 reports the number of interactions by species and fate immediately post interaction. Overall, 53.8% of all observed interactions resulted in the live release of the animal involved. Black petrel, common diving petrel & Buller's shearwater were the most commonly observed species. The four marine mammal interactions observed involved three species, bottlenose dolphin, New Zealand fur seal and pilot whale. The pilot whale was recorded as decomposing, with remarks stating that the animal was so decomposed that the observer was unable to attach a tag to it.

Table 20. Protected species interactions in the Precision Seafood Harvesting trawl fisheries during the 2016/17 observer year.

Species	Alive	Dead	Decomposing	Unknown (not recovered)	Grand Total
Birds					
Black (Parkinson's) petrel	2	4			6
Buller's shearwater	4				4
Common diving petrel	1			5	6
Flesh-footed shearwater	1				1
Mottled petrel	1				1
Storm petrels	1				1
White-chinned petrel	1				1
White-faced storm petrel	1				1
Birds Total	**12**	**4**	**0**	**5**	**21**
Marine Mammals					
Bottlenose dolphin		1			1
New Zealand fur seal	1	1			2
Pilot whale			1		1
Marine Mammals Total	**1**	**2**	**1**	**0**	**4**
Protected Fish					
White pointer shark	1				1
Protected Fish Total	**1**				**1**
Grand Total	**14**	**6**	**1**	**5**	**26**

Table 21a, b, c & d detail the broad method of interaction for each species. Net capture and impact against vessel were the most common forms of interactions, with net capture being the only method resulting in mortalities. Five common diving petrels were recorded with unknown fate, as the observer did not see the interaction, but was informed by the crew that the birds were found on the deck and released alive during the night.

Table 21. Method of interaction for a) protected species released alive, b) dead protected species and c) protected species with unknown fate observed in the inshore trawl fisheries during the 2016/17 observer year.

a) Protected species released alive

Species	Caught in net	Impact against vessel	Unknown	Grand Total
Birds				
Black (Parkinson's) petrel	2			2
Buller's shearwater		4		4
Common diving petrel		1		1
Flesh-footed shearwater	1			1
Mottled petrel			1	1
Storm petrels		1		1
White-chinned petrel		1		1
White-faced storm petrel			1	1
Birds Total	**3**	**7**	**2**	**12**
Marine Mammals				
New Zealand fur seal	1			1
Marine Mammals Total	**1**			**1**
Protected Fish				
White pointer shark	1			1
Protected Fish Total	**1**			**1**
Grand Total	**5**	**7**	**2**	**14**

b) Dead protected species

Species	Caught in net	Grand Total
Birds		
Black (Parkinson's) petrel	4	4
Birds Total	**4**	**4**
Marine Mammals		
Bottlenose dolphin	1	1
New Zealand fur seal	1	1
Marine Mammals Total	2	2
Grand Total	**6**	**6**

c) Decomposing protected species

Species	Caught in net	Grand Total
Pilot whale	1	1
Grand Total	**1**	**1**

d) Protected species with unknown fate

Species	Impact against vessel	Grand Total
Common diving petrel	5	5
Grand Total	**5**	**5**

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $1,160,369. Services were provided by the Ministry for Primary Industries Observer Services.

References

Rowe, S.J. 2009. Conservation Services Programme observer report: 1 July 2004 to 30 June 2007. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 94p.

Rowe, S.J. 2010. Conservation Services Programme observer report: 1 July 2007 to 30 June 2008. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 98p.

Ramm, K. 2010. Conservation Services Programme Observer Report: 1 July 2008 to 30 June 2009. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 126p.

Ramm, K. 2012a. Conservation Services Programme Observer Report: 1 July 2009 to 30 June 2010. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 130p.

Ramm, K. 2012b. Conservation Services Programme Observer Report: 1 July 2010 to 30 June 2011. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 121p.

Clemens-Seely, K., Clements, K., and Ramm, K. 2014. Conservation Services Programme Annual Research Summary 2012-13. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 66p.

Clemens-Seely, K. & Hjorvarsdottir, F. O. 2016. Conservation Services Programme Annual Research Summary 2013-14. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 80p.

Hjorvarsdottir, F. 2016. Conservation Services Programme Annual Research Summary 2014-15. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 80p.

Hjorvarsdottir, F. 2017. Conservation Services Programme Annual Research Summary 2015-16. Report prepared by the Conservation Services Programme of the New Zealand Department of Conservation, Wellington. 84p.

2.2 INT2015-02 Identification of marine mammals, turtles and protected fish captured in New Zealand fisheries

Overall objective

To determine which marine mammal, turtle and protected fish species are captured in fisheries and their mode of capture.

Specific objectives

1. To determine, primarily through examination of photographs, the taxon and, where possible, sex, age-class and provenance of marine mammals, turtles and protected fish captured in New Zealand fisheries (for live captures and dead specimens discarded at sea)

Rationale

The accurate determination of the taxon of marine mammals, turtles and protected fish captured in New Zealand fisheries is vital for examining the potential threat to population viability posed by incidental fisheries captures. Observers on commercial vessels are not always able to identify marine mammals, turtles and protected fish at sea with high precision, and the assessment of the age-class may require expert knowledge. Information gained through this project will link to Ministry for Primary Industry databases and will inform ongoing bycatch estimation, risk assessment, research and modelling of the effects of fisheries bycatch on marine mammals, turtles and protected fish populations.

This is a new project and is designed to complement the existing seabird identification project. Observers routinely collect samples of genetic material from these taxa, and these can be used to resolve uncertain identification determinations from photographs.

Project status

Awaiting data for completion.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $15,000 per annum. Services were provided by Anton van Helden, Marine Mammal Consultant.

2.3 INT2015-03 Identification and storage of cold-water coral bycatch specimens

Overall objective

To identify coral bycatch that cannot be identified by Government fisheries observers to the finest taxonomic level (assign codes to coral specimens to the species level wherever possible, when this is not possible; identify specimens to genus or family level).

Specific objectives

1. To determine through expert examination, the taxa of unidentified cold-water corals returned by fisheries observers.
2. Record all identified coral specimens and make them available for appropriate taxonomic collections.
3. Ensure preparation of genetic samples of selected octocoral specimens (*Thouarella sp.* Specifically *Thouarella crenlata*) is undertaken by taxonomic collection technicians during identification, in order to feed into planned coral connectivity work.
4. Formalise Fisheries Observer briefings with updated coral identification information.

Rationale

The 2010 amendment of Schedule 7A of the Wildlife Act 1953 protects all hard corals, including: black corals (all species in the order Antipatharia); gorgonian corals (all species in the order Alcyonacea (previously known as Order Gorgonacea)); stony corals (all species in the order Scleractinia); and hydrocorals (all species in the family Stylasteridae). Identifying coral bycatch that is unable to be identified by Government fisheries observers to the finest taxonomic level provides vital baseline information that can help to better inform research and marine protection such as predictive modelling, benthic risk assessments and management of benthic marine protected species.

The aim of this project is to improve the quality of data collection and protected coral identifications. Observer briefings can continue and be formalised, and Observers can be informed about how the research data are used. This will improve their skills at identifying and collecting samples and bycatch data. Specialists can then confirm identifications to help understand distributions at a more detailed taxonomic level. This work will also feed into planned coral connectivity research, which will enable more robust assessment of areas at risk from fisheries impacts.

Project status

This is a three-year term project that is due for completion in June 2019. Reporting for the 2016/17 year is now complete.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $40,000 per annum. Services were provided by NIWA.

Review milestones:

- Methodology report tabled on the CSP webpage on 16 November 2016
- Draft Final Annual Report tabled on the CSP webpage on 22 November 2017

Citation

Tracey, D., Mills S., Macpherson, D., Thomas, H. (2017). Identification and storage of cold-water coral bycatch specimens. Final Report prepared by NIWA for the Conservation Services Programme, Department of Conservation. INT2015-03. NIWA Client Report 2017349WN. 38 p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/identification-of-and-storage-of-cold-water-corals-final-annual-report/

2.4 INT2016-02 Identification of seabirds captured in New Zealand fisheries

Overall objective

To determine which seabird species are captured in fisheries and the mode of their capture.

Specific objectives

1. To determine, through examination of returned seabird specimens, the taxon, sex, and where possible age-class and provenance of seabirds killed in New Zealand fisheries (for returned dead specimens).
2. To detail the injuries, body condition and stomach contents and, where possible, the likely cause of mortality (for returned dead specimens).
3. To report any changes in the protocol used for the necropsy of seabirds (for returned dead specimens).
4. To determine, through examination of photographs, the taxon and, where possible, sex, age-class and provenance of seabirds captured in New Zealand fisheries (for live captures or dead specimens discarded at sea).

Rationale

Large numbers of seabirds frequent New Zealand commercial fishing waters. Birds with significant differences in conservation status can appear morphologically similar. The accurate determination of the taxon of seabirds captured in New Zealand fisheries is vital for examining the potential threat to population viability posed by incidental fisheries captures. Observers on commercial vessels are not always able to identify seabirds at sea with high precision and the assessment of the age-class, sex and provenance of captured individuals requires autopsy in the majority of cases. Historically all dead seabird specimens collected by observers have been returned for necropsy where possible. However, in many cases, the taxon can be confirmed through expert examination of photographs taken by observers, and this can be achieved at lower cost than returning carcases and performing necropsy. In order to maximise cost efficiencies, and in recognition of increased observer coverage levels in some fleets, a new protocol has been developed to determine which specimens are returned for full necropsy. This protocol aims to strike a balance between returning birds for full necropsy (for rarer species and in less observed fisheries) and photographing birds for determination of taxon (for commonly caught species in well observed fisheries).

Examining the causes of mortality and types of injuries incurred by individual seabirds returned from fisheries is necessary to help reduce future seabird captures in New Zealand fisheries by identifying gear risks. Linking this information to species, age- and sex-class, and breeding status, helps identify if different groups of seabirds are vulnerable to different risks in fishing interactions.

Information gained through this project will link to Ministry for Primary Industries databases, seabird bycatch estimates, and will inform ongoing risk assessment, research and modelling of the effects of fisheries bycatch on seabird populations. Further, the mode of capture and associated information will enable robust analyses to be made of the factors contributing to seabird capture events and inform the development of appropriate mitigation strategies.

Project status

This is a three-year term project that is due for completion in June 2019. Draft report for the 2016/17 year is now complete and is awaiting presentation to stakeholders before finalisation.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $80,000 per annum. Services were provided by WMIL.

Review milestones:

- Methodology report tabled on the CSP webpage on 16 November 2016

2.5 INT2016-03 Post release survival of white pointer sharks in New Zealand

Project Objective

1. To better characterise bycatch events of white sharks caught in commercial setnets.
2. To identify the operational and biological factors that affect post-release mortality of white sharks.
3. To identify methods of improving post release survival.

Rationale

White pointer sharks have been observed caught throughout the New Zealand EEZ and in a wide range of fisheries (Frances & Lyon 2012). As with other shark species there is a general paucity of information on the life history characteristics of white pointer sharks. However, indications are that they are generally slow growing and late maturing (Francis & Lyon 2012), making them susceptible to fishing impacts at a population level. While those animals caught in deeper water offshore trawls are generally identified as dead, those caught in coastal setnet fisheries, particularly on the South Coast South Island and West Coast North Island are often reported as being released alive, though with various injuries. In order to adequately assess fishery impact and develop mitigation solutions to maximise the likelihood of survival it is important to understand the post release survival of these animals. Studies on other elasmobranchs, bycaught in New Zealand fisheries have identified low survival rates of animals which were assessed as alive and in good condition at time of release (Francis 2014). Identifying factors which affect post release survival allows mitigation practices to be developed to reduce fisheries impacts.

Project status

Complete.

Summary of the methods and key findings

Ministry for Primary Industries' databases of fish catch and effort were searched and white shark records analysed. Observer data provided limited insight into bycatch of white sharks, because only nine sharks have been observed since 2008. Instead, we analysed data on 53 white sharks reported by fishers on Non-Fish and Protected Species (NFPS) forms since 2008, including 36 caught in set nets. Some captures may not have been reported, so the conclusions drawn may reflect reporting biases and not be valid. Three small regions (Great Exhibition Bay (GEB), Taranaki (TAR) and Foveaux Strait (FOV)) accounted for 89% of the 36 white sharks reported caught by set net vessels, but only 20% of the length of net set. Between 2007 and 2016, fishing effort declined in GEB and TAR but rose in FOV. White shark bycatch may have been affected by these changes in fishing effort, but trends in the spatial distribution of fishing effort, and changes in the importance of target fisheries, could also have influenced the impact of fishing on white sharks over the last decade.

The main target set net fisheries responsible for catching white sharks were different in all three regions: trevally in GEB, warehou in TAR and school shark/rig/spiny dogfish in FOV. The seasonality of the fisheries was not an important factor in GEB and TAR, although all FOV sharks were caught in summer-autumn. Two vessels reported 58% of the white sharks caught in the three regions. One of them (in FOV) set twice as much net as the next most important vessel. However, the other vessel (in GEB) was only the second-most important vessel in terms of amount of net set in that region, indicating that factors other than effort are important. Comparisons were made of set net gear parameters among regions, target species, vessels and shark- or non-shark sets. Higher nets tended

to catch more sharks in all regions, but sharks were caught across a range of mesh sizes, net lengths and set durations. Spatial factors were important in GEB and FOV, indicating that fishing location may be an important factor driving white shark bycatch.

Recommendations

- Bycatch could be reduced by identifying important hotspots of abundance and reducing or ceasing set net fishing in those areas at appropriate times of year. Restrictions on set netting in the Foveaux Strait–Stewart Island region during summer–autumn would greatly reduce white shark bycatch, as would closure to set netting of some other key white shark habitats.
- Reduction of set net height in key fisheries could reduce bycatch.
- 69% of sharks reported on NFPS forms were judged by fishers to be alive and in good condition, 3% were alive but injured, and 28% were dead. A post-release mortality experiment would be necessary to determine the true mortality rate of white sharks released alive from set nets. Such a study would have to run for 3–5 years to estimate PRM.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $20,000. Services were provided by NIWA.

Review milestones:

- Draft final report presented at the CSP TWG meeting on 16 March 2017
- Final report made available on the CSP webpage in June 2017

Citation

Francis, M. 2017. Bycatch of white sharks in commercial set nets. Report prepared by NIWA for the New Zealand Department of Conservation, Wellington. 27p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/post-release-survival-of-white-pointer-sharks-in-new-zealand-setnet-fisheries/

2.6 INT2016-04 Indirect effects of commercial fishing on Buller's shearwater and red-billed gulls

Project Objective

1. To identify potential indirect effects of commercial fishing on red-billed gulls and Buller's shearwater

Rationale

Commercial fishing, including purse seine capture methods, may be driving changes in fish populations in the Hauraki Gulf area leading to reduced availability of suitable prey for Buller's shearwater and red-billed gulls in surface waters. As poor divers, Buller's shearwater specialise in foraging in association with fish work-ups. This may be contributing to reduced breeding success of this species, which breeds only at the Poor Knights Islands. Recent tracking studies have shown that Buller's shearwaters now travel to the eastern South Island to gather food and incubation shift lengths have increased markedly since the 1970's (from 4 days per shift to 14 days). Red-billed gull colonies in the Hauraki Gulf have declined substantially from the 1960s. For example, less than 100 pairs nested on Mokohinau Island group in 2015 whereas this colony had >20,000 birds in the early 1960's. Red-billed gulls on the outer island colonies depend on krill and small fish brought to the sea surface by large schools of fish. This project will assess available information on seabird interactions with fish shoals and analyse the fish stock capture data from purse seine fleets in Hauraki Gulf and Bay of Plenty since the 1960s. This will be used to describe mechanisms for potential indirect effects of commercial fishing, and provide recommendations to better understand the mechanisms identified.

Project status

Complete.

Summary of the methods and key findings – Population status and trends of selected seabirds in northern New Zealand

Information was collated from numerous sources, principally the Classified Summarised Notes (CSN) of the Ornithological Society of New Zealand (OSNZ), published annually from 1939 to 1962, then as annual summaries up to 2002; New Zealand eBird checklists; OSNZ gull and tern survey, 1965-1968; Birds New Zealand red-billed gull survey database; species accounts published in various scientific journals; and individual records provided by knowledgeable observers.

Australasian gannets breed at 24 sites (including discrete sub-colonies). Information on long-term trends is mixed. The population expanded overall from 1946-47 to 1980-81, when the last full censuses were conducted. Since then, counts from photographs of some colonies taken in 2014-16 show apparent overall declines of -35% and -20% on the Three Kings and White Island respectively, whereas the mainland colonies at Muriwai, barely established in 1980-81, now support 1285 pairs, little changed from 1393 pairs recorded in 1998.

Spotted shag historically bred at up to 18 sites in the region, but currently do so at only three, suggesting of a long-term decline in both numbers of breeding pairs and sites. Interpreting these changes is complicated, however, by lack of clarity on just what past reported bird numbers refer to; difficulties in accessing known and potential breeding sites; near year-round breeding; and a paucity of recent counts.

Red-billed gull currently breed at 94 known sites, but not at a further 62 where the species once bred (a further 43 historically-known sites have not recently been surveyed). Changes in colony size through time indicate substantial—order of magnitude—declines at 16 sites; increases at nine sites; and no obvious change at four.

Records of white-fronted tern currently breeding at 42 sites probably grossly underestimates the actual number, given that nesting was recorded at 111 sites during the 1995-1998 national survey, and at 205 sites historically in the region. Limited data indicate that the species breeds erratically, with colony size fluctuating between years and birds often shifting sites. Colony sizes are currently smaller than in the past, however, suggesting a possible long-term decline.

Sightings of grey noddy have increased substantially since the early 1970s but, apart from one instance of breeding in 1993, there is no evidence of that the species currently breeds in the region.

Common problems encountered with all data sets included: inconsistency in survey methods; lack of clarity as to what the reported numbers denote—birds, pairs, or active nests; exact location of colonies often unclear; a potential bias in only reporting large colonies; and no regular monitoring. Fish and marine invertebrates, obtained on or close to the surface, often during fish 'boil ups', are the predominant foods, but for most species detailed knowledge of their diets at all stages is lacking.

Recommendations- Population status and trends of selected seabirds in northern New Zealand

- Establish a national multi-party monitoring programme to track changes in Australasian gannet, red-billed gull and white-fronted tern populations. Any changes and their causes cannot be adequately established through incidental data collection, the norm to date. Such a programme should be long-term and needs appropriate coordination and institutional support, including developing and promoting suitable monitoring protocols.
- Develop integrated population models, combining both census and demographic data, ideally linked to broader marine-ecosystem research initiatives, to identify those demographic components and processes that need to be better understood, and to explore possible long-term outcomes and consequences of present trends and possible management responses.

Summary of the methods and key findings – Population status and trends of selected seabirds in northern New Zealand

Information was collated from numerous sources, all outlined in the report.

Australasian gannets breed at 24 sites (including discrete sub-colonies). Information on long-term trends is mixed. The population expanded overall from 1946-47 to 1980-81, when the last full censuses were conducted. Since then, counts from photographs of some colonies taken in 2014-16 show apparent overall declines of -35% and -20% on the Three Kings and White Island respectively, whereas the mainland colonies at Muriwai, barely established in 1980-81, now support 1285 pairs, little changed from 1393 pairs recorded in 1998.

Spotted shag historically bred at up to 18 sites in the region, but currently do so at only three, suggesting of a long-term decline in both numbers of breeding pairs and sites. Interpreting these changes is complicated, however, by lack of clarity on just what past reported bird numbers refer to; difficulties in accessing known and potential breeding sites; near year-round breeding; and a paucity of recent counts.

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Sightings of grey noddy have increased substantially since the early 1970s but, apart from one instance of breeding in 1993, there is no evidence of that the species currently breeds in the region.

Common problems encountered with all data sets included: inconsistency in survey methods; lack of clarity as to what the reported numbers denote—birds, pairs, or active nests; exact location of colonies often unclear; a potential bias in only reporting large colonies; and no regular monitoring. Fish and marine invertebrates, obtained on or close to the surface, often during fish 'boil ups', are the predominant foods, but for most species detailed knowledge of their diets at all stages is lacking.

Recommendations - Population status and trends of selected seabirds in northern New Zealand

- Establish a national multi-party monitoring programme to track changes in Australasian gannet, red-billed gull and white-fronted tern populations. Any changes and their causes cannot be adequately established through incidental data collection, the norm to date. Such a programme should be long-term and needs appropriate coordination and institutional support, including developing and promoting suitable monitoring protocols.
- Develop integrated population models, combining both census and demographic data, ideally linked to broader marine-ecosystem research initiatives, to identify those demographic components and processes that need to be better understood, and to explore possible long-term outcomes and consequences of present trends and possible management responses.

Project logistics summary statement

This project was 100% crown funded. The planned cost for the project was $15,000.

Review milestones:

- Draft final reports and discussion material was presented on at the CSP TWG meeting on 16 March 2017.
- Final reports made available on the CSP webpage in June 2017.

Citation

Frost, P.G.H. 2017. Population status and trends of selected seabirds in northern New Zealand. Report prepared for the Conservation Services Programme, Department of Conservation, Wellington. 37p.

Gaskin, C. 2017. Procellariiformes associating with shoaling fish schools - northern New Zealand. Report prepared by Northern New Zealand Seabird Trust for the Department of Conservation, Wellington. 52p

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/indirect-effects-of-commercial-fishing-on-bullers-shearwater-and-red-billed-gulls/

3. Population Projects

3.1 POP2015-02 Flesh-footed shearwater: Various locations populations project

Overall objectives

1. To estimate the population size of flesh-footed shearwater at Middle Island (Mercury Islands).
2. To estimate key demographic parameters of flesh-footed shearwater at Lady Alice Island/Mauimua and Ohinau Islands.
3. To describe the at-sea distribution of flesh-footed shearwater breeding at Northland breeding sites.

Rationale

The Conservation Services Programme Seabird medium term research plan 2015 (CSP seabird plan 2015) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. It was developed as part of the work of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2015 for delivery in 2015/16 were identified and prioritised by the CSP RAG. This proposal covers prioritised components involving field work on flesh-footed shearwater, classified as at very high risk from commercial fisheries. Supporting rationale for all the components is summarised in the CSP seabird plan 2015.

Project status

Ongoing. This is a multi-year project which is due for completion in June 2018. The reporting for the 2016/17 year is now complete.

Summary of the methods and key findings

This report covers the population monitoring of flesh-footed shearwaters (*Puffinus carneipes*) on Ohinau and Lady Alice Islands carried out under Conservation Services Programme project POP2015-02. This is the first year of intensive monitoring for the entirety of the breeding season for both populations. Some preliminary monitoring and banding of the Ohinau Island population was conducted in April/May 2016.

A total of 661 birds were banded on Ohinau Island and 379 on Lady Alice Island during this season. A total of 229 study burrows were monitored on Ohinau Island and 179 on Lady Alice Island. A further 35 burrows on Ohinau Island and 30 burrows on Lady Alice Island were monitored by burrowscope only to assess if there were any effects of our monitoring. No effect was detected with burrowscope burrows having a lower breeding success than study burrows. At least one partner was identified in 91% and 72% of all study burrows for Ohinau Island and Lady Alice Island respectively. Three hundred and ninety-nine eggs were laid in all burrows combined and the overall breeding success (chicks that are likely to survive to fledging) for the season was 49.1%.

This result is the first measured for a New Zealand population of flesh-footed shearwaters. It is similar to that measured in some Australian populations, but we suspect that due to heavy rain and possible flooding of burrows it is slightly lower than could normally be expected. The high number of grey-faced petrels (*Pterodroma gouldi*) present on both islands is possibly also affecting breeding success.

Ongoing and repeated monitoring of both islands will continue and more robust conclusions about the population trends of flesh-footed shearwaters in New Zealand can be made.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. This is a three-year project and the planned cost for the project was $80,000 per annum. Services were provided by Wildlife Management International Ltd.

Review milestones:

- Project update presentation at the CSP TWG meeting on 10 June 2016
- Final report for 2015/16 component made available on the CSP webpage on in June 2016
- Project update presentation at the CSP TWG meeting on 27 July 2017
- Final report for 2016/17 component made available on the CSP webpage in February 2017

Citation

Mischler, C.P. 2016. Conservation Services Programme, Flesh-footed Shearwater Project 4653, Demographic Component, April-May 2016 Report. Report prepared by Wildlife Management International Ltd for the New Zealand Department of Conservation, Wellington. 11p.

Crowe, P.; Bell, M.; Kirk, H.; Burgin, D. 2017. Flesh-footed shearwater population monitoring on Ohinau and Lady Alice Islands, 2016/17 report. Report prepared by Wildlife Management International Limited for the New Zealand Department of Conservation, Wellington. 20p.

Bell, M.D.; Boyle, D.P. 2017. Population estimate of Flesh-footed Shearwaters on Middle Island. Report prepared by Wildlife Management International Limited for the New Zealand Department of Conservation, Wellington. 12p.

Kirk, H.; Crowe, P.; Bell, M. 2017. Foraging distribution and behaviour of flesh-footed shearwaters (Puffinus carneipes) breeding on Lady Alice Island – February 2017. Report prepared by Wildlife Management International Limited for the New Zealand Department of Conservation, Wellington. 24p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/flesh-footed-shearwater-demographic-component-2015-16/

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/flesh-footed-shearwater-various-locations-population-project-2016-17-update/

3.2 POP2016-01 Seabird population research: Chatham Islands 2016-17

Overall objectives

To collect information on key aspects of the biology of selected at-risk seabird species in order to reduce uncertainty or bias in estimates of risk from commercial fishing

Rationale

The Conservation Services Programme Seabird medium term research plan 2016 (CSP seabird plan 2016) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. It was developed as part of the work of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2016 for delivery in 2016/17 were identified and prioritised by the CSP RAG. This proposal covers prioritised components involving field work at the Chatham Islands, which have been developed to maximise cost and logistical efficiencies between components. Supporting rationale for all the components is summarised in the CSP seabird plan 2016.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $120,000. Services were provided by Wildlife Management International Limited (ground component) and Latitude 42 (aerial component).

Seabird population research, Chatham Islands 2016/17 (ground component)

Project status

Complete.

Summary (Forty-Fours)

A field team of three (Dave Bell, Dave Boyle and Hamish Tuanui-Chisholm) camped on the island from Dec 5th until Dec 9th, 2016.

A full census of Northern Buller's Mollymawks on the island counted 17,682 nests sites. This total is higher than previous counts (2007-09 average 14,699 nests) and is likely to be a result of improved methodology rather than an increase in numbers.

A full census of Northern Royal Albatross on the island counted 1,400 birds incubating eggs. This is significantly lower than that recorded using aerial photography in 2006-2009: average of 2,209 breeding pairs (range 1,879-2,692 pairs). As Northern Royal Albatross are a biannual breeder, without knowing the productivity from last season, it is difficult to determine if this represents a true decline. However, it seems most likely that Northern Royal Albatross on Motuhara are declining.

Recommendations (Forty-Fours)

- Biologically there is unlikely to be any issues in regard to undertaking a demographic study on this species.
- If a project was to be initiated on Northern Buller's Mollymawk, at the same time a project on Northern Royal Albatross should also be carried out as these population appears to be in serious decline.

Summary (The Pyramid)

Te Tara Koi Koia (The Pyramid), the sole breeding site of the Chatham Island Mollymawk *Thalassarche eremita*, is privately owned by the Daymond Whanau and we are very grateful for their permission to camp on the island to undertake research on Chatham Island Mollymawk.
A field team of two (Dave Bell and Dave Boyle) camped on the island from Nov 9th until Nov 14th.
A full census of the island counted 5296 nests sites of Chatham Island Mollymawk. This result is very similar to previous counts, with the average from 1999-2016 being 5,294 nest sites (range 5,194-5,407, n=11).

However, the long-term trend suggests that the population could be in gradual decline. Most nests contained breeding birds, with 63.1% of nests containing eggs, 10.8% a chick and 22.6% had already failed; only 3.5% of nests were classified as empty. Chick hatching had only just started during this field trip. A review of nest occupancy recorded during field trips since 1997 clarifies the breeding timetable of Chatham Island Mollymawk.

A total of 310 band recoveries we made of Chatham Island Mollymawk, this included 3 dead adults, 196 adults incubating eggs, 47 adults guarding a chick, 29 adults on a failed nest, 14 adults on an empty nest, and 21 adults caught away from nests where breeding status could not be determined.
A total of 65 study nests on the Camp Flat and Slopes had birds breeding in them, containing either an egg or chick. A further 9 marked nests were occupied by birds, but were empty.

Review milestones:

- Draft results presented at the CSP TWG meeting on 16 March 2017
- Draft Final reports made available for comments on the CSP meeting page on 17 July 2017
- Final report made available on the CSP webpage on in February 2018

Citation

Bell, M.D.; Bell, D.J.; Boyle, D.P.; Tuanui-Chisholm, H. 2017. Motuhara Seabird research: December 2016. Report prepared by Wildlife Management Limited for the Department of Conservation. 17p.

Bell, M.D.; Bell, D.J.; Boyle, D.P. 2017. Chatham Island Mollymawk research on Te Tara Koi Koia: November 2016. Report prepared by Wildlife Management International Limited for the Department of Conservation, Wellington. 24p.

Webpage

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/chatham-island-seabird-population-research-2016-17/

Seabird population research, Chatham Islands 2016/17 (aerial component)

Project status

Complete.

Summary of the methods and key findings

In November and December 2016, we used aerial photography and satellite imagery to determine the population size of Northern royal albatross breeding and Northern Buller's albatross on the Forty-Fours and The Sisters, Chatham Islands, and to compare the estimates derived from these techniques with ground counts. In addition, we also used the opportunity to test the feasibility of using aerial

photography to estimate population size of Northern giant petrels, which also breed on the two island groups.

The estimated annual count of royal albatross derived from aerial survey after adjustment to account for the presence of loafing birds in the colony was of 4,772 annual breeding pairs after correction using aerial close-up photos, and 4,406 annual breeding pairs after correction using ground counts.

The count derived from satellite imagery for The Sisters and The Forty-Fours was 2,578 and 2,533 Apparently Occupied Sites, respectively, which was 21% lower than the raw aerial count for The Sisters (3,269 birds) and 38% higher than the raw aerial count for the Forty-Fours (1,830 birds). The ground count for the Forty-Fours was 1,404 annual breeding pairs.

The estimated annual count of Buller's albatross derived from aerial survey after adjustment to account for the presence of loafing birds in the colony was 17,969 annual breeding pairs after correction using aerial close-up photos, and 16,138 annual breeding pairs after correction using ground counts (correction factor 0.121). Most birds (85.3%) were breeding on The Forty-Fours.

The ground count for the Forty-Fours was 16,492 annual breeding pairs, which included an estimate of 3,445 nesting attempts that had failed. Adjusted aerial counts for The Forty-Fours were 7.1% and 16.5% lower than the ground count, although a direct comparison is difficult due to the 14-day difference between the ground and aerial counts, and the inclusion of failed nests in the ground counts, which would not have been detectable from the air.

There were no counts derived from satellite imagery for Buller's albatross as the resolution of the imagery is unsuitable for counting this species.

Aerial counting of northern giant petrels was not effective at either The Sisters or The Forty-Fours. Birds were not clearly visible in most images and detecting birds was difficult. An aerial count of 370 chicks at The Forty-Fours, was 30% of the 1,235 giant petrel chicks counted on the ground.

The use of WorldView-3 satellite imagery to count albatross populations is a new phenomenon which has potential application to the other greater albatross species. The mixed results obtained in this study indicate there may be more to be learnt to refine the technique. At this stage use of either aerial photographic surveys or on-ground counts remain the preferred methods for estimating population size and monitoring in the Chatham Islands.

Recommendations

- At this stage use of conventional ground or aerial counting techniques are likely to be more cost effective, and remain the preferred methods for estimating population size and monitoring in the Chatham Islands.

Review milestones:

- Draft results presented at the CSP TWG meeting on 24 May 2017
- Final report made available on the CSP webpage in August 2017

Citation

Baker, G.B., Jensz, K., Bell, M., Fretwell, P.T. & Phillips, R.A. 2017. Seabird Population Research, Chatham Islands 2016/17 aerial photographic survey. Report prepared by Latitude 42 for the Department of Conservation, Wellington, New Zealand. 20p.

Webpage

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/seabird-population-research-chatham-islands-2016-17-aerial-survey/

3.3 POP2016-02 Seabird population research: Auckland Islands 2016-17

Overall objectives

To collect information on key aspects of the biology of selected at-risk seabird species in order to reduce uncertainty or bias in estimates of risk from commercial fishing

Rationale

The Conservation Services Programme Seabird medium term research plan 2016 (CSP seabird plan 2016) outlines a five-year research programme to deliver on the seabird population research component of CSP. It is targeted at addressing relevant CSP Objectives (as described in the CSP Strategic Statement) and National Plan of Action – Seabirds Objectives. It was developed as part of the work of the CSP Research Advisory Group. Key components of research described in the CSP seabird plan 2016 for delivery in 2016/17 were identified and prioritised by the CSP RAG. This proposal covers prioritised components involving field work at the Auckland Islands, which have been developed to maximise cost and logistical efficiencies between components. Supporting rationale for all the components is summarised in the CSP seabird plan 2016.

Gibson's wandering albatross

Project objectives

1. To estimate the population size of Gibson's albatross population.
2. To collect data to estimate the adult survival and other demographic parameters at Adams Island.

Project status

Complete.

Summary of the methods and key findings

Estimates of population size, survivorship, productivity and recruitment were made from a mark-recapture study undertaken in a 61 ha intensively monitored study area.

The size and trend of the Gibson's albatross population was estimated by counts of active nests in 3 representative parts of their main breeding grounds on Adams Island which have been re-counted repeatedly since 1998. The numbers of birds nesting in 2017 was a little lower than the previous year, probably because of relatively high numbers of pairs breeding and high breeding success in 2016, likely due to a strong El Niño.

There were estimated to be 4,423 pairs of Gibson's albatross breeding in 2017, about half the number of pairs breeding in 2004 (i.e. 8,728) before the population crashed. Proportion breeding and nesting success in Gibson's wandering albatrosses appears related to the large-scale patterns of climate variability, the southern oscillation and the Pacific decadal oscillation.

Survivorship and productivity of Gibson's wandering albatross is improving and the rate of decline of the population has slowed, though the population is still decreasing or is at best stable. However, counts of the number of nesting birds continue to gradually increase because a higher proportion of the birds are choosing to nest.

Even if ocean conditions are favourable in the next few years, as they were in early 2016 due to the strong El Nino, a rapid increase in the size of the breeding population of Gibson's wandering albatross is unlikely as productivity has been low for almost a decade, so there are few young birds available to join the breeding population.

While the conservation status of Gibson's wandering albatross is so poor, monitoring its population structure and trend on Adams Island remains an important conservation priority.

Recommendations

- Population size and trend and adult survival should continue to be estimated at regular intervals until the population substantially increases. A detailed modelling exercise such as the one carried out by Francis et al in 2012 would give a better indication of the trajectory of the whole population and should be undertaken within the next five years.
- Recent estimates of the size of the population are sufficiently accurate that a whole-island census is probably unnecessary.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $50,000. Services were provided by Albatross Research.

Review milestones:

- Results were presented on at the CSP TWG meeting on 24 May 2017
- Final report made available on the CSP webpage in June 2017

Citation

Walker K, Elliott, G, Rexer-Huber K, Parker G. 2017. Gibson's wandering albatross population study and census 2016/17. Report prepared by Albatross Research for the Department of Conservation, Wellington. 17p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/gibsons-wandering-albatross-at-adams-island-population-study-and-census-2016-17/

White-capped albatross

Project status

Complete.

Project objectives

1. Undertaking mark recapture work at the study colony established on Disappointment Island to collect data suitable for estimating key demographic parameters such as adult survival.
2. Conduct an aerial photographic census of white-capped albatross at the Auckland Islands.
3. Archive all photographic data obtained for white-capped albatross in accordance with the protocols described by Baker et al (2015).

Summary of the methods and key findings (ground component)

We established a marked population of breeding adult white-capped albatross at their largest colony on Disappointment Island, Auckland Islands with the long-term aim to estimate key white-capped albatross demographic parameters, including adult survival. The work reported in 2017 comprises the set-up phase over three annual visits 2015 - 2017 of a study area established in a dense white-capped albatross colony close to Castaways Bay. To support the interpretation of aerial photographs, an additional objective was to conduct ground-truthing counts to estimate the proportion of breeding white-capped albatrosses from those that are apparently incubating (birds sitting on nests that do not actually have an egg).

A total of 393 breeding white-capped albatrosses have been banded in three annual visits to Disappointment Island 2015 – 2017. White-capped albatross resighting rates of birds banded in previous years were 21% in 2016 and 24% in 2017. Ground-truthing counts of incubating versus apparently incubating birds revealed that overall the proportion of incubating birds averaged 64% from 21 transects.

Two years of recaptures do not provide sufficient recapture histories for individuals to allow survival estimates. However, our two short visits in 2016 and 2017 recorded encouraging resighting rates, given the short duration of visits that did not allow sufficient time for breeding pairs to changeover mates, and the primary focus of the work on banding and ground-truthing (not resighting).

Ground-truthing data show that counts of the breeding population of white-capped albatrosses on Disappointment Island using aerial photography cannot provide an accurate or consistent estimate without calibration by ground-truthing data of the number of birds apparently incubating. As the proportion of incubators versus apparent incubators may vary around the island, we question whether sufficient ground truthing data can be collected to enable accurate estimates of the entire breeding population based on interpretation of aerial photography.

Recommendations (ground component)

A further five-day visit to Disappointment Island would allow the banded population to be increased to more than 600 birds. Simulation modelling by Roberts et al. (2015) found estimates from 600 individuals provided acceptably precise survival estimates with 5 years of resighting effort.
We recommend that visits to Disappointment Island plan for at least five days on the island.
We also recommend that trips take place during the brood guard stage to (1) minimise or eliminate the risk of causing breeding failures, and (2) coincide with the time when parents change-over nest attendance most frequently.

Summary of the field work methods (aerial component)

Field work for previous years (2006-2015) has been previously described in Baker et al (2015) and Baker and Jensz (2016). From 2006 to 2010 flights were conducted in December to coincide with the early incubation period of the breeding cycle. At this time, it was anticipated that birds would have just completed egg laying (M. Double unpublished; P. Sagar unpublished), and hence most birds that attempted to breed would still be attending active nests. The dates of our previous visits to the Auckland Islands were 16 December 2006, 13 December 2007, 14 December 2008, 3 December 2009 and 15 December 2010. For logistical reasons the counts since 2011 were undertaken in January (11

January 2012, 14 January 2013, 20 January 2014 and 13 January 2016. The 2016 counts were undertaken on 18 January (Disappointment Island, Adams Island) and 19 January 2017 (SW Cape, Auckland Island), and all colonies were photographed at least twice. The timing of January counts is not ideal with respect to the breeding cycle of white-capped albatross, as although hatching would not have commenced, some nests could be expected to have failed and those breeding birds may have abandoned their breeding sites.

Photography was timed to occur between 1100 to 1600 NZDT. Although there is little information on the behaviour of breeding white-capped albatrosses, information from the closely-related shy albatross *Thalassarche cauta* indicates that during the early incubation period the ratio of incubating to loafing birds is high as most loafers are at sea during the middle of the day (B. Baker unpublished).

The survey photographs of Disappointment Island were taken at an altitude of about 400 metres, well above the minimum limit of 300 m recommended by DOC. Most photographs were taken with the zoom lens set at a focal length of 100 mm. The close-ups were taken using the Canon lens' maximum extension of 400 mm. The entire set of photographs were subsequently replicated to ensure that four complete back-up sets existed both on portable hard drives and in at least three different locations. A full set of photographs was provided to Department of Conservation officer.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $50,000. Services were provided by Parker Conservation, NIWA & Latitude 42.

Review milestones:

- Results were presented on at the CSP TWG meeting on 24 May 2017
- Final report made available on the CSP webpage in June 2017

Citation

Parker, G.C., Sagar, P., Thompson, D. & Rexer-Huber, K. 2016. White-capped albatross – adult survival & other demographic parameters, Auckland Islands 2017. Report prepared by Parker Conservation for the Department of Conservation, Wellington. 14p.

Baker, G.B. & Jensz, K. 2017. White-capped albatross aerial photographic survey, January 2017. Report prepared by Latitude 42 for the Department of Conservation, New Zealand. 5p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/whitee28090capped-albatross--adult-survival-and-other-demographic-parameters-auckland-islands-2017/

http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/marine-conservation-services/reports/auckland-island-white-capped-albatross-aerial-2017.pdf

White-chinned petrel

Project objectives

1. To extend the collection of resight data from study colonies established to estimate key demographic parameters.
2. Retrieval of additional tracking devices to collect further spatial foraging data which can be used to describe the spatial overlap with commercial fishing effort.

Project status

Complete.

Summary of the methods and key findings

The white-chinned petrel Procellaria aequinoctialis is one of the most frequently observed seabird species captured in fisheries bycatch, yet some populations remain virtually unstudied. In the New Zealand region, the priority programmes to fill key information gaps included surveying, tracking and collecting demographic data from white-chinned petrels in the Auckland Islands. Survey of the Campbell Island population and clarification of taxonomic uncertainty in the New Zealand region were secondary aims. The scope of this report is to summarise research findings, with focus on New Zealand populations of white-chinned petrels.

An estimated 186,000 (95% CI: 131,000–248,000) white-chinned petrel pairs breed in the Auckland Islands, and the Campbell Island group supports around 22,000 (15,000–29,000) breeding pairs. The New Zealand region supports almost a third of white-chinned petrels globally, but population trends remain unknown. We establish population baselines that can be repeated for trend estimation.

A tracking programme in the Auckland Islands has retrieved 40 geolocators from white-chinned petrels, which were analysed together with tracking data from all major island populations. NZ populations do not overlap at sea with populations from South Atlantic or Indian Ocean islands. Antipodes and Auckland populations have some marine areas of overlap, but also have large areas specific to birds from a single island. Global density estimates for white-chinned petrels show key global density hotspots (off South America, New Zealand, and southern Africa). A study was initiated to collect demographic data from white-chinned petrels at Adams Island, Auckland Islands. Four years of data have since been collected.

Genomic data revealed genetic structure in white-chinned petrels at very fine scale (among islands) and at broad oceanic scales (between Atlantic and Indian Ocean regions) that was not detected previously. Three ocean-basin scale evolutionarily significant units, ESUs, were identified. The NZ ESU contains Antipodes, Auckland and Campbell island populations. Some NZ island populations are sufficiently unique from others in the region to link mortality in a specific fishery to a given island.

Recommendations

- Survey data from Antipodes need analysing fully.
- Estimated numbers of white-chinned petrels on Campbell are coarse; local burrow occupancy data and surveys of Jacquemart have greatest potential to improve accuracy.

- For population trend data at New Zealand islands, Auckland and Campbell white-chinned petrel estimates should be repeated (5–10 years).
- The Antipodes population needs re-survey in the next 1–2 years. Resightings at Adams study colony should continue for demographic parameter estimates
- Tracking is needed for white-chinned petrels from Campbell (only island population with unknown range).
- Bycatch white-chinned petrels in areas used by only one population should be linked to island of origin; e.g. off Peru, in Tasman Sea. Petrel density data should be overlaid with fishing effort.
- Resightings at the Adams Island study colony should continue for demographic parameter estimates.
- The potential to genetically assign bycatch white-chinned petrels to island of origin needs testing and development, targeting bycatch petrels from areas where populations overlap.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $20,000. Services were provided by Kalinka Rexer-Huber, University of Otago.

Review milestones:

- Project updates presented at the CSP TWG meeting on 10 June 2016
- 2015/16 Progress report made available on the CSP webpage in October 2016
- Final summary report made available on the CSP webpage in February 2018

Citation

Rexer-Huber, K. 2017 White-chinned petrel distribution, abundance and connectivity: NZ populations and their global context. Report prepared by Parker Conservation for the Department of Conservation. 13p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2015-16/white-chinned-petrel-population-research-summary-report/

3.4 POP2016-03 Updated basking shark bycatch review

Project Objectives

1. To update the 2012 review of basking shark bycatch with information from the most recent fishing years.
2. To reassess the efficacy of management measures.
3. To update the review of relevant research on basking shark population parameters.
4. To explore potential future work to better understand basking shark populations and biology around New Zealand.

Rationale

Since the review of Francis & Sutton (2012; output of CSP POP2011-04) a series of bycatch events and industry management interventions have occurred. The National Plan of Action-Sharks has also been developed which has specific objectives related to increasing understanding and improving management of shark populations. Advances have also been made in the understanding of basking shark biology. It is therefore timely to update the review of Francis & Sutton (2012), to ensure the most recent available information is readily available to inform management of fisheries bycatch of this species.

Project status

Complete.

Summary of the methods and key findings

A literature search was carried out for new publications on basking sharks since 2012. Ministry for Primary Industries' databases of fish catch and effort were searched and basking shark records analysed. Raw catch per unit effort (CPUE) indices were calculated for each of three core fishery regions using observed captures. A shorter series of CPUE indices was also calculated using reported commercial data.

There is weak genetic structuring of basking sharks at the scale of ocean basins and large-scale movement. This is confirmed by new tagging studies that found movements of 3000–4600 km in the Atlantic and Pacific oceans. Basking sharks frequently inhabit ocean depths greater than 600 m. The aggregations of basking sharks in shallow coastal waters represent only part of their complex behavioural and habitat requirements. Japanese drift net surveys east of New Zealand during the late 1980s found sharks less than 3 m long inhabit epipelagic waters in the open ocean. The recent discovery of a 6.9 m mature female indicates that some mature at a smaller size than previously thought.

Observed raw CPUE has been at or near zero in East Coast (EC) and West Coast (WC) fisheries since the mid 2000s, while CPUE in Southland–Auckland Islands region (SA) fluctuated around low levels. It is not known whether the low numbers of captures in recent decades are a result of different operational methods used by the fleet, a change in regional availability of sharks, or a decline in basking shark abundance. SA region was responsible for 83% of the basking shark captures in 2011–2016. More than half of the SA captures came from the arrow squid target trawl fishery. Catch rates were greatest in 200−400 m of water, at the deeper end of the squid fishery depth range, and in the silver warehou fishery. Sharks were caught at moderate rates down to depths as great as 800 m One fishing vessel was responsible for 52% of captures in SA. This is probably explained by a combination of high fishing effort, and the larger headline height and greater depth worked than other vessels. Headline height was an important factor affecting basking shark catch rates.

No specific management measures are in place for basking sharks. However, an active mitigation programme has been operated by Deepwater Group to reduce shark captures since October 2013. It is not yet clear whether the mitigation measures have had any effect on basking shark captures, and given the low and variable catch rates of sharks, any effect will be difficult to detect. A move towards headline heights of less than 4 m, and a reduction of fishing in the favoured depth range of sharks, would probably reduce basking shark captures.

Recommendations

- Collection of tissue samples (e.g. fin clips) for feeding into international studies of basking shark genetics.
- Collection of white muscle samples, and sampling of stomach contents, to determine the trophic level occupied by basking sharks, and what they feed on, in subsurface habitats.
- Shark length should be measured or estimated, and sex determined, for all sharks caught in commercial fisheries.
- Vessels should retain any small juveniles caught for scientific study.
- Attempts should be made to deploy popup satellite tags on free-swimming basking sharks. This will rely on the ability to find animals at the surface in an accessible location

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $15,000. Services were provided by NIWA.

Review milestones:

- Draft final report made available for commenting on the CSP meeting webpage on 19 April 2017.
- Final report made available on the CSP webpage in June 2017.

Citation

Francis, M. 2017. Review of commercial fishery interactions and population information for New Zealand basking shark. Report prepared by NIWA for the New Zealand Department of Conservation, Wellington. 44p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/updated-basking-shark-bycatch-review-2016-17/

3.5 POP2016-09 Support to cetacean habitat suitability modelling

Specific objectives

1. To prepare spatial distribution information for cetacean species held by DOC to inform planned habitat suitability modelling and ultimately fisheries risk assessment.

Rationale

There are 47 cetacean species known to occur in New Zealand waters, three of which are listed as Nationally Critical, and another three as Nationally Endangered (Baker et al. 2010) under the New Zealand threat classification system. All cetaceans in New Zealand's territorial seas and Exclusive Economic Zone (EEZ) are protected under national law by the Marine Mammal Protection Act (1978), which mandates that all physical or habitat disturbances to the animals must be avoided or mitigated. However, the knowledge about distribution and habitat use patterns of cetaceans in New Zealand waters is limited, especially for those that inhabit offshore waters. This lack of information limits the attempts by government, conservation and industry stakeholders to consider risks and minimize impacts on cetaceans. Compiling existing cetacean sightings datasets and modelling cetacean habitat use will provide improved understanding of the environmental drivers of cetacean habitat use and generate reliable predictions of species habitat suitability patterns. This project will assist the development of habitat modelling through the preparation and compilation of DOC data sources and lay the ground work for future CSP projects to develop a web-based portal, which will enable quick and dynamic access to the best available information of the habitat suitability of various cetacean species in New Zealand. The results from this project will feed in to the longer term Marine Mammal Risk Assessment in New Zealand waters, and to CSPs five-year marine mammal medium term research plan (Goetz, personal comm).

Project status

Project cancelled as the objectives of this project were met through another work programme within the Marine Species & Threats team at DOC.

Project logistics summary statement

This project was 100% crown funded. The planned cost for the project was $15,000.

3.6 POP2016-05 Yellow-eyed penguin foraging and indirect effects

Specific objectives

1. To describe the at-sea foraging distribution of adult and juvenile yellow-eyed penguins breeding in Otago and Southland.
2. To collate and synthesise existing information relevant to the indirect effect of commercial fishing induced benthic habitat modification on the mainland population of yellow-eyed penguins.
3. To identify mechanisms through which commercial fishing induced benthic habitat modification may affect the mainland population of yellow-eyed penguins, and provide recommendations for future research to better understand these indirect effects.

Rationale

Ellenberg and Mattern (2012; output of CSP project POP2011-08) provided research recommendations to understand the impact of fishing induced benthic habitat modification on yellow-eyed penguins in the Otago and Foveaux Strait regions. The recommendations include data collection on yellow-eyed penguins using GPS devices, and sea floor surveys.

This project aims to build on a proposed research programme at Otago University to investigate the diet, dispersal and foraging strategies of yellow-eyed penguins. Such information will form a key component of further investigation of mechanisms of potential indirect effects of commercial fishing on this species. This project will also assess available information to describe mechanisms for potential indirect effects of commercial fishing, and provide recommendations to better understand mechanisms identified. A thorough collation and synthesis of existing information will ensure cost effectiveness and synergies with other research programmes are maximised in progressing our understanding in this area.

Project status

Ongoing - This is a two-year project, and is due for completion in June 2018. Reporting is due in the 2017/18 year.

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $25,000. Services were provided by Mel Young, University of Otago.

Review milestones:

- Progress presented at the CSP TWG on 27 July 2017

3.7 POP2016-06 Salvin's albatross Bounty Islands: methodology development

Overall objective

To Develop a methodology to estimate the population size of Salvin's albatross at the Bounty Islands, and collect of at-sea distributional information.

Rationale

Recent population estimates of Salvin's albatross at the Bounty Islands (part of CSP project POP2012-06) using ground and aerial methods have found contrasting evidence in regards population trend (Amey & Sagar 2013; Baker et al 2014). The at-sea foraging distribution of this population is described from only a small sample size of individuals due to device failure in a recent study (Thompson et al 2014; part of POP2012-06).

This project will develop a methodology for a project to estimate an updated population estimate of Salvin's albatross at the Bounty Islands, a comparison of the updated estimate to previous estimates to determine population trend, and collect a representative sample of at-sea foraging distributional information. Completing all these components in one project will maximise cost-effectiveness at this remote site.

It is envisaged that the research plan developed will be proposed for delivery as part of CSP in 2017/18.

Project status

Complete.

Recommendations

- Two-year project.
- Satellite mapping of island to allow area of occupancy to be quantified.
- Aerial photographic survey in year 1 (and ideally repeated in year 2) to estimate total number of breeding pairs and area of occupancy.
- Aerial survey conducted in late September.
- Ground visit in both years, coinciding with aerial survey to allow ground truthing.
- Focus on GLS deployment in year 1, with trial PPT/GPS transmitting device deployment.
- Focus on GLS retrieval and additional PPT/GPS transmitting devices deployment in year 2.
- Identify any potential constraints limiting breeding success.
- Band and resight birds with potential to establish a study site area on Proclamation Island (easiest access and most existing data).

Project logistics summary statement

This project was 50% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $10,000.

Review milestones:

- Final report published on the CSP website in March 2017

Citation

Debski, I; Hjörvarsdóttir, F. 2017. Salvin's albatross Bounty Islands: methodology development. Report of Workshop held on 28 November 2016.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/salvins-albatross-bounty-islands-methodology-development-2016-17/

3.8 POP2016-06 New Zealand Sea Lion: Auckland Islands pup count

Specific objectives

1. To estimate New Zealand sea lion pup production at Enderby, Figure of eight and Dundas Islands.
2. To update the New Zealand sea lion database

Rationale

New Zealand sea lions are classified as Nationally Critical (Baker et al. 2010), and are incidentally killed each year in southern commercial trawl fishing operations targeting species including squid, scampi and southern blue whiting. The foraging areas of New Zealand sea lions at the Auckland Islands have been shown to overlap with commercial trawl fishing activity, particularly SQU6T and SCI6A. Approximately 7o% of New Zealand sea lions breed at the Auckland Islands, where population data have been collected since the mid-1990s, including estimates of pup production and resighting of marked animals. Since 2001 there has been a considerable decline in pup production at the Auckland Islands. A literature review to identify potential indirect effects of commercial fishing on the Auckland Islands population as part of CSP project POP2010-01 (Bowen 2012) highlighted a number of key information gaps that currently prevent a full understanding of any such potential indirect effects, including time series data of population dynamics as collected in this project. CSP project POP2012-02 analysed population data collected during previous years in order to determine the key demographic factors driving the observed population decline of New Zealand sea lions at the Auckland Islands. It found that low pupping rates, a declining trend in cohort survival to age 2 and low adult survival may explain declining pup counts in one studied population (Roberts et al. 2014).

In response to the continued decline at the Auckland Islands, the Ministers of Conservation and Primary Industries announced that a Threat Management Plan (TMP) for New Zealand sea lions would be developed. This is currently underway and full public consultation occurred in the second quarter of 2016. This research project is scoped to collect pup count information required to manage the impact of commercial fishing on the Auckland Islands population, in line with CSP Objective E. It is envisaged that other research, and/or management actions, will be progressed as part of the TMP, and may be delivered alongside the research programme proposed here to provide logistical synergies.

Project status

Complete.

Summary of the methods and key findings

New Zealand sea lion monitoring was undertaken between 10 January and 21 January 2017 at Enderby Island, Dundas Island and Figure of Eight Island in the Auckland Islands group. A full description of methods is available in Childerhouse (2016), which is available from DOC and the author upon request. The research followed almost exactly the same methods as undertaken previously by DOC with a few differences outlined in the methodology part of the report. Overall, the project was a success and all objectives were completed.

Pup production was estimated for New Zealand sea lion colonies at Sandy Bay (n=349), Dundas Island (n=1,549), Figure of Eight Island (n=67) and South-East Point (n=0); with total pup production for the Auckland Islands in 2016/17 estimated as 1965.

The estimate for 2016/17 is 14% higher than for 2015/16 and is 31% higher than the lowest ever estimate for pup production in 2008/09.

Seven hundred and seventy-five pups were marked at the Auckland Islands including: Sandy Bay – 328 flipper tagged and microchipped; Dundas Island – 400 flipper tagged only; and Figure of Eight Island – 47 flipper tagged only

There was only a small amount of resighting effort conducted as part of this project as there was no time allocated to it. Additional limited resighting effort is being undertaken by DOC personnel remaining on Enderby Island

Project logistics summary statement

This project was 90% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $100,000. Services were provided by Blue Planet Marine.

Review milestones:

- Methodology presented at the CSP TWG meeting on 25 October 2016
- Final results presented at the CSP TWG meeting on 1 March 2017
- Final report published on the CSP website in May 2017

Citation

Childerhouse, S., Burns, T., French, R., Michael, S. & Muller, C. 2017. FINAL Report for CSP Project New Zealand sea lion monitoring at the Auckland Islands 2016/17. Report prepared by Blue Planet Marine for the New Zealand Department of Conservation, Wellington. 24p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/new-zealand-sea-lion-monitoring-at-the-auckland-islands-2016-17/

4. Mitigation Projects

4.1 MIT2015-01 Seabird bycatch reduction (small vessel longline fisheries)

Specific objectives

1. To provide one or more liaison officers to the inshore bottom longline and small vessel surface longline fishing fleets, with a focus on northern North Island, to assist those fleets reduce their seabird bycatch.
2. To coordinate the seabird liaison officer roles with wider efforts targeted at seabird bycatch reduction in relevant fisheries to achieve the greatest possible reduction in bycatch.

Rationale

To effectively reduce the risk of interactions with seabirds it is important for vessels to take the latest developments in mitigation technology and be able to adapt them to their specific operations. Translating the latest scientific research and fishing regulations into operational parameters is not always a straight forward process. To reduce that risk at a species level it is necessary for there to be consistency of application of mitigation across all fleets interacting with the species. Seabird liaison officers have formed a vital interface between skippers, government and researchers. Other projects and processes are also underway, which aim to reduce seabird bycatch, including the work of collaborative groups involving industry, Government and eNGOs, and process driven by the Ministry for Primary Industries. Coordinating liaison officers with these other processes to maximise reduction results is important.

Liaison officers were trialled in the snapper longline fleet around the Hauraki Gulf in 2013/14 and its initial positive results led to an expanded project being jointly resourced between DOC and MPI in 2014/15. This project expanded to a wider area and over a broader range of seasons, in particular to a larger portion of the Snapper longline fleet whilst also moving into the bluenose/hapuku fleet to develop vessel specific Seabird Management Plans (SMPs) along with liaison with the domestic surface longline fleet. Based the outcomes of two years of this work the ongoing need for the liaison role has been demonstrated to allow review, refinement and expansion of SMPs or equivalent on inshore vessels interacting with seabird species.

Project status

Complete.

Summary of the methods and key findings

The objectives for this project were consistent through the three years as follows: 1. To provide one or more liaison officers to the inshore bottom longline and small vessel surface longline fishing fleets, with a focus on northern North Island, to assist those fleets reduce their seabird bycatch. 2. To coordinate the seabird liaison officer roles with wider efforts targeted at seabird bycatch reduction in relevant fisheries to achieve the greatest reduction in bycatch possible.

Observer coverage in the surface longline fishery on New Zealand's (NZ) West Coast of the South Island (WCSI) during the fishing season May-June 2016 highlighted instances of significant seabird capture events and poor use of tori lines. This prompted an increase in focus for the liaison project towards this fleet and fishery. The refined objective was to deliver an intensive and assertive plan to install and

implement a structured and comprehensive risk management programme across the entire domestic surface longline fleet. This was to be undertaken within the ambit of the existing MIT 2015-01 project.

It is to be noted that the larger vessel (50 m+ length overall – LOA) Foreign Licensed Vessel fleet (Japanese freezer longliners) had not been in the fishery in 2015-16 and neither in 2016-17, so the surface longline activity in the NZ Exclusive Economic Zone (EEZ) is now entirely a domestic small vessel (17-22 m LOA) operation. Collaboration in the form of meetings between industry, DOC and the Ministry for Primary Industries (MPI) significantly helped scope the details of the proposed programme and its operation.

Collaboration in the form of meetings between industry, DOC and the Ministry for Primary Industries (MPI) significantly helped scope the details of the proposed programme and its operation. This report encompasses both the Co-ordination and Liaison Officer components of the project, Surface Longline Fleet Liaison Programme (the Programme).

Recommendations

Future Liaison Officer support should increase focus on:

- Increase focus on fisher reporting and feedback, as this communication loop both improves practices and reduces risk of incidents or problems escalating into major capture events.
- Continued maintenance of good tori lines
- Increased focus on ensuring shore-based staff are fully aware of the Liaison Officer process and understand and support it, especially recognising the need for new or relief skippers to be inducted (by advising the LO programme if need be)
- Await finalisation regarding weighted lines and then evaluate the need for any workshop on proper and safe use.
- Instigate a review of the prescriptive Longline Regulations with regard to tori lines, with consideration for more enabling approach that allows for and ensures effective tori lines are used consistently.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $150,000 per annum. Services were provided by Resourcewise Ltd & Fishing Vessel Management Services Ltd.

Review milestones:

- Draft final report presented at the CSP TWG meeting 1 March 2017
- Final report published on the CSP webpage in December 2017

Citation

Wells, R. & Cleal, J. 2017. Department of Conservation, Conservation Services Programme Project MIT2015-01 (Year 3: 2016-17), Final Report, Seabird Liaison for Surface Longline Fleet Programme. Report prepared by Resourcewise Ltd & Fishing Vessel Management Services Ltd for the Conservation Services Programme Department of Conservation, New Zealand. 39p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/seabird-liaison-for-surface-longline-fleet-programme-2016-17/

4.2 MIT2015-02 Small vessel seabird mitigation project

Specific objectives

1. To test the efficacy of mitigation strategies or devices identified by the work of the seabird liaison officers operating in the small vessel bottom longline fleets.
2. To support efficacy testing of the improved tori line designs produced as an output of project MIT2014-02.

Rationale

The small vessel surface longline fishery poses substantial risk to most, high and very high-risk seabirds (see Table 7 of the CSP seabird plan 2015) despite current mitigation requirements and use. Implementation of proven mitigation strategies is known to be variable both within and between these fleets. Seabird Liaison officers have been deployed in the northern inshore bottom longline fleets for the past two years, also moving into the surface longline fleet during 2014/15, and further work is proposed in project MIT2015-01. In order to provide robust advice on best practice to fishers it is important that new or adapted mitigation options are backed up with adequate testing of efficacy. Recent work has included testing of new weighting options, setting practices and novel devices such as the hook pod (including CSP projects MIT 2011-03, MIT 2012-01 and MIT2013-02). Research is underway to develop improved tori line designs (CSP project MIT2014-02).

Project status

Additional elements of this project were postponed to 2017/18.

Summary of the methods and key findings – Tori line designs for small longline vessels

Tori lines are one of the most thoroughly tested seabird bycatch reduction measures available, and have been proven effective in reducing seabird bycatch in both trawl and longline fisheries. However, most of the work to date has been carried out on vessels over 20 m in length.

This report describes further work producing tori line designs suitable for use under normal commercial fishing conditions in the New Zealand pelagic longline fleet, comprising small vessels 12-25m in length. The project also sought to address any concerns raised by fishers. In particular, designs were developed that addressed safety concerns, minimised tangling, and allowed deployment at night and in poor weather conditions.

Achieving a 75m aerial extent with a combination of long tube streamers and short tape streamers is feasible as a minimum standard, which corresponds favourably to internationally recognised best practice advice for larger pelagic vessels. Design considerations are focussed on the aerial section, the drag section and the tori poles and their attachment. Advice is provided on how to optimise each of these elements for deployment on small vessels.

In developing specifications or guidance for tori lines to be used on small vessels we recognise the need to incorporate a degree of flexibility to allow designs to be optimised to each individual vessel. For example, allowing considerable flexibility in the design of the drag section of the tori line is recommended as the method of generating drag is not important.

Summary of the methods and key findings – Testing of Hookpod-minis in the NZ pelagic longline fishery

Following initial Hookpod trials in 2013, a new model of Hookpod, the Hookpod-mini, was developed to suit the fishing operations of the New Zealand surface longline fishery. We tested the operational and mitigation effectiveness of the Hookpod-mini relative to current fishing practices in the fleet, through depth opening trials, experimental and long-term trials during commercial fishing and collection of sink rate data.

Hookpod-mini opening depth tests and sink rates of weighted snoods indicated that Hookpod-minis provided protection to seabirds from hooks to a depth greater than that achieved through the combined use of tori lines and line weighting. Hookpod-minis had an advantage of being more consistent in achieving protection from hooks to a given depth compared to line weighting (sink rate profiles were highly variable) and tori lines (correct deployment was dependent on conditions such as wind). Hookpod-minis were used for half the hooks set for total of 20 experimental sets on two vessels. The control gear comprised the vessels' normal setup of either unweighted snoods or snoods with 60 g sliding weights at 1 m from the hook, plus tori lines. Catch comparisons indicated no significant difference in target fish or shark bycatch between Hookpod-minis and the vessels' control gear. A long-term skipper-collected dataset covered 10 months fishing with Hookpod-minis and the vessel's control gear (unweighted gear with tori line and night setting). Hookpod-mini loss and failure rates were well below the target 1 % per set and seabird bycatch rates were considerably lower on the Hookpod-mini snoods.

Our findings suggest that Hookpod-minis are an operationally feasible and effective seabird bycatch mitigation measure in the New Zealand surface longline fishery.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $100,000 in 2016/17. Services were provided by Vita Maris.

Review milestones:

- Draft final report for Tori line design presented at the CSP TWG meeting on 8 June 2017.
- Draft final report for Hookpod-minis presented at the CSP TWG meeting on 3 August 2017.
- Final report for Hookpod-minis available on the CSP webpage in August 2017.
- Final report for the Tori line design made available on the CSP webpage in September 2017.

Citation

Goad, D. 2017. Tori line designs for small longline vessels. Report prepared by Vita Maris for the Department of Conservation, Wellington. 21p.

Goad, D. & Sullivan, B. (2017). Testing the Hookpod-mini in the New Zealand pelagic longline fishery. Report prepared by Vita Maris for the Department of Conservation, Wellington.

Weblink

Design of Tori lines for small longline vessels:
http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/tori-line-designs-for-small-longline-vessels/

Testing of Hookpod-minis in the NZ pelagic longline fishery:
http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/testing-hookpod-mini-in-the-new-zealand-pelagic-longline-fishery/

4.3 MIT2016-01 Protected species bycatch media

Project Objectives

1. To produce a newsletter to communicate protected species-related information to commercial fishermen;
2. To produce media suitable for incorporation into third party publications in order to maximise audience exposure.
3. To develop and produce identification tools targeted at commercial fishermen to improve their understanding of protected species interacting with their fishing operations

Rationale

Reducing the impacts of commercial fishing on protected species relies on individual fishermen actively applying best practice mitigation methods to their fishing activity. Applying and developing mitigation methods in specific circumstances requires an understanding of the protected species that may be impacted, and the nature with which they interact with fishing activity. A range of relevant information exists, often the result of research projects, however, appropriate communication of this generally involves interpretation of research outputs to cater to specific audiences. Project MIT2014-01 used a hard copy and web based newsletter to provide a medium for this communication (Pierre 2016). Project MIT 2016-01 will build on this by not only producing a quarterly newsletter, to be distributed in both hard copy and electronic, but also a range of media articles which can be directly incorporated into other relevant publications such as industry magazines and port newsletters. This expansion of scope will allow increase in target audience exposure and uptake.

Previously the Department has produced identification guides for seabirds and sharks (e.g. CSP 2007, 2010). Having up-to-date identification tools will improve the ability of fishermen to accurately understand which species are interacting with their fishing operations, so that they can ensure adequate measures are being taken to avoid or minimise bycatch. The guides also provide distribution and behavioural information which help inform mitigation strategies. These tools will also help improve the quality of data reported on captured protected species, thus contributing to a better understanding of the nature and extent of interactions. Such data contributes to risk assessments used in fisheries management, and enables the development of appropriate mitigation options where required. This project will allow the production (e.g. printing costs) of education resources across a variety of media using data from existing sources such as observer records, tracking studies and the protected species identification projects (e.g. INT2016-02 and INT2015-02). Resources will be targeted at commercial fishers, preferably in a region and fishery specific manner to provide information on species of concern which will assist in development and refinement of effective mitigation strategies.

Project status

Complete.

Summary of the methods and key findings

To address the first objective of this project, four newsletters have been prepared and circulated during the first year of the two-year project term. Articles covered new, emerging, and best practice bycatch mitigation measures, research underway on mitigation, policy developments, current events, and other protected species information relevant to commercial fishing. Newsletters have included key references, to facilitate access to information additional to that presented.

The newsletter circulation included commercial fishers and others involved in the fishing industry, such as those holding fishing quota and annual catch entitlement, Seafood New Zealand's Sector Representative Entities and Commercial Stakeholder Organisations, seafood company representatives, Ministry for Primary Industries regional office staff, the New Zealand Federation of Commercial Fishermen, and practitioners working on fisheries bycatch issues. Throughout this reporting period, the newsletter was distributed in html form via email, via Twitter and Facebook links, as an A4 2-page pdf file distributed electronically, and a hard copy newsletter mailed to recipients who did not have an electronic point of contact or specifically requested a hard copy.

Overall, the newsletter reaches approximately 1,575 recipients directly. The html newsletter was opened by an average of 39.4% of recipients during the year, almost identical to the previous year of the project. Twitter was the fastest growing channel for distribution, with around 200 views (range: 123 – 233) per issue. The overwhelming majority of readers were located in New Zealand (87% or more for each issue), with international readers based in Australia, the USA, Canada, Japan, Greece, and Thailand.

To address the third objective of the project, two seabird identification guides previously produced by the Department of Conservation (the Fisher's Guide to New Zealand Seabirds and the Fisher's Guide to New Zealand Coastal Seabirds) were updated. These were reprinted in hard copy and as web-quality pdfs.

Next steps for the project include:

- Continuing the quarterly production and circulation of the Bycatch Bylines newsletter,
- Addressing the second objective of the project, by producing media for inclusion in third-party publications such as Seafood magazine, and,
- Developing and printing a new guide to protected fish and reptile species.

Recommendations

Beyond the current project term, there are additional opportunities to improve resources available for fishers working to reduce the risks that commercial fishing presents to protected species.

Recommendations for future work include:

- Continuing the production and circulation of the newsletter at a quarterly frequency,
- Producing a pictorial guide for fishers on handling protected species after capture in fishing operations,
- Continuing the production of fact sheets on key bycatch mitigation measures (e.g. line-weighting), and
- Developing a series of short (e.g. five minute) videos on the use of key bycatch mitigation measures, such as tori lines, line-weighting and fish waste retention, that show how these measures can be applied safely and effectively on vessels.

Review milestones:

- Draft final report presented at the CSP TWG meeting on 28 February 2018.
- Final report made available at the CSP webpage in March 2018.

Project logistics summary statement

This project was 100% funded via Conservation Service Levies on the fishing industry. The planned cost for the project was $30,000 per annum. Services were provided by JPEC Ltd.

Citation

Pierre, J.P. 2017. Conservation Services Programme Project MIT2016-01: Protected Species bycatch media. Report prepared by JPEC Ltd for the New Zealand Department of Conservation. 8p.

Weblink

http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/Protected-Species-Bycatch-Media

4.4 MIT2016-02 Entanglement of cetaceans in pot/trap lines and setnets and a review of potential mitigation methods

Project Objectives

1. To characterise the nature and extent of entanglement of whale species in pot/trap lines and setnets in New Zealand and make recommendations on whether or not the current levels of risk warrant development or implementation of improved mitigation.
2. To identify and assess the current mitigation techniques for cetacean capture in the pot/trap lines and setnets both domestically and internationally and make recommendations as to their applicability in the New Zealand market.

Rationale

Cetaceans (primarily humpbacks, though also southern right whales and orca) can become entangled fish pot/trap lines or setnets (including down-lines). Within New Zealand this has most commonly been documented in Kaikoura, during winter, where the humpback whale northern migration comes close to shore and overlaps with the rock lobster fishing activity. In recent years there have also been increasing reports on the North Island, including Orca. The occasional Southern right whale has also been reported as entangled. DOC has a response team which will attempt a release a cetacean if conditions allow.

The number of reported incidents annually is low in New Zealand in comparison with some other countries; however, in recent years there has been a notable increase in occurrence outside of Kaikoura, and including other species. The frequency of humpback whale entanglements will also be related to the status of the humpback whale population as the risk of entanglement will increase with increasing numbers of cetaceans passing through the inshore waters of the East Coast of the South Island. DOC coordinates an annual survey of the humpback whale migration each winter, and the most recent season (2015) observed the highest count of whales coming through the Cook Strait (137) since the survey commenced in 2004.

It is timely to assess the level of risk posed to cetaceans from commercial pot/trap and setnet fishing activity, and determine whether or not the current level of risk warrants development or implementation of improved mitigation measures.

Project status

Complete.

Summary of the methods and key findings

Between 1984 and 2017, there were 44 reported large whale entanglements in NZ waters, of which 39 were attributable to pot/trap and set net fisheries. 64% of large whale entanglements involved rock lobster and 'likely' rock lobster gear, 21% of entanglements involved set net gear and 15% of entanglements involved either rope from an unknown gear type, or the gear involved in the entanglement was unknown.

The outcome of entanglement events was variable. 29% of all documented entanglements were fully disentangled, with 10.5% partially disentangled. 10.5% of whales shed gear on their own (without intervention). Conversely, 18% of entanglements were linked to the death of the individual, either directly or indirectly, and the fate of 32% of entangled whales remained unknown.

The risk of entanglement to NZ populations of humpback and southern right whales is likely to be low. Risk to killer whales in NZ waters is likely higher, as is the risk to an individual animal once entangled. The individual animals at greatest risk of entanglement are humpback whales on their northern migration along the east coast of the South Island. This timing and location coincides with a high level of commercial rock lobster fishery effort. The recovery of whale populations is likely to lead to more frequent interactions with fisheries and heighten the need for adequate mitigation methods.

There are three main categories of mitigation employed to address the entanglement of large whales: acoustic deterrents; gear modifications; and management modifications. Despite global efforts to mitigate the entanglement of large whales, few gear modifications have proven successful in reducing documented entanglement numbers. Acoustic deterrents have shown mixed results with large cetaceans, with most studies indicating no response by large whales.

Given the high economic value of the NZ commercial pot/trap and set net fisheries involved, as well as the current low documented incidence of entanglements, seasonal or temporal closures are not a viable mitigation tool. Seasonal, mandatory gear modifications focused on reducing the amount of slack rope in the water column is a more measured approach to reduce risk.

An advocacy campaign that targets fishers around the Kaikoura region and along the south-east coast of the South Island during the months of May-August may be effective. Disentanglement efforts will continue to be a vital.

Recommendations

Cost effective and practical ways to reduce risk until effective mitigation measures are developed:

- Minimising slack rope likely reduces the risk of entanglement and is an appropriate interim mitigation method until other methods are further developed and groundtruthed.
- Conducting observations of the use of NZRLC's 'OceanSnap' application and if/how this consequently results in fishers moving/removing gear in instances when whales are sighted.
- Developing or purchasing entanglement buoys similar to those used in Western Australia may help relocate entangled animals when weather, logistics or availability hamper the disentanglement effort.
- Conducting public education campaigns about the New Zealand disentanglement network to decrease likelihood of people taking matters into their own hands. Similarly, increased funding or training for DOC's phone operators to reassure callers their call has been attended to and that DOC is responding.
- Training of additional personnel (within and outside of DOC) as part of the New Zealand disentanglement network. Ideally such personnel will have existing sufficient vessel and

whale experience so that they understand both the marine environment and animal behaviour.

Recommendations in order to increase New Zealand's knowledge and ability to understand and appropriately mitigate the entanglement of large whale species in pot/trap lines and set nets:

- Conduct an audit of all internal DOC entanglement-related records and collate the results.
- Enhance data reporting protocols for entanglement events. DOC should develop and instigate a clear, consistent classification system whereby gear type is specifically listed.
- Conducting scar-based studies would help quantify the extent of the entanglement problem for whales migrating past New Zealand.
- Determining sex via DNA analysis may be useful in order to help inform impact on particular demographics, or particular risk, as well as add to the data informing population dynamics of other genetic collections.
- Monitor (or assist with), the global development of fisheries gear modification focused on lowering the rate of whale interactions with fisheries.

Review milestones:

- Methodology presented at the CSP TWG meeting on 25 October 2016.
- Draft final report presented at the CSP TWG meeting on 24 May 2017.
- Final report published on the CSP webpage in September 2017.

Citation

Laverick S, Douglas L, Childerhouse S, and Burns D (2017). Entanglement of cetaceans in pot/trap lines and set nets and a review of potential mitigation methods. Report by Blue Planet Marine for the Department of Conservation, Wellington. 75p.

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http://www.doc.govt.nz/our-work/conservation-services-programme/csp-reports/2016-17/entanglement-of-cetaceans-in-pot-trap-lines-and-set-nets-and-a-review-of-potential-mitigation-methods/